ThinkPad

Hardware Maintenance Manual

ThinkPad Edge E220s and S220

Note: Before using this information and the product it supports, be sure to read the general information under "Notices" on page lxxxvii.

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About this manual

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

ThinkPad Edge E220s and S220

Machine Type (MT) 5038

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 2
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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 to 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 type specified in the parts list.
   c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-ThinkPad alterations. Use good judgment as to the safety of any non-ThinkPad alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check for cracked or bulging batteries.
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

DANGER

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

DANGER

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

DANGER

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

DANGER

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

DANGER

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

DANGER

To avoid shock, do not remove the plastic cover that protects the lower part of the inverter card.

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.

⚠️ خطر

قبل اعادة تشغيل الحاسب بعد الانتهاء من استبدال FRU، تأكد من أنه قد تم اعادة كل من المسامير و السوست وكل الأجزاء الصغيرة الأخرى في أماكنهم ولم يتم فقدهم داخل الحاسب.
ويمكن التحقق من ذلك عن طريق هز الحاسب والاستماع لأي صوت صاخب يصدر منه.
قد تؤدي الأجزاء أو الرقائق المعدنية الى حدوث دائرة قصر.

⚠️ خطر

تحتوي بعض البطاريات الاحتياطية على كمية صغيرة من مادتي النيكل والكادميوم. لا تقم بفك أو اعادة شحن البطارية الاحتياطية ولا تقم أيضا بالقائها في النار أو الماء ولا تتسبب في احداث دائرة قصر بها. قم بالتخلص من البطارية كما هو موضح في القوانين المحلية.
استخدم نوع البطارية المحدد والذي يوصى باستخدامه. حيث أنه قد يؤدي استخدام نوع بطارية غير صحيح الى اشتعالها أو انفجارها.

⚠️ خطر

تحتوي حزمة البطارية على كمية صغيرة من مادة النيكل. لا تقم بفكها أو القاءها في النار أو الماء ولا تتسبب في احداث دائرة قصر بها. تخلص من حزمة البطارية وفقا لما هو موضح في القوانين المحلية. قم، عند استبدال حزمة البطارية، باستخدام الأنواع المحددة فقط والتي يوصى باستخدامها. حيث أنه قد يؤدي استخدام نوع بطارية غير صحيح الى اشتعالها أو انفجارها.

⚠️ خطر

قد تتسبب بطارية الليثيوم في حدوث حريق أو انفجار أو حدوث حروق شديدة. لا تقم باعادة شحن البطارية أو ازالة موصل الاستقطاب الخاص بها ولا تحاول أيضا فكها أو تسخينها لأكثر من ١٠٠ درجة منوية (٢١٢ فهرنهايت) أو حرقها أو تعريض محتويات الخانة الخاصة بها للماء. قم بالتخلص من البطارية وفقا لما هو موضح في القوانين المحلية. استخدم نوع البطارية المحدد والذي يوصى باستخدامه. حيث أنه قد يؤدي استخدام نوع بطارية غير صحيح الى اشتعالها أو انفجارها.

⚠️ خطر

اذا ما انكسرت شاشة LCD ولامس السائل الداخلي عينيك أو يديك، قم في الحال بغسلهما بالماء لمدة لا تقل عن ١٥ دقيقة. اذا ما وجدت أي أعراض بعد الغسل اطلب عندئذ المساعدة الطبية.

![warning] خطر

لتجنب التعرض لأي صدمات، لا تقم بازالة الغطاء البلاستيكي الذي يحمي الجزء الأسفل
من بطاقة العاكس.

![warning] خطر

على الرغم من أن البطاريات الرئيسية يكون لها جهد منخفض، الا أنه قد تقوم البطاريات
التي حدث قصور بها أو التي تم توصيلها أرضيا باصدار تيار يكفي لحدوث حروق للأفراد
أو تعرض المواد القابلة للاشتعال للحريق.

![warning] خطر

ما لم يتم السماح بالتبديل الفوري لأي FRU الجاري استبداله بدون ضرورة اغلاق النظام، قم
بتنفيذ ما يلي قبل ازالته. قم بايقاف تشغيل الحاسب ونزع كل أسلاك الطاقة من المخارج الكهربائية
وقم أيضا بازالة حزمة البطارية ثم قم بفصل أي كابلات متصلة.

![warning]

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.

![warning]

PERIGO

Algumas baterias reserva contêm uma pequena quantidade de níquel e cádmio. Não desmonte uma bateria reserva, recarregue-a, jogue-a no fogo ou na água, ou deixe-a entrar em curto-circuito. 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.

![warning]

PERIGO

O pacote da bateria contém uma pequena quantidade de níquel. Não o desmonte, jogue-o no fogo ou na água, ou deixe-o entrar em curto-circuito. Descarte o pacote da bateria conforme requerido pelas leis ou regulamentos locais. Use somente a bateria nas partes listadas apropriadas ao substituir o pacote da bateria. O uso de uma bateria incorreta pode resultar em combustão ou explosão da bateria.

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 temperature supérieure à 100°C, ne la faites pas brûler et n'en exposez pas le contenu à l'eau. Mettez la pile au rebut conformément à la réglementation en vigueur. Une pile inappropriée risque de prendre feu ou d'exploser.

⚠️

DANGER

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

⚠️

DANGER

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

DANGER

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

DANGER

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

VORSICHT

Bevor nach einem FRU-Austausch der Computer wieder angeschlossen wird, muß sichergestellt werden, daß keine Schrauben, Federn oder andere Kleinteile fehlen oder im Gehäuse vergessen wurden. Der Computer muß geschüttelt und auf Klappergeräusche geprüft werden. Metallteile oder-splitter können Kurzschlüsse erzeugen.

VORSICHT

Die Bereitschaftsbatterie, die sich unter dem Diskettenlaufwerk befindet, kann geringe Mengen Nickel und Cadmium enthalten. Sie darf nur durch die Verkaufsstelle oder den IBM Kundendienst ausgetauscht werden. Sie darf nicht zerlegt, wiederaufgeladen, kurzgeschlossen, oder Feuer oder Wasser ausgesetzt werden. Die Batterie kann schwere Verbrennungen oder Verätzungen verursachen. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Bereitschafts-oder Systembatterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

VORSICHT

Akkus enthalten geringe Mengen von Nickel. Sie dürfen nicht zerlegt, wiederaufgeladen, kurzgeschlossen, oder Feuer oder Wasser ausgesetzt werden. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Batterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

VORSICHT

Die Systembatterie ist eine Lithiumbatterie. Sie kann sich entzünden, explodieren oder schwere Verbrennungen hervorrufen. Batterien dieses Typs dürfen nicht aufgeladen, zerlegt, über 100°C erhitzt oder verbrannt werden. Auch darf ihr Inhalt nicht mit Wasser in Verbindung gebracht oder der zur richtigen Polung angebrachte Verbindungsstecker entfernt werden. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Batterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

VORSICHT

Die Leuchtstoffröhre im LCD-Bildschirm enthält Quecksilber. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Der LCD-Bildschirm besteht aus Glas und kann zerbrechen, wenn er unsachgemäß behandelt wird oder der Computer auf den Boden fällt. Wenn der Bildschirm beschädigt ist und die darin befindliche Flüssigkeit in Kontakt mit Haut und Augen gerät, sollten die betroffenen Stellen mindestens 15 Minuten mit Wasser abgespült und bei Beschwerden anschließend ein Arzt aufgesucht werden.

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.

סכנה

לפני הפעלת המחשב לאחר החלפת FRU יש לוודא שכל הברגים, הקפיצים, וחלקים קטנים אחרים
נמצאים במקומם ואינם חופשיים לזוז בתוך המחשב. כדי לוודא זאת, יש לטלטל את המחשב
ולהקשיב לגילוי קולות שקשוק. חלקי או שבבי מתכת עלולים לגרום לקצרים חשמליים.

סכנה

סוללות המתוגה מסוימות מכילות כמות קטנה של ניקל וקדמיום. אין לפרק סוללת המתוגה,
לטעון אותה מחדש, להשליך אותה לאש או למים או לקצר אותה. יש לסלק את הסוללה
כנדרש על ידי התקנות והחוקים המקומיים. יש להשתמש רק בסוללה המופיעה ברשימת החלקים
המתאימה. שימוש בסוללה לא מתאימה עלול לגרום להצתה או התפוצצות של הסוללה.

סכנה

מארז הסוללה מכיל כמות קטנה של ניקל וקדמיום. אין לפרק את מארז הסוללה, להשליך אותו
לאש או למים או לקצר אותו. יש לסלק את מארז הסוללה הסוללה כנדרש על ידי התקנות
והחוקים המקומיים. יש להשתמש רק בסוללה המופיעה ברשימת החלקים המתאימים בזמן
החלפת מארז הסוללה. שימוש בסוללה לא מתאימה עלול לגרום להצתה או התפוצצות של
הסוללה.

סכנה

סוללת תליתיום עלולה לגרום לשריפה, להתפוצצות או לכוויות קשות. אין לטעון אותה מחדש,
לסלק את המחבר המקוטב שלה, לפרק אותה או לחמם אותה לטמפרטורה העולה על 100 מעלות
צלזיוס. אין לשרוף את הסוללה ואין לחשוף את תוכן תאה למים. יש לסלק את הסוללה כנדרש
בתקנות ובחוקים המקומיים. יש להשתמש רק בסוללה המופיעה ברשימת החלקים המתאימים.
שימוש בסוללה אחרת עלול לגרום לסכנת שריפה או התפוצצות.

סכנה

אם מסך תצוגה חנוזלי (LCD) נשבר והנוזל מתוך חמסך בא במגע עם עיניכם או ידיכם, שטפו את
האזורים חנגועים מיד במים במשך 15 דקות לפחות. פנו לקבלת עזרה רפואית אם תסמינים חנובעים
מהמגע עם חנוזל נמשכים לאחר חשטיפה.

סכנה

כדי למנוע התחשמלות, אין להסיר את מכסה הפלסטיק המגן על חלקו התחתון של הכרטיס
ההפך.

סכנה

אף שחסוללות הראשיות הן בעלות מתח נמוך, סוללה מקוצרת או מוארקת עלולה להפיק זרם
מספיק לגרימת כוויות או להצתת חומרים דליקים.

סכנה

אלא אם כן מותרת יְהחלפה חמרי של ה-FRU המוחלף, פעלו כדלהלן לפני הסרתו :
כבו את המחשב, נתקו את כל כבלי החשמל מהשקעים, הוציאו את מארז הסוללות ונתקו את כל הכבלים
המחוברים.

