ThinkPad T430 and T430i
Hardware Maintenance Manual
Note: Before using this information and the product it supports, be sure to read the general information under Appendix A “Notices” on page 117.
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**Appendix A. Notices**

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About this manual

This manual contains service and reference information for the following ThinkPad® products.

ThinkPad T430 and T430i  Machine Type 2342, 2344, 2345, 2347, 2349, 2350, 2351

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 ThinkPad products. Use this manual along with the advanced diagnostic tests to troubleshoot problems effectively. Before servicing a ThinkPad product, be sure to read all the information under Chapter 1 “Safety information” on page 1 and Chapter 2 “Important service information” on page 25.
Chapter 1. Safety information

This chapter presents following safety information that you need to be familiar with before you service a ThinkPad notebook computer.

- “General safety” on page 1
- “Electrical safety” on page 2
- “Safety inspection guide” on page 3
- “Handling devices that are sensitive to electrostatic discharge” on page 3
- “Grounding requirements” on page 4
- “Safety notices (multilingual translations)” on page 4
- “Laser compliance statements (multilingual translations)” on page 17

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 that you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. Do not attempt to lift any object that weighs more than 16 kg (35 lb) or that you think is 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 technicians 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 toolcase 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, about 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing, because 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.
- Fan louvers on the machine help to prevent overheating of internal components. Do not obstruct fan louvers or cover them with labels or stickers.
Electrical safety

Observe the following rules when working on electrical equipment.

Important:

- Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.
- Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.
- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power off the wall box that supplies power to the machine, and to lock the wall box in the off position.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you. That 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.

CAUTION:
An electrical shock can occur only when there is a complete circuit. By observing the above rule, you may prevent a current from passing through your body.
- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages. Instructions for these precautions 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:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators
  - Units similar to those listed above

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 purpose of this inspection guide is to assist you in identifying potentially unsafe conditions. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury. This guide addresses only those items. You should use good judgment to identify potential safety hazards due to attachment of non-ThinkPad 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 a bulging capacitor
- Mechanical hazards, such as loose or missing hardware

To determine whether there are any potentially unsafe conditions, use the following checklist at the beginning of every service task. 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 the frame ground.
   b. The power cord should be the authorized type specified for your computer. Go to: http://www.lenovo.com/serviceparts-lookup.
   c. Insulation must not be frayed or worn.
4. Check for cracked or bulging batteries.
5. Remove the cover.
6. Check for any obvious non-ThinkPad alterations. Use good judgment as to the safety of any non-ThinkPad alterations.
7. 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.
8. Check for worn, frayed, or pinched cables.
9. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

**Handling devices that are sensitive to electrostatic discharge**

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.
Notes:
1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Ensure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:
- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use 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 to guard against ESD damage is desirable but not necessary.
  - Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
  - When working on a double-insulated or battery-operated system, use an ESD common ground or reference point. 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 (multilingual translations)
The safety notices in this section are provided in the following languages:
- English
- Arabic
- Brazilian Portuguese
- French
- German
- Hebrew
- Japanese
- Korean
- Spanish
- Traditional Chinese

DANGER
Before the computer is powered on after FRU replacement, make sure that all screws, springs, and other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical short circuits.
DANGER

Some standby batteries contain a small amount of nickel and cadmium. Do not disassemble a standby battery, recharge it, throw it into fire or water, or short-circuit it. Dispose of the battery as required by local ordinances or regulations. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

DANGER

The battery pack contains small amounts of nickel. Do not disassemble it, throw it into fire or water, or short-circuit it. Dispose of the battery pack as required by local ordinances or regulations. Use only the battery in the appropriate parts listing when replacing the battery pack. Use of an incorrect battery can result in ignition or explosion of the battery.

DANGER

The lithium battery can cause a fire, an explosion, or a severe burn. Do not recharge it, remove its polarized connector, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

DANGER

If the LCD breaks and the fluid from inside the LCD gets into your eyes or on your hands, immediately wash the affected areas with water for at least 15 minutes. Seek medical care if any symptoms from the fluid are present after washing.

DANGER

To avoid shock, do not remove the plastic cover that protects the lower part of the inverter card.
Though the main batteries have low voltage, a short-circuited or grounded battery can produce enough current to burn personnel or combustible materials.

DANGER

Unless hot swap is allowed for the FRU being replaced, do as follows before removing it: power off the computer, unplug all power cords from electrical outlets, remove the battery pack, and disconnect any interconnecting cables.
PERIGO

Antes de ligar o computador após a substituição da FRU, certifique-se de que todos os parafusos, molas e outras peças pequenas estejam no lugar e não estejam soltas dentro do computador. Verifique isso sacudindo o computador e procurando ouvir sons de peças soltas. Peças metálicas ou lascas de metal podem causar curto-circuito.

PERIGO


PERIGO

A bateria de lítio pode causar incêndio, explosão ou graves queimaduras. Não a recarregue, remova seu conector polarizado, desmonte-a, aqueça-a acima de 100°C (212°F), incinere-a, ou exponha o conteúdo de sua célula à água. Descarte a bateria conforme requerido pelas leis ou regulamentos locais. Use somente a bateria nas partes listadas apropriadas. O uso de uma bateria incorreta pode resultar em combustão ou explosão da bateria.

PERIGO

Se o LCD quebrar e o fluido de dentro dele entrar em contato com seus olhos ou com suas mãos, lave as áreas afetadas imediatamente com água durante pelo menos 15 minutos. Procure cuidados médicos se algum sintoma causado pelo fluido surgir após a lavagem.

PERIGO

Para evitar choque elétrico, não remova a capa plástica que protege a parte inferior da placa inversora.

PERIGO

Embora as principais baterias possuam baixa voltagem, uma bateria em curto-circuito ou aterrada pode produzir corrente o bastante para queimar materiais de pessoal ou inflamáveis.

PERIGO

A menos que uma hot swap seja permitida para a FRU que está sendo substituída, faça o seguinte antes de removê-la: desligue o computador, desconecte todos os cabos de energia das tomadas, remova o pacote de baterias e desconecte quaisquer cabos de interconexão.
DANGER

Avant de remettre l'ordinateur sous tension après remplacement d'une unité en clientèle, vérifiez que tous les ressorts, vis et autres pièces sont bien en place et bien fixées. Pour ce faire, secouez l'unité et assurez-vous qu'aucun bruit suspect ne se produit. Des pièces métalliques ou des copeaux de métal pourraient causer un court-circuit.

DANGER

Certaines batteries de secours contiennent du nickel et du cadmium. Ne les démontez pas, ne les rechargez pas, ne les exposez ni au feu ni à l'eau. Ne les mettez pas en court-circuit. Pour les mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la pile de sauvegarde ou celle de l'horloge temps réel, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquate. Une batterie ou une pile inappropriée risque de prendre feu ou d'exploser.

DANGER

La batterie contient du nickel. Ne la démontez pas, ne l'exposez ni au feu ni à l'eau. Ne la mettez pas en court-circuit. Pour la mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la batterie, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquate. En effet, une batterie inappropriée risque de prendre feu ou d'exploser.

DANGER

La pile de sauvegarde contient du lithium. Elle présente des risques d'incendie, d'explosion ou de brûlures graves. Ne la rechargez pas, ne retirez pas son connecteur polarisé et ne la démontez pas. Ne l'exposez pas à une température supérieure à 100°C, ne la faites pas brûler et n'en exposez pas le contenu à l'eau. Mettez la pile au rebut conformément à la réglementation en vigueur. Une pile inappropriée risque de prendre feu ou d'exploser.

DANGER

Si le panneau d'affichage à cristaux liquides se brise et que vous recevez dans les yeux ou sur les mains une partie du fluide, rincez-les abondamment pendant au moins quinze minutes. Consultez un médecin si des symptômes persistent après le lavage.
DANGER

Afin d’éviter tout risque de choc électrique, ne retirez pas le cache en plastique protégeant la partie inférieure de la carte d’alimentation.

DANGER

Bien que le voltage des batteries principales soit peu élevé, le court-circuit ou la mise à la masse d’une batterie peut produire suffisamment de courant pour brûler des matériaux combustibles ou causer des brûlures corporelles graves.

DANGER

Si le remplacement à chaud n’est pas autorisé pour l’unité remplaçable sur site que vous remplacez, procédez comme suit avant de retirer l’unité : mettez l’ordinateur hors tension, débranchez tous les cordons d’alimentation des prises de courant, retirez le bloc de batterie et déconnectez tous les câbles d’interconnexion.

VORSICHT


VORSICHT

VORSICHT


VORSICHT


VORSICHT


VORSICHT

Aus Sicherheitsgründen die Kunststoffabdeckung, die den unteren Teil der Spannungswandlerplatine umgibt, nicht entfernen.

VORSICHT

Obwohl Hauptbatterien eine niedrige Spannung haben, können sie doch bei Kurzschluß oder Erdung genug Strom abgeben, um brennbare Materialien zu entzünden oder Verletzungen bei Personen hervorzurufen.
Wenn ein Austausch der FRU bei laufendem Betrieb nicht erlaubt ist, gehen Sie beim Austausch der FRU wie folgt vor: Schalten Sie den Computer aus, ziehen Sie alle Netzkabel von den Netzsteckdosen ab, entfernen Sie den Akku und ziehen Sie alle miteinander verbundenen Kabel ab.

---

ThinkPad T430 and T430i Hardware Maintenance Manual

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Sehen Sie sich die folgende Anleitung auf der ThinkPad T430 und T430i Hardware Maintenance Manual an, um sicherzustellen, dass die FRU korrekt installiert wird.

---

Obwohl die folgenden Schritte für die Installation der FRU dargestellt werden, ist es wichtig, dass Sie die Anleitung sorgfältig studieren, um sicherzustellen, dass alles korrekt ausgeführt wird.

---

Die folgenden Schritte sind für die Installation der FRU auf der ThinkPad T430 und T430i Hardware Maintenance Manual.

---

Um sicherzustellen, dass die FRU korrekt installiert wird, sollten Sie folgende Schritte durchführen:

1. Ziehen Sie alle Netzstecker ab.
2. Ziehen Sie den Akku aus dem Computer.
3. Entfernen Sie alle miteinander verbundenen Kabel.
4. Öffnen Sie den Computergehäuse.
5. Installieren Sie die neue FRU. 
7. Schließen Sie alle Netzstecker wieder an.
8. Ziehen Sie den Akku wieder ein.

---

Die folgenden Schritte sind für die Installation der FRU auf der ThinkPad T430 und T430i Hardware Maintenance Manual.

---

Wichtig: Stellen Sie sicher, dass die FRU richtig installiert wird, um Verletzungen zu vermeiden.
危険

FRUの交換後、ThinkPadの電源を入れる前に、ねじ、ネジ、その他の小さな部品がすべて正しい位置にあり、またThinkPadの内部で縫ってないことを確認してください。これを確認するには、ThinkPadを握って、カチャカチャと音がしないか確かめます。金属部品や金属破片はショートの原因になることがあります。

危険

予備バッテリーの中には少量のニッケルとカドミウムが含まれているものがあります。したがって、予備バッテリーの分解、再充電、火または水中への投棄、またはショートさせることは決して行わないでください。バッテリーを廃棄する場合は地方自治体の条例に従ってください。適切なパッケージリサイクルにあるバッテリーだけを使用してください。壊れたバッテリー使用すると、バッテリーが発火したり、爆発したりすることがあります。

危険

バッテリー・バックには少量のニッケルが含まれています。バッテリー・バックを分解したり、火または水中に投げ込んだり、ショートさせないでください。バッテリー・バックの廃棄にあたっては、地方自治体の条例または規則に従ってください。バッテリー・バックを交換するときは、適切なパッケージリサイクルにあるバッテリーだけを使用してください。壊れたバッテリーを使用すると、バッテリーが発火したり、爆発したりすることがあります。

危険

リチウム・バッテリーは、火災、爆発、または重症のけがを引き起こすことがある。バッテリーの分解、バッテリーの充電、その他のコンポーネントの取り外し、バッテリー本体の分解、100℃(212°F)以上の加熱、焼却、電池の中身を水に浸すことはしないでください。バッテリーを廃棄する場合は地方自治体の条例に従ってください。適切なパッケージリサイクルにあるバッテリーだけを使用してください。壊れたバッテリーを使用すると、バッテリーが発火したり、爆発したりすることがあります。

危険

LCDが破損し、LCDの中の液体が目に入ったり、手に触れたりした場合は、液体が触れ部分を少なくとも15分間洗い流してください。洗い流した後に、液体によって何らかの症状が現れた場合は、医師の治療を受けてください。

危険

感電を防ぐため、インサーターカードの下部を保護しているプラスチック・カバーを外さないでください。

危険
メイン・バッテリーの電圧は低くても、ショートしたり、接地したバッテリーが、作業中に一時的に負荷され、可燃物を燃やすだけの電流を発生させる場合があります。

危険
交換しようとしているFRUがホット・スワップに対応していない場合、それを取り外す前に、コンピューターの電源をオフにし、すべての電源コードをコンセントから抜き、バッテリー・パックを取り外して、相互接続しているケーブルをすべて切り離してください。

戦略
FRUを交換・取り付けする前に、すべてのアップグレード・オプションの接続を解除し、システムに電源を入れないでください。FRUを取り扱う際は、手袋をはめてください。

戦略
FRUを交換・取り付けする前に、すべてのアップグレード・オプションの接続を解除し、システムに電源を入れないでください。FRUを取り扱う際は、手袋をはめてください。FRUを交換・取り付けする前に、すべてのアップグレード・オプションの接続を解除し、システムに電源を入れないでください。FRUを取り扱う際は、手袋をはめてください。FRUを交換・取り付けする前に、すべてのアップグレード・オプションの接続を解除し、システムに電源を入れないでください。FRUを取り扱う際は、手袋をはめてください。
경고

기본 배터리의 전압은 낮지만, 단락되거나 접촉된 배터리는 화상을 일으키며
충분한 전류와 가연성 물질을 발생시킬 수 있습니다.

