Hardware Maintenance Manual

ThinkPad X240
Note: Before using this information and the product it supports, be sure to read the general information under Appendix A “Notices” on page 101.
# Contents

## About this manual

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>5</td>
<td>41</td>
</tr>
<tr>
<td>6</td>
<td>43</td>
</tr>
<tr>
<td>7</td>
<td>45</td>
</tr>
<tr>
<td>8</td>
<td>53</td>
</tr>
<tr>
<td>9</td>
<td>57</td>
</tr>
</tbody>
</table>

## Chapter 1. Safety information

<table>
<thead>
<tr>
<th>Subchapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>General safety</td>
<td>1</td>
</tr>
<tr>
<td>Electrical safety</td>
<td>1</td>
</tr>
<tr>
<td>Safety inspection guide</td>
<td>2</td>
</tr>
<tr>
<td>Handling devices that are sensitive to electrostatic discharge</td>
<td>3</td>
</tr>
<tr>
<td>Grounding requirements</td>
<td>4</td>
</tr>
<tr>
<td>Safety notices (multilingual translations)</td>
<td>4</td>
</tr>
</tbody>
</table>

## Chapter 2. Important service information

<table>
<thead>
<tr>
<th>Subchapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy for replacing FRUs</td>
<td>19</td>
</tr>
<tr>
<td>Strategy for replacing a hard disk drive or a solid-state drive</td>
<td>19</td>
</tr>
<tr>
<td>Important notice for replacing a system board</td>
<td>20</td>
</tr>
<tr>
<td>How to use error message</td>
<td>20</td>
</tr>
<tr>
<td>Strategy for replacing FRUs for CTO, special-bid, and standard models</td>
<td>20</td>
</tr>
<tr>
<td>Product definition</td>
<td>20</td>
</tr>
<tr>
<td>FRU identification</td>
<td>20</td>
</tr>
</tbody>
</table>

## Chapter 3. General checkout

<table>
<thead>
<tr>
<th>Subchapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>What to do first</td>
<td>23</td>
</tr>
<tr>
<td>Checkout guide</td>
<td>24</td>
</tr>
<tr>
<td>Lenovo Solution Center</td>
<td>24</td>
</tr>
<tr>
<td>Quick test programs</td>
<td>24</td>
</tr>
<tr>
<td>UEFI diagnostic program</td>
<td>25</td>
</tr>
<tr>
<td>Bootable diagnostic programs</td>
<td>25</td>
</tr>
<tr>
<td>Power system checkout</td>
<td>26</td>
</tr>
<tr>
<td>Checking the ac power adapter</td>
<td>26</td>
</tr>
<tr>
<td>Checking operational charging</td>
<td>27</td>
</tr>
<tr>
<td>Checking the external battery pack</td>
<td>27</td>
</tr>
<tr>
<td>Checking the coin-cell battery</td>
<td>28</td>
</tr>
</tbody>
</table>

## Chapter 4. Related service information

<table>
<thead>
<tr>
<th>Subchapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restoring the factory contents by using the product Recovery Disc Set</td>
<td>29</td>
</tr>
<tr>
<td>Using the Windows recovery programs on the Windows 8 operating system</td>
<td>30</td>
</tr>
<tr>
<td>Passwords</td>
<td>32</td>
</tr>
<tr>
<td>Power-on password</td>
<td>32</td>
</tr>
<tr>
<td>Hard disk password</td>
<td>33</td>
</tr>
<tr>
<td>Supervisor password</td>
<td>34</td>
</tr>
<tr>
<td>Power management</td>
<td>34</td>
</tr>
<tr>
<td>Screen blank mode (for the Windows 7 operating system only)</td>
<td>34</td>
</tr>
<tr>
<td>Sleep mode</td>
<td>34</td>
</tr>
<tr>
<td>Hibernation mode</td>
<td>35</td>
</tr>
<tr>
<td>Symptom-to-FRU index</td>
<td>35</td>
</tr>
<tr>
<td>Numeric error codes</td>
<td>36</td>
</tr>
<tr>
<td>Error messages</td>
<td>37</td>
</tr>
<tr>
<td>Beep symptoms</td>
<td>37</td>
</tr>
<tr>
<td>No-beep symptoms</td>
<td>37</td>
</tr>
<tr>
<td>LCD-related symptoms</td>
<td>37</td>
</tr>
<tr>
<td>Intermittent problems</td>
<td>38</td>
</tr>
<tr>
<td>Undetermined problems</td>
<td>38</td>
</tr>
</tbody>
</table>

## Chapter 5. Status indicators

<table>
<thead>
<tr>
<th>Subchapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locating computer controls, connectors, and indicators</td>
<td>41</td>
</tr>
<tr>
<td>Front view</td>
<td>41</td>
</tr>
<tr>
<td>Left-side view</td>
<td>45</td>
</tr>
<tr>
<td>Bottom view</td>
<td>45</td>
</tr>
<tr>
<td>Locating FRUs and CRUs</td>
<td>46</td>
</tr>
<tr>
<td>Major FRUs</td>
<td>48</td>
</tr>
<tr>
<td>LCD FRUs</td>
<td>50</td>
</tr>
<tr>
<td>Miscellaneous kits and other FRUs</td>
<td>52</td>
</tr>
<tr>
<td>Looking up FRU information</td>
<td>52</td>
</tr>
</tbody>
</table>

## Chapter 6. Function keys and combinations

<table>
<thead>
<tr>
<th>Subchapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw notices</td>
<td>53</td>
</tr>
<tr>
<td>Retaining serial numbers</td>
<td>54</td>
</tr>
<tr>
<td>Restoring the serial number of the system unit</td>
<td>54</td>
</tr>
<tr>
<td>Retaining the UUID</td>
<td>55</td>
</tr>
<tr>
<td>Reading or writing the ECA information</td>
<td>55</td>
</tr>
</tbody>
</table>

## Chapter 7. Locations

<table>
<thead>
<tr>
<th>Subchapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1010 External battery pack</td>
<td>57</td>
</tr>
<tr>
<td>1020 Base cover assembly</td>
<td>59</td>
</tr>
<tr>
<td>1030 Internal battery pack</td>
<td>60</td>
</tr>
</tbody>
</table>

© Copyright Lenovo 2013
<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1040 Memory module</td>
</tr>
<tr>
<td>1050 Hard disk drive or solid-state drive and drive cable</td>
</tr>
<tr>
<td>1080 Fan assembly</td>
</tr>
<tr>
<td>1090 dc-in cable assembly</td>
</tr>
<tr>
<td>1100 System board</td>
</tr>
<tr>
<td>1110 Coin-cell battery</td>
</tr>
<tr>
<td>1120 Speaker assembly</td>
</tr>
<tr>
<td>1130 Smart card reader assembly</td>
</tr>
<tr>
<td>1140 LCD unit</td>
</tr>
<tr>
<td>1150 Power-button card</td>
</tr>
<tr>
<td>1160 Fingerprint-reader card</td>
</tr>
<tr>
<td>1170 Keyboard assembly</td>
</tr>
<tr>
<td>For models with non-touch panel</td>
</tr>
<tr>
<td>2010 LCD bezel</td>
</tr>
<tr>
<td>2020 LCD hinges, LCD panel, and LCD cable</td>
</tr>
<tr>
<td>2030 Camera/microphone module and camera cable</td>
</tr>
<tr>
<td>2040 Wireless LAN/WAN antenna assembly and LCD rear-cover assembly</td>
</tr>
<tr>
<td>For models with touch panel</td>
</tr>
<tr>
<td>2010 LCD I-shaped bezel</td>
</tr>
<tr>
<td>2020 LCD hinges and LCD front metal bezel</td>
</tr>
<tr>
<td>2030 LCD panel, LCD cable, and LCD front strap bezel</td>
</tr>
<tr>
<td>2040 Camera/microphone module and camera cable</td>
</tr>
<tr>
<td>2050 Wireless LAN/WAN antenna assembly and LCD rear-cover assembly</td>
</tr>
</tbody>
</table>

**Appendix A. Notices** | 101 |
**Trademarks** | 102 |

**Appendix B. Abbreviation and acronym table** | 103 |
About this manual

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

ThinkPad X240          Machine types (MT) 20AL and 20AM.

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 19.
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 1
- “Safety inspection guide” on page 2
- “Handling devices that are sensitive to electrostatic discharge” on page 3
- “Grounding requirements” on page 4
- “Safety notices (multilingual translations)” on page 4

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. Make sure 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, make sure 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. Make sure 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.

Attention: 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.

**Attention:** Another person must be there to switch off the power, if necessary.
- Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

**Attention:** 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* when they are removed from their normal operating places in a machine:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators
  - Similar units as 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. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:
- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use 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

DANGERS

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.

DANGERS

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.