⚠️ 危険

FRU の交換後、 ThinkPad の電源を入れる前に、ねじ、バネ、その他の小さな部
品がすべて正しい位置にあり、また ThinkPad の内部で緩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ことは決して行わないでください。バッテリーを廃棄する
場合は地方自治体の条例に従ってください。適切なパーツ・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

バッテリー・パックには少量のニッケルが含まれています。バッテリー・パック
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・パックの廃棄にあたっては、地方自治体の条例または規則に従って
ください。バッテリー・パ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、または重症のやけどを引き起こすことが
あります。バックアップ・バッテリーの充電、その極性コネクターの取り外し、
バッテリー本体の分解、
100℃ (212 ˚F) 以上への加熱、焼却、電池の中身を水に浸すことはしないでくださ
い。バッテリーを廃棄する場合は地方自治体の条例に従ってください。適切な
パーツ・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、作業者にやけどを負わせたり、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・パックを取り外して、相互接続している
ケーブルをすべて切り離してください。

⚠ 위험

FRU를 교체하고 나서 컴퓨터 전원을 켜기 전에 모든 나사, 스프링 및 기타
작은 부품들이 올바른 위치에 있는지, 컴퓨터 내부에 단단하게 연결되어 있
는지 확인하십시오. 컴퓨터를 흔들어 달깍거리는 소리가 나지 않는지 확인하
십시오. 금속 부품 또는 금속 조각은 누전을 일으킬 수 있습니다.

⚠ 위험

일부 보조 배터리에는 소량의 니켈 및 카트뮴이 포함되어 있습니다. 보조 배
터리를 분해하거나, 다시 충전하거나, 불 또는 물에 던지거나, 단락시키지 마
십시오. 배터리 팩을 폐기할 때에는 해당 지역의 법률 규정을 따르십시오. 배
터리 팩을 교체할 때에는 올바른 배터리만 사용하십시오. 올바르지 않은 배터
리를 사용하면 배터리가 발화되거나 폭발할 수 있습니다.

⚠ 위험

배터리 팩에는 소량의 니켈이 포함되어 있습니다. 배터리 팩을 분해하거나,
불 또는 물에 던지거나, 단락시키지 마십시오. 배터리 팩을 폐기할 때에는 해
당 지역의 법률 규정을 따르십시오. 배터리 팩을 교체할 때에는 올바른 배터
리만 사용하십시오. 올바르지 않은 배터리를 사용하면 배터리가 발화되거나
폭발할 수 있습니다.

⚠ 위험

리튬 배터리는 화재, 폭발 또는 심각한 화상을 일으킬 수 있습니다. 리튬 배터
리를 다시 충전하거나, 극성 커넥터를 제거하거나, 분해하거나, 100C(212F)
이상으로 가열하거나, 소각하거나, 전지 내용물을 물에 노출시키지 마십시오.
배터리를 폐기할 때에는 해당 지역을 법률 규정을 따르십시오. 올바른 배터리
만 사용하십시오. 올바르지 않은 배터리를 사용하면 배터리가 발화되거나 폭
발할 수 있습니다.

⚠ 위험

LCD가 파손되어 LCD 내부의 액체가 눈에 들어가거나 손에 묻으면 즉시 깨끗한
물로 15분 이상 닦아 내십시오. 씻은 후에 조금이라도 이상을 느끼면 즉시 병원에
가서 의사의 진찰을 받아야 합니다.

⚠ 위험

전기적 위험을 방지하려면 인버터 카드의 아래 부분을 보호하는 플라스틱 덮개를
제거하지 마십시오.

⚠️ 위험

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

⚠️ 위험

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

⚠️PELIGRO

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

⚠️PELIGRO

Algunas baterías de reserva contienen una pequeña cantidad de níquel y cadmio. No las desmonte, ni recargue, ni las eche al fuego o al agua ni las 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 despues de lavarse.

⚠️PELIGRO

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

⚠️PELIGRO

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

⚠️PELIGRO

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

⚠️危險

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

⚠️危險

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

⚠️危險

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

⚠️危險

鋰電池會導致起火、爆炸或嚴重燒傷。請勿再充電、拔除其電極接頭、拆開、加熱超過 100°C (212°F) 、焚燒，或讓電池組成物浸到水。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。

⚠️ 危險

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。

⚠️ 危險

為避免電擊，請勿拆下轉換卡下面的塑膠護蓋。

⚠️ 危險

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 允許以熱抽換來替換，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 presents 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" on page 20
  - "Important notice for replacing a system board" on page 20
  - "How to use error message" on page 20
- "Strategy for replacing FRUs for CTO, CMV, and GAV" on page 20
  - "Product definition" on page 20
  - "FRU identification for CTO, CMV, and GAV products" on page 21

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:

Make sure 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/support and click **Drivers & Software**. Then follow the instructions on the screen to install the necessary software.

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.

Attention: The setup configuration on the computer you are servicing may have been customized. Running Automatic Configuration may alter the settings. Note the current configuration settings (using the View Configuration option); then, when service has been completed, verify that those settings remain in effect.

Strategy for replacing a hard disk drive

Always try to run a low-level format before replacing a hard disk drive. This will cause all customer data on the hard disk 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.

If your computer is shipped with an mSATA drive and a solid state drive or hard disk drive, the mSATA drive will be seen as hard disk 0 in the system, and assigned drive C:. The solid state drive or hard disk drive will be seen as hard disk 1, and assigned drive D:. The mSATA drive is installed in the wireless WAN card slot of the computer. The Lenovo preloaded software is installed on the mSATA drive.

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, CMV, and GAV

Product definition

Dynamic Configure To Order (CTO)

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

Custom Model Variant (CMV)

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

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

- The HMM will have the 4-digit MT and 3-digit CTO model only (Example: 1829-CTO). Again, CMVs are custom models and are not found in the HMM.

General Announce Variant (GAV)

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

FRU identification for CTO, CMV, and GAV products

There are three information resources to identify which FRUs are used to support CTO, CMV, and GAV products. These sources are PEW, eSupport, and the *Hardware Maintenance Manual*.

Using PEW

- **PEW** is the primary source for identifying FRU part numbers and FRU descriptions for the key commodities for CTO, CMV and GAV products at a MT - serial number level. An example of key commodities are hard disk drives, system boards, microprocessors, Liquid Crystal Displays (LCDs), and memory.

- Remember, all CTO and CMV products are loaded in PEW under the 4-digit MT and 3-digit model, where model = "CTO" (Example: 1829-CTO). GAVs are loaded in PEW under the 4-digit MT and 3-digit model, where model = a "fixed part number", not "CTO" (Example: 1829-F1U).

- PEW can be accessed at the following Web site:
  http://www.lenovo.com/support/site.wss/document.do?lndocid=LOOK-WARNTY
  Select Warranty lookup. Input the MT and the Serial number and the list of key commodities will be returned in the PEW record under COMPONENT INFORMATION.

Using eSupport

For key commodities (examples - hard disk drive, system board, microprocessor, LCD, and memory)

eSupport can be used to view the warranty status of key commodities built in a particular machine serial (this is the same record found in PEW). eSupport can be accessed at http://www.lenovo.com/support.

To view the warranty status of the key commodities on your computer, 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**.

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

eSupport also can be used to view the complete list of FRUs for a machine type and model.

To view the complete list of FRUs, do the following:
1. Go to http://www.lenovo.com/support.
2. Click **Parts & Accessories**.
3. Provide your product information or click **Launch** to automatically identify your product.
4. Click **Product & Parts Detail**.
5. On the PRODUCT AND PARTS DETAIL page, click **Parts Detail** to view the complete list of FRUs.

Using the *Hardware Maintenance Manual*

For key commodities (examples - hard disk drive, system board, microprocessor, LCD, and memory)

Use the *Hardware Maintenance Manual* as a backup to PEW and eSupport to view the complete list of FRUs at the MT model level.

Chapter 3. General checkout

This chapter presents following information:
- "What to do first" on page 23
- "Checkout guide" on page 24
  - "System supporting the Lenovo ThinkVantage Toolbox program and the PC-Doctor for DOS diagnostics program" on page 24
  - "System supporting the Lenovo diagnostics programs" on page 28
- "Power system checkout" on page 30

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

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

Important notes:

- **Only certified trained personnel should service the computer.**

- **Before replacing any FRU, read the entire page on removing and replacing FRUs.**

- **When you replace FRUs, it is recommended to use new nylon-coated screws.**

- **Be extremely careful during such write operations as copying, saving, or formatting.** Drives in the computer that you are servicing sequence might have been altered. If you select an incorrect drive, data or programs might be overwritten.

- **Replace a FRU only with another FRU of the correct model.** When you replace a FRU, make sure that the model of the machine and the FRU part number are correct by referring to the FRU parts list.

- **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 do 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
- Improper disc insertion or use of an optical drive
- Diskette drive damage caused by pressure on the diskette drive cover, foreign material in the drive, or the insertion of a diskette with multiple labels
- Damaged or bent diskette eject button
- Fuses blown by attachment of a nonsupported device
- Forgotten computer password (making the computer unusable)
- Sticky keys caused by spilling a liquid onto the keyboard
- Use of an incorrect ac power adapter on laptop products

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

Checkout guide

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

Note: The diagnostic tests are intended to test only ThinkPad products. The use of non-ThinkPad products, prototype cards, or modified options can lead to false indications of errors and invalid system responses.

1. Identify the failing symptoms in as much detail as possible.
2. Verify the symptoms. Try to re-create the failure by running the diagnostic test or by repeating the operation.

System supporting the Lenovo ThinkVantage Toolbox program and the PC-Doctor for DOS diagnostics program

The section provides information about ThinkPad computers that support the Lenovo ThinkVantage Toolbox program and the PC-Doctor® for DOS diagnostics program. Some descriptions might not apply to your particular computer.

Diagnostics using PC-Doctor for DOS

The ThinkPad notebook computer has a test program called PC-Doctor for DOS (hereafter called *PC-Doctor*.) You can detect errors by running the diagnostics test included in PC-Doctor.

Note: PC-Doctor for DOS is available at the following Web site:

http://www.lenovo.com/support

To create the PC-Doctor diagnostic CD, follow the instructions on the Web site.

For some possible configurations of the computer, PC-Doctor might not run correctly. To avoid this problem, you need to initialize the computer setup by use of the ThinkPad Setup before you run PC-Doctor.

To enter ThinkPad Setup, do as follows:

1. Turn on the computer.
2. When the ThinkPad logo comes up, immediately press F1 to enter the ThinkPad Setup.

Note: If a supervisor password has been set by the customer, ThinkPad Setup menu appears after the password is entered. You can start the ThinkPad Setup program by pressing Enter instead of entering the supervisor password; however, you cannot change the parameters that are protected by the supervisor password.

On the ThinkPad Setup screen, press F9, Enter, F10, and then Enter.

Note: When you initialize the computer configuration, some devices are disabled, such as the serial port. If you test one of these devices, you will need to enable it by using Configuration utility for DOS. The utility is available on the following Web site: http://www.lenovo.com/support

Testing the computer

Note: The PC-Doctor diagnostic CD does not support any optical drives connected through USB devices or any others. It supports only the internal optical drive of the ThinkPad notebook computer.