위험

FRU 교체 시 Hot Swap이 지원되지 않는 경우, FRU를 제거하기 전에 컴퓨터의
전원을 꺼고, 전기 콘센트에서 전원 코드를 분리하고, 배터리를 제거한 후, 연결된
모든 케이블을 분리하십시오.

PELIGRO

Antes de encender el sistema después de sustituir una FRU, compruebe que todos los tornillos, muelles y
demás piezas pequeñas se encuentran en su sitio y no se encuentran sueltas dentro del sistema. Compruébelo
agitando el sistema y escuchando los posibles ruidos que provocarían. Las piezas metálicas pueden causar
cortocircuitos eléctricos.

PELIGRO

Algunas baterías de reserva contienen una pequeña cantidad de níquel y cadmio. No las desmonte, ni
recargue, ni las eche al fuego o al agua ni las cortocircuiten. Deséchelas tal como dispone la normativa local.
Utilice sólo baterías que se encuentren en la lista de piezas. La utilización de una batería no apropiada
puede provocar la ignición o explosión de la misma.

PELIGRO

Las baterías contienen pequeñas cantidades de níquel. No las desmonte, ni recargue, ni las eche al fuego
o al agua ni las cortocircuiten. Deséchelas tal como dispone la normativa local. Utilice sólo baterías que se
encuentren en la lista de piezas al sustituir la batería. La utilización de una batería no apropiada puede
provocar la ignición o explosión de la misma.

PELIGRO

La batería de repuesto es una batería de litio y puede provocar incendios, explosiones o quemaduras graves.
No la recargue, ni quite el conector polarizado, ni la desmonte, ni caliente por encima de los 100°C (212°F), ni
la incinere ni exponga el contenido de sus celdas al agua. Deséchela tal como dispone la normativa local.
Si la LCD se rompe y el fluido de su interior entra en contacto con sus ojos o sus manos, lave inmediatamente las áreas afectadas con agua durante 15 minutos como mínimo. Obtenga atención médica si se presenta algún síntoma del fluido después de lavarse.

⚠️ PELIGRO ⚠️

Para evitar descargas, no quite la cubierta de plástico que rodea la parte baja de la tarjeta invertida.

⚠️ PELIGRO ⚠️

Aunque las baterías principales tienen un voltaje bajo, una batería cortocircuitada o con contacto a tierra puede producir la corriente suficiente como para quemar material combustible o provocar quemaduras en el personal.

⚠️ PELIGRO ⚠️

Salvo que se permita el intercambio en caliente para la unidad sustituible localmente, realice lo siguiente antes de extraerla: apague el sistema, desconecte todos los cables de alimentación de las tomas de alimentación eléctrica, extraiga la batería y desconecte los cables de interconexión.

⚠️ PELIGRO ⚠️

完成 FRU 更换之后，在開啟電腦的電源之前，請確定所有螺絲、螺帽及其他小零件都已歸位，沒有遺留在電腦內部。
若要確認這一點，請搖晃電腦，聽聲音是否有卡答的聲響。
金屬零件或導電的火花會造成電線短路。

⚠️ PELIGRO ⚠️

部分備用電池含有微量的銫和鎵。請勿拆開備用電池、再充電、丟入火或水中，或使其形成短路。請按照當地法令或規定來棄置電池。
僅限使用零件清單中的電池。使用不適當的電池會導致電池起火或爆炸。

⚠️ PELIGRO ⚠️

電池套件含有微量的銫。請勿拆開電池套件、丟入火或水中，或使其形成短路。
請按照當地法令或規定來棄置電池套件。
更換電池套件時，僅限使用零件清單中的電池。使用不適當的電池會導致電池起火或爆炸。

⚠️ PELIGRO ⚠️

危险
Laser compliance statements (multilingual translations)

The laser compliance statements in this section are provided in the following languages:

- English
- Arabic
- Brazilian Portuguese
- French
- German
- Hebrew
- Japanese
- Korean
- Spanish
- Traditional Chinese
CAUTION:
When laser products (such as CD-ROMs, DVD 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.

تحذير:

عند تثبيت منتجات الليزر (مثل أقراس CD-ROM أو محركات تشغيل أقراس أو DVD أو أجهزة الألياف البصرية أو الألياف النواقل)، لاحظ ما يلي:

- لا تقم بنزع الغطاء. قد ينتج عن نزع غطاء منتج لصق لعشرة أشرطة ليزر في منتهى الخطورة. لا توجد أجزاء يمكن صيانتها داخل الجهاز.
- قد ينتج عن استخدام مفاتيح أو تنفيذ عمليات ضبط أو إجراءات بطريقة مختلفة عما هو محدد هنا التعرض لأشعة ليزر في منتهى الخطورة.

خطر

تحتوي بعض منتجات الليزر على صمام ثنائي ليزر متصل من Class 3B أو Class 3A. لاحظ ما يلي.

تحتوي بعض منتجات الليزر على صمام ثنائي ليزر مصمم من Class 3B أو Class 3A. توجد أشرطة لصق عند الفتح. لا تنظر للشعاع ولا تنظر بطريقة مباشرة باستخدام أدوات ضوئية وتجنب التعرض المباشر للشعاع.
CUIDADO:
Quando produtos a laser (como CD-ROMs, unidades de DVD, dispositivos de fibra ótica ou transmissores) estão instalados, observe o seguinte:

- Não remova as tampas. A remoção das tampas do produto a laser pode resultar em exposição prejudicial à radiação de laser. Não há peças que permitam manutenção no interior do dispositivo.
- A utilização de controles ou ajustes ou a execução de procedimentos diferentes daqueles especificados aqui pode resultar em exposição perigosa à radiação.

PERIGO

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

Radiação a laser quando aberta. Não olhe diretamente para o feixe a olho nu ou com instrumentos óticos e evite exposição direta ao feixe.
ATTENTION :
Si des produits laser (tels que des unités de CD, DVD, à fibre optique ou des émetteurs) sont installés, lisez les informations suivantes :

- 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 exposition directe au rayon laser. Évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques.
Vorsicht:
Bei der Installation von Lasergeräten (wie CD-ROM-Laufwerken, DVD-Laufwerken, Einheiten mit Lichtwellenleitertechnik oder Sendern) Folgendes beachten:

- Werden Steuerelemente, Einstellungen oder Durchführungen von Prozeduren anders als hier angegeben verwendet, kann gefährliche Laserstrahlung auftreten.

Gefahr

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

警告:
レーザー製品 (CD-ROM、DVD ドライブ、光ファイバー装置、または送信機など) を取り付ける場に
は、以下のことに注意してください。

・ カバーを外さないこと。カバーを取り外すと有害なレーザー光を浴びることがあります。この装置
の内部には保守が可能な部品はありません。
・ 本書で指定された内容以外の、お客様による整備、調整、または手順を行った場合、レーザー放射
の危険があります。

危険

一部のレーザー製品には、クラス 3A またはクラス 3B のレーザー・ダイオードが組み込まれてい
ます。次の点に注意してください。

開けるとレーザー光が放射されます。光線を見つめたり、光学機械を使って直接見たり、光線を
直接浴びることは避けてください。

警告:
レーザー製品 (CD-ROM、DVD ドライブ、光纖素接続または送信機) が設置されている場合、次の一覧を同
じように取扱ってください。

・ 袋を開けずさまように、レーザー製品の袋を開けた場合、有害なレーザー光を浴びる可能性があります。箇
所の内部には保守が可能な部品はありません。
・ 本書で指定された内容以外の、お客様による整備、調整、または手順を行った場合、レーザー放射
の危険があります。

危険

一部レーザー製品は、クラス 3A またはクラス 3B のレーザー・ダイオードが含まれています。次の一覧を同
じように取扱ってください。

・ ディスクの袋を開けずさまように、レーザー製品の袋を開けた場合、有害なレーザー光を浴びる可能性があります。箇
所の内部には保守が可能な部品はありません。
・ 本書で指定された内容以外の、お客様による整備、調整、または手順を行った場合、レーザー放射
の危険があります。
PRECAUCIÓN:
Cuando haya instalados productos láser (por ejemplo, unidades de CD-ROM, unidades de DVD, dispositivos de fibra óptica o transmisores), tenga en cuenta lo siguiente:

• No extraiga las cubiertas. La extracción de las cubiertas del producto láser podría producir una exposición a radiación láser peligrosa. No hay ninguna pieza dentro del dispositivo que pueda reparar.

• La utilización de controles, ajustes o la realización de procedimientos diferentes a los especificados puede dar como resultado una exposición peligrosa a radiaciones.

PELIGRO

Algunos productos láser contienen un diodo láser de Clase 3A o Clase 3B incorporado. Tenga en cuenta lo siguiente.

Emite radiación láser cuando está abierto. No fije la vista en el rayo, no lo mire directamente con instrumentos ópticos y evite la exposición directa al rayo.
警告：
安装雷射產品（如 CD-ROM、DVD 光碟機、光纖裝置或轉送器）時，請注意下列事項：

- 請勿卸下外蓋。卸下雷射產品的外蓋可能導致曝露於危險的雷射輻射。裝置內沒有可維修的零件。
- 若不遵守本文規定的控制、調整或操作程序，可能會導致危險的輻射外洩。

危險

某些雷射產品包含內嵌式 3A 類或 3B 類雷射二極體。這類光碟機的使用者應注意下列聲明。

在開啟光碟機時，會有雷射輻射。請勿直視光束或以光學儀器直接觀看光束，並避免直接暴露在光束中。
Chapter 2. Important service information

This chapter presents following important service information that applies to all machine types supported by this manual:

- “Strategy for replacing FRUs” on page 25
  - “Strategy for replacing a hard disk drive” on page 26
  - “Important notice for replacing a system board” on page 26
  - “How to use error message” on page 26
- “Strategy for replacing FRUs for CTO, CMV, and GAV” on page 26
  - “Product definition” on page 26
  - “FRU identification for CTO, CMV, and GAV products” on page 27

Important:

- If the computer is equipped with both a hard disk drive and an mSATA solid-state drive, do not use the mSATA solid-state drive as a bootable device. The mSATA solid-state drive is used for the “cache” function only.
- Advise customers to contact the Lenovo® Customer Support Center if they need any assistance in obtaining or installing any software fixes, drivers, and UEFI BIOS downloads. Telephone numbers for Lenovo Support are available at http://www.lenovo.com/support/phone
- System Disassembly/Reassembly videos that show the FRU removals or replacements for the Lenovo authorized service technicians are available in the following support site: http://www.lenovoservicetraining.com/ion/

Strategy for replacing FRUs

Before replacing parts:

Ensure that all software fixes, drivers, and UEFI BIOS downloads are installed before replacing any FRUs listed in this manual.

After a system board is replaced, ensure that the latest UEFI BIOS is loaded to the system board before completing the service action.

To download and install software fixes, drivers, and UEFI BIOS, go to http://www.lenovo.com/ThinkPadDrivers and follow the instructions on the screen.

Use the following strategy to prevent unnecessary expense for replacing and servicing FRUs:

- If you are instructed to replace a FRU but the replacement does not correct the problem, reinstall the original FRU before you continue.
- Some computers have both a processor board and a system board. If you are instructed to replace either the processor board or the system board, and replacing one of them does not correct the problem, reinstall that board, and then replace the other one.
- If an adapter or a device consists of more than one FRU, any of the FRUs may be the cause of the error. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change. Replace only the FRU that changed the symptoms.
Strategy for replacing a hard disk drive

Always try to run a low-level format operation before replacing a hard disk drive or a solid-state drive. This will cause all customer data on the hard disk drive or solid-state drive to be lost. Be sure that the customer has a current backup of the data before you perform this task.

**Attention:** The drive startup sequence in the computer you are servicing might have been changed. Be extremely careful during write operations such as copying, saving, or formatting. If you select an incorrect drive, data or programs can be overwritten.

If the computer is shipped with both an mSATA solid-state drive and a hard disk drive, the mSATA solid-state drive is used for the “cache” function and to support the Intel® Rapid Start Technology. We recommend that users do not replace the mSATA solid-state drive by themselves. Otherwise, the “cache” function will not work and the Intel Rapid Start Technology cannot be used any more.

**Attention:** Ensure that you partition the mSATA solid-state drive after installing it on the computer you are servicing. Otherwise, the mSATA solid-state drive will not function correctly. For instructions on how to partition an mSATA solid-state drive, go to http://www.lenovo.com/support/msata-fru.

Important notice for replacing a system board

Some components mounted on a system board are very sensitive. Improper handling of a system board can cause damage to those components, and may cause a system malfunction.

**Attention:** When handling a system board:

- Do not drop a system board or apply any excessive force to it.
- Avoid rough handling of any kind.
- Avoid bending a system board and hard pushing to prevent cracking at each Ball Grid Array (BGA) chipset.

How to use error message

Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, begin the diagnosis with the first error code. Whatever causes the first error code might also cause false error codes. If no error code is displayed, see whether the error symptom is listed in the “Symptom-to-FRU Index”.

Strategy for replacing FRUs for CTO, CMV, and GAV

Product definition

**Dynamic Configure To Order (CTO)**

This provides the ability for a customer to configure a Lenovo solution from an eSite, and have this configuration sent to fulfillment, where it is built and shipped directly to the customer. The machine label and eSupport will load these products as the 4-digit MT and 3-digit model, where model = “CTO” (Example: 1829-CTO).

**Custom Model Variant (CMV)**

This is a unique configuration that has been negotiated between Lenovo and the customer. A unique 4-digit MT and 3-digit model is provided to the customer to place orders (example: 1829-W15). A CMV is a special bid offering. Therefore, it is not generally announced.

- The MTM portion of the machine label is the 4-digit MT and 3-digit model, where model = “CTO” (example: 1829-CTO). The PRODUCT ID portion of the machine label is the 4-digit MT and 3-digit CMV model (example: 1829-W15).
• eSupport will show both the CTO and CMV machine type models (example: 1829-CTO and 1829-W15 will be found on the eSupport site.)

General Announce Variant (GAV)
This is a standard model (fixed configuration). GAVs are announced and offered to all customers. The MTM portion of the machine label is a 4-digit MT and 3-digit model, where model = a “fixed part number”, not “CTO” (example: 1829-F1U). Also, eSupport will list these products under the same fixed model number.