DANGERS

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.

DANGER

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.

قبل اعادة تشغيل الحاسب بعد الانتهاء من استبدال FRU، تأكد من أنه قد تم اعادة كل من المسامير و السروت وكل الأجزاء الصغيرة الأخرى في أماكنهم ولم يتم قدهم داخل الحاسب. ويمكن للتحقق من ذلك عن طريق هز الحاسب والاستماع لأي صوت صادب يصدر منه. قد تؤدي الأجزاء أو الرقائق المعدنية إلى حدوث دائرة قصيرة.
تحتوي بعض البطاريات الاحتياطية على كمية صغيرة من مادة التيتان والكادميوم. لا تقم بفك أو إعادة شحن البطارية الاحتياطية ولا تقم أيضاً بإلقائها في النار أو الماء ولا تتبسي في أحداث دائرة قصر بها. قد بالتخلص من البطارية كما هو موضح في القوانين المحلية. استخدم نوع البطارية المحدد والذي يوصى باستخدامها. حيث أنه قد يؤدي استخدام نوع بطارية غير صحيح إلى اشتعالها أو انفجارها.

تحتوي حزمة البطارية على كمية صغيرة من مادة التيتان. لا تقم بإلقائها أو القاءها في النار أو الماء ولا تتبسي في أحداث دائرة قصر بها. تخلص من حزمة البطارية وفقاً لما هو موضح في القوانين المحلية. قد استبدال حزمة البطارية، باستخدام الأنواع المحددة فقط والتي يوصى باستخدامها. حيث أنه قد يؤدي استخدام نوع بطارية غير صحيح إلى اشتعالها أو انفجارها.

قد تتسبب بطارية الليثيوم في حدوث حريق أو انفجار أو حدوث حرق سريع. لا تقم بإعادة شحن البطارية أو إزالة موصل الاستقاط البصري بها ولا تحاول أيضاً فكها أو تسخينها أكثر من 100 درجة مئوية (212 درجة فهرنهايت) أو حرقها أو تعرض محويت الخليطة الخاصة بها للماء. قد بالتخلص من البطارية وفقاً لما هو موضح في القوانين المحلية. استخدم نوع البطارية المحدد والذي يوصى باستخدامها. حيث أنه قد يؤدي استخدام نوع بطارية غير صحيح إلى اشتعالها أو انفجارها.

إذا ما تتسرب شائكة LCD وللأسلاك الداخلية حولك أو يليك، قد في الحال يعمل ب.ArrayList بالآلاء لمدة لا تقل عن 10 دقائق. إذا ما وجدت أي أعراض بعد العمل اطلب عندك المساعدة الطبية.

لتجنب التعرض لأي صدمات، لا تقم بإزالة الغطاء البلاستيكي الذي يحمي الجزء الأسفل من بطارية العكس.

على الرغم من أن البطاريات الرئيسة تكون لها جهد منخفض، إلا أنه قد تقوم البطاريات التي حدث صفر بها أو التي تم توصيلها أرضيًا بتصادار تيار كفي للحديد حروق للأفراد أو تعرض المواد القابلة للاشتعال للحريق.
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 soltos 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


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.
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.

VORSICHT

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.
危険

FRU の交換後、ThinkPad の電源を入れる前に、ねじ、パネ、その他の小さな部品がすべて正しい位置にあり、また ThinkPad の内部で鈍じんでいないことを確認してください。
これを確認するには、ThinkPad を振って、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、火または水の中への投棄、またはショートさせる事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。適切なペーパー・リストにあるバッテリーだけを使用してください。誤っ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

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、火または水の中に投げ込んだり、ショートさせないでください。バッテリー・バックの発熱にあたっては、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、適切なパーツ・リストにあるバッテリーだけを使用してください。誤っ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、または重症のけがなどを引き起こすことがありります。バックアップ・バッテリーの充電、その端末コネクターの取り外し、バッテリー本体の分解、100 ℃（212 ℉）以上への加熱、焼却、電池の混入を水に浸すことはしないでください。バッテリーを発熱する場合は地方自治体の条例に従ってください。適切なパーツ・リストにあるバッテリーだけを使用してください。誤っ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、液体が触れた部分を少なくとも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、インバーター・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、作業者のけがを負わせたり、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・バックを取り外して、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。

危険

FRUを破壊して、内蔵コンピューター構成要素を取扱い、その他のサーバ、ストレージ、または他のサーバ、ストレージ、または他のコンピューターの構成要素に影響を及ぼす可能性があるため、取り扱いに当たっては十分に注意してください。

警告

FRUを破壊して、内蔵コンピューター構成要素を取扱い、その他のサーバ、ストレージ、または他のサーバ、ストレージ、または他のコンピューターの構成要素に影響を及ぼす可能性があるため、取り扱いに当たっては十分に注意してください。
일부 보조 배터리에는 소량의 니켈 및 카드뮴이 포함되어 있습니다. 보조 배터리 품질은 블랙이나, 블랙 또는 흰색, 단락시키지 마십시오. 배터리를 풀기 쉬운 방식으로 미세봉을 사용하거나, 배터리를 개방할 때에는 해당 지역의 법규를 따르십시오. 배터리를 개방할 때에는 올바른 배터리를 사용해야 합니다. 올바르지 않은 배터리를 사용하면 배터리가 발화되거나 폭발할 수 있습니다.

위험

배터리 폐가는 소량의 니켈이 포함되어 있습니다. 배터리 폐기를 분해하지거나, 불 또는 물에 먼저거나, 단락시키지 마십시오. 배터리를 폐기할 때에는 해당 지역의 법규를 따르십시오. 배터리를 폐기할 때에는 올바른 배터리 사용하십시오. 올바르지 않은 배터리를 사용하면 배터리가 발화되거나 폭발할 수 있습니다.

위험

리튬 배터리는 화제, 폭발 또는 상각한 화상을 일으킬 수 있습니다. 리튬 배터리는 휴대 전화나, 극소 컨테이너를 채취하지 않으십시오. 배터리를 폐기할 때에는 해당 지역의 법규를 따르십시오. 배터리를 폐기할 때에는 올바른 배터리를 사용하십시오. 올바르지 않은 배터리를 사용하면 배터리가 발화되거나 폭발할 수 있습니다.

위험

LCD가 파손되어 LCD 내부의 액체가 눈에 들어가거나 손에 묻으면 즉시 깨끗한 물로 15분 이상 타내 내십시오. 꼭은 후에 조심하십시오 아종을 느껴면 즉시 병원에 가서 의사의 진찰을 받아야 합니다.

위험

전기적 위험을 방지하려면 인터페이스 기판 아래 부분을 보호하는 플라스틱 덮개를 제거하지 마십시오.

위험

기본 배터리의 전압은 낮지만, 단락되거나 전자레인지 배터리는 화상을 일으키기 충분한 전류와 가열성 물질을 발생시킬 수 있습니다.

위험

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

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. Comprúebeo 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 cortocircuite. 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 cortocircuite. 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.

PELIGRO

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 medica 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.
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.

危険

完成 FRU 更换之後，在開啟電腦的電源之前，請確定所有螺絲、彈簧及其它小零件都已歸位，沒有遺留在電腦內部。
若要確認這一點，請搖晃電腦，聽聽看是否有卡嗒的聲音。
金屬零件或儀錶的火花會造成電路短路。

危険

部分備用電池含有微量的鈹和銠。請勿拆開備用電池、再充電、丟入火或水中，
以使其形成短路。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。

危険

電池套件含有微量的鉛。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包裝。
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。

危険

鋰電池會導致起火、爆炸或嚴重燒傷。請勿再充電、拔除其電樞接頭、拆開、
加熱超過 100°C (212°F)、焚燒，或讓電池或其物質到水。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。

危険

如果 LCD 破裂導致 LCD 流出的液體沾到您的眼睛或手，請立即以清水沖洗沾
染部位至少 15 分鐘。如果在清洗後出現該液體所造成的任何症狀，請就醫治
療。

危険

為避免電擊，請勿拆下轉換卡下面的塑膠護蓋。

危険

雖然主電池的電壓很低，但短路或接地電池所產生的電流，仍足以使人燒傷或
使可燃物質起火。
危險

除非 FRU 允許以熱插換來替換，否則請依下列方式將其移除：將電腦關機，拔除插座上所有電源線，移除電池包，並拔開任何交互連接的線材。
Chapter 2. Important service information

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

- “Strategy for replacing FRUs” on page 19
  - “Strategy for replacing a hard disk drive or a solid-state drive” on page 19
  - “Important notice for replacing a system board” on page 20
  - “How to use error message” on page 20
- “Strategy for replacing FRUs for CTO, special-bid, and standard models” on page 20
  - “Product definition” on page 20
  - “FRU identification” on page 20

Important:
- 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 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 or a solid-state drive

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

Attention: The drive startup sequence in the computer you are servicing may 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.
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 BGA (Ball Grid Array) 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 may also cause false error codes. If no error code is displayed, see whether the error symptom is listed in the Symptom-to-FRU Index for the computer you are servicing.