To run the test, do as follows:

1. Turn off the computer.
2. Make sure that the optical drive that is supported as a startup device is installed to the computer you are servicing.
3. Turn on the computer. If the computer cannot be powered on, go to "Power system checkout" on page 30, and check the power sources.

   If an error code appears, go to "Symptom-to-FRU index" on page 37.
4. When the ThinkPad logo comes up, immediately press F12 to enter the Network Boot menu.
5. Insert the PC-Doctor CD into the optical drive.
6. Press cursor keys to select **ATAPI CDx** (x: 0, 1, ...) and then press Enter.
7. Follow the instructions on the screen.
8. The main panel of PC-Doctor appears.
9. Select **Diagnostics** with the arrow keys, and press Enter.

   Note: You can select an item not only with the arrow keys, but also with the TrackPoint® pointer. Instead of pressing Enter, click the left button.

   A pull-down menu appears. (Its exact form depends on the model.)

   Note: PC-Doctor menu does not mean the formal support device list. Some unsupported device names may appear in the PC-Doctor menu.

```
Diagnostics    Interactive Tests    Hardware Info    Utility    Quit    F1=Help
┌─────────────────┐
│ Run Normal Test │
  Run Quick Test
  CPU/Coprocessor
  System Memory
  Systemboard
  Video Adapter
  Fixed Disks
  Diskette Drives
  Other Devices
  Communication
  Wireless LAN




    ┌──────────────────────────────────────────────────────────────┐
    │ PC-DOCTOR 2.0  Copyright 2008 PC-Doctor, Inc.  All Rights Reserved. │
    └──────────────────────────────────────────────────────────────┘


  Use the cursor keys and ESC to move in menus. Press ENTER to select.
```
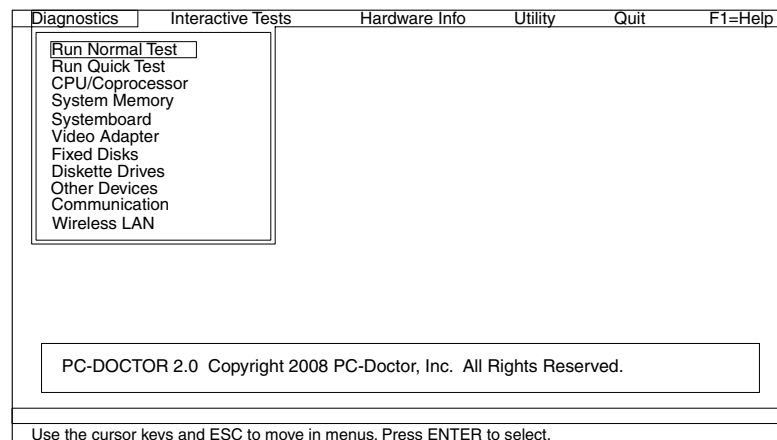
The options on the test menu are as follows:

Diagnostics	Interactive Tests
• Run Normal Test • Run Quick Test • CPU/Coprocessor • System Memory • System board • Video Adapter • Fixed Disks • Diskette Drives • Other Devices • Communication • Wireless LAN	• Keyboard • Video • Internal Speaker • Mouse • Diskette • System Load • Optical Drive Test • Intel® WLAN Radio Test

Notes:

• In the **Keyboard** test in **Interactive Tests**, the Fn key should be held down for at least 2 seconds; otherwise, it cannot be sensed.

• **Video Adapter** test supports only the LCD display on the ThinkPad notebook computer. If you have an external monitor attached to the computer, detach it before running PC-Doctor for DOS.

• To test **Digital Signature Chip**, the security chip must be set to Active.

10. Run the applicable function test.

11. Follow the instructions on the screen. If there is a problem, PC-Doctor shows messages describing it.

12. To exit the test, select **Quit — Exit Diag**. To cancel the test, press Esc.

Note: After running PC-Doctor, check the time and date on the system and reset them if they are incorrect.

Detecting system information with PC-Doctor

PC-Doctor can detect the following system information:

Hardware Info

System Configuration
Memory Contents
Physical Disk Drives
VGA Information
ATA Drive Info
PCI Information
SMBIOS Info
VESA LCD Info
Hardware Events Log

Utility

Run External Tests
Benchmark System
DOS Shell
Tech Support Form
Battery Rundown
Erase Drive Contents
View PCDR Host Log

Lenovo ThinkVantage Toolbox

Lenovo ThinkVantage® Toolbox is a diagnostic program that works through the Windows® operating system. It enables you to view symptoms of computer problems and solutions for them, and includes automatic notification when action is required, computing assistance, advanced diagnostics, and diagnostic history.

Note: To install the latest Lenovo ThinkVantage Toolbox on the computer, go to http://web.lenovothinkvantagetoolbox.com/ click **Download Lenovo ThinkVantage Toolbox**, and then follow the instructions on the Web site.

To run this program, do as follows:

Windows 7:

Click **Start ➙ Control Panel ➙ System and Security ➙ Lenovo - System Health and Diagnostics**.

Windows XP:

Click **Start ➙ All Programs ➙ ThinkVantage ➙ Lenovo ThinkVantage Toolbox**.

Follow the instructions on the screen. Lenovo ThinkVantage Toolbox also has problem determination aids that determine software and usage problems.

For additional information about this program, see the Help for the program.

FRU tests

The following table shows the test for each FRU.

Table 1. FRU tests

FRU	Applicable test
System board	1. **Diagnostics ➙ CPU/Coprocessor** 2. **Diagnostics ➙ Systemboard**
Power	**Diagnostics ➙ ThinkPad Devices ➙ AC Adapter, Battery 1 (Battery2)**
LCD unit	1. **Diagnostics ➙ Video Adapter** 2. **Interactive Tests ➙ Video**
Audio	Enter the ThinkPad Setup and change Serial ATA (SATA) setting to **Compatibility**, and run **Diagnostics ➙ Other Device ➙ Conexant Audio**
Speaker	**Interactive Tests ➙ Internal Speaker** **Note:** Once Audio test is done, the no sound is heard this test. In this case, turn off and turn on the computer. Then, run this test again.
Keyboard	1. **Diagnostics ➙ Systemboard ➙ Keyboard** 2. **Interactive Tests ➙ Keyboard**
Hard disk drive or solid state drive (SSD)	Enter the ThinkPad Setup and change Serial ATA (SATA) setting to **Compatibility**, and run **Diagnostics ➙ Fixed Disks**
Diskette drive	1. **Diagnostics ➙ Diskette Drives** 2. **Interactive Tests ➙ Diskette**
Optical drive	1. **Diagnostics ➙ Other Devices ➙ Optical Drive** 2. **Interactive Tests ➙ Optical Drive Test**
Memory	1. If two DIMMs are installed, remove one of them and run **Diagnostics ➙ System Memory**. 2. If the problem does not recur, return the DIMM to its place, remove the other one, and run the test again.

Table 1. FRU tests (continued)

FRU	Applicable test
TrackPoint or pointing device	If the TrackPoint does not work, check the configuration as specified in the ThinkPad Setup. If the TrackPoint is disabled, select **Automatic** to enable it. After you use the TrackPoint, the pointer may drift on the screen for a short time. This drift can occur when a slight, steady pressure is applied to the TrackPoint pointer. This symptom is not a hardware problem. If the pointer stops after a short time, no service action is necessary. If enabling the TrackPoint does not correct the problem, continue with the following: • **Interactive Tests → Mouse**
Touch Pad	If the Touch Pad does not work, check the configuration as specified in the ThinkPad Setup. If the Touch Pad is disabled, select **Automatic** to enable it. If enabling the Touch Pad does not correct the problem, continue with the following: • **Interactive Tests → Mouse**

System supporting the Lenovo diagnostics programs

The section provides information about ThinkPad computers that support the Lenovo diagnostics programs. Some descriptions might not apply to your particular computer.

The Lenovo diagnostics programs include the following:

- Lenovo Solution Center
- Quick test programs
- UEFI diagnostic program
- Bootable diagnostic programs

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.

Note: The Lenovo Solution Center program is available only on models preinstalled with the Windows 7 operating system. It also can be downloaded from http://www.lenovo.com/diagnose.

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

For additional information about this program, see the help information system of that program.

Quick test programs

Lenovo Hard Drive Quick Test and Lenovo Memory Quick Test are two quick test programs that enable you to troubleshoot and resolve computer internal storage and memory problems.

Notes:

- If the computer you are servicing is not installed with the Lenovo Solution Center program, you can download the quick test programs from the Lenovo Support Web site.
- The two programs are applicable to computers installed with the Windows 7, Windows XP, Windows Server 2003, or Windows Server 2008 operating system.

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

To run a quick test using the downloaded program, do the following:

1. Go to the C:\SWTOOLS\ldiag folder.

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 tests to be performed.

7. Follow the instructions on the screen to start the test. When a problem is detected, information messages will be 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 and internal storage problems, 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 30, and check the power sources. If an error code is displayed, go to "Symptom-to-FRU index" on page 37 for error code descriptions and troubleshooting hints.

2. When the ThinkPad logo is displayed, repeatedly press and release the F12 key. When the Boot Menu window opens, release the F12 key.

3. Press the Tab key to switch to the Application Menu window.

4. Use the arrow keys to select **Lenovo Diagnostics** and then press Enter. The main screen of the UEFI diagnostic program is displayed.

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

The options on the main screen are as follows:

Tests	Tools
• Quick Memory Test • Quick Storage Device Test • Exit Application	• System Information • Recover Bad Sectors Tool

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 http://www.lenovo.com/diagnose.

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 30, and check the power sources. If an error code is displayed, go to "Symptom-to-FRU index" on page 37 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 30, and check the power sources. If an error code is displayed, go to "Symptom-to-FRU index" on page 37 for error code descriptions and troubleshooting hints.

    2. Insert the CD into the optical drive.

    3. Restart the computer.

    4. When the ThinkPad logo is displayed, repeatedly press and release the F12 key. When the Boot Menu window opens, release the F12 key.

    5. Use the arrow keys to select **ATAPI 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 a symptom, do the following:
1. Turn off the computer.
2. Connect the ac power adapter.
3. Check that power is supplied when you turn on the computer.
4. Insert a straightened paper clip into the emergency reset hole to reset the computer. Confirm the system is still powered on.
5. Turn off the computer.
6. Disconnect the ac power adapter.
7. Check that the battery pack supplies power when you turn on the computer.

If you suspect a power problem, see the appropriate one of the following power supply checkouts:
- "Checking the ac power adapter" on page 30
- "Checking operational charging" on page 31
- "Checking the battery pack" on page 31
- "Checking the backup battery" on page 31

Checking the ac power adapter

You are here because the computer fails only when the ac power adapter is used.