FRU identification for CTO, CMV, and GAV products
Use Lenovo eSupport to identify major FRUs, FRU part numbers, and FRU descriptions for CTO, CMV, and GAV products at an MT - serial number level. Examples of major FRUs are hard disk drive, system board, liquid crystal display (LCD), and memory module. All CTO and CMV products are loaded under the 4-digit MT and 3-digit model, where model = “CTO” (example: 1829-CTO). GAVs are loaded under the 4-digit MT and 3-digit model, where model = a “fixed part number”, not “CTO” (example: 1829-F1U).

To identify the major FRUs for a product, do the following:
1. Go to: http://www.lenovo.com/support
2. Click Warranty & Services.
3. Click Check Warranty Status.
4. On the Warranty Status Lookup page, click Parts Lookup.
5. Type your machine type and serial number, and then click Submit.

eSupport also can be used to view the general FRU list for a product.

To get the general FRU list for a product, do the following:
1. Go to: http://www.lenovo.com/support
2. Click Parts & Accessories.
3. Follow the instructions on the screen to select product.
4. Click Products and Parts Detail.
5. On the PRODUCT AND PARTS DETAIL page, click the Parts Detail tab to view the FRU list.

Note: The FRU list is a general list of components and does not contain specific model information.
Chapter 3. General checkout

This chapter presents following information:
- “What to do first” on page 29
- “Checkout guide” on page 30
  - “Lenovo Solution Center” on page 30
  - “Quick test programs” on page 30
  - “UEFI diagnostic program” on page 31
  - “Bootable diagnostic programs” on page 31
- “Power system checkout” on page 32

Some descriptions in this chapter might not apply to your particular computer.

Before you go to the checkout guide, be sure to read the following important notes.

Important notes:
- Only certified trained personnel should service the computer.
- Before replacing any FRU, read the entire page on removing or replacing FRUs.
- When you replace FRUs, it is recommended to use new nylon-coated screws.
- Be extremely careful during such write operations as copying, saving, or formatting. Drives in the computer that you are servicing sequence might have been altered. If you select an incorrect drive, data or programs might be overwritten.
- Replace a FRU only with another FRU of the correct model. When you replace a FRU, ensure that the model of the machine and the FRU part number are correct.
- A FRU should not be replaced because of a single, unreproducible failure. Single failures can occur for a variety of reasons that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. Consider replacing a FRU only when a problem recurs. If you suspect that a FRU is defective, clear the error log and run the test again. If the error does not recur, do not replace the FRU.
- Be careful not to replace a nondefective FRU.

What to do first

When you return a FRU, you must include the following information in the parts exchange form or parts return form that you attach to it:
1. Name and phone number of service technician
2. Date of service
3. Date on which the machine failed
4. Date of purchase
5. Failure symptoms, error codes appearing on the display, and beep symptoms
6. Procedure index and page number in which the failing FRU was detected
7. Failing FRU name and part number
8. Machine type, model number, and serial number
9. Customer’s name and address

Note: During the warranty period, the customer may be responsible for repair costs if the computer damage was caused by misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance by the customer. Following is a list of some common items that are not covered under warranty and some symptoms that might indicate that the system was subject to stress beyond normal use.

Before checking problems with the computer, determine whether the damage is covered under the warranty by referring to the following list:
The following are not covered under warranty:
- LCD panel cracked from the application of excessive force or from being dropped
- Scratched (cosmetic) parts
- Distortion, deformation, or discoloration of the cosmetic parts
- Plastic parts, latches, pins, or connectors that have been cracked or broken by excessive force
- Damage caused by liquid spilled into the system
- Damage caused by the improper insertion of a PC Card or the installation of an incompatible card
- Improper disc insertion or use of an optical drive
- Diskette drive damage caused by pressure on the diskette drive cover, foreign material in the drive, or the insertion of a diskette with multiple labels
- Damaged or bent diskette eject button
- Fuses blown by attachment of a nonsupported device
- Forgotten computer password (making the computer unusable)
- Sticky keys caused by spilling a liquid onto the keyboard
- Use of an incorrect ac power adapter on laptop products

The following symptoms might indicate damage caused by nonwarranted activities:
- Missing parts might be a symptom of unauthorized service or modification.
- Check for obvious damage to a hard disk drive. If the spindle of a hard disk drive becomes noisy, the hard disk drive might have been dropped or subject to excessive force.

Checkout guide

Use the following procedures as a guide in identifying and correcting problems with the ThinkPad notebook computer.

Note: The diagnostic tests are intended to test only ThinkPad products. The use of non-ThinkPad products, prototype cards, or modified options can lead to false indications of errors and invalid system responses.
1. Identify the failing symptoms in as much detail as possible.
2. Verify the symptoms. Try to re-create the failure by running the diagnostic test or by repeating the operation.

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.

The Lenovo Solution Center program is available for download at http://www.lenovo.com/diags.

To run the Lenovo Solution Center program, go to Control Panel and click System and Security → Lenovo - System Health and Diagnostics, and then follow the instructions on the screen.

For more information about the Lenovo Solution Center program, refer to the help information system of the program.

Quick test programs

You can run quick test programs to troubleshoot and resolve computer problems, especially when the computer does not have the Lenovo Solution Center program installed.

Lenovo provides the following quick test programs:
- **Lenovo Hard Drive Quick Test**: Use this program to troubleshoot and resolve internal storage problems.
- **Lenovo Memory Quick Test**: Use this program to troubleshoot and resolve memory module problems.
The quick test programs are applicable on the following operating systems:
- Microsoft® Windows® 8
- Microsoft Windows 7
- Microsoft Windows XP
- Microsoft Windows Server® 2003
- Microsoft Windows Server 2008

To download and install a quick test program, go to \http://www.lenovo.com/diags\ and follow the instructions on the Web site.

To run a test using a quick test program, do the following:
1. Go to the C:\SWTOOLS\diag directory.
2. Double-click the gui_lsc_lite.exe file.
3. When the User Account Control window opens, click Yes.
4. Select the device class to be tested.
5. Select the devices to be tested.
6. Select the test to be performed.
7. Follow the instructions on the screen to start the test. When a problem is detected, information messages are displayed. Refer to the messages to troubleshoot the problem.

**UEFI diagnostic program**

A UEFI diagnostic program is preinstalled on the computer. It enables you to test memory modules and internal storage devices, view system information, and check and recover bad sectors on internal storage devices.

To run the UEFI diagnostic program, do the following:
1. Turn on the computer. If the computer cannot be turned on, go to “Power system checkout” on page 32, and check the power sources. If an error code is displayed, go to “Symptom-to-FRU index” on page 42 for error code descriptions and troubleshooting hints.
2. When the ThinkPad logo is displayed, repeatedly press and release the F10 key. The main screen of the UEFI diagnostic program is displayed.
3. Follow the instructions on the screen to use the program.

<table>
<thead>
<tr>
<th>Tests</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Memory Test</td>
<td>System Information</td>
</tr>
<tr>
<td>Quick Storage Device Test</td>
<td>Recover Bad Sectors Tool</td>
</tr>
<tr>
<td>Exit Application</td>
<td></td>
</tr>
</tbody>
</table>

**Bootable diagnostic programs**

If the computer you are servicing is not installed with the UEFI diagnostic program, you can download a bootable diagnostic program from the Lenovo Support Web site. The bootable diagnostic programs enable you to test computer memory and internal storage devices, view system information, and check and recover the internal storage devices. To use the bootable diagnostic programs, you can create a bootable diagnostic medium on a USB device or CD.

To create a bootable diagnostic medium, do the following:
2. Click **Lenovo Bootable Diagnostics**.
3. Follow the instructions on the Web site to create a bootable diagnostic medium on a USB device or CD.

To use the diagnostic medium you have created, do one of the following:

- If you have created the bootable diagnostic medium on a USB device, do the following:
  1. Attach the USB device to the computer.
  2. Turn on the computer. If the computer cannot be turned on, go to “Power system checkout” on page 32, and check the power sources. If an error code is displayed, go to “Symptom-to-FRU index” on page 42 for error code descriptions and troubleshooting hints.
  3. When the ThinkPad logo is displayed, repeatedly press and release the F12 key. When the Boot Menu window opens, release the F12 key.
  4. Use the arrow keys to select **USB HDD** and then press Enter. The diagnostic program will be launched automatically.
  5. Follow the instructions on the screen to use the diagnostic program.

- If you have created the bootable diagnostic medium on a CD, do the following:
  1. Turn on the computer. If the computer cannot be turned on, go to “Power system checkout” on page 32, and check the power sources. If an error code is displayed, go to “Symptom-to-FRU index” on page 42 for error code descriptions and troubleshooting hints.
  2. Insert the CD into the optical drive.
  3. Restart the computer.
  4. When the ThinkPad logo is displayed, repeatedly press and release the F12 key. When the Boot Menu window opens, release the F12 key.
  5. Use the arrow keys to select **ATAPI CD x (x: 0, 1, ...)** and then press Enter. The diagnostic program will be launched automatically.
  6. Follow the instructions on the screen to use the diagnostic program.

### Power system checkout

To verify a symptom, do the following:
1. Turn off the computer.
2. Remove the battery pack.
3. Connect the ac power adapter.
4. Check that power is supplied when you turn on the computer.
5. Turn off the computer.
6. Disconnect the ac power adapter and install the charged battery pack.
7. Check that the battery pack supplies power when you turn on the computer.

If you suspect a power problem, see the appropriate one of the following power supply checkouts:
- “Checking the ac power adapter” on page 32
- “Checking operational charging” on page 33
- “Checking the battery pack” on page 33
- “Checking the backup battery” on page 34

### Checking the ac power adapter

If your computer fails only when the ac power adapter is used, use the instructions in this topic.

- If the power problem occurs only when the docking station or the port replicator is used, replace the docking station or the port replicator.
• If the power-on indicator does not turn on, check the power cord of the ac power adapter for correct continuity and installation.
• If the computer does not charge during operation, go to “Checking operational charging” on page 33.

To check the ac power adapter, do the following:
1. Unplug the ac power adapter cable from the computer.
2. Measure the output voltage at the plug of the ac power adapter cable. See the following illustration:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Voltage (V dc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+20</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Ground</td>
</tr>
</tbody>
</table>

**Note:** Output voltage across pin 2 of the ac power adapter might differ from the one you are servicing.
3. If the voltage is not correct, replace the ac power adapter.
4. If the voltage is acceptable, replace the system board.

**Note:** Noise from the ac power adapter does not always indicate a defect.

### Checking operational charging

To check whether the battery charges correctly during operation, do the following:

**Note:** Before you begin, install a discharged battery pack or a battery pack that has less than 50% of the total power remaining in the computer.
1. If the battery status indicator does not turn on, remove the battery pack and let it return to room temperature.
2. Reinstall the battery pack.
3. If the indicator still does not turn on, replace the battery pack.
4. If the indicator still does not turn on, replace the system board. Otherwise, refer to Checking the battery pack to check the original battery pack.

### Checking the battery pack

The battery status icon in the Windows notification area displays the percentage of battery power remaining.

To check for detailed battery status information, do the following:
• For Windows 7: Open the Power Manager program and click the **Battery** tab.
• For Windows 8: Open the Lenovo Support program and click **Battery Health**, or open the Lenovo Settings program and click **Power**.

**Note:** If the battery pack becomes hot, it may not be able to charge. Remove it from the computer and leave it at room temperature for a while. After it cools down, reinstall and recharge it.

To check the battery pack, do the following:
1. Turn off the computer and disconnect the ac power adapter.
2. Remove the battery pack and measure the voltage between battery terminals 1 (+) and 7 (-). The correct voltage are shown in the following table.
3. Measure the resistance between battery terminals 5 and 7. The resistance must be 4 to 30 KΩ. If the resistance is not correct, replace the battery pack.

4. Depending on the voltage that you measure, do one of the following:
   - If the voltage is less than +11.0 V dc, recharge the battery pack. If the voltage is still less than +11.0 V dc after recharging, replace the battery pack.
   - If the voltage is more than +11.0 V dc, discharge the battery pack until the voltage becomes less than +11.0 V dc and then recharge the battery pack. If the voltage still is less than +11.0 V dc after recharging, replace the battery pack.

   **Note:** Recharging will take at least three hours, even if the battery status indicator does not turn on.

5. Replace the system board if the new battery pack is not charged.

### Checking the backup battery

Do the following:

1. Power off the computer, and unplug the ac power adapter from it.
2. Turn the computer upside down.
3. Remove the battery pack (see “1010 Battery pack” on page 68).
4. Remove the backup battery (see “1060 Backup battery” on page 74).
5. Measure the voltage of the backup battery. See the following illustration.

<table>
<thead>
<tr>
<th>Wire</th>
<th>Voltage (V dc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red (+)</td>
<td>+2.5 to +3.2</td>
</tr>
<tr>
<td>Black (-)</td>
<td>Ground</td>
</tr>
</tbody>
</table>

- If the voltage is correct, replace the system board.
- If the voltage is not correct, replace the backup battery.
- If the backup battery discharges quickly after replacement, replace the system board.
Chapter 4. Related service information

This chapter presents following information:
- “Restoring the factory contents by using the product Recovery Disc Set” on page 35
- “Using the Windows recovery programs on the Windows 8 operating system” on page 36
- “Passwords” on page 38
- “Power management” on page 40
- “Symptom-to-FRU index” on page 42

Service Web site:
When the latest maintenance diskette and the system program service diskette become available, they will be posted on http://www.lenovo.com/support.