Strategy for replacing FRUs for CTO, special-bid, and standard models
This topic provides information about the model types and FRU identification.

Product definition
This topic introduces different model types and how to identify each type.

Dynamic Configure To Order (CTO) model
This model provides the ability for a customer to configure a Lenovo solution from a Web site, 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-character MT, 4-character model, and 2-character country code. The model is “CTO1” and the default country code is “WW” (example: 20AACTO1WW).

Special-bid model
This model is a unique configuration that has been negotiated between Lenovo and the customer. A unique MTM consists of a 4-character MT, a 4-character model, and a numeric 2-character country code is provided to the customer to place orders (example: 20AA000955). The country code assigned is numeric and does not designate a specific country or region. The custom model factsheet for the MTM indicates which country the special-bid MTM is set up for. Special-bid offering is not generally announced.

Standard model
Standard models (fixed configuration) are announced and offered to all customers. The MTM portion of the machine label consists of a 4-character MT, a 4-character model, and an alphabetic 2-character country code. The country code assigned is alphabetic and represents a designated country or region (example: 20AA0009UK).

FRU identification
Use Lenovo eSupport to identify major FRUs, FRU part numbers, and FRU descriptions for a product at an MT - serial number level. Examples of major FRUs are hard disk drive, system board, liquid crystal display (LCD), and memory module.

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 introduces following information:

• "What to do first" on page 23
• "Checkout guide" on page 24
  – "Lenovo Solution Center" on page 24
  – "Quick test programs" on page 24
  – "UEFI diagnostic program" on page 25
  – "Bootable diagnostic programs" on page 25
• "Power system checkout" on page 26

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 and replacing FRUs.
• When you replace FRUs, it is recommended use new nylon-coated screws.
• Be extremely careful during such write operations as copying, saving, or formatting. The sequence of the drives in the computer that you are servicing 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 by referring to the web site: http://www.lenovo.com/serviceparts-loolup
• 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 subjected 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
- 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 computers.

**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

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 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 26, and check the power sources. If an error code is displayed, go to “Symptom-to-FRU index” on page 35 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 diagnostic program.

The options on the main screen are as follows:

<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:
1. Go to:
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 26, and check the power sources. If an error code is displayed, go to “Symptom-to-FRU index” on page 35 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 26, and check the power sources. If an error code is displayed, go to “Symptom-to-FRU index” on page 35 for error code descriptions and troubleshooting hints.
  2. Insert the CD into the external 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 CDx** (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 if the battery packs and the power adapter are functional, do the following:

1. Turn off the computer.
2. Connect the ac power adapter.
3. Turn on the computer. If the computer can be turned on, it means that either the battery pack or the ac power adapter is functional.
4. Insert a straightened paper clip into the emergency reset hole to reset the computer. If the computer is still powered on, it means that the ac power adapter is functional.
5. Turn off the computer.
6. Disconnect the ac power adapter and turn on the computer. If the computer can be turned on, it means that the battery pack is functional.

If you suspect that the power problem is caused by a specific power device, refer to the appropriate checkout item in the following list:

- “Checking the ac power adapter” on page 26
- “Checking operational charging” on page 27
- “Checking the coin-cell battery” on page 28

### Checking the ac power adapter

You are here because the computer fails only when the ac power adapter is used.
• If the system status indicator (the indicator in the ThinkPad logo or the indicator in the center of the power button) does not blink three times when an ac power source is connected, 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 27.

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.

<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 of 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 batteries charge properly during operation, do the following:
1. Discharge the batteries until the remaining battery power is less than 50%.
2. Connect the computer to ac power to charge the batteries. If the battery status icon in the Windows notification area indicates that the batteries are not charging, remove the batteries and let them return to room temperature.
3. Reinstall the batteries. If the batteries are still not charging, replace the batteries.
4. Check the battery status icon again. If the same error still exists, replace the system board.

Checking the external battery pack

This system supports only batteries specially designed for this specific system and manufactured by Lenovo or an authorized builder. The system does not support unauthorized batteries or batteries designed for other systems. If an unauthorized battery pack or a battery pack designed for another system is installed, the system will not charge.

Attention: Lenovo has no responsibility for the performance or safety of unauthorized batteries, and provides no warranties for failures or damage arising out of their use.

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 operating system: Open the Power Manager program and click the Battery tab.
• For Windows 8 operating system:
  – Open the Lenovo Settings program and click Power.
  – Open the Lenovo Support program and click Battery Health.
**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. Power off the computer.
2. Remove the battery pack and measure the voltage between battery terminals 1 (+) and 7 (-). See the following figure:

   ![Battery Terminals Diagram]

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Voltage (V dc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2</td>
<td>+0 to +12.6</td>
</tr>
<tr>
<td>6, 7</td>
<td>Ground (-)</td>
</tr>
</tbody>
</table>

3. If the voltage is less than +11.0 V dc, the battery pack has been discharged.
   If the voltage is still less than +11.0 V dc after recharging, replace the battery pack.
4. If the voltage is more than +11.0 V dc, 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. If the resistance is correct, replace the system board.

**Checking the coin-cell battery**

To check the coin-cell battery, do the following:
1. Disable the built-in battery. See “Disabling the built-in battery” on page 58.
2. Remove the coin-cell battery. See “1110 Coin-cell battery” on page 73.
3. Measure the voltage of the coin-cell battery.

   ![Coin-Cell Battery Diagram]

<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 coin-cell battery.
- If the coin-cell 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 29
- “Using the Windows recovery programs on the Windows 8 operating system” on page 30
- “Passwords” on page 32
- “Power management” on page 34
- “Symptom-to-FRU index” on page 35

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.

1. Connect an external CD/DVD drive.
2. Make the CD/DVD drive the first startup device in the startup sequence using the following procedure:
   a. Open the ThinkPad Setup program and select Startup → Boot.
   b. Select the CD/DVD drive as the 1st Boot Device.
3. Insert the bootable recovery disc into the CD/DVD drive.
4. Start the computer from the external CD/DVD drive.
5. When prompted, select your language and click Next.
6. Read the license and accept the terms and conditions. Then follow the instructions on the screen.
7. 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.
8. 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.

---

**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 31.

**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.

**Reseting 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 operating system if Windows 8 fails to start**

The Windows recovery environment on your computer is capable of operating independently from the Windows 8 operating system. This enables you to recover or repair the operating system even if the Windows 8 operating system fails to start.

After two consecutive failed boot attempts, the Windows recovery environment starts automatically. Then you can choose repair and recovery options by following the instructions on the screen.

**Note:** Ensure that your computer is connected to ac power during the recovery process.

**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://go.microsoft.com/fwlink/?LinkID=263800

Passwords
As many as three passwords may be needed for any 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 powered on by an unauthorized person. The password must be entered before an operating system can be started.

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.
2. Remove the built-in battery packs. For instructions on how to remove the battery pack, see “1030 Internal battery pack” on page 60.
3. Remove the backup battery. For instructions on how to remove the backup battery, see “1110 Coin-cell battery” on page 73. Wait for a few seconds.
4. Reinstall the backup battery. For instructions on how to install the backup battery, see “1110 Coin-cell battery” on page 73.
5. Reinstall the built-in battery packs. For instructions on how to install the battery pack, see “1030 Internal battery pack” on page 60.
6. Turn on the computer and wait until the POST ends. After the POST ends, the password prompt does not appear. The power-on password has been removed.

- 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 logo screen is displayed, immediately press F1. Type the supervisor password to enter the ThinkPad Setup program.
  4. Select Password.
  6. Type the current supervisor password in the Enter Current Password field. Then leave the Enter New Password field blank, and press Enter twice.
  7. In the Changes have been saved window, press Enter.
  8. Press F10 to save changes and exit the ThinkPad Setup program.

**Hard disk password**

There are two kinds of 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 it has, it can be used for access to 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 or the master 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 with a scheduled fee.

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

  1. Turn on the computer.
  2. When the logo screen is displayed, immediately press F1.
  3. When the user hard disk password icon is displayed on the screen, press F1. The master hard disk password icon is displayed. Enter the master hard disk password.
4. When the supervisor password icon is displayed, enter the supervisor password to enter the ThinkPad Setup program.
5. Select **Security**.
6. Select **Password**.
7. Select **Hard-disk x password**, where x is the letter of the hard disk drive. A pop-up window opens.
8. Select **Master hard disk password**.
9. 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.
10. 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.

**Supervisor password**

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

**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 on the taskbar.
2. Select **Power off display**.

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 or solid-state drive is powered off.
- The microprocessor stops.