- If the power-on indicator does not turn on, check the power cord of the ac power adapter for correct continuity and installation.

- If the computer does not charge during operation, go to "Checking operational charging" on page 31

To check the ac power adapter, do the following:
1. Unplug the ac power adapter cable from the computer.
2. Measure the output voltage at the plug of the ac power adapter cable. See the following figure:
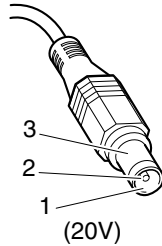
Pin	Voltage (V dc)
1	+20
2	0
3	Ground

Note: Output voltage across pin 2 of the ac power adapter might be different from the one you are servicing.

3. If the voltage is not correct, replace the ac power adapter.

4. If the voltage is acceptable, do the following:

- Replace the system board.

- If the problem persists, go to "FRU tests" on page 27.

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

Checking operational charging

To check whether the battery charges properly during operation, use a discharged battery pack or a battery pack that has less than 50% of the total power remaining when installed in the computer.

Perform operational charging. If the battery status indicator or icon does not turn on, replace the battery pack.

If the charge indicator still does not turn on, replace the system board.

Checking the battery pack

Battery charging does not start until the Power Manager Battery Gauge shows that less than 96% of the total power remains; under this condition the battery pack can charge to 100% of its capacity. This protects the battery pack from being overcharged or from having a shortened life.

To check your battery, move your cursor to the Power Manager Battery Gauge icon in the icon tray of the Windows taskbar and wait for a moment (but do not click), and the percentage of battery power remaining is displayed. To get detailed information about the battery, double-click the Power Manager Battery Gauge icon.

Check the main battery status good or not by using Power Manager. Make sure that the power scheme in Power Manager is **Always Fully charge**.

Checking the backup battery

Do the following:

1. Disable the battery pack in UEFI BIOS (see "1000 Disabling the battery pack in UEFI BIOS" on page 50).

2. Remove the backup battery (see "1040 Backup battery" on page 56).

3. Measure the voltage of the backup battery. See the following figure.

Red (+)
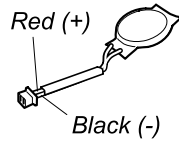
Black (-)

Wire	Voltage (V dc)
Red	+2.5 to +3.2
Black	Ground

- If the voltage is correct, replace the system board.
- If the voltage is not correct, replace the backup battery.
- If the backup battery discharges quickly after replacement, replace the system board.

Chapter 4. Related service information

This chapter presents following information:
- "Restoring the factory contents by using Recovery Disc Set" on page 33
- "Passwords" on page 34
- "Power management" on page 36
- "Symptom-to-FRU index" on page 37

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 Recovery Disc Set

When the hard disk drive (HDD) or solid state drive is replaced because of a failure, no product recovery program is on the new drive. In this case, you must use the Recovery Disc Set for the computer. Order the Recovery Disc Set and the drive at the same time so that you can recover the new drive with the pre-installed software when they arrive. For information on which discs to order, see "Recovery discs" on page 81.

The recovery disc set consists of the user instructions and the following set of DVDs to restore the computer to the original factory configuration.

Operating System Recovery Disc (one disc)

This disc restores the Microsoft® Windows operating system. Use this disc to start the recovery process.

Applications and Drivers Recovery Disc (one or more discs)

This disc restores the preinstalled applications and drivers on the computer.

Supplemental Recovery Disc

This disc contains additional content, such as updates to the software that was preinstalled on the computer. Not all recovery disc sets come with a *Supplemental Recovery Disc*.

Notes:

- You must have a DVD drive to use the recovery discs. If you do not have an internal DVD drive, you can use an external USB DVD drive.
- 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.

To restore the computer to the original factory configuration using the recovery disc set, do the following:

Note: Recovery takes several hours. The length of time depends on the method you use. If you use recovery discs, recovery takes at least five hours.

1. Make the CD/DVD drive the first startup device in the startup sequence using the following procedure:
   a. Press and hold down the F1 key, and then turn on the computer. When the logo screen is displayed or if you hear repeating beeps, release the F1 key. The ThinkPad Setup opens.
   b. Use the arrow keys to select **Startup ➔ Boot**.

c. Select the CD/DVD drive as the **1st Boot Device**.

2. Insert the *Operating System Recovery Disc* into the DVD drive.

3. Press F10 to save the ThinkPad Setup configuration changes. Follow the instructions on the screen to begin the recovery process.

4. Select your language and click **Next**.

5. Read the license. If you agree with the terms and conditions, select **I accept these terms and conditions** and then click **Next**. If you do not agree with the terms and conditions, follow the instructions on the screen.

6. Click **Yes** in the displayed window to begin the operating system recovery process.

7. Insert the *Applications and Drivers Recovery Disc* when prompted and then click **OK** to begin the applications and drivers recovery process.

8. If you have a *Supplemental Recovery Disc*, insert it when prompted and click **Yes**. If you do not have a *Supplemental Recovery Disc*, click **No**.

9. When all of the data has been copied from the last disc in the set and has been processed, remove the disc and restart the computer.

   Note: The rest of the recovery process is fully automated and no action is required by you. 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.

10. When the recovery process is complete, the Set Up Windows screen is displayed. Follow the instructions on the screen to complete the Windows setup.

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

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

Passwords

As many as three passwords may be needed for any ThinkPad notebook computer: the power-on password (POP), the hard-disk password (HDP), and the supervisor password (SVP).

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

Exception: If only an SVP is installed, the password prompt does not appear when the operating system is booted.

Power-on password

A power-on password (POP) protects the system from being powered on by an unauthorized person. The password must be entered before an operating system can be booted. For how to remove the POP, see "How to remove the power-on password" on page 35.

Hard-disk password

There are two hard-disk passwords (HDPs):

• User HDP—for the user

• Master HDP—for the system administrator, who can use it to get access to the hard disk even if the user has changed the user HDP

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

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

For how to remove the POP, see "How to remove the hard-disk password" on page 35.

Supervisor password

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

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

How to remove the power-on password

To remove a POP that you have forgotten, do the following:

(A) If no SVP has been set:
1. Disable the battery pack in UEFI BIOS (see "1000 Disabling the battery pack in UEFI BIOS" on page 50).
2. Remove the backup battery. For how to remove the backup battery, see "1040 Backup battery" on page 56.
3. Turn on the computer and wait until the POST ends. After the POST ends, the password prompt does not appear. The POP has been removed.
4. Make sure that the battery pack is disabled in UEFI BIOS (see "1000 Disabling the battery pack in UEFI BIOS" on page 50).
5. Reinstall the backup battery.

(B) If an SVP has been set and is known by the service technician:
1. Turn on the computer.
2. When the ThinkPad logo comes up, immediately press F1.
3. Type in the supervisor password to enter ThinkPad Setup.
4. Select **Security**, using the cursor directional keys to move down the menu.
5. Select **Password**.
6. Select **Power-On Password**.
7. Type the current SVP in the **Enter Current Password** field. then leave the **Enter New Password** field blank, and press Enter twice.
8. In the Changes have been saved window, press Enter.
9. Press F10; then, in the Setup Notice window, select **Yes**.

How to remove the hard-disk password

Attention: If **User only** mode is selected and the user HDP has been forgotten and cannot be made available to the service technician, neither Lenovo nor Lenovo authorized service technicians provide any services to reset the user HDPs or to recover data from the hard disk drive. The hard disk drive can be replaced for a scheduled fee.

To remove a user HDP that has been forgotten, when the SVP and the master HDP are known, do the following:

1. Turn on the computer.
2. When the ThinkPad logo comes up, immediately press F1 to enter ThinkPad Setup.
3. Select **Security**, using the cursor directional keys to move down the menu.
4. Select **Password**.
5. Select **Hard-disk *x* password**, where *x* is the letter of the hard disk drive. A pop-up window opens.
6. Select **Master HDP**.
7. Type the current master HDP in the **Enter Current Password** field. then leave the **Enter New Password** field blank, and press Enter twice.
8. Press F10.
9. Select **Yes** in the Setup Notice window. Both user HDP and master HDP will have been removed.

Power management

To reduce power consumption, the computer has three power management modes: screen blank, sleep (standby in Windows XP), and hibernation.

Screen blank mode

To put the computer into screen blank mode, do as follows:

1. Right-click the Power Manager Battery Gauge in the task bar.
2. Select **Power off display (keep current power plan)** (in Windows XP, **keep current power scheme**).

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

Sleep (standby) mode

When the computer enters sleep (standby) mode, the following events occur in addition to what occurs in screen blank mode:
- The LCD is powered off.
- The hard disk drive is powered off.
- The CPU stops.

In certain circumstances, the computer goes into sleep (standby) mode automatically:

- If a "suspend time" has been set on the timer, and the user does not do any operation with the keyboard, the TrackPoint, the hard disk, the parallel connector, or the diskette drive within that time.
- If the battery indicator blinks orange, indicating that the battery power is low.

Note: Even if you do not set the low-battery alarm, the charge indicator notifies you when the battery is low, and then the computer enters the power-saving mode automatically.

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

Also, in either of the following events, the computer automatically returns from sleep (standby) mode and resumes operation:

- The ring indicator (RI) is signaled by a serial device or a PC Card device.

- The time set on the resume timer elapses.

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

Hibernation mode

In hibernation mode, the following occurs:

- The system status, RAM, VRAM, and setup data are stored on the hard disk.
- The system is powered off.

To cause the computer to enter hibernation mode, do any of the following:

- 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 in either of the following conditions:

- If a "hibernation time" has been set on the timer, and if the user does not do any operation with the keyboard, the TrackPoint, the hard disk drive, the parallel connector, or the diskette drive within that time.
- If the timer conditions are satisfied in suspend mode.

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

Symptom-to-FRU index

This section contains following information:
- "Numeric error codes" on page 38
- "Error messages" on page 38
- "No-beep symptoms" on page 38
- "LCD-related symptoms" on page 39
- "Intermittent problems" on page 39
- "Undetermined problems" on page 39

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 39.

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

Symptom or error (beeps, if any)	FRU or action, in sequence
0187 EAIA data access error-The access to EEPROM is failed. (two short beeps)	**System board.**
0189 Invalid RFID configuration information area—The EEPROM checksum is not correct. (two short beeps)	**System board.**
0190 Critical low-battery error (two short beeps)	1. **Charge the battery pack.** 2. Battery pack.
0191 System Security—Invalid Remote Change requested.	1. **Run ThinkPad Setup, and then save current setting by pressing F10.** 2. System board.
0251 System CMOS checksum bad— Default configuration used. (two short beeps)	1. **Charge the backup battery for more than 8 hours by connecting the ac power adapter.** 2. Replace the backup battery and run ThinkPad Setup to reset the time and date.
0271 Date and time error—Neither the date nor the time is set in the computer. (two short beeps)	**Run ThinkPad Setup to reset the time and date.**
1802 Unauthorized network card is plugged in—Turn off and remove the miniPCI network card. (two short beeps)	1. **Remove the Mini PCI network card.** 2. System board.