Restoring the factory contents by using the product Recovery Disc Set

When the main storage device is replaced because of a failure, no product recovery program is on the new drive. In this case, the customer must use the Recovery Disc Set to recover the tablet. Order the Recovery Disc Set and the drive at the same time so that the customer can restore the tablet to the factory default settings by using the Recovery Disc Set after the new drive is installed. For information about which discs to order, go to:

Depending on the model, the number of recovery discs included in the Recovery Disc Set differs. To restore the factory contents by using the product Recovery Disc Set, do the following:

Notes:
- During the recovery process, all data on the drive will be deleted. If possible, copy any important data or personal files that you want to keep onto removable media or a network drive before you start the recovery process.
- The recovery process takes one to two hours to complete. The length of time depends on the method you use. If you use product Recovery Disc Set, the recovery process takes about two hours.
- Connect an external CD/DVD drive.
- Make the CD/DVD drive the first startup device in the startup sequence using the following procedure:
  - Open the ThinkPad Setup program and select **Startup → Boot**.
  - Select the CD/DVD drive as the **1st Boot Device**.
- Insert the bootable recovery disc into the CD/DVD drive.
- Start the computer from the external CD/DVD drive.
- When promoted, select your language and click **Next**.
- Read the license and accept the terms and conditions. Then follow the instructions on the screen.
- If the Recovery Disc Set contains a **Supplemental Recovery Disc**, insert it when prompted and click **Yes**.

  **Note:** Not all Recovery Disc Sets come with a Supplemental Recovery Disc. If there is a Supplemental Recovery Disc, it will be clearly marked as such.
- When all of the data has been copied from the last disc in the set and has been processed, remove the external CD/DVD drive and restart the computer. Follow the instructions on the screen to finish the recovery.

  **Note:** The rest of the recovery process is fully automated and no action from you is required. The computer will restart into the Microsoft Windows desktop several times and you might experience periods when no activity is apparent on the screen for several minutes at a time. This is normal.
9. When the recovery process completes, the Welcome to Microsoft Windows screen is displayed. Follow the instructions on the screen to complete the Windows setup.

10. After you have completed the Windows setup, you might want to restore the original startup sequence. Start the ThinkPad Setup program and then press F9 to restore the default settings. Press F10 to save changes and exit the ThinkPad Setup program.

**Note:** After restoring a drive to the factory default settings, you might need to reinstall some device drivers.

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**Using the Windows recovery programs on the Windows 8 operating system**

This section provides information about the recovery solutions for the Windows 8 operating system.

A Windows recovery image is preinstalled in the recovery partition on your computer. The Windows recovery image enables you to refresh your computer, or reset your computer to the factory default settings.

You can create recovery media as backups or replacement for the Windows recovery image. With the recovery media, you can troubleshoot and fix the problems on your computer even if you cannot start the Windows 8 operating system. It is recommended that you create recovery media as early as possible. For more information, see “Using recovery media” on page 37.

**Refreshing the computer**

If your computer does not perform well and the problem might be caused by a recently installed program, you can refresh your computer without losing your personal files or changing your settings.

**Attention:** If you refresh your computer, the programs that came with your computer and the programs that you installed from Windows Store will be reinstalled, but all other programs will be removed.

To refresh your computer, do the following:

1. Move your cursor to the top-right or bottom-right corner of the screen to display the charms. Click **Settings → Change PC settings → General**.
2. In the **Refresh your PC without affecting your files** section, click **Get started**.
3. Follow the instructions on the screen to refresh your computer.

**Resetting the computer to the factory default settings**

If you want to recycle your computer or just start over, you can reset your computer to the factory default settings. Resetting the computer will reinstall the operating system, reinstall all the programs that came with your computer, and reset all the settings to the factory default settings.

**Attention:** If you reset the computer to the factory default settings, all your personal files and settings will be deleted. To avoid data loss, make a backup copy of all the data that you want to keep.

To reset your computer to the factory default settings, do the following:

1. Move your cursor to the top-right or bottom-right corner of the screen to display the charms. Click **Settings → Change PC settings → General**.
2. In the **Remove everything and reinstall Windows** section, click **Get started**. Then click **Next** to confirm the operation.
3. Depending on your needs, do one of the following:
   - To perform a quick format, click **Just remove my files** to start the process. The process will take several minutes.
• To perform a complete format, click **Fully clean the drive** to start the process. The process will take several hours.

4. Follow the instructions on the screen to reset your computer to the factory default settings.

**Using the advanced startup options**

With the advanced startup options, you can change the firmware settings of the computer, change the startup settings of the Windows operating system, start the computer from an external device, or restore the Windows operating system from a system image.

To use the advanced startup options, do the following:

1. Move your cursor to the top-right or bottom-right corner of the screen to display the charms. Click **Settings → Change PC settings → General**.
2. In the **Advanced startup** section, click **Restart now → Troubleshoot → Advanced options**.
3. Select a desired startup option, then follow the instructions on the screen.

**Recovering your computer from the Windows recovery environment**

The Windows recovery environment on your computer operates independently from the Windows 8 operating system. If the Windows 8 operating system fails to start, you still can use the Windows recovery environment to troubleshoot and fix problems.

The Windows recovery environment starts automatically in the case of two consecutive failed boots.

To manually start the Windows recovery environment, turn on or restart the computer. Before the Windows 8 operating system starts, repeatedly press the F11 key. The Windows recovery environment starts.

To use the Windows recovery environment, do the following:

**Note:** Ensure that your computer is connected to ac power.

1. Select a preferred language and then select a preferred keyboard layout.
2. Click **Troubleshoot** to display the optional recovery solutions.
3. Select a corresponding recovery solution according to your situation. For example, select **Reset your PC** if you want to reset your computer to the factory default settings.

**Creating and using recovery media**

You can create recovery media as backups for the Windows recovery environment and the Windows recovery image. If you cannot start the computer, you can use recovery media to troubleshoot and fix the problems on your computer.

It is recommended that you create recovery media as early as possible. Once you create recovery media, keep them in a safe place and do not use them to store other data.

**Creating recovery media**

To create recovery media, you need a USB drive with at least 8 GB of storage. The required USB capacity depends on the size of the recovery image.

**Attention:** Creating recovery media will delete anything stored on the USB drive. To avoid data loss, make a backup copy of all the data that you want to keep.

To create recovery media, do the following:

**Note:** Ensure that your computer is connected to ac power.
1. Move your cursor to the top-right or bottom-right corner of the screen to display the charms, and click Search.

2. Type recovery in the Search field and click Settings. Then click Create a recovery drive.

3. Click Yes in the User Account Control window to allow the Recovery Media Creator program to start.

4. Ensure that you select the Copy the recovery partition from the PC to the recovery drive. option. Then click Next.

   **Important:** If you clear the Copy the recovery partition from the PC to the recovery drive. option, you will create recovery media without the recovery partition content. You still can start the computer from the recovery media, but you might be unable to recover your computer if the recovery partition on your computer is damaged.

5. Connect a proper USB drive then click Next.

6. Click Create in the Recovery Drive window. The creation of the recovery media starts.

7. When the creation of the recovery media finishes, do one of the following:
   
   - To keep the recovery partition on your computer, click Finish.
   - To delete the recovery partition on your computer, click Delete the recovery partition.

   **Attention:** If you delete the recovery partition on your computer, do keep the recovery media in a safe place. The Windows recovery image will not be stored in your computer anymore, and you will need the recovery media to refresh or reset your computer.

8. Remove the USB drive. The recovery media are created successfully.

**Using recovery media**

If you cannot start your computer, or if you cannot start the Windows recovery image on your computer, use recovery media to recover your computer.

To use recovery media, do the following:

**Note:** Ensure that your computer is connected to ac power.

1. Turn on or restart the computer. Before the Windows operating system starts, repeatedly press the F12 key. The Boot Menu window opens.

2. Select the recovery drive as the boot device.

3. Select a preferred language and then select a preferred keyboard layout.

4. Click Troubleshoot to display the optional recovery solutions.

5. Select a corresponding recovery solution according to your situation. For example, select Reset your PC if you want to reset your computer to the factory default settings.

For more information about the recovery solutions provided by the Windows 8 operating system, go to: http://www.lenovo.com/accessories/services/index.html

**Passwords**

As many as three passwords might be needed for a ThinkPad notebook computer: the power-on password, the hard disk password, and the supervisor password.

If any of these passwords has been set, a prompt for it will be displayed on the screen whenever the computer is turned on. The computer does not start until the password is entered.

**Note:** If only a supervisor password is set, the password prompt will not be displayed when the operating system is started.
Power-on password

A power-on password protects the system from being turned on by an unauthorized person. The password must be entered before an operating system can be booted. For instructions on how to remove the power-on password, see “How to remove the power-on password” on page 39.

Hard disk password

There are two hard disk passwords:

- User hard disk password - for the user
- Master hard disk password - for the system administrator, who can use it to get access to the hard disk even if the user has changed the user hard disk password.

Note: There are two modes for the hard disk password: User only and Master + User. The Master + User mode requires two hard disk passwords; the system administrator enters both in the same operation. The system administrator then provides the user hard disk password to the system user.

Attention: If the user hard disk password has been forgotten, check whether a master hard disk password has been set. If a master hard disk password has been set, it can be used to access the hard disk drive. If no master hard disk password is available, neither Lenovo nor Lenovo authorized service technicians provide any services to reset either the user hard disk password or the master hard disk password, or to recover data from the hard disk drive. The hard disk drive can be replaced for a scheduled fee.

For instructions on how to remove the hard disk password, see “How to remove the hard disk password” on page 40.

Supervisor password

A supervisor password protects the system information stored in the ThinkPad Setup program. The user must enter the supervisor password in order to get access to the ThinkPad Setup program and change the system configuration.

Attention: If the supervisor password has been forgotten and cannot be made available to the service technician, there is no service procedure to reset the password. The system board must be replaced for a scheduled fee.

How to remove the power-on password

To remove the power-on password, do the following:

If no supervisor password has been set, do the following to remove the power-on password:

1. Turn off the computer and disconnect the ac power adapter.
2. Remove the battery pack. For instructions on how to remove the battery pack, see “1010 Battery pack” on page 68.
3. Remove the backup battery. For instructions on how to remove the backup battery, see “1060 Backup battery” on page 74.
4. Connect the ac power adapter. Turn on the computer and wait until the POST ends. After the POST ends, the password prompt will not be displayed. The power-on password has been removed.
5. Reinstall the backup battery and the battery pack.

If a supervisor password has been set and is known to the service technician, do the following to remove the power-on password:

1. Turn on the computer.
2. When the ThinkPad logo is displayed, immediately press F1.
3. Type the supervisor password to enter the ThinkPad Setup program.
4. Select **Security**.
5. Select **Password**.
6. Select **Power-On Password**.
7. Type the current supervisor password in the **Enter Current Password** field. Then leave the **Enter New Password** field blank, and press Enter twice.
8. In the Changes have been saved window, press Enter.
9. Press F10 to save changes and exit the ThinkPad Setup program.

**How to remove the hard disk password**

**Attention:** If **User only** mode is selected and the user hard disk password has been forgotten and cannot be made available to the service technician, neither Lenovo nor Lenovo authorized service technicians provide any services to reset the user hard disk password, or to recover data from the hard disk drive. To put the system back to operational status, the only Lenovo and Lenovo-authorized service solution would be to replace the hard disk drive or solid-state drive with a scheduled fee.

To remove a user hard disk password that has been forgotten, when the supervisor password and the master hard disk password are known, do the following:

1. Turn on the computer.
2. When the ThinkPad logo is displayed, immediately press F1 to enter the ThinkPad Setup program.
3. Select **Security**.
4. Select **Password**.
5. Select **Hard-disk x password** where x is the letter of the hard disk drive. A pop-up window opens.
6. Select **Master HDP**, where HDP stands for hard disk password.
7. Type the current master hard disk password in the **Enter Current Password** field. Then, leave the **Enter New Password** field blank, and press Enter twice.
8. Press F10 to save changes and exit the ThinkPad Setup program. The user hard disk password and the master hard disk password have been removed.

**Power management**

To reduce power consumption, the computer has three power management modes: screen blank, sleep, and hibernation.

**Screen blank mode (for the Windows 7 operating system only)**

If the time set on the “Turn off monitor” timer in the operating system expires, the LCD backlight turns off.

To put the computer into screen blank mode, do the following:

1. Right-click the battery gauge in the task bar.
2. Select **Power off display (keep current power plan)**.

To end screen blank mode and resume normal operation, press any key.

**Sleep mode**

When the computer enters sleep mode, the following events occur in addition to what occurs in screen blank mode:

- The LCD is powered off.
- The hard disk drive is powered off.
• The microprocessor stops.

To enter sleep mode, press Fn+F4.

In certain circumstances, the computer goes into sleep mode automatically:
• After a period of inactivity specified in power plan settings
• When the battery indicator blinks orange, indicating that the battery power is low

To cause the computer to return from sleep mode and resume operation, do one of the following:
• Press the Fn key.
• Open the LCD cover.
• Turn on the power button.

Also, in either of the following events, the computer automatically returns from sleep mode and resumes operation:
• The ring indicator (RI) is signaled by a serial device or a PC Card device.
• The time set on the resume timer elapses.

**Note:** The computer does not accept any input immediately after it enters sleep mode. Wait a few seconds before taking any action to reenter operation mode.

**Hibernation mode**

In hibernation mode, the following occurs:
• The system status, RAM, VRAM, and setup data are stored on the hard disk.
• The system is powered off.

**Note:** If the computer enters the hibernation mode while it is docked to the docking station, do not undock it before resuming normal operation. If you do undock it and then try to resume normal operation, you will get an error message, and you will have to restart the system.

If you have defined one of the following actions as the event that causes the system to go into hibernation mode, perform that action:
• Closing the lid.
• Pressing the power button.
• Pressing Fn+F4 keys.

Also, the computer goes into hibernation mode automatically after a period of inactivity specified in power plan settings.

When the power is turned on, the computer returns from hibernation mode and resumes operation. The hibernation file in the boot record on the hard disk drive is read, and system status is restored from the hard disk drive.
Symptom-to-FRU index

This section contains following information:

- “Numeric error codes” on page 42
- “Error messages” on page 44
- “Beep symptoms” on page 44
- “No-beep symptoms” on page 44
- “LCD-related symptoms” on page 44
- “Intermittent problems” on page 45
- “Undetermined problems” on page 45

The symptom-to-FRU index in this section lists symptoms and errors and their possible causes. The most likely cause is listed first, in boldface type.