To enter sleep mode, do one of the following:
- For Windows 7: Click the arrow beside the **Shutdown** icon from the **Start** menu, and then select **Sleep**. To return from sleep mode, press the Fn key.
- For Windows 8: Move the cursor to the bottom-right corner of the screen to display the charms. Then click **Settings → Power → Sleep**.

In certain circumstances, the computer goes into sleep mode automatically:
- After a period of inactivity specified in power plan settings
- When 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.

**Hibernation mode**

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

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.

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 or solid-state drive is read, and system status is restored from the hard disk drive or solid-state drive.

**Symptom-to-FRU index**

This section contains following information:
- “Numeric error codes” on page 36
- “Error messages” on page 37
- “Beep symptoms” on page 37
- “No-beep symptoms” on page 37
- “LCD-related symptoms” on page 37
- “Intermittent problems” on page 38
- “Undetermined problems” on page 38

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 38.

**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><strong>0177</strong> Bad SVP data, stop POST task—The checksum of the supervisor password in the EEPROM is not correct.</td>
<td>Replace the system board.</td>
</tr>
<tr>
<td><strong>0183</strong> Bad CRC of Security Settings in EFI Variable. Enter the ThinkPad Setup program. – The checksum of the Security settings in the EFI Variable is not correct.</td>
<td>1. Run the ThinkPad Setup program. The settings will be corrected automatically. Then save the current settings by pressing F10.  2. Replace the system board.</td>
</tr>
<tr>
<td><strong>0187</strong> EAIA data access error—The access to EEPROM is failed.</td>
<td>Replace the system board.</td>
</tr>
<tr>
<td><strong>0188</strong> Invalid RFID Serialization Information Area.</td>
<td>Replace the system board.</td>
</tr>
<tr>
<td><strong>0189</strong> Invalid RFID configuration information area—The EEPROM checksum is not correct.</td>
<td>Replace the system board.</td>
</tr>
<tr>
<td><strong>0190</strong> Critical low-battery error</td>
<td>1. Charge the battery pack.  2. Replace the battery pack.</td>
</tr>
<tr>
<td><strong>0191</strong> System Security—Invalid Remote Change requested.</td>
<td>1. Run the ThinkPad Setup program, and then save current setting by pressing F10.  2. Replace the system board.</td>
</tr>
<tr>
<td><strong>0199</strong> System Security—Security password retry count exceeded.</td>
<td>1. Run the ThinkPad Setup program. The retry count will be reset. Then save the current settings by pressing F10.  2. Replace the system board.</td>
</tr>
<tr>
<td><strong>1802</strong> Unauthorized network card is plugged in—Turn off and remove the network card.</td>
<td>1. Remove network card.  2. Replace the system board.</td>
</tr>
<tr>
<td><strong>1820</strong> 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>Remove all but the reader that you set up for the authentication.</td>
</tr>
<tr>
<td><strong>2100</strong> Detection error on HDD0 (Main HDD)</td>
<td>1. Reseat the hard disk drive.  2. Replace the main hard disk drive.  3. Replace the system board.</td>
</tr>
<tr>
<td><strong>2101</strong> Detection error on SSD1 (M.2)</td>
<td>1. Reseat the M.2 SSD device.  2. Replace the M.2 SSD device.  3. Replace the system board.</td>
</tr>
<tr>
<td><strong>2102</strong> Detection error on SSD2 (M.2)</td>
<td>1. Reseat the M.2 SSD device.  2. Replace the M.2 SSD device.  3. Replace the system board.</td>
</tr>
<tr>
<td><strong>2110</strong> Read error on HDD0 (Main HDD)</td>
<td>1. Reseat the hard disk drive.  2. Replace the main hard disk drive.  3. Replace the system board.</td>
</tr>
<tr>
<td><strong>2111</strong> Read error on SSD1 (M.2)</td>
<td>1. Reseat the M.2 SSD device.  2. Replace the M.2 SSD device.  3. Replace the system board.</td>
</tr>
<tr>
<td><strong>2112</strong> Read error on SSD2 (M.2)</td>
<td>1. Reseat the M.2 SSD device.  2. Replace the M.2 SSD device.  3. Replace the system board.</td>
</tr>
</tbody>
</table>
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>2200</td>
<td>Replace the system board.</td>
</tr>
<tr>
<td>2201</td>
<td>Replace the 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>Fan error.</td>
<td>1. Replace the fan.</td>
</tr>
<tr>
<td></td>
<td>2. Apply thermal grease.</td>
</tr>
<tr>
<td></td>
<td>3. Replace the system board.</td>
</tr>
<tr>
<td>Thermal sensing error.</td>
<td>Replace the system board.</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>Replace the 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. Replace the memory module.</td>
</tr>
<tr>
<td></td>
<td>2. Replace the system board.</td>
</tr>
<tr>
<td>Five short beeps</td>
<td>Replace the system board.</td>
</tr>
<tr>
<td>One long beep and two short beeps</td>
<td>Replace the 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, system status 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. Reseat memory module.</td>
</tr>
<tr>
<td></td>
<td>3. Replace the system board.</td>
</tr>
<tr>
<td>No beep, system status indicator on, and LCD blank during POST.</td>
<td>1. Reseat memory module.</td>
</tr>
<tr>
<td></td>
<td>2. Replace the 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 notebooks 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, system status indicator on, and a blank LCD during POST.</td>
<td>Replace the 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. Replace the LCD assembly.</td>
</tr>
<tr>
<td>• LCD brightness cannot be adjusted.</td>
<td>3. Replace the 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. Replace the LCD assembly.</td>
</tr>
<tr>
<td>• Wrong color displayed.</td>
<td>4. Replace the system board.</td>
</tr>
<tr>
<td>Horizontal or vertical lines displayed on LCD.</td>
<td>Replace the 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.

When analyzing an intermittent problem, do the following:
1. Run the diagnostic test for the system board in loop mode at least 10 times.
2. If no error is detected, do not replace any FRUs.
3. If any error is detected, replace the FRU shown by the FRU code. Rerun the test to verify that no more errors exist.

Undetermined problems

If the diagnostic tests did not identify the adapter or 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 26.
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. Printer, mouse, and other external devices
   c. Battery packs
   d. Hard disk drive or solid-state drive
   e. External diskette drive or optical drive
   f. Memory module
   g. M.2 cards
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 status indicators that show the status of the computer.

Table 7. Status indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Indicator behavior and description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Fn Lock indicator</td>
<td><strong>Off</strong> (default mode): The Fn Lock function is disabled. To initiate the special function of each key, press the function key directly. To input F1 - F12, press the Fn key and the corresponding function key.</td>
</tr>
<tr>
<td></td>
<td><strong>On</strong> (legacy mode): The Fn Lock function is enabled. To input F1 - F12, press the corresponding function key directly. To initiate the special function of each function key, press the Fn key and the corresponding function key.</td>
</tr>
<tr>
<td>2 Speaker-mute indicator</td>
<td>When the speaker-mute indicator is on, the speakers are muted.</td>
</tr>
<tr>
<td>3 Microphone-mute indicator</td>
<td>When the microphone-mute indicator is on, the microphones are muted.</td>
</tr>
<tr>
<td>Indicator</td>
<td>Indicator behavior and description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4 Camera status indicator</td>
<td>When the camera status indicator is on, the camera is in use.</td>
</tr>
<tr>
<td>5 System status indicator</td>
<td><strong>Blinking for three times</strong>: The computer is connected to an ac power source.</td>
</tr>
<tr>
<td></td>
<td><strong>On</strong>: The computer is in use.</td>
</tr>
<tr>
<td></td>
<td><strong>Off</strong>: The computer is off or in hibernation mode.</td>
</tr>
<tr>
<td></td>
<td><strong>Slow-blinking</strong>: The computer is in sleep mode.</td>
</tr>
<tr>
<td></td>
<td><strong>Fast-blinking</strong>: The computer is entering sleep or hibernation mode.</td>
</tr>
</tbody>
</table>
Chapter 6. Function keys and combinations

The following table describes the functions of function keys and key combinations.