Error messages

Table 3. Error messages

Symptom or error (beeps, if any)	FRU or action, in sequence
Fan error. (four short beeps, one long beep)	1. **Fan.** 2. Thermal grease. 3. System board.

No-beep symptoms

Table 4. No-beep symptoms

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, LCD blank, and no POST.	1. **Make sure that every connector is connected tightly and correctly**. 2. DIMM. 3. System board.
No beep, power-on indicator on, and LCD blank during POST.	1. **Reseat DIMM**. 2. System board.
The power-on password prompt appears.	A power-on password or a supervisor password is set. Type the password and press **Enter**.
The hard-disk password prompt appears.	A hard-disk password is set. Type the password and press **Enter**.

LCD-related symptoms

Important: The TFT LCD for the notebook computer contains many thin-film transistors (TFTs). The presence of a small number of dots that are missing, discolored, or always lighted is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns.

If the LCD you are servicing has two or less visible defective pixels, it should not be considered faulty. However, if the LCD has three or more visible defective pixels, it will be deemed as defective by Lenovo and it should be replaced.

Notes:
- This policy applies to all ThinkPad notebook computers purchased on 1 January, 2008 or later.
- Lenovo will not provide replacement if the LCD is within specification as we cannot guarantee that any replacement LCD will have zero pixel defects.
- One pixel consists of R, G, B sub-pixels.

Table 5. LCD-related symptoms

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

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 30)

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 pack
   d. Hard disk drive
   e. External diskette drive or optical drive
   f. DIMM
   g. Optical disk or diskette in the internal drive
   h. PC 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 system status indicators that show the status of the computer.
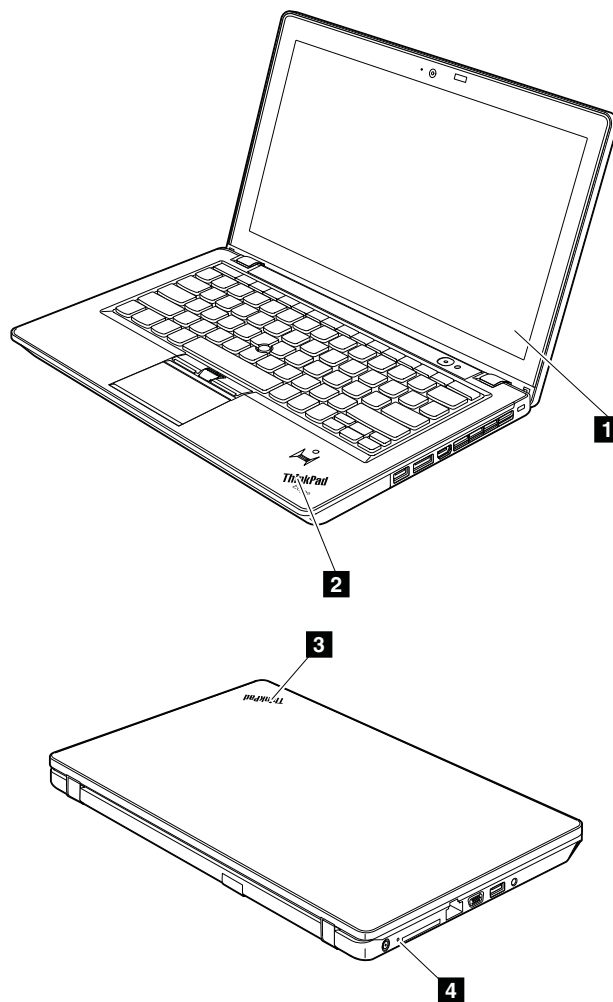
Table 6. Status indicators

Indicator	Meaning
1 On-screen indicators	**Caps lock:** Caps Lock mode is enabled. You can enter all alphabetic characters (A-Z) in uppercase without pressing the Shift key. **Wireless status:** Press F9 to enable or disable the wireless features. You can quickly change the power state of each feature in the list.
4 Power status	• **Green:** The ac power adapter is connected. If a battery is installed on the computer, it is charged when this indicator is on. • **Off:** The ac power adapter is not connected.

Table 6. Status indicators (continued)

Indicator	Meaning
2 Sleep (standby) status ThinkPad Edge	The illumination dot in the ThinkPad logo on the outer lid of the computer and on the palm rest works as a system-status indicator: it shows whether the computer is in sleep (standby), hibernation, or normal mode. • **Red:** The computer is on (in normal mode). • **Fast blinking red:** The computer is entering sleep (standby) or hibernation mode. • **Slow blinking red:** The computer is in sleep (standby) mode. • **Off:** The computer is off or in hibernation mode.
3 Sleep (standby) status ThinkPad	

Chapter 6. Special keys

This computer has several special keys at the upper row of the keyboard. To use each function, directly press the desired key.

The following table shows the function of each special key.

Table 7. Special keys

Special key	Description
Speaker mute (F1)	If you mute the sound and then turn off the computer, the sound will remain muted when you turn on the computer again. To turn on the sound, press the Speaker volume up or Speaker volume down keys.
Speaker volume down (F2)	
Speaker volume up (F3)	
Microphone mute (F4)	When you press the microphone mute key, all of the recording devices are set on mute or unmute; this is the default setting.
Launching the camera and audio settings (F5)	When you press F5, the camera and audio settings window opens and the camera preview is turned on. From the camera and audio settings window, you can change the camera and audio settings.
Switching a display output location (F6)	**For Windows 7:** Switch between the computer display and an external monitor. Windows will show these display options: • Computer display only (LCD) • Computer display and external monitor (same image) • Computer display and external monitor (extended desktop function) • External monitor only **Note:** To switch between the computer display and an external monitor, the Win+P key combination is also available.
Display brightness down (F7)	The computer display becomes dimmer. The purpose of this method is to change the brightness level temporarily. To change the default brightness level, change the settings of the Power Option in the Control Panel or use the Power Manager.
Display brightness up (F8)	The computer display becomes brighter. The purpose of this method is to change the brightness level temporarily. To change the default brightness level, change the settings of the Power Option in the Control Panel or use the Power Manager.

Table 7. Special keys (continued)

Special key	Description
Wireless radio control (F9) `(((•)))` `F9`	Enables or disables the built-in wireless networking features. If you press this key, a list of wireless features is displayed. You can quickly change the radio state of each feature in the list. **Notes:** If you want to use this button to enable or disable the wireless features, the following device drivers must be installed on your computer beforehand: • Power Management Driver • On Screen Display Utility • Wireless device drivers
Previous track/scene (F10) `|◄` `F10`	For Multimedia control
Play/pause (F11) `►II` `F11`	
Next track/scene (F12) `►|` `F12`	

Chapter 7. FRU replacement notices

External CRU statement to customers:
Some problems with your product can be resolved 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; you may request that Lenovo installs an Optional-service CRU according to the warranty service for your product.* Where you are 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 may find a list of CRUs in the publications that ship with your product or at http://www.lenovo.com/CRUs. You may 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 may 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.

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

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 (for the P/N, see "Miscellaneous parts" on page 79) in your tool bag.
- It is recommended to use new screws.
- It is recommended to use each screw only once.
- Use a torque screwdriver if you have one.

Tighten screws as follows:

- **Plastic to plastic**

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

  90 degrees more

  (Cross-section)
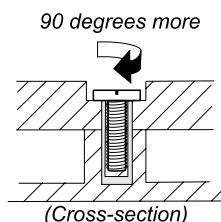
- **Logic card to plastic**

  Turn an additional **180 degrees** after the screw head touches the surface of the logic card:

180 degrees more

(Cross-section)
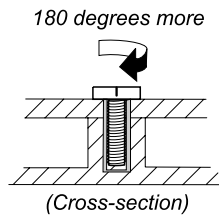
- **Torque driver**

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

Retaining serial numbers

This section includes the following descriptions:

Restoring the serial number of the system unit

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

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

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

1. Install the LENOVO ThinkPad Hardware Maintenance Diskette Version 1.76 or later, and restart the computer.

2. From the main menu, select **1. Set System Identification**.

3. Select **2. Read S/N data from EEPROM**.

The serial number of each device in your computer is displayed; the serial number of the system unit is listed as follows:
- 20: Serial number

Write down that number.

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

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

1. Install the LENOVO ThinkPad Hardware Maintenance Diskette Version 1.76 or later and restart the computer.

2. From the main menu, select **1. Set System Identification**.

3. Select **1. Add S/N data from EEPROM**. Follow the instructions on the screen.

If the MTM and Product ID numbers differ from each other on the rear label, use what is shown for the Product ID field. See example below:

MTM on rear label:

TTTT-CTO S/N SSSSSSS

Product ID on rear label:

TTTT-MMM (Use this number when setting Serial Number)

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

Retaining the UUID

The Universally Unique Identifier (UUID) is a 128-bit number uniquely assigned to your computer at production and stored in the EEPROM of your system board. The algorithm that generates the number is designed to provide unique IDs until the year A.D. 3400. No two computers in the world have the same number.

When you replace the system board, you must set the UUID on the new system board as follows:

1. Install the LENOVO ThinkPad Hardware Maintenance Diskette Version 1.76 or later, and restart the computer.
2. From the main menu, select **4. Assign UUID**. A new UUID is created and written. If a valid UUID already exists, it is not overwritten.

Reading or writing the ECA information

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

To check what ECAs have been previously applied to the machine, use the ECA Information Read/Write function on the LENOVO ThinkPad Hardware Maintenance Diskette Version 1.76 or later.

1. Insert the LENOVO ThinkPad Hardware Maintenance Diskette Version 1.76 or later, and restart the computer.
2. From the main menu, select **6. Set ECA Information**.
3. To read ECA information, select **2. Read ECA/rework number from EEPROM** and follow the instruction.
4. To read 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 LENOVO ThinkPad Hardware Maintenance Diskette Version 1.76 or later to update the EEPROM.

Note: Only the ECA number is stored in the EEPROM. The machine type of the ECA is assumed be the same as the machine type of the machine that had the ECA applied to it.

1. Insert the LENOVO ThinkPad Hardware Maintenance Diskette Version 1.76 or later, and restart the computer.
2. From the main menu, select **6. Set ECA Information**.
3. To write ECA information, select **1. Write ECA/rework number from EEPROM**, and follow the instruction.
4. To write box build date, select **4. Write box build date from EEPROM**, and follow the instruction on the screen.

If the system board is being replaced, try to read the ECA information from the old system board and transfer the information to the new system. If the system board is inoperable, this will not be possible.