Note: Do the FRU replacement or other actions in the sequence shown in the column headed “FRU or action, in sequence.” If replacing a FRU does not solve the problem, put the original part back in the computer. Do not replace a nondefective FRU.

This index can also help you determine, during regular servicing, what FRUs are likely to need to be replaced next.

A numeric error is displayed for each error detected in POST or system operation. In the displays, n can be any number.

If no numeric code is displayed, check the narrative descriptions of symptoms. If the symptom is not described there, go to “Intermittent problems” on page 45.

Note: For a device not supported by diagnostic codes in the ThinkPad notebook computers, see the manual for that device.

Numeric error codes

Table 2. Numeric error codes

<table>
<thead>
<tr>
<th>Symptom or error</th>
<th>FRU or action, in sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>0177</td>
<td>System board.</td>
</tr>
<tr>
<td>Bad SVP data, stop POST task—The checksum of the supervisor password in the EEROM is not correct.</td>
<td></td>
</tr>
</tbody>
</table>
| 0183            | 1. Run the ThinkPad Setup program, and then save current setting by pressing F10.  
| Bad CRC of Security Settings in EFI Variable. Enter the ThinkPad Setup program. |
| 0187            | System board.             |
| EAIA data access error—The access to EEROM is failed. |
| 0188            | System board.             |
| Invalid RFID Serialization Information Area. |
| 0189            | System board.             |
| Invalid RFID configuration information area—The EEROM checksum is not correct. |
| 0190            | 1. Charge the battery pack.  
| Critical low-battery error |
| 0191            | 1. Run the ThinkPad Setup program, and then save current setting by pressing F10.  
| 0191            | 2. System board.           |
| ThinkPad T430 and T430i Hardware Maintenance Manual |
### Table 2. Numeric error codes (continued)

<table>
<thead>
<tr>
<th>Symptom or error</th>
<th>FRU or action, in sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>0199 System Security — Security password retry count exceeded.</td>
<td>1. Run the ThinkPad Setup program, and then save the current setting by pressing F10. 2. System board.</td>
</tr>
<tr>
<td>0251 System CMOS checksum bad - Default configuration used.</td>
<td>1. Charge the backup battery for more than 8 hours by connecting the ac adapter. 2. Replace the backup battery and run ThinkPad Setup to reset the time and date.</td>
</tr>
<tr>
<td>0253 EFI Variable Block Data was destroyed.</td>
<td>Run ThinkPad Setup to reset the time and date</td>
</tr>
<tr>
<td>0271 Real-Time Clock Error. Check Date and Time settings.</td>
<td>1. Remove Mini PCI network card. 2. System board.</td>
</tr>
<tr>
<td>1802 Unauthorized network card is plugged in—Turn off and remove the miniPCI network card.</td>
<td>Remove all but the reader that you set up for the authentication.</td>
</tr>
<tr>
<td>1820 More than one external fingerprint reader is attached. Power off and remove all but the reader that you set up within your main operating system.</td>
<td>System board</td>
</tr>
<tr>
<td>2100 Detection error on HDD0 (Main HDD)</td>
<td>1. Reseat the hard disk drive. 2. Main hard disk drive. 3. System board.</td>
</tr>
<tr>
<td>2101 Detection error on HDD1 (Ultrabay HDD)</td>
<td>1. Reseat the hard disk drive. 2. Ultrabay® hard disk drive. 3. System board.</td>
</tr>
<tr>
<td>2102 Detection error on HDD2 (Mini SATA)</td>
<td>1. Reseat the Mini SATA device. 2. Mini SATA device. 3. System board.</td>
</tr>
<tr>
<td>2110 Read error on HDD0 (Main HDD)</td>
<td>1. Reseat the hard disk drive. 2. Main hard disk drive. 3. System board.</td>
</tr>
<tr>
<td>2111 Read error on HDD1 (Ultrabay HDD)</td>
<td>1. Reseat the hard disk drive. 2. Ultrabay hard disk drive. 3. System board.</td>
</tr>
<tr>
<td>2112 Read error on HDD2 (Mini SATA)</td>
<td>1. Reseat the Mini SATA device. 2. Mini SATA device. 3. System board.</td>
</tr>
<tr>
<td>2200 Machine Type and Serial Number are invalid.</td>
<td>System board.</td>
</tr>
<tr>
<td>2201 Machine UUID is invalid</td>
<td>System board.</td>
</tr>
</tbody>
</table>
Error messages

Table 3. Error messages

<table>
<thead>
<tr>
<th>Symptom or error</th>
<th>FRU or action, in sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Thermal grease.</td>
</tr>
<tr>
<td>Thermal sensing error.</td>
<td>System board.</td>
</tr>
<tr>
<td>The battery installed is not supported by this system and will not charge. Please replace the battery with the correct Lenovo battery for this system. Press the ESC key to continue.</td>
<td>Replace the battery.</td>
</tr>
</tbody>
</table>

Beep symptoms

Table 4. Beep symptoms

<table>
<thead>
<tr>
<th>Symptom or error</th>
<th>FRU or action, in sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four cycles of four short beeps</td>
<td>System board</td>
</tr>
<tr>
<td>Five short beeps, pause, and five more short beeps</td>
<td>System board</td>
</tr>
<tr>
<td>One short beep, pause, three short beeps, pause, three more short beeps, pause, and one short beep</td>
<td>1. Memory module.</td>
</tr>
<tr>
<td></td>
<td>2. System board.</td>
</tr>
<tr>
<td>Three short beeps, pause, one short beep, pause, one more short beep, pause, and three short beeps</td>
<td>Remove the installed PCI devices.</td>
</tr>
<tr>
<td>Five short beeps</td>
<td>System board</td>
</tr>
<tr>
<td>One long and two short beeps</td>
<td>System board</td>
</tr>
</tbody>
</table>

No-beep symptoms

Table 5. No-beep symptoms

<table>
<thead>
<tr>
<th>Symptom or error</th>
<th>FRU or action, in sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>No beep, power-on indicator on, LCD blank, and no POST.</td>
<td>1. Ensure that every connector is connected tightly and correctly.</td>
</tr>
<tr>
<td></td>
<td>2. Memory module.</td>
</tr>
<tr>
<td>No beep, power-on indicator on, and LCD blank during POST.</td>
<td>1. Reseat memory module.</td>
</tr>
<tr>
<td></td>
<td>2. System board.</td>
</tr>
<tr>
<td>The power-on password prompt appears.</td>
<td>A power-on password or a supervisor password is set. Type the password and press Enter.</td>
</tr>
<tr>
<td>The hard-disk password prompt appears.</td>
<td>A hard-disk password is set. Type the password and press Enter.</td>
</tr>
</tbody>
</table>

LCD-related symptoms

Important: The TFT LCD for the notebook computer contains many thin-film transistors (TFTs). The presence of a small number of dots that are missing, discolored, or always lighted is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns. If the LCD you are servicing has two or less visible defective pixels, it should not be considered faulty. However, if the LCD has three or more visible defective pixels, it will be deemed as defective by Lenovo and it should be replaced.
Notes:
- This policy applies to all ThinkPad notebook computers purchased on 1 January, 2008 or later.
- Lenovo will not provide warranty replacement if the LCD is within specifications because we cannot guarantee that any replacement LCD will have zero pixel defects.
- One pixel consists of R, G, B sub-pixels.

Table 6. LCD-related symptoms

<table>
<thead>
<tr>
<th>Symptom or error</th>
<th>FRU or action, in sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>No beep, power-on indicator on, and a blank LCD during POST.</td>
<td>System board.</td>
</tr>
<tr>
<td>• LCD backlight not working.</td>
<td>1. Reseat the LCD connectors.</td>
</tr>
<tr>
<td>• LCD too dark.</td>
<td>2. LCD assembly.</td>
</tr>
<tr>
<td>• LCD brightness cannot be adjusted.</td>
<td>3. System board.</td>
</tr>
<tr>
<td>• LCD contrast cannot be adjusted.</td>
<td></td>
</tr>
<tr>
<td>• LCD screen unreadable.</td>
<td>1. See important note for “LCD-related symptoms.”</td>
</tr>
<tr>
<td>• Characters missing pixels.</td>
<td>2. Reseat all LCD connectors.</td>
</tr>
<tr>
<td>• Screen abnormal.</td>
<td>3. LCD assembly.</td>
</tr>
<tr>
<td>• Wrong color displayed.</td>
<td>4. System board.</td>
</tr>
<tr>
<td>Horizontal or vertical lines displayed on LCD.</td>
<td>LCD assembly.</td>
</tr>
</tbody>
</table>

Intermittent problems

Intermittent system hang problems can be due to a variety of causes that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. FRU replacement should be considered only when a problem recurs.

Undetermined problems

If the diagnostic tests did not identify the device that has failed, if wrong devices are installed, or if the system simply is not operating, follow these procedures to isolate the failing FRU (do not isolate FRUs that have no defects).

Verify that all attached devices are supported by the computer.

Verify that the power supply being used at the time of the failure is operating correctly. (See “Power system checkout” on page 32.)

1. Turn off the computer.
2. Visually check each FRU for damage. Replace any damaged FRU.
3. Remove or disconnect all of the following devices:
   a. Non-ThinkPad devices
   b. Devices attached to the docking station or the port replicator
   c. Printer, mouse, and other external devices
   d. Battery pack
   e. Hard disk drive
   f. External diskette drive or optical drive
   g. Memory module in the slot on the underside of the computer (To locate the slot, See “1070 Memory module (in the slot on the underside of the computer)” on page 75.)
   h. Optical disk or diskette in the internal drive
   i. Smart card, Expresscard, and media card
4. Turn on the computer.
5. Determine whether the problem has been solved.
6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
7. If the problem remains, replace the following FRUs one at a time (do not replace a nondefective FRU):
   a. System board
   b. LCD assembly
Chapter 5. Status indicators

This chapter presents the system status indicators that show the status of the computer.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Speaker mute indicator</td>
<td><strong>Orange</strong>: The speakers are on mute. To mute or unmute the speakers, press the speaker mute button.</td>
</tr>
<tr>
<td>2 Microphone mute indicator</td>
<td><strong>Orange</strong>: The microphones are on mute. By default, when the microphones are on mute, none of the recording devices is available.</td>
</tr>
<tr>
<td>3 Wireless LAN, WAN, Bluetooth or WiMAX status indicator</td>
<td><strong>Green</strong>: The wireless LAN, WAN, Bluetooth, or WiMAX feature is on. <strong>Blinking green</strong>: Data is being transmitted.</td>
</tr>
<tr>
<td>4 Device access indicator</td>
<td><strong>Blinking green</strong>: The hard disk drive, solid-state drive, mSATA solid-state drive, or the second hard disk drive in the Serial Ultrabay Enhanced bay is reading or writing data.</td>
</tr>
<tr>
<td>5 Caps Lock indicator</td>
<td>When the Caps Lock mode is enabled, the Caps Lock indicator is displayed on the screen. You can type all alphabetic characters (A-Z) in uppercase directly.</td>
</tr>
<tr>
<td>6 Power-on indicator</td>
<td>The power button stays lit whenever the computer is on, blinks when the computer is in sleep mode, and is off when the computer is turned off.</td>
</tr>
<tr>
<td>7 Serial Ultrabay Enhanced device status indicator</td>
<td><strong>Green</strong>: A Serial Ultrabay Enhanced device is installed and in use. <strong>Blinking green</strong>: A Serial Ultrabay Enhanced device is being detached.</td>
</tr>
<tr>
<td>8 Battery status indicator</td>
<td><strong>Green</strong>: The battery charge level is 20% or higher. <strong>Orange</strong>: The battery charge level is between 5% and 20%. <strong>Fast blinking orange</strong>: The battery charge level is lower than 5% or less, or the battery is charging. <strong>Slow blinking orange</strong>: The battery is being charged. When the battery charge level reaches 20%, the blinking color changes to green. <strong>Slow blinking green</strong>: The battery charge level is between 20% and 80%, and charging is continuing. When the battery charge level reaches 80%, the battery status indicator stops blinking, but the charging might continue until the battery is 100% charged. <strong>Note</strong>: If the computer is operating on battery power, the battery status indicator does not work while the computer is turned off or is in sleep mode or hibernation mode. <strong>Quick blinking orange</strong>: An error has occurred in the battery. <strong>The battery status indicator blinks three times</strong>: The ac power adapter is attached to the computer.</td>
</tr>
</tbody>
</table>
Table 7. Status indicators (continued)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] The battery status indicator is off: The battery pack of the computer is detached or the computer is powered off.</td>
<td></td>
</tr>
<tr>
<td>[ ] Sleep status indicator</td>
<td><strong>Green:</strong> The computer is in sleep mode.</td>
</tr>
<tr>
<td></td>
<td><strong>Blinking green:</strong> The computer is entering sleep mode or hibernation mode, or is resuming normal operation.</td>
</tr>
</tbody>
</table>
Chapter 6. Fn key combinations

The following table describes the functions of Fn key combinations.