Table 8. Function keys

<table>
<thead>
<tr>
<th>Function keys and key combinations</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fn+Esc</td>
<td>Press Fn+Esc to enable or disable the Fn Lock function and switch between default mode and legacy mode of using the function keys.</td>
</tr>
<tr>
<td>• <strong>When the Fn Lock function is disabled:</strong> The Fn Lock indicator is off. To initiate the special function of each function key, press the corresponding function key directly. To input F1 - F12, press the Fn key and the corresponding function key.</td>
<td></td>
</tr>
<tr>
<td>• <strong>When the Fn Lock function is enabled:</strong> The Fn Lock indicator turns on. To input F1 - F12, press the corresponding function key directly. To initiate the special function of each function key, press the Fn key and the corresponding function key.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F1</th>
<th>Speaker mute</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2</td>
<td>Speaker volume down</td>
</tr>
<tr>
<td>F3</td>
<td>Speaker volume up</td>
</tr>
<tr>
<td>F4</td>
<td>Microphone mute</td>
</tr>
<tr>
<td>F5</td>
<td>Brightness down</td>
</tr>
<tr>
<td>F6</td>
<td>Brightness up</td>
</tr>
<tr>
<td>F7</td>
<td>Switch a display output location.</td>
</tr>
<tr>
<td>F8</td>
<td>Enable or disable wireless features.</td>
</tr>
</tbody>
</table>
| F9  | For Windows 7: Open *Control Panel*.  
    For Windows 8: Open the *Settings* charm. |
| F10 | For Windows 7: Open *Windows Search*.  
    For Windows 8: Open the *Search* charm. |
| F11 | View all applications that are currently open. |
| F12 | For Windows 7: Open *Computer*.  
    For Windows 8: View all the programs. |
| Fn+Spacebar | Control the keyboard backlight. |
|            | There are three modes for the keyboard backlight: **Off**, **Low**, and **High**. Press Fn+Spacebar to change the modes of the keyboard backlight. |
| Fn+B       | The same function as the Break key on a conventional keyboard. |
| Fn+P       | The same function as the Pause key on a conventional keyboard. |
| Fn+S       | The same function as the SysRq key on a conventional keyboard. |
| Fn+K       | The same function as the ScrLK key on a conventional keyboard. |
| Fn+End     | The same function as the Insert key on a conventional keyboard. |
Chapter 7. Locations

This chapter introduces the locations of the hardware components on your computer.

Locating computer controls, connectors, and indicators

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

Front view

1 Camera (on some models)
2 Microphones
3 Power button
4 Security-lock slot
5 Ethernet connector
6 SIM card tray (on some models)
7 Media card reader
8 Always-On USB 3.0 connector
9 Combo audio connector
10 Fingerprint reader (on some models)
11 TrackPoint® pointing stick
12 ThinkPad trackpad
Left-side view

1. Power connector
2. Fan louvers
3. VGA connector
4. USB 3.0 connector
5. Mini DisplayPort® connector
6. Smart card reader (on some models)

Bottom view

1. Emergency-reset hole
2. Battery pack
3. Docking station connector (on some models)
4. Speakers

Locating FRUs and CRUs

This topic introduces the following service parts:
“Major FRUs” on page 48
“LCD FRUs” on page 50

Notes:
- Each FRU is available for all types or models, unless otherwise specified.
- A customer replaceable unit (CRU) is identified by a single asterisk (*) or two asterisks (**) in the CRU ID column. A single asterisk (*) means that the part is a self-service CRU; two asterisks (**) means that the part is an optional-service CRU. A letter “N” in the CRU ID column means that the part is not a CRU.
- **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 Guides & Manuals and then follow the on-screen instructions to find the manual for your product. You might be required to return the defective part that is replaced by the 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 and power cord. Other self-service CRUs depending on product design might include the memory module, wireless card, keyboard, and palm rest with fingerprint reader and ThinkPad trackpad.
- **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

<table>
<thead>
<tr>
<th>No.</th>
<th>FRU descriptions</th>
<th>CRU ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Hard-disk-drive cable bracket (see “Miscellaneous kits and other FRUs” on page 52)</td>
<td>N</td>
</tr>
<tr>
<td>1</td>
<td>LCD unit (see “LCD FRUs” on page 50)</td>
<td>N</td>
</tr>
<tr>
<td>2</td>
<td>Keyboard spacer</td>
<td>N</td>
</tr>
<tr>
<td>3</td>
<td>Keyboard bezel assembly with ThinkPad trackpad</td>
<td>N</td>
</tr>
<tr>
<td>4</td>
<td>Power-button card</td>
<td>N</td>
</tr>
<tr>
<td>5</td>
<td>SIM-card tray</td>
<td>N</td>
</tr>
<tr>
<td>No.</td>
<td>FRU descriptions</td>
<td>CRU ID</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>6</td>
<td>Fingerprint-reader card (on some models)</td>
<td>N</td>
</tr>
<tr>
<td>7</td>
<td>System board</td>
<td>N</td>
</tr>
<tr>
<td>8</td>
<td>Wireless-LAN card</td>
<td>**</td>
</tr>
<tr>
<td>9</td>
<td>Wireless-WAN card</td>
<td>**</td>
</tr>
<tr>
<td>9</td>
<td>M.2 solid-state drive</td>
<td>N</td>
</tr>
<tr>
<td>10</td>
<td>Speaker assembly</td>
<td>N</td>
</tr>
<tr>
<td>11</td>
<td>Hard disk drive or solid-state drive</td>
<td>**</td>
</tr>
<tr>
<td>12</td>
<td>Hard-disk-drive cable or solid-state-drive cable</td>
<td>**</td>
</tr>
<tr>
<td>13</td>
<td>Battery pack</td>
<td>*</td>
</tr>
<tr>
<td>14</td>
<td>Base cover assembly</td>
<td>**</td>
</tr>
<tr>
<td>15</td>
<td>Smart-card reader (on some models)</td>
<td>N</td>
</tr>
<tr>
<td>16</td>
<td>Flexible printed circuits (FPC) for smart-card reader (on some models)</td>
<td>N</td>
</tr>
<tr>
<td>17</td>
<td>Internal battery pack</td>
<td>N</td>
</tr>
<tr>
<td>18</td>
<td>Coin-cell battery</td>
<td>N</td>
</tr>
<tr>
<td>19</td>
<td>Memory module</td>
<td>**</td>
</tr>
<tr>
<td>20</td>
<td>Fan assembly</td>
<td>N</td>
</tr>
<tr>
<td>21</td>
<td>FPC for ThinkPad trackpad models with or without fingerprint reader</td>
<td>N</td>
</tr>
<tr>
<td>22</td>
<td>dc-in cable assembly</td>
<td>N</td>
</tr>
<tr>
<td>23</td>
<td>Keyboard</td>
<td>N</td>
</tr>
<tr>
<td>24</td>
<td>TrackPoint cap</td>
<td>*</td>
</tr>
</tbody>
</table>
LCD FRUs
For models with non-touch panel

Table 10. LCD FRUs

<table>
<thead>
<tr>
<th>No.</th>
<th>FRU descriptions</th>
<th>CRU ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>Rubber cable guides (see “Miscellaneous kits and other FRUs” on page 52)</td>
<td>N</td>
</tr>
<tr>
<td>1</td>
<td>LCD bezel</td>
<td>N</td>
</tr>
<tr>
<td>2</td>
<td>Camera/microphone module</td>
<td>N</td>
</tr>
<tr>
<td>3</td>
<td>Camera cable</td>
<td>N</td>
</tr>
<tr>
<td>4</td>
<td>Wireless LAN/WAN antenna assembly</td>
<td>N</td>
</tr>
<tr>
<td>5</td>
<td>LCD rear-cover assembly</td>
<td>N</td>
</tr>
<tr>
<td>6</td>
<td>LCD cable</td>
<td>N</td>
</tr>
<tr>
<td>7</td>
<td>LCD panel</td>
<td>N</td>
</tr>
<tr>
<td>8</td>
<td>LCD hinges</td>
<td>N</td>
</tr>
</tbody>
</table>
For models with touch panel

![Diagram of LCD FRUs]

<table>
<thead>
<tr>
<th>No.</th>
<th>FRU descriptions</th>
<th>CRU ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>Rubber cable guides (see “Miscellaneous kits and other FRUs” on page 52)</td>
<td>N</td>
</tr>
<tr>
<td>1</td>
<td>LCD panel</td>
<td>N</td>
</tr>
<tr>
<td>2</td>
<td>Camera/microphone module</td>
<td>N</td>
</tr>
<tr>
<td>3</td>
<td>Camera cable</td>
<td>N</td>
</tr>
<tr>
<td>4</td>
<td>Wireless-LAN/WAN antenna assembly</td>
<td>N</td>
</tr>
<tr>
<td>5</td>
<td>LCD rear-cover assembly</td>
<td>N</td>
</tr>
<tr>
<td>6</td>
<td>LCD front metal bezel</td>
<td>N</td>
</tr>
<tr>
<td>7</td>
<td>LCD front strap bezel</td>
<td>N</td>
</tr>
<tr>
<td>8</td>
<td>LCD cable</td>
<td>N</td>
</tr>
<tr>
<td>9</td>
<td>LCD I-shape bezel</td>
<td>N</td>
</tr>
<tr>
<td>10</td>
<td>LCD hinges</td>
<td>N</td>
</tr>
</tbody>
</table>
## Miscellaneous kits and other FRUs