Chapter 8. Removing and replacing a FRU

External CRU statement to customers:
Some problems with your product can be resolved 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; you may request that Lenovo installs an Optional-service CRU according to the warranty service for your product.* Where you are 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 may find a list of CRUs in the publications that ship with your product or at http://www.lenovo.com/CRUs. You may 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 may 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.

This chapter presents directions and drawings for use in removing and replacing a FRU. Be sure to observe the following general rules:

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 7 "FRU replacement notices" on page 45.

3. Begin by removing any FRUs that have to be removed before replacing the failing FRU. Any such FRUs are listed at the top of each FRU replacement page. 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 to replace a FRU, 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. For information about connecting and arranging internal cables, see Chapter 9 "Locations" on page 71.

8. When replacing a FRU, use the correct screw(s) as shown in the procedures.

⚠️**DANGER**

> **Before removing any FRU, restart the computer to UEFI BIOS, disable the battery pack in UEFI BIOS (see "1000 Disabling the battery pack in UEFI BIOS" on page 50), unplug all power cords from electrical outlets, and then disconnect any interconnecting cables.**

Attention: After replacing a FRU, do not turn on the computer until you have made sure that all screws, springs, and other small parts are in place and none are loose inside the computer. Verify this by shaking the computer gently and listening for rattling sounds. Metallic parts or metal flakes can cause electrical short circuits.

Attention: The system board is sensitive to, and can be damaged by, electrostatic discharge. Before touching it, establish personal grounding by touching a ground point with one hand or by using an electrostatic discharge (ESD) strap (P/N 6405959).

Before servicing ThinkPad Edge E220s and S220

Some models of the ThinkPad Edge E220s and S220 you are servicing might have the SIM card that the customer has installed.

If the computer you are servicing has the SIM card, remove it before you start the servicing.

After you finish the servicing, make sure that you insert the card back into the slot firmly.
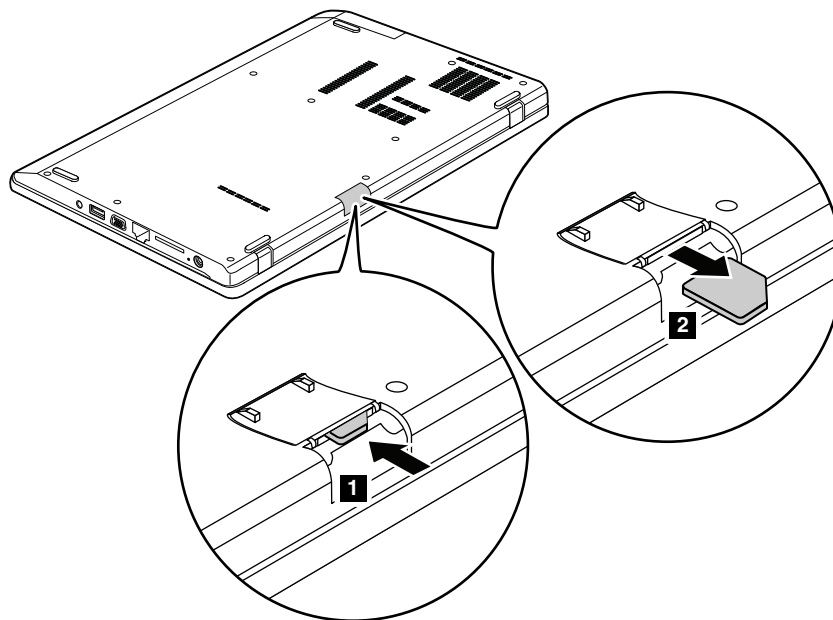
1000 Disabling the battery pack in UEFI BIOS

Before servicing the computer, disable the battery pack in UEFI BIOS.

1. Turn on the computer. When the ThinkPad logo screen is displayed. Press F1 to enter ThinkPad Setup.
2. Select **Config**, and then select **Power**.
3. Choose **Disable built-in battery** .
4. Follow on-screen instructions.
5. Make sure that the system is powered off.

The battery pack will be disabled in UEFI BIOS. When ac power is reconnected, the battery pack will be automatically enabled.

1010 Hard disk drive or solid state drive assembly

Attention:

- Do not drop the drive or apply any physical shock to it. The drive is sensitive to physical shock. Improper handling can cause damage and permanent loss of data.

- Before removing the drive, have the user make a backup copy of all the information on it if possible.

- Never remove the drive while the computer is operating or is in suspend mode.

Before servicing the hard disk drive or solid disk drive, disable the battery pack in UEFI BIOS (see "1000 Disabling the battery pack in UEFI BIOS" on page 50).

Removal steps of HDD or SSD assembly
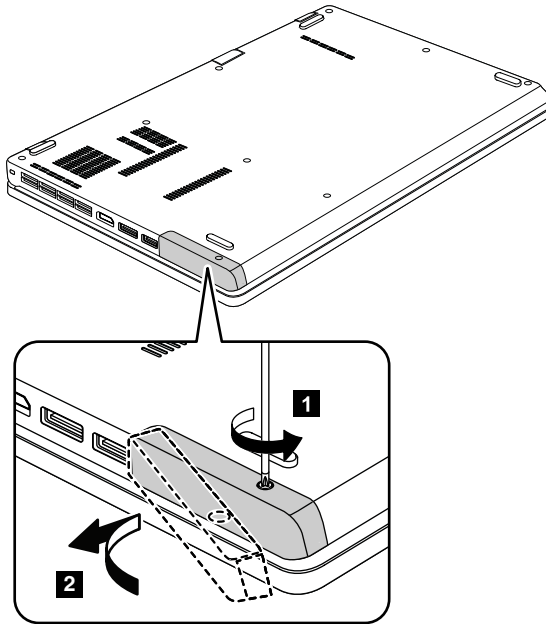
Removal steps of HDD or SSD bracket
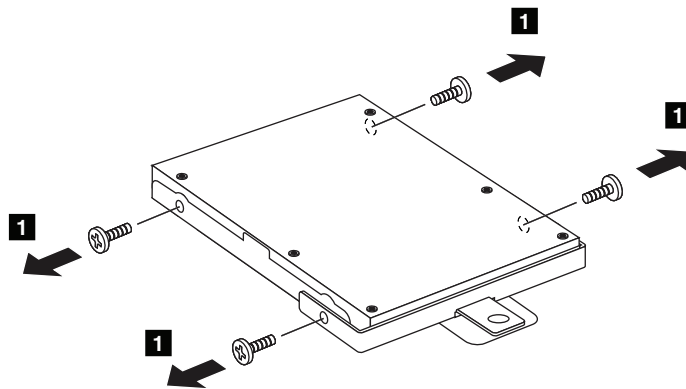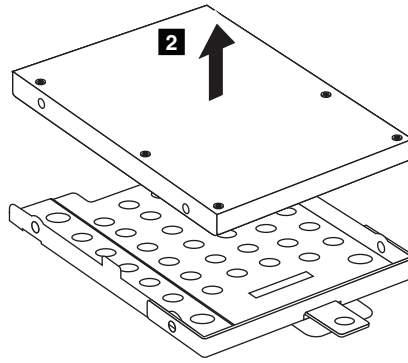
| Step	Screw (quantity)	Color	Torque
1	M2 × 4 mm, flat-head, nylon-coated (4)	Black	0.181 Nm (1.85 kgfcm)

1020 Keyboard

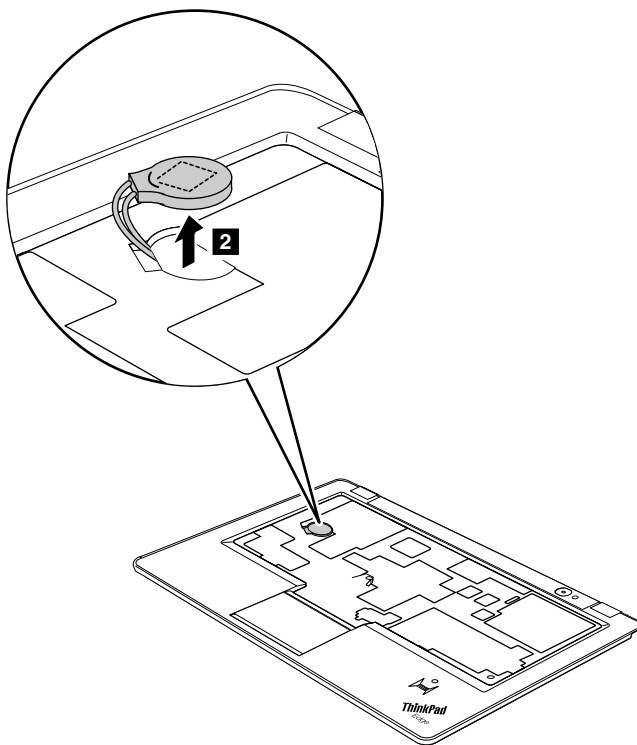For access, perform the following steps in order:

- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50

Removal steps of keyboard
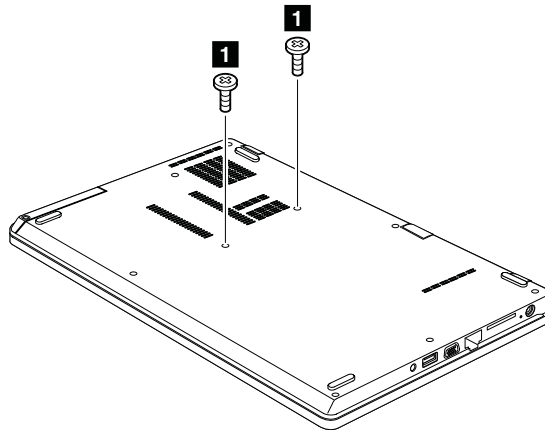
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, wafer-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
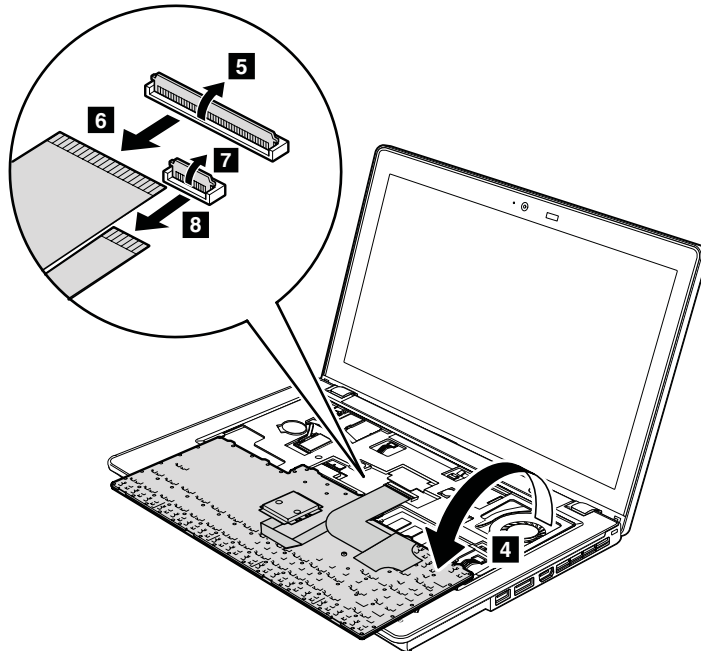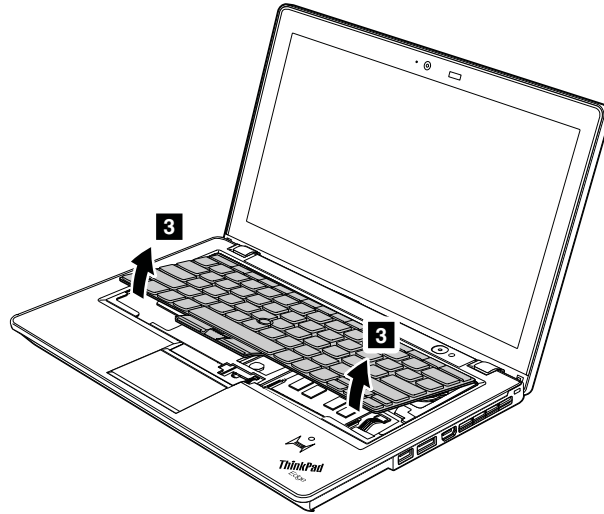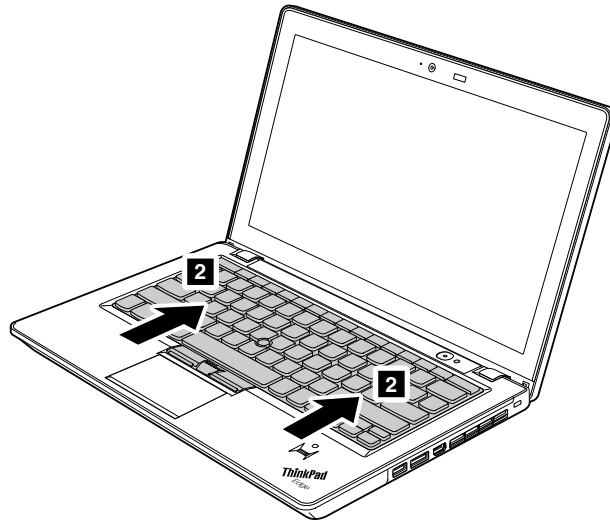
Installation of the keyboard

When installing the keyboard, do as follows:

1. Attach the connectors.

2. Attach the keyboard so that the keyboard edges are under the frame as shown in the following figure.
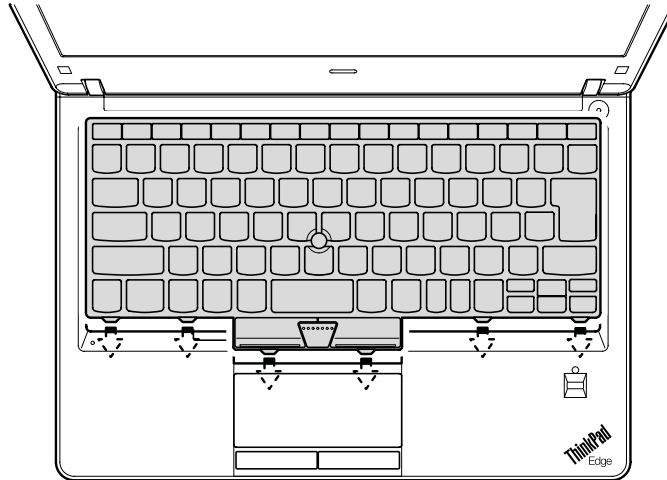
3. Secure the keyboard by tightening the screws from the bottom side of the computer.

1030 Top case assembly

For access, perform the following steps in order:

- "1000 Disabling the battery pack in UEFI BIOS" on page 50

- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50

Removal steps of top case assembly
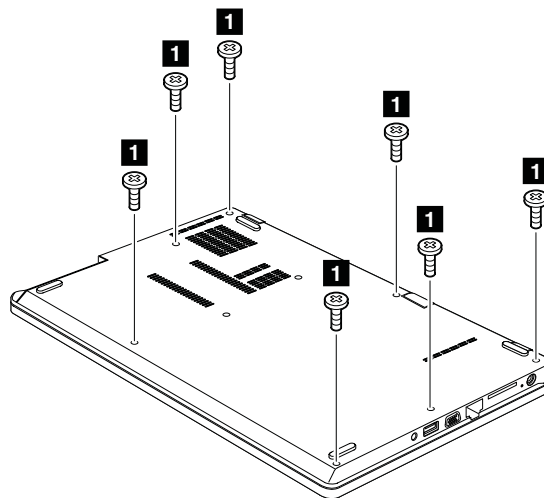
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, wafer-head, nylon-coated (7)	Black	0.181 Nm (1.85 kgfcm)
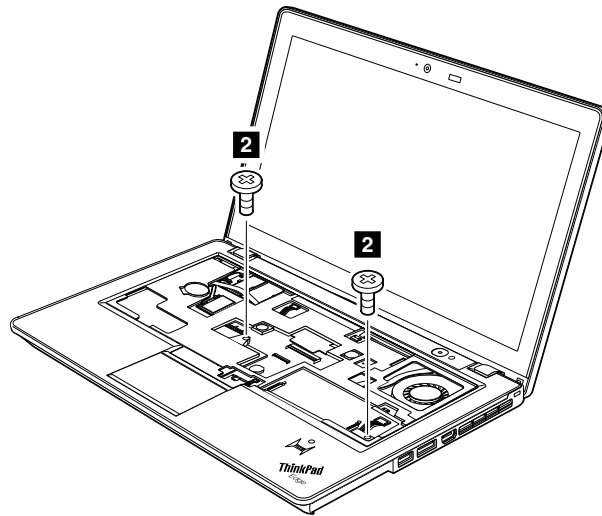
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, wafer-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
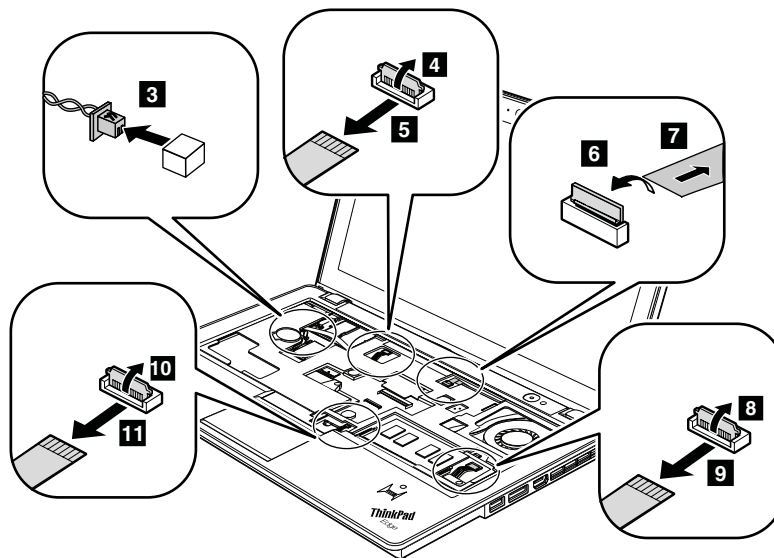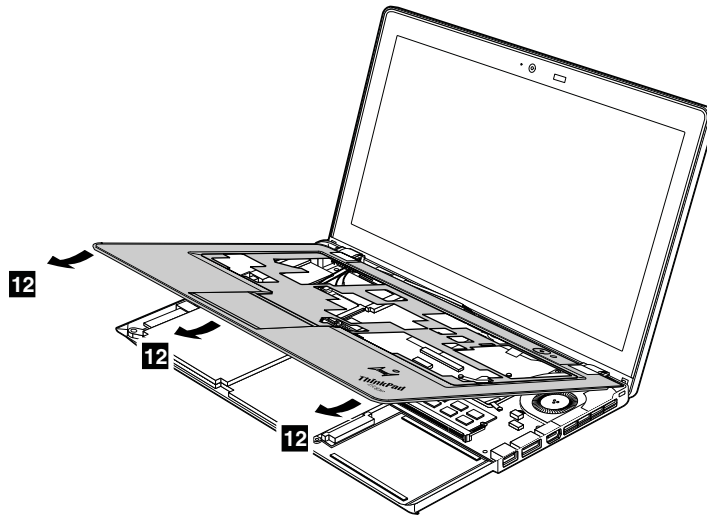
1040 Backup battery

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.
- Remove the "1030 Top case assembly" on page 54.

Removal steps of backup battery

⚠️**DANGER**

Use only the battery specified in the parts list for your computer. Any other battery could ignite or explode.
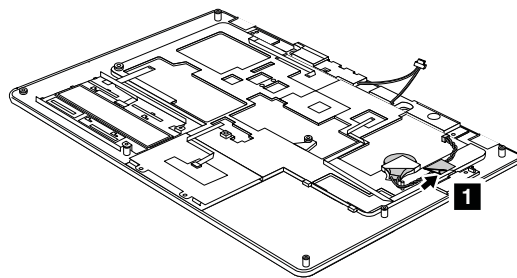
When installing: Make sure that the connector is attached firmly.

1050 Speaker assembly

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.
- Remove the "1030 Top case assembly" on page 54.
- Remove the "1080 Battery pack" on page 58.

Removal steps of speaker assembly
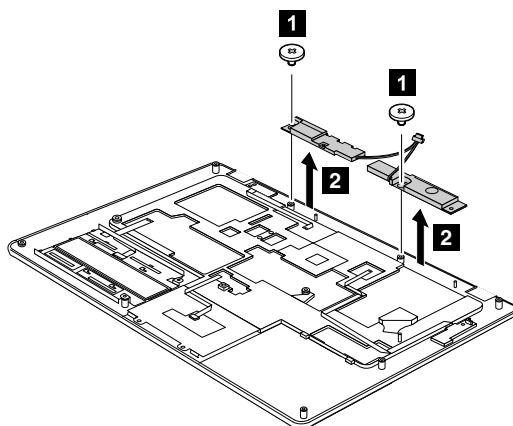
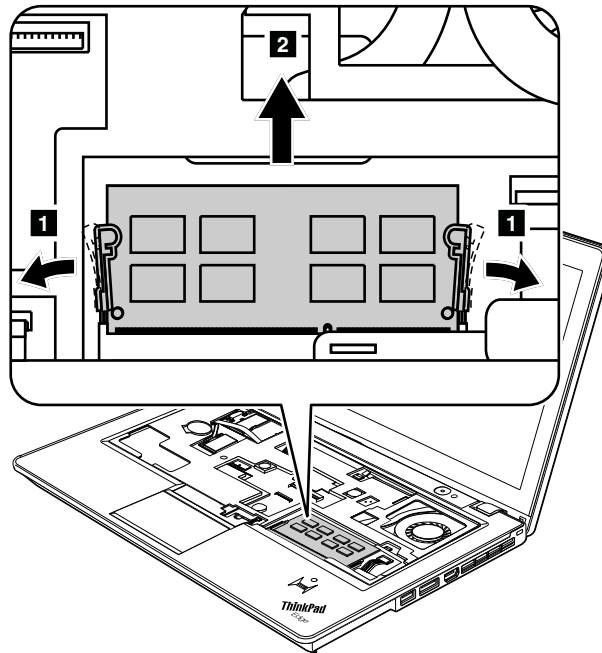**When installing:** Make sure that the connector is attached firmly.