<table>
<thead>
<tr>
<th>Key combination</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fn+F3</td>
<td>Locks the computer.</td>
</tr>
</tbody>
</table>
| Fn+F4           | Puts the computer into sleep mode. To return to normal operation, press the Fn key only.  
|                 | **Notes:**  
|                 | • To use the Fn+F4 key combination, you must have the ThinkPad Power Management Driver installed on the computer.  
|                 | • If you want to use the combination to put the computer into hibernation mode, change the power plan settings. |
| Fn+F5           | Enables or disables the built-in wireless networking features.  
|                 | **Notes:** If you want to use Fn+F5 to enable or disable the wireless features, the following device drivers must be installed on the computer beforehand:  
|                 | • Power Management Driver  
|                 | • On Screen Display Utility  
|                 | • Wireless device drivers |
| Fn+F6           | • For Windows 7: Opens the Communications settings window, in which you can preview your video image, take a snapshot of your current image, and change the camera and audio settings.  
|                 | • For Windows 8: Starts the Lenovo Settings program, which enables you to change the camera and audio settings. |
| Fn+F7           | Switches between the computer display and an external monitor.  
|                 | **Note:** You also can use the Windows+P combination to switch between the computer display and an external monitor. |
| Fn+F8           | The computer display becomes dimmer. |
| Fn+F9           | The computer display becomes brighter. |
| Fn+F10          | Previous track/scene |
| Fn+F11          | Play or pause |
| Fn+F12          | Next track/scene |
| Fn+Spacebar     | Controls the keyboard backlight and the ThinkLight® light.  
|                 | • Press once: Turn on the keyboard backlight to low brightness level.  
|                 | • Press again: Adjust the keyboard backlight to high brightness level.  
|                 | • Press the third time: Turn off the keyboard backlight and turn on the ThinkLight light.  
|                 | • Press the fourth time: Turn off the ThinkLight light.  
|                 | **Note:** If the computer you are servicing does not have a backlit keyboard, the Fn+Spacebar combination controls only the ThinkLight light. |
| Fn+B            | Has the same function as the Break key on a conventional keyboard. |
| Fn+K            | Has the same function as the ScrLK key on a conventional keyboard. |
| Fn+P            | Has the same function as the Pause key on a conventional keyboard. |
| Fn+S            | Has the same function as the SysRq key on a conventional keyboard. |
Chapter 7. Locations

This chapter introduces the locations of the computer hardware components.

Locating computer controls, connectors, and indicators

This topic introduces the locations of the computer controls, connectors, and indicators.

Front view

1. Integrated camera (on some models)  
2. ThinkLight light  
3. Built-in microphones  
4. Status indicators (see Chapter 5 “Status indicators” on page 47)  
5. Power button  
6. Built-in speakers  
7. Security keyhole  
8. USB 2.0 connector  
9. Wireless radio switch  
10. ExpressCard slot  
11. Media card reader slot  
12. Serial Ultrabay Enhanced bay  
13. Smart card reader slot  
14. Fingerprint reader (on some models)  
15. Touch pad buttons  
16. Touch pad  
17. TrackPoint buttons  
18. TrackPoint pointing stick  
19. UltraNav® pointing device  
20. Volume control buttons  
21. Black button
Rear view

1 Status indicators (see Chapter 5 “Status indicators” on page 47)
2 USB 3.0 connectors
3 Mini DisplayPort connector
4 Combo audio jack

5 Monitor connector
6 ac power connector
7 Ethernet connector
8 Always On USB connector

Bottom view

1 Battery pack
2 Battery pack latch
3 Memory module slot
4 Docking connector

5 LCD cover latch
6 Serial Ultrabay Enhanced bay lock latch
7 Serial Ultrabay Enhanced bay eject latch

Locating FRUs and CRUs

This topic introduces the following service parts:
• “Major FRUs and CRUs” on page 56
• “LCD FRUs and CRUs” on page 58
• “Miscellaneous kits and other FRUs” on page 59
Notes:

- Each FRU is available for all types or models, unless otherwise specified.

**CRU statement for customers:**

You can resolve some problems with your product with a replacement part you can install yourself, called a “Customer Replaceable Unit” or “CRU.” Some CRUs are designated as self-service CRUs and others are designated as optional-service CRUs. Installation of self-service CRUs is your responsibility. For optional-service CRUs, you can either install the CRU yourself or you can request that a Service Provider install the CRU according to the warranty service for your product. If you intend on installing the CRU, Lenovo will ship the CRU to you. CRU information and replacement instructions are shipped with your product and are available from Lenovo at any time upon request. You can find a list of CRUs for your product in this Hardware Maintenance Manual. An electronic version of this manual can be found at http://www.lenovo.com/support. Click User Guides & Manuals and then follow the on-screen instructions to find the manual for your product. You might be required to return the defective CRU. When return is required: (1) return instructions, a prepaid shipping label, and a container will be included with the replacement CRU; and (2) you might be charged for the replacement CRU if Lenovo does not receive the defective CRU within thirty (30) days of your receipt of the replacement CRU. See your Lenovo Limited Warranty documentation for full details.

ThinkPad computers contain the following types of CRUs:

- **Self-service CRUs:** These CRUs unplug or are held by no more than two screws. Examples of these types of CRUs include the ac power adapter, power cord, battery, and hard disk drive. Other self-service CRUs depending on product design might include the memory module, wireless card, keyboard, and palm rest with finger print reader and touchpad.

- **Optional-service CRUs:** These CRUs are isolated parts within the computer that 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.
Table 9. Major FRUs and CRUs

<table>
<thead>
<tr>
<th>No.</th>
<th>FRU description</th>
<th>Self-service CRU</th>
<th>Optional-service CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LCD unit (see “LCD FRUs and CRUs” on page 58)</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Keyboard bezel assembly</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Express dummy card</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>PCI Express Mini Card for wireless LAN/WiMAX</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Memory module</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Table 9. Major FRUs and CRUs (continued)

<table>
<thead>
<tr>
<th>No.</th>
<th>FRU description</th>
<th>Self-service CRU</th>
<th>Optional-service CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Speaker assembly</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Magnesium structure frame</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Serial Ultrabay Enhanced bay or blank bezel</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>Smart card reader (on some modes)</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>10</td>
<td>Smart card reader FPC cable</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>I/O sub card</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>DC-in connector</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>13</td>
<td>Battery pack</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>14</td>
<td>Base cover assembly</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>15</td>
<td>Backup battery</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>16</td>
<td>Memory module slot cover</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>17</td>
<td>mSATA solid-state drive</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>18</td>
<td>PCI Express Mini Card for wireless WAN</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>19</td>
<td>Hard disk drive rubber rails or solid-state drive spacers</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>20</td>
<td>Hard disk drive or solid-state drive</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>21</td>
<td>Hard disk drive slot cover</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>22</td>
<td>System board assembly</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>23</td>
<td>Microprocessor</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>24</td>
<td>Thermal fan assembly</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>25</td>
<td>Bluetooth daughter card</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>26</td>
<td>Keyboard</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>27</td>
<td>TrackPoint cap</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Table 10. LCD FRUs and CRUs

<table>
<thead>
<tr>
<th>No.</th>
<th>FRU description</th>
<th>Self-service CRU</th>
<th>Optional-service CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LCD bezel assembly</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Integrated camera</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>LCD panel</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Hinges</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Wireless antenna set</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Table 10. LCD FRUs and CRUs (continued)

<table>
<thead>
<tr>
<th>No.</th>
<th>FRU description</th>
<th>Self-service CRU</th>
<th>Optional-service CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>LCD rear cover assembly</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>LED and camera cable</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>LCD cable</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>LED board</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Miscellaneous kits and other FRUs

Table 11. Miscellaneous kits

<table>
<thead>
<tr>
<th>FRU descriptions</th>
<th>Self-service CRU</th>
<th>Optional service CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD miscellaneous kit:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Logo ThinkPad</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>• Logo Lenovo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Icon Plate Rear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• LCD Latch R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• LCD Latch L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AL SHEET</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• POLON 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• POLON 2 (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• POLON 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Bumper (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Icon plate front for T430</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Icon plate front for T430i</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Camera model's plate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Non-camera model's plate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Mic Rubber (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• English Spec</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

System board miscellaneous kit:

| System board miscellaneous kit: | | |
| • CPU bracket                  | No               | No                   |
| • SIM guide bracket            |                  |                      |
| • Express card Housing (TYCO 2129119-1) | | |
| • Express card Housing (NORTHSTAR 31940000700) | | |
| • Insulation sheet, DIMM       |                  |                      |
| • Insulation sheet, SIM slide spacer | | |
| • Insulation sheet, SIM pull tab | | |
| • Insulation sheet, M/B bottom battery | | |
| • Insulation sheet, DC-IN      |                  |                      |
| • Insulation sheet, around CPU |                  |                      |
| • Insulation sheet, under CPU bracket | | |
| • Insulation sheet, HHD        |                  |                      |
| • Insulation sheet, Express card | | |
| • Insulation sheet, WAN module area | | |
| • Insulation sheet, GPU        |                  |                      |
| • Insulation sheet, battery    |                  |                      |
| • Insulation sheet, docking connector | | |
| • Insulation sheet, battery connector | | |
| • Insulation sheet, PCH bottom |                  |                      |
| • Insulation sheet, PCH top    |                  |                      |
| • Insulation sheet, voltage source | | |
| • English Spec                 |                  |                      |
### Table 11. Miscellaneous kits (continued)

<table>
<thead>
<tr>
<th>FRU descriptions</th>
<th>Self-service CRU</th>
<th>Optional service CRU</th>
</tr>
</thead>
</table>
| **Base miscellaneous kit:**  
  • Foot Rubber - Rear (2)  
  • Foot Rubber - Front LH  
  • Foot Rubber - Front RH  
  • Slide Lock Eject  
  • Bracket - Puller Eject  
  • Pull Lever Eject  
  • Coil Spring - Slide Lever  
  • Knob - Wireless SW  
  • Lever - Wireless SW  
  • English Spec | No | No |
| **Magnesium structure frame miscellaneous kit:**  
  • Magnesium Kensington bracket  
  • Height adjuster (2)  
  • Circular sticker (9)  
  • Finger, ODD  
  • Finger, HDD front  
  • Finger, HDD rear  
  • Finger, HDD bracket  
  • Finger, front touch pad (2)  
  • Finger, Express card  
  • Finger, keyboard (2)  
  • DIMM insulation sheet  
  • Antenna cable bunding (6)  
  • Screw M2.5 x L3.5  
  • Sponge 5.5 x 4  
  • Sponge 13 x 4  
  • Sponge 15.5 x 4 (2)  
  • Tape 30 x 15 (4)  
  • Tape 45 x 12  
  • PORON 15 x 4.2 (2)  
  • English Spec | No | No |
| **Keyboard bezel miscellaneous kit:**  
  • Bracket - fingerprint reader  
  • Insulation sheet - fingerprint  
  • Bracket - touch pad  
  • Insulation sheet - touch pad  
  • English Spec | No | No |
| **System miscellaneous kit:**  
  • Spacer - Smart Card for SC model  
  • Spacer - Smart Card for Non SC model  
  • Dummy card - Express  
  • CPU Insulation sheet  
  • Thermalpad  
  • Bracket for lvds  
  • Bracket for fan  
  • SIM dummy card  
  • Blind sheet for no WWAN model  
  • English Spec | No | No |
| **Screw and tape kit:**  
  • Screw M2.0 x L3.0 (40)  
  • Screw M2.0 x L9.5 (10)  
  • Screw M2.0 x L14.0 (10)  
  • Screw M2.5 x L3.5 (8)  
  • Screw M2.5 x L6.5 (8) | No | No |
Table 11. Miscellaneous kits (continued)

<table>
<thead>
<tr>
<th>FRU descriptions</th>
<th>Self-service CRU</th>
<th>Optional service CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tape cable fix 10 x 20 (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Tape cable fix 10 x 30 (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• English Spec</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 12. Other FRUs

<table>
<thead>
<tr>
<th>FRU descriptions</th>
<th>Self-service CRU</th>
<th>Optional service CRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>ac adapter</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Power cord</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Looking up FRU information

For detailed FRU information, including part numbers, descriptions, and substitution part numbers, go to http://www.lenovo.com/serviceparts-lookup.
Chapter 8. FRU replacement notices

This chapter presents notices related to removing or replacing parts. Read this chapter carefully before replacing any FRU.

CRU statement for customers:
You can resolve some problems with your product with a replacement part you can install yourself, called a “Customer Replaceable Unit” or “CRU.” Some CRUs are designated as self-service CRUs and others are designated as optional-service CRUs. Installation of self-service CRUs is your responsibility. For optional-service CRUs, you can either install the CRU yourself or you can request that a Service Provider install the CRU according to the warranty service for your product. If you intend on installing the CRU, Lenovo will ship the CRU to you. CRU information and replacement instructions are shipped with your product and are available from Lenovo at any time upon request. You can find a list of CRUs for your product in this Hardware Maintenance Manual. An electronic version of this manual can be found at http://www.lenovo.com/support. Click User Guides & Manuals and then follow the on-screen instructions to find the manual for your product. You might be required to return the defective CRU. When return is required: (1) return instructions, a prepaid shipping label, and a container will be included with the replacement CRU; and (2) you might be charged for the replacement CRU if Lenovo does not receive the defective CRU within thirty (30) days of your receipt of the replacement CRU. See your Lenovo Limited Warranty documentation for full details.

Screw notices
Loose screws can cause a reliability problem. In the ThinkPad notebook computer, this problem is addressed with special nylon-coated screws that have the following characteristics:

- They maintain tight connections.
- They do not easily come loose, even with shock or vibration.
- They are harder to tighten.

Do the following when you service this machine:

- Keep the screw kit in your tool bag. For the part number of the screw kit, go to http://www.lenovo.com/serviceparts-lookup.
- It is recommended to use new screws.
- It is recommended to use each screw only once.
- Use a torque screwdriver if you have one.

Tighten screws as follows:

- **Plastic to plastic**
  Turn an additional 90 degrees after the screw head touches the surface of the plastic part:

  ![90 degrees more](image)

  (Cross-section)

- **Logic card to plastic**
  Turn an additional 180 degrees after the screw head touches the surface of the logic card:
Notes:

- Ensure that you use the correct screw. It is recommended to use new screws for replacements. If you have a torque screwdriver, tighten all screws firmly to the torque specified in the screw information table for each step.
- Ensure torque screwdrivers are calibrated correctly following country specifications.

Retaining serial numbers

This section includes the following descriptions:

- “Restoring the serial number of the system unit” on page 64
- “Retaining the UUID” on page 65
- “Reading or writing the ECA information” on page 65

Restoring the serial number of the system unit

When the computer was manufactured, the EEPROM on the system board was loaded with the serial numbers of the system and all major components. These numbers need to remain the same throughout the life of the computer.

If you replace the system board, you must restore the serial number of the system unit to its original value.

Before replacing the system board, save the original serial number by doing the following:

1. Install the latest version of LENOVO ThinkPad Hardware Maintenance Diskette or Maintenance Key, and then restart the computer.
2. From the main menu, select 1. Set system identification.
3. Turn off the computer, and then turn on the computer again.
4. When the ThinkPad logo is displayed, press Esc.
5. Select 2. Read S/N data from EEPROM and follow the instructions on the screen. The serial number of each device in your computer is displayed; the serial number of the system unit is listed as follows:
   - 20 Serial number
6. Write down that number.