### Table 12. Miscellaneous kits

<table>
<thead>
<tr>
<th>FRU descriptions</th>
<th>CRU ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>System miscellaneous kit:</td>
<td>N</td>
</tr>
<tr>
<td>- [A] Hard-disk-drive cable bracket (1)</td>
<td></td>
</tr>
<tr>
<td>- ThinkPad logo (4)</td>
<td></td>
</tr>
<tr>
<td>- Lenovo logo (2)</td>
<td></td>
</tr>
<tr>
<td>- Microphone rubber for camera model (4)</td>
<td></td>
</tr>
<tr>
<td>- Microphone rubber for non-camera model (4)</td>
<td></td>
</tr>
<tr>
<td>- [B] Rubber cable guide, left side (2)</td>
<td></td>
</tr>
<tr>
<td>- [B] Rubber cable guide, right side (2)</td>
<td></td>
</tr>
<tr>
<td>- Illustration sheet for ThinkPad trackpad</td>
<td></td>
</tr>
<tr>
<td>- Illustration sheet for ThinkPad trackpad 6</td>
<td></td>
</tr>
<tr>
<td>- Illustration sheet for ThinkPad trackpad 7</td>
<td></td>
</tr>
<tr>
<td>- Spec</td>
<td></td>
</tr>
<tr>
<td>Base cover miscellaneous kit:</td>
<td>N</td>
</tr>
<tr>
<td>- Rubber foot (8)</td>
<td></td>
</tr>
<tr>
<td>- Captured screw for docking model (10)</td>
<td></td>
</tr>
<tr>
<td>- Spec</td>
<td></td>
</tr>
<tr>
<td>Screw and tape kit:</td>
<td>N</td>
</tr>
<tr>
<td>- Screw, M2*L2.7 (46)</td>
<td></td>
</tr>
<tr>
<td>- Screw, M2.5*L4, flat head (8)</td>
<td></td>
</tr>
<tr>
<td>- Screw, M2*L3.5, silver, small head (40)</td>
<td></td>
</tr>
<tr>
<td>- Screw, black, flat head (4)</td>
<td></td>
</tr>
<tr>
<td>- Step screw, M2*L2.3 (4)</td>
<td></td>
</tr>
<tr>
<td>- Illustration sheet for ThinkPad trackpad 5</td>
<td></td>
</tr>
<tr>
<td>- Illustration sheet for ThinkPad trackpad 6</td>
<td></td>
</tr>
<tr>
<td>- Illustration sheet for ThinkPad trackpad 7</td>
<td></td>
</tr>
<tr>
<td>- Conductive sheet for ThinkPad trackpad R</td>
<td></td>
</tr>
<tr>
<td>- Conductive sheet for ThinkPad trackpad L</td>
<td></td>
</tr>
<tr>
<td>- Adhesive tape for ThinkPad trackpad</td>
<td></td>
</tr>
<tr>
<td>- Tape for fixing cable (102)</td>
<td></td>
</tr>
<tr>
<td>- Spec</td>
<td></td>
</tr>
</tbody>
</table>

### Table 13. Other FRUs

<table>
<thead>
<tr>
<th>FRU descriptions</th>
<th>CRU ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>ac power adapter</td>
<td>*</td>
</tr>
<tr>
<td>Power cord</td>
<td>*</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](http://www.lenovo.com/serviceparts-lookup)
Chapter 8. FRU replacement notices

This chapter presents notices related to removing and 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 Guides & Manuals and then follow the on-screen instructions to find the manual for your product. You might be required to return the defective part that is replaced by the 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.

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](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 that 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 54
- “Retaining the UUID” on page 55

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.

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

If you can not find the serial number of the system unit on the bottom of the computer, try the following method to get the number:

Note: Before you perform the operation, ensure that the UEFI/Legacy setting within the Startup menu in the ThinkPad Setup program is set to UEFI Only.
1. Connect a USB memory key to the computer.
2. Go to http://www.lenovo.com/maintenanceutilities and follow the instructions on the screen to create a Maintenance Key.

Note: Only an authorized Lenovo service technician can access the above Web site.
3. Restart the computer.
4. When the logo is displayed, press Esc. The ThinkPad Config Information Update Utility interface is displayed.
5. Type 1 under Enter the action desired, then press Enter. The ThinkPad Serial Number Update Utility for Asset ID screen is displayed.
6. Type 2 under Enter the action desired, then press Enter. The serial number of each device in your computer is displayed; the serial number of the system unit is listed as follow:
20- Serial number
7. Record the serial number of the system unit.

After you replace the system board, do the following to restore the serial number of the system unit:
1. Connect the Maintenance Key to the computer.
2. When the logo is displayed, press Esc. The ThinkPad Config Information Update Utility interface is displayed.

3. Type 1 under **Enter the action desired**, then press Enter. The ThinkPad Serial Number Update Utility for Asset ID screen is displayed.

4. Type 1 under **Enter the action desired**, then press Enter. Then follow the instructions on the screen to restore the serial number of the system unit.

**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, perform the following steps to create a new UUID for the system board if the system board does not have a UUID:

**Note:** Before you perform the operation, ensure that the UEFI/Legacy setting within the **Startup** menu in the ThinkPad Setup program is set to **UEFI Only**.

1. Connect a USB memory key to the computer.
2. Go to [http://www.lenovo.com/maintenanceutilities](http://www.lenovo.com/maintenanceutilities) and follow the instructions on the screen to create a Maintenance Key.

**Note:** Only an authorized Lenovo service technician can access the above Web site.

3. Restart the computer.
4. When the logo screen is displayed, press Esc. The ThinkPad Config Information Update Utility interface is displayed.
5. Type 2 under **Enter the action desired**, then press Enter. The Auto UUID generation utility interface is displayed.
6. Type y under **Change UUID. OK? [Y/N]**, then press Enter. 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) is 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 the box build date, select **5. Read box build date from EEPROM**, and follow the instruction 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 instructions on the screen. To write the 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 is available for downloading at [http://www.lenovo.com/support](http://www.lenovo.com/support). 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 part 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 53.
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 section. 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 screws as shown in the replacement procedures.

⚠️ **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.
- The system board is sensitive to, and can be damaged by, electrostatic discharge (ESD). Before touching it, establish personal grounding by touching a ground point with one hand or by using an electrostatic discharge strap.
Before servicing the computer

Carefully read this topic before servicing the computer.

Disabling the built-in battery

Before replacing any FRU, ensure that you have disabled the built-in battery by doing the following:

1. Turn off the computer and disconnect the ac power adapter and all cables from the computer.
2. Turn on the computer. When the ThinkPad logo is displayed, press F1 continuously to enter the ThinkPad Setup program.
3. Select Config → Power. The Power submenu is displayed.
4. Select Disable built-in battery.
5. Click Yes in the Setup Warning window, then the computer turns off automatically. Wait three to five minutes to let the computer cool.

The battery will be automatically enabled when the ac power adapter is reconnected to the computer.

Removing the SIM card tray

Before you start the servicing, remove the SIM card tray with the installed SIM card or dummy SIM card from the computer.

After you finish the servicing, ensure that you install the SIM card tray with the SIM card or dummy SIM card back into the computer.
1010 External battery pack

Important notice for replacing a battery pack

Attention: Lenovo has no responsibility for the performance or safety of unauthorized batteries, and provides no warranties for failures or damage arising out of their use.

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 on the computer, the customer should download and install the program to diagnose the battery pack, before getting a non-physically damaged battery pack replaced. Note that the replacement of a physically damaged battery pack is not covered by the warranty.

Removal steps of the external battery pack

DANGER

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

1020 Base cover assembly

For access, remove this FRU:
- “1010 External battery pack” on page 59

Note: Depending on the model, your computer might look slightly different from the illustrations in this topic.

Removal steps of the base cover assembly

Loosen the screws 1.
Applying labels to the base cover assembly:

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 that are not shipped with the new base cover, peel them from the old base cover, and adhere them to the new one.

The following illustration shows the location of each label.

1 S/N label
2 GEO label
3 IMEI label
4 NAL label
5 China GEO label
6 Certificate of Authenticity label
7 Genuine Microsoft label

1030 Internal battery pack

For access, remove this FRU:
• “1010 External battery pack” on page 59
• “1020 Base cover assembly” on page 59

Important notices for replacing a battery pack

Attention: Lenovo has no responsibility for the performance or safety of unauthorized batteries, and provides no warranties for failures or damage arising out of their use.

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 pack 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 on the computer, the customer should download and install the program to diagnose the battery pack, before getting a non-physically damaged battery pack replaced. Note that the replacement of a physically damaged battery pack is not covered by the warranty.

⚠️ DANGER

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

Removal steps of the internal battery pack

To disconnect the battery connector in step 2, use one finger to slightly hold the connector. Then use the other hand to hold the battery cable and pull it out horizontally.