   **Note:** The serial number of the system unit is also written on the label attached to the bottom of the computer.

After you have replaced the system board, restore the serial number by doing the following:

1. Install the latest version of LENOVO ThinkPad Hardware Maintenance Diskette or Maintenance Key, and then restart the computer.
2. From the main menu, select 1. Set system identification.
3. Turn off the computer, and then turn on the computer again.
4. When the ThinkPad logo is displayed, press Esc.
5. Select 1. Add S/N data from EEPROM. Follow the instructions on the screen.
If the MTM and Product ID numbers differ from each other on the rear label, use what is shown for the Product ID field. See the following example:

**MTM on the rear label:**
TTTT-CTO S/N SSSSSSS

**Product ID on the rear label:**
TTTT-MMM (Use this number when setting Serial Number.)

In the example, the Serial Number to be input is “1STTTTMMMSSSSSSS”.

**Retaining the UUID**

The Universally Unique Identifier (UUID) is a 128-bit number uniquely assigned to your computer at production and stored in the EEPROM of your system board.

The algorithm that generates the number is designed to provide unique IDs until the year A.D. 3400. No two computers in the world have the same number.

When you replace the system board, follow the following steps to create new UUID for the system board if the system board does not have a UUID:
1. Install the latest version of LENOVO ThinkPad Hardware Maintenance Diskette or Maintenance Key, and then restart the computer.
2. From the main menu, select 4. Assign UUID. A new UUID is created and written. If a valid UUID already exists, it is not overwritten.

**Reading or writing the ECA information**

Information on Engineering Change Announcements (ECA) are stored in the EEPROM of the system board. The electronic storage of this information simplifies the procedure to check if the ECA has been previously applied to a machine. The machine does not need to be disassembled to check for the ECA application.

To check what ECAs have been previously applied to the machine, use the ECA Information Read/Write function on the LENOVO ThinkPad Hardware Maintenance Diskette or Maintenance Key.
1. Insert the latest version of LENOVO ThinkPad Hardware Maintenance Diskette or Maintenance Key, and then restart the computer.
2. From the main menu, select 6. Set ECA Information.
3. To read the ECA information, select 2. Read ECA/rework number from EEPROM and follow the instructions on the screen; To read box build date, select 5. Read box build date from EEPROM, and follow the instructions on the screen.

After an ECA has been applied to the machine, the EEPROM must be updated to reflect the ECA’s application. Use the latest version of LENOVO ThinkPad Hardware Maintenance Diskette or Maintenance Key to update the EEPROM.

**Note:** Only the ECA number is stored in the EEPROM. The machine type of the ECA is assumed to be the same as the machine type of the machine that had the ECA applied to it.
1. Insert the latest version of LENOVO ThinkPad Hardware Maintenance Diskette or Maintenance Key, and then restart the computer.
2. From the main menu, select 6. Set ECA Information.
3. To write the ECA information, select 1. Write ECA/rework number from EEPROM, and follow the instruction; To write box build date, select 4. Write box build date from EEPROM, and follow the instruction on the screen.
If the system board is being replaced, try to read the ECA information from the old system board and transfer the information to the new system. If the system board is inoperable, this will not be possible.
Chapter 9. Removing or replacing a FRU

This chapter provides instructions on how to remove or replace a FRU.

CRU statement for customers:
You can resolve some problems with your product with a replacement part you can install yourself, called a “Customer Replaceable Unit” or “CRU.” Some CRUs are designated as self-service CRUs and others are designated as optional-service CRUs. Installation of self-service CRUs is your responsibility. For optional-service CRUs, you can either install the CRU yourself or you can request that a Service Provider install the CRU according to the warranty service for your product. If you intend on installing the CRU, Lenovo will ship the CRU to you. CRU information and replacement instructions are shipped with your product and are available from Lenovo at any time upon request. You can find a list of CRUs for your product in this Hardware Maintenance Manual. An electronic version of this manual can be found at http://www.lenovo.com/support. Click User Guides & Manuals and then follow the on-screen instructions to find the manual for your product. You might be required to return the defective CRU. When return is required: (1) return instructions, a prepaid shipping label, and a container will be included with the replacement CRU; and (2) you might be charged for the replacement CRU if Lenovo does not receive the defective CRU within thirty (30) days of your receipt of the replacement CRU. See your Lenovo Limited Warranty documentation for full details.

General guidelines
When removing or replacing a FRU, be sure to observe the following general guidelines:

1. Do not try to service any computer unless you have been trained and certified. An untrained person runs the risk of damaging parts.
2. Before replacing any FRU, review Chapter 8 “FRU replacement notices” on page 63.
3. Begin by removing any FRUs that have to be removed before replacing the failing FRU. Any such FRUs are listed at the beginning of each FRU replacement procedure. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing a FRU, as given in the drawings by the numbers in square callouts.
5. When turning a screw, turn it in the direction as given by the arrow in the drawing.
6. When removing a FRU, move it in the direction as given by the arrow in the drawing.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement.
8. When replacing a FRU, use the correct screw(s) as shown in the replacement procedure.

⚠️ DANGER

Before removing any FRU, turn off the computer, unplug all power cords from electrical outlets, remove the battery pack, and then disconnect any interconnecting cables.

Attention: After replacing a FRU, do not turn on the computer until you have made sure that all screws, springs, and other small parts are in place and none are loose inside the computer. Verify this by shaking the computer gently and listening for rattling sounds. Metallic parts or metal flakes can cause electrical short circuits.
Attention: The system board is sensitive to, and can be damaged by, electrostatic discharge. Before touching it, establish personal grounding by touching a ground point with one hand or by using an electrostatic discharge (ESD) strap.

Before servicing the computer

Removing the SIM card:

Some models you are servicing might have the SIM card that the customer has installed. If the computer you are servicing has the SIM card installed, remove it before you start the servicing.

To remove the SIM card, you need to remove the battery pack first. See “1010 Battery pack” on page 68.

After you finish the servicing, ensure that you insert the card back into the slot firmly.

1010 Battery pack

Important notice for replacing a battery pack:

- The Lenovo Solution Center program provides an automatic battery diagnostic test that determines if the battery pack is defective. A battery pack FRU should not be replaced unless this diagnostic test shows that the battery is defective. The only exception to this is if the battery pack is physically damaged or a customer is reporting a possible safety issue.

- If the Lenovo Solution Center program is not installed in the computer, the customer should download this program before a non-physically damaged battery pack is replaced. Note that the replacement of a physically damaged battery pack is not covered by the warranty.
Removal steps of battery pack

DANGER

Use only the authorized battery specified for your computer. Any other battery could ignite or explode.

Unlock the battery latch 1. Hold the battery latch in the unlocked position, and remove the battery pack in the direction shown by the arrow 2.

When installing: Install the battery pack in the slot. Ensure that the battery latch is in the locked position.

1020 ExpressCard blank bezel

Removal steps of ExpressCard blank bezel
When you press the ExpressCard blank bezel 1, it pops out 2.
When installing: Ensure that the bezel is correctly oriented as shown in the following illustration.

---

1030 Serial Ultrabay Enhanced bay or blank bezel

For access, remove this FRU:
- “1010 Battery pack” on page 68

Removal steps of Serial Ultrabay Enhanced bay or blank bezel

Hold the bay lock latch in the unlocked position 1, and slide the bay eject latch in the direction shown by the arrow 2. Then pull out the Serial Ultrabay Enhanced bay or the blank bezel in the direction shown by the arrow 3.
1040 Hard disk drive or solid-state drive

For access, remove this FRU:
• “1010 Battery pack” on page 68

Attention:
• Do not drop the drive or apply any physical shock to it. The drive is sensitive to physical shock. Improper handling can cause damage and permanent loss of data.
• Before removing the drive, have the user make a backup copy of all the information on it if possible.
• Never remove the drive while the computer is operating or in suspend mode.
Removal steps of hard disk drive or solid-state drive

Note: Loosen the screw 1.

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Capture screw (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
For hard disk drive and rubber rails:

For solid-state drive and spacers:

When installing: Ensure that the solid-state drive spacers or the hard disk drive rubber rails are attached firmly.

1050 Memory module slot cover

For access, remove this FRU:
- “1010 Battery pack” on page 68

Removal steps of memory module slot cover

Note: Loosen the screws 1
**1060 Backup battery**

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1050 Memory module slot cover” on page 73

**Removal steps of backup battery**

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Capture screw (2)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
DANGER

Use only the authorized battery specified for your computer. Any other battery could ignite or explode.

1070 Memory module (in the slot on the underside of the computer)

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1050 Memory module slot cover” on page 73

Removal steps of memory module (in the slot on the underside of the computer)

When installing: Insert the notched end of the memory module into the slot. Press the memory module firmly, and pivot it until it snaps into place. Ensure that it is firmly installed in the slot and does not move easily.

Note: Your computer has two memory module slots: one on the underside of the computer and the other under the keyboard. If only one memory module is to be installed on the computer you are servicing, install it in the slot located under the keyboard.

1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1050 Memory module slot cover” on page 73
Removal steps of PCI Express Mini Card for wireless WAN

Unplug the connectors by using the antenna RF connector removal tool, or pick the connectors with your fingers and gently unplug them in the direction shown by the arrows 1.

When installing: Plug the red cable into the main connector, and the blue cable into the auxiliary connector on the card.

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>M2 × 3 mm, wafer-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
If the computer you are servicing is a wireless WAN-ready model and does not have a wireless WAN card, route the antenna cables and secure them with tape as shown in the following illustration.

![Illustration of antenna cables routed and secured](image)

**Removal steps of PCI Express Half Mini Card for wireless WAN**

Unplug the connectors by using the antenna RF connector removal tool, or pick the connectors with your fingers and gently unplug them in the direction shown by the arrows 1.

![Illustration showing connectors unplug](image)

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>M2 × 3 mm, wafer-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
When installing: Plug the red cable into the main connector, and the blue cable into the auxiliary connector on the card.

If the computer you are servicing is a wireless WAN-ready model and does not have a wireless WAN card, route the antenna cables and secure them with tape as shown in the following illustration.

Removal steps of mSATA solid-state drive

The computer comes with either a PCI Express Mini Card for wireless WAN or an mSATA solid-state drive. If the computer is equipped with an mSATA solid-state drive, it is installed in the wireless WAN card slot.
Note:

Attention:

- Do not drop the drive or apply any physical shock to it. The drive is sensitive to physical shock. Improper handling can cause damage and permanent loss of data.
- Before removing the drive, have the user make a backup copy of all the information on it if possible.
- Never remove the drive while the computer is operating or in suspend mode.
- Ensure that you partition the mSATA solid-state drive after installing it on the computer you are servicing. Otherwise, the mSATA solid-state drive will not function correctly. For instructions on how to partition an mSATA solid-state drive, go to http://www.lenovo.com/support/msata-fru.

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M2 x 3 mm, wafer-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
1090 Keyboard

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1050 Memory module slot cover” on page 73

Removal steps of keyboard

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M2 × 14 mm, wafer-head, nylon-coated (2)</td>
<td>Silver</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
Press the keyboard in the direction shown by the arrows 2 until the rear edge of the keyboard is detached from the keyboard bezel.

Lift the keyboard a little in the direction shown by the arrow 3 and then detach the connector 4.
Installation steps of keyboard
Attach the keyboard connector.

Attach the keyboard and ensure that the keyboard edge is under the frame.
When the front edge of the keyboard is housed firmly, gently press the keys with your palms and slightly slide the keyboard toward you until the keyboard is in place.

Secure the keyboard by tightening the screws from the bottom side of the computer.

1100 Memory module (in the slot under the keyboard)

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1050 Memory module slot cover” on page 73
- “1090 Keyboard” on page 80

Note: Your computer has two memory module slots: one on the underside of the computer and the other under the keyboard. If only one memory module is to be installed on the computer you are servicing, install it in the slot located under the keyboard.
Removal steps of memory module (in the slot under the keyboard)

When installing: Insert the notched end of the memory module into the slot. Press the memory module firmly, and pivot it until it snaps into place. Ensure that it is firmly installed in the slot and does not move easily.
1120 PCI Express Mini Card for wireless LAN/WiMAX

For access, remove these FRUs in order:
• “1010 Battery pack” on page 68
• “1050 Memory module slot cover” on page 73
• “1090 Keyboard” on page 80

PCI Express Mini Card for wireless LAN/WiMAX

Unplug the connectors by using the antenna RF connector removal tool, or pick the connectors with your fingers and gently unplug them in the direction shown by the arrows 1.

Note: Some models might have only two antenna cables.

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>M2 x 9.5 mm, wafer-head, nylon-coated (1)</td>
<td>Silver</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

When installing:
For models with a wireless LAN card that has two antenna connectors, plug the gray cable into the main connector, and the black cable into the auxiliary connector. If the computer you are servicing has three cables, put the white cable in the cable protection tube and secure it with tape as shown in the following illustration.

1130 Keyboard bezel assembly, FPC cable, and Bluetooth daughter card

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1020 ExpressCard blank bezel” on page 69
- “1050 Memory module slot cover” on page 73
- “1090 Keyboard” on page 80

Removal steps of keyboard bezel assembly, FPC cable, and Bluetooth daughter card
<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M2 x 14 mm, wafer-head, nylon-coated (5)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
<tr>
<td>2</td>
<td>M2 x 3 mm, wafer-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
<tr>
<td>3</td>
<td>M2 x 3 mm, wafer-head, nylon-coated (2)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
When installing: Ensure that the connector is attached firmly.

Note: The FPC cable is attached on the underside of the keyboard bezel assembly. On some models, the Bluetooth daughter card also is attached on the underside of the keyboard bezel assembly. For the models that do not have a Bluetooth daughter card, skip steps 8 to 9.

When installing: Ensure that the connectors are attached firmly.
<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>M2 x 3 mm, wafer-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

When installing: Ensure that the connector is attached firmly.