Attention: When connecting the battery cable, align the battery cable with the battery connector first. Then insert the battery cable straight into the battery connector horizontally. Otherwise, the battery cable might be damaged.

<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, small-head, nylon-coated (3)</td>
<td>Silver</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
When installing:
Ensure that the internal battery pack is attached firmly.

1040 Memory module

For access, remove this FRU:
• “1010 External battery pack” on page 59
• “1020 Base cover assembly” on page 59

Removal steps of the memory module

When installing:
Insert the notched end of the memory module into the memory slot at an angle of about 20 degrees. Press the memory module in firmly, and pivot it downward until it snaps into place. Ensure that the memory module is firmly seated in the slot and does not move easily.

1050 Hard disk drive or solid-state drive and drive cable

For access, remove this FRU:
• “1010 External battery pack” on page 59
• “1020 Base cover assembly” on page 59
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 system is operating or in suspend mode.

Removal steps of the hard disk drive or solid-state drive and drive 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 × 4 mm, flat-head, nylon-coated (1)</td>
<td>Silver</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
<tr>
<td>2</td>
<td>M2 × 2.7 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 hard disk drive or solid-state drive is firmly attached.

**1060 Wireless-LAN card**

For access, remove this FRU:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59

**Removal steps of the wireless-LAN card**

In step 1, disconnect the connectors by using the removal tool for the antenna RF connector or pick off the connectors in the direction as shown by using your fingers.

<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 2.7 mm, flat-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

When installing:
Plug the gray cable into the main connector and the black cable into the auxiliary connector on the card.
1070 Wireless-WAN card or M.2 solid-state drive

For access, remove this FRU:
• “1010 External battery pack” on page 59
• “1020 Base cover assembly” on page 59

Removal steps of the wireless-WAN 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 × 2.7 mm, flat-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

Cable routing:
If you are servicing a WAN-ready model, do not remove the connector cap from the wireless-WAN cable. Route and secure the cables as shown in the following illustration.
Removal steps of the M.2 solid-state drive

<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 2.7 mm, flat-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

1080 Fan assembly

For access, remove this FRU:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
Removal steps of the fan assembly

1. Loosen the screws 1 in ascending alphabetical order 1a to 1d as illustrated.

2. Release the cables from the cable holder on the fan assembly.

3. Remove the fan assembly.
When installing:

- Always wear fingerstalls when handling the fan assembly. Do not touch or hold any part of the fan assembly with bare fingers.
- Before you attach the fan assembly to the computer, apply thermal grease, at an amount of 0.2 grams, on the part marked ④ in the following illustration. Either too much or too less application of grease can cause a thermal problem due to imperfect contact with a component. If a fan assembly needs to be reused, remove and reapply thermal grease.

- Do not touch the thermal grease.
- Do not press, touch, or rotate the fan impeller.
- Do not touch the fan inlet hole.
- Do not twist or pull the cable of the fan assembly.
- Do not apply pressure on the top and bottom covers of the fan assembly.
- Do not press the heat pipe. Hold both sides of the heat pipe if you need to take the fan assembly.
- Do not shake or drop the fan assembly.
- Ensure that the fan connector is attached firmly.
- Replace the fan assembly if you observe the following:
  - The cover of the fan assembly is deformed or damaged.
  - There is abnormal noise during rotation.

1090 dc-in cable assembly

For access, remove the following FRUs in order:

- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1080 Fan assembly” on page 67
Removal steps of the dc-in cable 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 4 mm, flat-head, nylon-coated (1)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

1100 System board

Important notices for handling the system board

When handling the system board, observe the following:

- The system board has an accelerometer, which can be broken when several thousands of G-forces are applied.

  **Note:** Dropping a system board from a height of as little as 15 cm (6 inches) so that it falls flat on a hard bench can subject the accelerometer to as much as 6000 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.

- 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 material.

For access, remove the following FRUs in order:

- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1030 Internal battery pack” on page 60
- “1040 Memory module” on page 62
- “1060 Wireless-LAN card” on page 65
- “1070 Wireless-WAN card or M.2 solid-state drive” on page 66
- “1080 Fan assembly” on page 67
Removal steps of the system 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 × 2.3 mm, big head, nylon-coated (2)</td>
<td>Black</td>
<td>0.181 Nm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

Chapter 9. Removing or replacing a FRU
### Step 14

**Screw (quantity)**

- M2 x 4 mm, flat-head, nylon-coated (2)

**Color**

- Silver

**Torque**

- 0.181 Nm (1.85 kgf-cm)

### Step 15

**Screw (quantity)**

- M2 x 3 mm, flat-head, nylon-coated (1)

**Color**

- Silver

**Torque**

- 0.181 Nm (1.85 kgf-cm)
When installing:
Ensure that the connectors are attached firmly.

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.

- Platform Controller Hub (PCH)
- Microprocessor

**1110 Coin-cell battery**

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1030 Internal battery pack” on page 60
- “1040 Memory module” on page 62
- “1060 Wireless-LAN card” on page 65
- “1070 Wireless-WAN card or M.2 solid-state drive” on page 66
- “1080 Fan assembly” on page 67
- “1100 System board” on page 70

⚠️ **DANGER**

Use only the authorized battery specified for your computer. Any other battery could ignite or explode.
Removal steps of the coin-cell battery

When installing:
Ensure that the coin-cell battery connector is attached firmly.

1120 Speaker assembly

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1030 Internal battery pack” on page 60
- “1040 Memory module” on page 62
- “1060 Wireless-LAN card” on page 65
- “1070 Wireless-WAN card or M.2 solid-state drive” on page 66
- “1080 Fan assembly” on page 67
- “1100 System board” on page 70

Removal steps of the 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 × 2.3 mm, big 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.

1130 Smart card reader assembly

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1030 Internal battery pack” on page 60
- “1040 Memory module” on page 62
- “1060 Wireless-LAN card” on page 65
- “1070 Wireless-WAN card or M.2 solid-state drive” on page 66
- “1080 Fan assembly” on page 67
- “1100 System board” on page 70
- “1120 Speaker assembly” on page 74

Removal steps of the smart card reader assembly
### 1140 LCD unit

For access, remove this FRU:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59

#### Removal steps of the LCD unit
<table>
<thead>
<tr>
<th>Step</th>
<th>Screw (quantity)</th>
<th>Color</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>M2 × 4 mm, flat-head, nylon-coated (6)</td>
<td>Silver</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
When installing:

- Ensure that the connectors are attached firmly.
- Ensure that you correctly route and secure the cables.

**Attention:** 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.

### 1150 Power-button card

For access, remove the following FRUs in order:

- “1020 Base cover assembly” on page 59
- “1030 Internal battery pack” on page 60
- “1040 Memory module” on page 62
- “1060 Wireless-LAN card” on page 65
- “1070 Wireless-WAN card or M.2 solid-state drive” on page 66
- “1120 Speaker assembly” on page 74
- “1080 Fan assembly” on page 67
- “1100 System board” on page 70
- “1140 LCD unit” on page 76
Removal steps of the power-button 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>M2.5 × 4 mm, flat-head, nylon-coated (2)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
<tr>
<td>2</td>
<td>M2 × 2.7 mm, flat-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.

1160 Fingerprint-reader card

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1030 Internal battery pack” on page 60
- “1040 Memory module” on page 62
- “1060 Wireless-LAN card” on page 65
- “1070 Wireless-WAN card or M.2 solid-state drive” on page 66
- “1120 Speaker assembly” on page 74
- “1080 Fan assembly” on page 67
- “1100 System board” on page 70
- “1140 LCD unit” on page 76
Removal steps of the fingerprint-reader 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>M2.5 × 4 mm, flat-head, nylon-coated (2)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
<tr>
<td>2</td>
<td>M2 × 2.7 mm, flat-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.

1170 Keyboard assembly

For access, remove the following FRUs in order:
• “1010 External battery pack” on page 59
• “1020 Base cover assembly” on page 59
• “1030 Internal battery pack” on page 60
• “1040 Memory module” on page 62
• “1050 Hard disk drive or solid-state drive and drive cable” on page 62
• “1060 Wireless-LAN card” on page 65
• “1070 Wireless-WAN card or M.2 solid-state drive” on page 66
• “1120 Speaker assembly” on page 74
• “1110 Coin-cell battery” on page 73
• “1080 Fan assembly” on page 67
• “1100 System board” on page 70
• “1140 LCD unit” on page 76

Removal steps of the keyboard 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 × 4 mm, flat-head, nylon-coated (5)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
For models with non-touch panel

2010 LCD bezel

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1140 LCD unit” on page 76

Removal steps of the LCD bezel

1. Use a slotted screwdriver or tweezers to gently pry up a corner of the LCD bezel.

2. Hold the corner and slowly peel off the LCD bezel.
When installing: Ensure that a new LCD bezel is used. Install a new LCD bezel whenever the old one is removed.

2020 LCD hinges, LCD panel, and LCD cable

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1140 LCD unit” on page 76
- “2010 LCD bezel” on page 83

Removal steps of the LCD hinges

<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 × 2.2 mm, big-head, nylon-coated (4)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>
Removal steps of the LCD panel and LCD cable
When installing: Ensure that the LCD connector is attached firmly.

**2030 Camera/microphone module and camera cable**

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1140 LCD unit” on page 76
- “2010 LCD bezel” on page 83
- “2020 LCD hinges, LCD panel, and LCD cable” on page 84

**Removal steps of the camera/microphone module and camera cable**
Chapter 9. Removing or replacing a FRU
2040 Wireless LAN/WAN antenna assembly and LCD rear-cover assembly

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1140 LCD unit” on page 76
- “2010 LCD bezel” on page 83
- “2020 LCD hinges, LCD panel, and LCD cable” on page 84
- “2030 Camera/microphone module and camera cable” on page 86

Removal steps of the wireless LAN/WAN antenna assembly
Cable routing:
When you install the antenna assembly and camera cable, route the camera cable in the cable holder and the antenna cable outside the cable holder.
Antenna locations

a Wireless-LAN auxiliary antenna (black)
b Wireless-WAN auxiliary antenna (blue)
c Wireless-WAN main antenna (red)
d Wireless-LAN main antenna (gray)

For models with touch panel

2010 LCD I-shaped bezel

For access, remove the following FRUs in order:
• “1010 External battery pack” on page 59
• “1020 Base cover assembly” on page 59
• “1140 LCD unit” on page 76

Removal steps of the LCD I-shaped bezel

1. Use a slotted screwdriver or tweezers to gently pry up a corner of the LCD I-shaped bezel.
2. Hold the corner and slowly peel off the LCD I-shaped bezel.

When installing: Ensure that a new LCD I-shaped bezel is used. Install a new LCD I-shape bezel whenever the old one is removed.

2020 LCD hinges and LCD front metal bezel

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1140 LCD unit” on page 76
- “2010 LCD I-shaped bezel” on page 90
Removal steps of the LCD hinges

<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 × 2.2 mm, big-head, nylon-coated (4)</td>
<td>Black</td>
<td>0.181 Nm (1.85 kgf-cm)</td>
</tr>
</tbody>
</table>

Hardware Maintenance Manual
Removal steps of the LCD front metal bezel
2030 LCD panel, LCD cable, and LCD front strap bezel

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1140 LCD unit” on page 76
- “2010 LCD I-shaped bezel” on page 90
- “2020 LCD hinges and LCD front metal bezel” on page 91
Removal steps of the LCD panel, LCD cable, and LCD front strap bezel
**When installing:** Ensure that the LCD connector is attached firmly.

**When installing:** Ensure that a new LCD front strap bezel is used. Install a new LCD front strap bezel whenever the old one is removed.

### 2040 Camera/microphone module and camera cable

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1140 LCD unit” on page 76
- “2010 LCD I-shaped bezel” on page 90
- “2020 LCD hinges and LCD front metal bezel” on page 91
- “2030 LCD panel, LCD cable, and LCD front strap bezel” on page 94
Removal steps of the camera/microphone module and camera cable

1
2
2050 Wireless LAN/WAN antenna assembly and LCD rear-cover assembly

For access, remove the following FRUs in order:
- “1010 External battery pack” on page 59
- “1020 Base cover assembly” on page 59
- “1140 LCD unit” on page 76
- “2010 LCD I-shaped bezel” on page 90
- “2020 LCD hinges and LCD front metal bezel” on page 91
- “2030 LCD panel, LCD cable, and LCD front strap bezel” on page 94
- “2040 Camera/microphone module and camera cable” on page 96
Removal steps of the wireless LAN/WAN antenna assembly

Cable routing:
When you install the antenna assembly and camera cable, route the camera cable in the cable holder and the antenna cable outside the cable holder.
Antenna locations

- a Wireless-LAN auxiliary antenna (black)
- b Wireless-WAN auxiliary antenna (blue)
- c Wireless-WAN main antenna (red)
- d Wireless-LAN main antenna (gray)
Appendix A. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
1009 Think Place - Building One
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary.

Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.
Trademarks
The following terms are trademarks of Lenovo in the United States, other countries or both:

- Lenovo
- ThinkPad
- TrackPoint

Mini DisplayPort (mDP) is a Trademark of the Video Electronics Standards Association.

Microsoft, Windows, and Windows Server are trademarks of the Microsoft group of companies.

Other company, product, or service names may be the trademarks or service marks of others.
## Appendix B. Abbreviation and acronym table

The following table lists some abbreviations and acronyms that might be used in this manual.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>3G</td>
<td>third generation of mobile telecommunications technology</td>
</tr>
<tr>
<td>BGA</td>
<td>Ball Grid Array</td>
</tr>
<tr>
<td>BIOS</td>
<td>basic input/output system</td>
</tr>
<tr>
<td>CMOS</td>
<td>complementary metal-oxide semiconductor</td>
</tr>
<tr>
<td>COA</td>
<td>Certificate of Authentication</td>
</tr>
<tr>
<td>CRC</td>
<td>cyclic redundancy check</td>
</tr>
<tr>
<td>CRT</td>
<td>cathode ray tube</td>
</tr>
<tr>
<td>CRU</td>
<td>customer-replaceable unit</td>
</tr>
<tr>
<td>CTO</td>
<td>Configure To Order</td>
</tr>
<tr>
<td>EAIA</td>
<td>Enhanced Asset Information Area</td>
</tr>
<tr>
<td>ECA</td>
<td>Engineering Change Announcements</td>
</tr>
<tr>
<td>EEPROM</td>
<td>Electrically Erasable Programmable Read-Only Memory</td>
</tr>
<tr>
<td>EFI</td>
<td>Extensible Firmware Interface</td>
</tr>
<tr>
<td>EPO</td>
<td>emergency power-off</td>
</tr>
<tr>
<td>ESD</td>
<td>electrostatic discharge</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FCC</td>
<td>Federal Communications Commission</td>
</tr>
<tr>
<td>FRU</td>
<td>Field Replaceable Unit</td>
</tr>
<tr>
<td>GAV</td>
<td>General Announce Variant</td>
</tr>
<tr>
<td>GPU</td>
<td>graphics processing unit</td>
</tr>
<tr>
<td>HDD</td>
<td>hard disk drive</td>
</tr>
<tr>
<td>HDMI</td>
<td>high-definition multimedia interface</td>
</tr>
<tr>
<td>ICs</td>
<td>integrated circuits</td>
</tr>
<tr>
<td>ICCID</td>
<td>integrate circuit card identity</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standardization Organization</td>
</tr>
<tr>
<td>LAN</td>
<td>local area network</td>
</tr>
<tr>
<td>LCD</td>
<td>liquid crystal display</td>
</tr>
<tr>
<td>MAC</td>
<td>media access control</td>
</tr>
<tr>
<td>MT</td>
<td>machine type</td>
</tr>
<tr>
<td>MTM</td>
<td>machine type and model</td>
</tr>
<tr>
<td>PC</td>
<td>personal computer</td>
</tr>
<tr>
<td>PCH</td>
<td>Platform Controller Hub</td>
</tr>
<tr>
<td>POST</td>
<td>power-on self-test</td>
</tr>
<tr>
<td>RAM</td>
<td>random-access memory</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Term</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>RF</td>
<td>radio frequency</td>
</tr>
<tr>
<td>RFID</td>
<td>radio-frequency identification</td>
</tr>
<tr>
<td>RI</td>
<td>ring indicator</td>
</tr>
<tr>
<td>RJ</td>
<td>registered jack</td>
</tr>
<tr>
<td>SATA</td>
<td>Serial Advanced Technology Attachment</td>
</tr>
<tr>
<td>SIM</td>
<td>subscriber identity module</td>
</tr>
<tr>
<td>SVP</td>
<td>supervisor password</td>
</tr>
<tr>
<td>TFTs</td>
<td>thin-film transistors</td>
</tr>
<tr>
<td>UEFI</td>
<td>Unified Extensible Firmware Interface</td>
</tr>
<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
</tr>
<tr>
<td>UUID</td>
<td>universally unique identifier</td>
</tr>
<tr>
<td>VGA</td>
<td>video graphics array</td>
</tr>
<tr>
<td>VRAM</td>
<td>video random-access memory</td>
</tr>
<tr>
<td>WAN</td>
<td>wide area network</td>
</tr>
</tbody>
</table>
Part Number: SP40A26001

Printed in China