1140 Smart card reader

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1050 Memory module slot cover” on page 73
- “1090 Keyboard” on page 80
- “1130 Keyboard bezel assembly, FPC cable, and Bluetooth daughter card” on page 86
Removal steps of smart card reader or smart card dummy spacer

Some models have a smart card dummy spacer as a miscellaneous part. For those models, remove the spacer as shown:
When installing: Ensure that the connector is attached firmly.

### 1150 Speaker assembly

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1050 Memory module slot cover” on page 73
- “1090 Keyboard” on page 80
- “1130 Keyboard bezel assembly, FPC cable, and Bluethooth daughter card” on page 86

Removal steps of speaker assembly

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M2 x 3 mm, wafer-head, nylon-coated (2)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

When installing: Attach the speaker assembly and route the cable as shown in the following illustration, and ensure that the speaker connector is attached firmly.
1160 LCD unit

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1020 ExpressCard blank bezel” on page 69
- “1050 Memory module slot cover” on page 73
- “1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive” on page 75
- “1090 Keyboard” on page 80
- “1120 PCI Express Mini Card for wireless LAN/WiMAX” on page 85
- “1130 Keyboard bezel assembly, FPC cable, and Bluetoooth daughter card” on page 86

Removal steps of LCD unit

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M2.5 × 6.5 mm, wafer-head, nylon-coated (2)</td>
<td>Black</td>
<td>0.392 Nm (4.0 kgf-cm)</td>
</tr>
<tr>
<td>Step</td>
<td>Screw (quantity)</td>
<td>Color</td>
<td>Torque</td>
</tr>
<tr>
<td>------</td>
<td>------------------------------------------------------</td>
<td>-----------</td>
<td>--------------------</td>
</tr>
<tr>
<td>2</td>
<td>M2 × 3 mm, wafer-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
<tr>
<td>6</td>
<td>M2.5 × 6.5 mm, wafer-head, nylon-coated (2)</td>
<td>Black</td>
<td>0.392 Nm (4.0 kgf-cm)</td>
</tr>
</tbody>
</table>
When installing:

- Ensure that you attach the connectors firmly.
- Ensure that you route the cables correctly and tape up in the proper positions as shown in the above illustration.
- When you route the cables, ensure that they are not subject to any tension. Tension could cause the cables to be damaged by the cable guides, or a wire to be broken.
1170 Thermal Fan assembly

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1020 ExpressCard blank bezel” on page 69
- “1050 Memory module slot cover” on page 73
- “1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive” on page 75
- “1090 Keyboard” on page 80
- “1120 PCI Express Mini Card for wireless LAN/WiMAX” on page 85
- “1130 Keyboard bezel assembly, FPC cable, and Bluetooth daughter card” on page 86
- “1150 Speaker assembly” on page 91
Removal steps of thermal fan assembly

Note: Loosen the screws 1a to 1d in ascending alphabetic order as illustrated.

For models that have a discrete graphics card:

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Capture shoulder screw (4)</td>
<td>Silver</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
<tr>
<td>2</td>
<td>M2 x 3 mm, wafer-head, nylon-coated (1)</td>
<td>black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
For models that have an integrated graphics card:

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Capture shoulder screw (4)</td>
<td>Silver</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
When installing:

Before you attach the thermal fan assembly to the computer, apply thermal grease, at an amount of 0.2 grams, on the parts marked 2 as in the following illustrations. Either too much or too less application of grease can cause a thermal fan problem due to imperfect contact with a component. For the fan in models that have an integrated graphics module, you need to peel the thin film off from the thermal rubber marked 6.

For models that have a discrete graphics card:
For models that have an integrated graphics card:

When attaching the thermal fan assembly to the frame, take care not to damage the heat sink of the fan assembly. Do not press the top of the fan cover and the fan hub.

Ensure that the fan connector is attached firmly.

1180 Microprocessor

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1020 ExpressCard blank bezel” on page 69
- “1050 Memory module slot cover” on page 73
- “1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive” on page 75
- “1090 Keyboard” on page 80
- “1120 PCI Express Mini Card for wireless LAN/WiMAX” on page 85
- “1130 Keyboard bezel assembly, FPC cable, and Bluethooth daughter card” on page 86
- “1150 Speaker assembly” on page 91
- “1160 LCD unit” on page 93
- “1170 Thermal Fan assembly” on page 96
**Attention:** The microprocessor is extremely sensitive. When you service the microprocessor, avoid any kind of rough handling.

**Removal steps of microprocessor**

Rotate the head of the screw in the direction shown by the arrow 1 to release the lock, and remove the microprocessor 2. After that, peel the mylar off from the microprocessor as shown by the arrow 3.

When installing: Ensure that the mylar is attached to the microprocessor. Place the microprocessor in the microprocessor socket, and then rotate the head of the screw in the direction shown by the arrow 4 to secure the microprocessor.

**1190 Base cover assembly and DC-in connector**

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1020 ExpressCard blank bezel” on page 69
- “1030 Serial Ultrabay Enhanced bay or blank bezel” on page 70
- “1040 Hard disk drive or solid-state drive” on page 71
- “1050 Memory module slot cover” on page 73
- “1060 Backup battery ” on page 74
- “1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive” on page 75
- “1090 Keyboard” on page 80
- “1120 PCI Express Mini Card for wireless LAN/WiMAX” on page 85
- “1130 Keyboard bezel assembly, FPC cable, and Blutheoth daughter card” on page 86
Removal steps of base cover assembly and DC-in connector

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>M2 × 3 mm, wafer-head, nylon-coated (6)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
<tr>
<td>3</td>
<td>M2 × 9.5 mm, wafer-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

When installing: Ensure that the wireless switch is adjusted as shown in callout 3.
Step | Screw (quantity) | Color | Torque
--- | --------------- | ----- | -----
6   | M2 x 3 mm, wafer-head, nylon-coated (1) | Black | 0.181 Nm (1.85 kgf-cm)

When installing: Ensure that the connector is attached firmly.

Applying labels to the base cover

The new base cover FRU is shipped with a kit containing labels of several kinds. Apply those labels when you replace the base cover. For the labels which are not shipped with the new base cover, peel them from the old base cover, and adhere them to the new one.

Notes:

- If the Certificate of Authentication (COA) label 2 is attached to a part that is replaced, return the old part with the label attached to the customer, or provide a letter to the customer stating what the label was originally on the computer and what the label part number, serial number, and product key were.
- If the base cover has two FCC labels, apply both to the new base cover.

The following illustration shows the correct location of each label.
1200 Magnesium structure frame

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1020 ExpressCard blank bezel” on page 69
- “1030 Serial Ultrabay Enhanced bay or blank bezel” on page 70
- “1040 Hard disk drive or solid-state drive” on page 71
- “1050 Memory module slot cover” on page 73
- “1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive” on page 75
- “1090 Keyboard” on page 80
- “1120 PCI Express Mini Card for wireless LAN/WiMAX” on page 85
- “1130 Keyboard bezel assembly, FPC cable, and Bluethooth daughter card” on page 86
- “1150 Speaker assembly” on page 91
- “1160 LCD unit” on page 93
- “1170 Thermal Fan assembly” on page 96
- “1180 Microprocessor” on page 100
• “1190 Base cover assembly and DC-in connector” on page 101

Removal steps of magnesium structure frame

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M2 x 3 mm, wafer-head, nylon-coated (4)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
<tr>
<td>2</td>
<td>M2 x 9.5 mm, wafer-head, nylon-coated (2)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

1210 System board assembly, ExpressCard slot, and I/O sub card

For access, remove these FRUs in order:
• “1010 Battery pack” on page 68
• “1020 ExpressCard blank bezel” on page 69
• “1030 Serial Ultrabay Enhanced bay or blank bezel” on page 70
• “1040 Hard disk drive or solid-state drive” on page 71
• “1050 Memory module slot cover” on page 73
• “1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive” on page 75
• “1090 Keyboard” on page 80
• “1120 PCI Express Mini Card for wireless LAN/WIMAX” on page 85
• “1130 Keyboard bezel assembly, FPC cable, and Bluetooth daughter card” on page 86
• “1150 Speaker assembly” on page 91
• “1160 LCD unit” on page 93
• “1170 Thermal Fan assembly” on page 96
• “1180 Microprocessor” on page 100
• “1190 Base cover assembly and DC-in connector” on page 101

Important notices for handling the system board:
When handling the system board, bear the following in mind:
• The system board has an accelerometer, which can be broken by applying several thousands of G-forces.

  Note: Dropping a system board from a height of as little as 6 inches so that it falls flat on a hard bench can subject the accelerometer to as much as 6,000 G's of shock.
• Be careful not to drop the system board on a bench top that has a hard surface, such as metal, wood, or composite.
• If a system board is dropped, be sure to document the drop in a reject report, and replace the system board.
• Avoid rough handling of any kind.
• At every point in the process, be sure not to drop or stack the system board.
• If you put a system board down, be sure to put it only on a padded surface such as an ESD mat or a corrugated conductive surface.

Removal steps of system board assembly, ExpressCard slot, and I/O sub card

**Attention:** The following components soldered on the top side of the system board are extremely sensitive. When you service the system board, avoid any kind of rough handling.

- **a** Microprocessor
- **b** Platform Controller Hub (PCH)
- **c** Graphic Processing Unit (GPU)

**Note:** The GPU is only for models that have a discrete graphics card. Models that have an integrated graphics module do not have a GPU on the system board.

- **d** Accelerometer chip for the hard disk drive Active Protection System™
### Step 1

<table>
<thead>
<tr>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2 x 3 mm, wafer-head, nylon-coated (2)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

### Step 2

### Step 3

### Step 4

### Step 5

### Step 1

<table>
<thead>
<tr>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2 x 3 mm, wafer-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
2010 LCD bezel assembly

For access, remove this FRU:
• “1010 Battery pack” on page 68

Removal steps of LCD bezel assembly

When installing: Ensure that all the latches are attached firmly. Then secure the bezel with the screws.

2020 LED board

For access, remove these FRUs in order:
• “1010 Battery pack” on page 68
• “2010 LCD bezel assembly” on page 108
Removal steps of LED board

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M2 x 3 mm, flat-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

When installing: Ensure that the connector is attached firmly.

2030 Integrated camera

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “2010 LCD bezel assembly” on page 108
Removal steps of integrated camera

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M2 ¥ 3 mm, flat-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
2040 LCD panel and LCD cable

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1020 ExpressCard blank bezel” on page 69
- “1050 Memory module slot cover” on page 73
- “1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive” on page 75
- “1090 Keyboard” on page 80
- “1120 PCI Express Mini Card for wireless LAN/WiMAX” on page 85
- “1130 Keyboard bezel assembly, FPC cable, and Bluetooth daughter card” on page 86
- “1150 Speaker assembly” on page 91
- “1160 LCD unit” on page 93
- “2010 LCD bezel assembly” on page 108
- “2020 LED board” on page 108
- “2030 Integrated camera” on page 109

Removal steps of LCD panel and LCD cable

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M2 x 3 mm, wafer-head, nylon-coated (4)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

When installing: When attaching the LCD panel to the cover, gently press the left and right edges covered with metal. Do not press the surface of the panel or apply any excessive force to the panel.
When installing: Ensure that the connector is attached firmly.

### 2050 LED and camera cable

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1020 ExpressCard blank bezel” on page 69
- “1050 Memory module slot cover” on page 73
- “1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive” on page 75
- “1090 Keyboard” on page 80
- “1120 PCI Express Mini Card for wireless LAN/WiMAX” on page 85
- “1130 Keyboard bezel assembly, FPC cable, and Bluethooth daughter card” on page 86
- “1150 Speaker assembly” on page 91
- “1160 LCD unit” on page 93
- “2010 LCD bezel assembly” on page 108
- “2020 LED board” on page 108
- “2030 Integrated camera” on page 109
- “2040 LCD panel and LCD cable” on page 111
2060 Wireless antenna set

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1020 ExpressCard blank bezel” on page 69
- “1050 Memory module slot cover” on page 73
- “1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive” on page 75
- “1090 Keyboard” on page 80
- “1120 PCI Express Mini Card for wireless LAN/WiMAX” on page 85
- “1130 Keyboard bezel assembly, FPC cable, and Bluetooth daughter card” on page 86
- “1150 Speaker assembly” on page 91
- “1160 LCD unit” on page 93
- “2010 LCD bezel assembly” on page 108
- “2020 LED board” on page 108
- “2030 Integrated camera” on page 109
- “2040 LCD panel and LCD cable” on page 111
- “2050 LED and camera cable” on page 112
Removal steps of wireless antenna set

When installing: When you install the wireless antenna set, route the cables as shown in the illustration above. As you route the cables, ensure that they are not subject to any tension. Tension could cause the cables to be damaged by the cable guides, or a wire to be broken.

<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>M2 × 3 mm, flat-head, nylon-coated (2)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
2070 Hinges and LCD rear cover assembly

For access, remove these FRUs in order:
- “1010 Battery pack” on page 68
- “1020 ExpressCard blank bezel” on page 69
- “1050 Memory module slot cover” on page 73
- “1080 PCI Express Mini Card for wireless WAN or mSATA solid-state drive” on page 75
- “1090 Keyboard” on page 80
- “1120 PCI Express Mini Card for wireless LAN/WiMAX” on page 85
- “1130 Keyboard bezel assembly, FPC cable, and Blueooth daughter card” on page 86
- “1150 Speaker assembly” on page 91
- “1160 LCD unit” on page 93
- “2010 LCD bezel assembly” on page 108
- “2020 LED board” on page 108
- “2030 Integrated camera” on page 109
- “2040 LCD panel and LCD cable” on page 111
- “2050 LED and camera cable” on page 112
- “2060 Wireless antenna set” on page 113

Removal steps of hinges and LCD rear cover assembly
<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M2.5 x 3.5 mm, wafer-head, nylon-coated (4)</td>
<td>Black</td>
<td>0.392 Nm (4.0 kgf-cm)</td>
</tr>
</tbody>
</table>

When installing: Attach the hinges as shown in the following illustration.
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