1080 Battery pack

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.
- Remove the "1030 Top case assembly" on page 54.

Important notice for replacing a battery pack:

- Lenovo ThinkVantage Toolbox or Lenovo Solution Center (in Windows 7) has an automatic battery diagnostic that determines if the battery pack is defective. A battery pack FRU should not be replaced unless this diagnostic 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 Lenovo ThinkVantage Toolbox is not installed in the computer, the customer should download this program before a non-physically damaged battery pack is replaced. Note that the replacement of a physically damaged battery pack is not covered by the warranty.

Removal steps of battery pack

⚠️**DANGER**

Use only the battery specified in the parts list for your computer. Any other battery could ignite or explode.

Remove the battery **1**. Then detach the battery connector **2**.
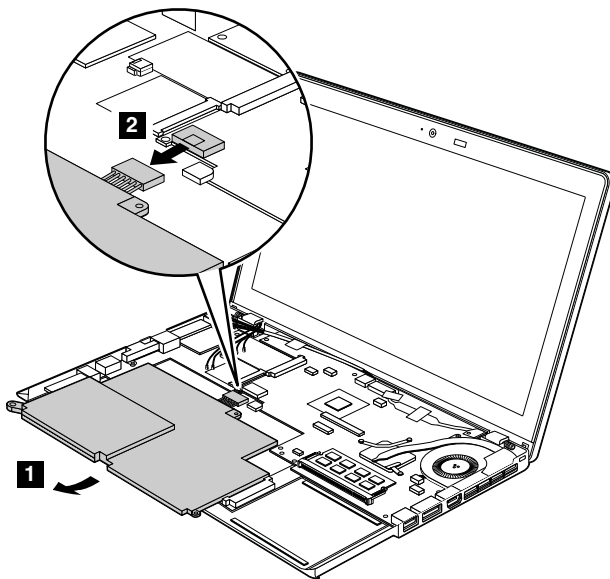
1090 DIMM

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.

Removal steps of DIMM

When installing: Insert the notched end of the DIMM into the socket. Press the DIMM in firmly, and pivot it until it snaps into place. Make sure that it is firmly fixed in the slot and does not move easily.
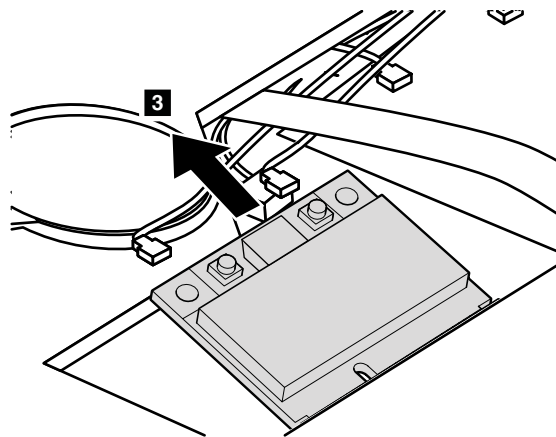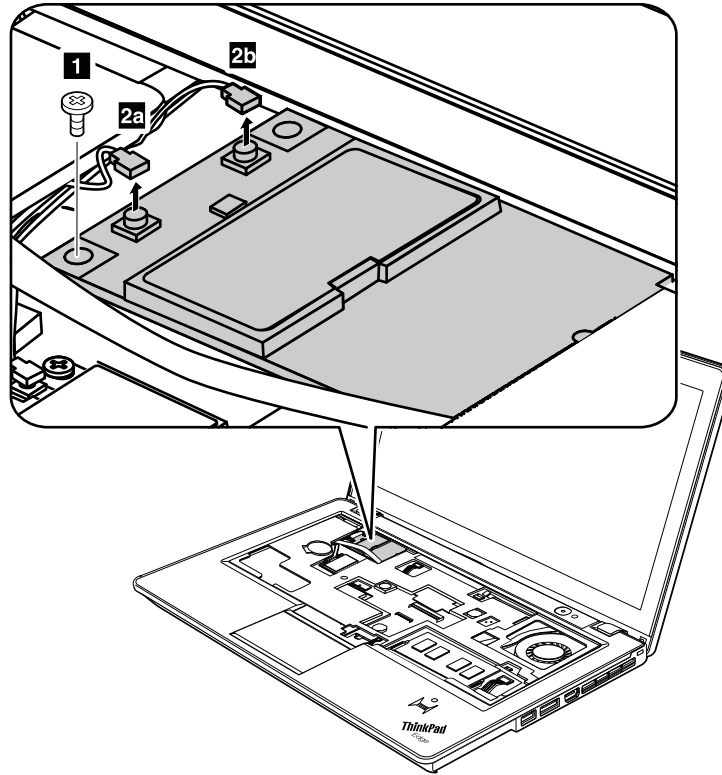
1100 PCI Express Mini Card for wireless LAN

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
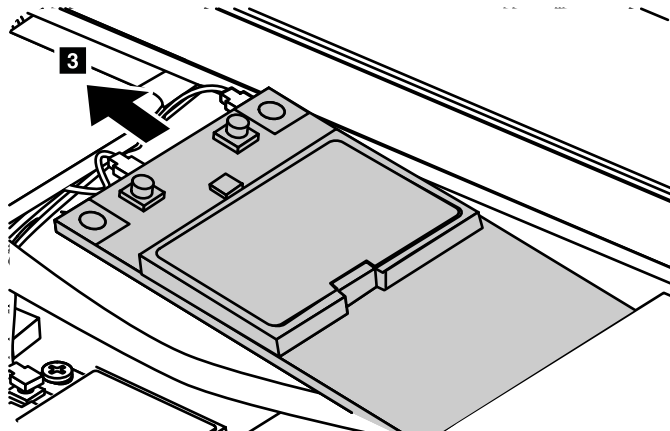- Remove the "1020 Keyboard" on page 52.

Removal steps of PCI Express Mini Card for wireless LAN

Remove the screws **1**. Then remove the antenna RF connectors **2**.

Note: Some models might have a third white antenna cable.
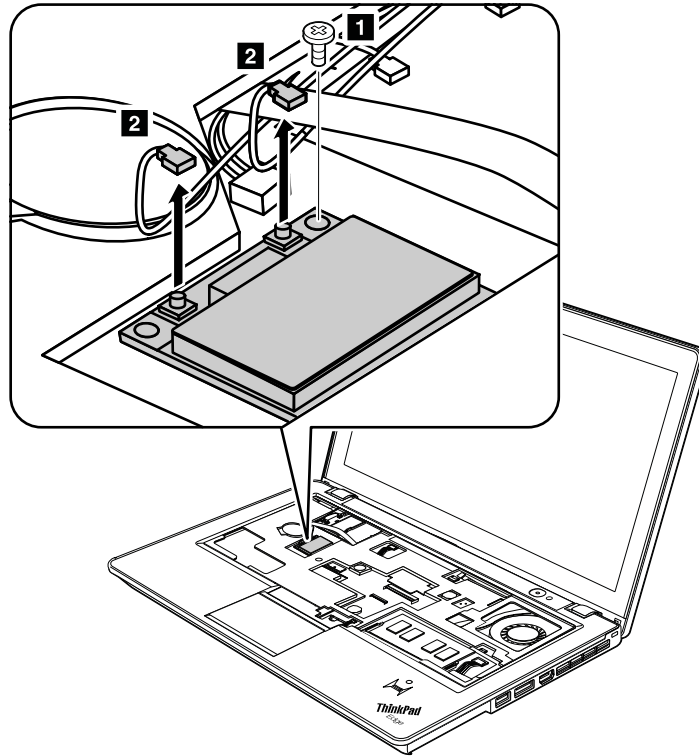
Step	Screw (quantity)	Color	Torque
2	M2 × 3 mm, wafer-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgfcm)

When installing: Plug the gray cable into the jack marked **MAIN** or **M**, and the black cable into the jack marked **AUX** or **A** on the card.

Note: In models with a wireless LAN card that has three antenna connectors, plug the gray cable (MAIN) into the jack marked **TR1**, the white cable (third) into the jack marked **RO** or **TR3**, and the black cable (AUX) into the jack marked **TR2** on the card.
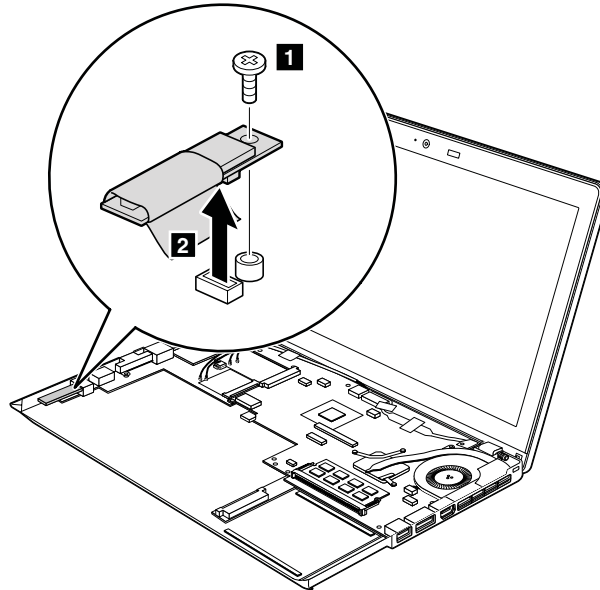
1110 PCI Express Mini Card for wireless WAN

For access, perform the following steps in order:

- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.

Removal steps of PCI Express Mini Card for wireless WAN

Remove the screws **1**. Then remove the antenna RF connectors **2**.

When installing: Plug the orange cable into the jack marked **MAIN**, and the blue cable into the jack marked **AUX** on the card.

Step	Screw (quantity)	Color	Torque
2	M2 × 3 mm, wafer-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgfcm)

1120 Bluetooth daughter card

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.
- Remove the "1030 Top case assembly" on page 54.
- Remove the "1080 Battery pack" on page 58.

Removal steps of Bluetooth daughter card

Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, wafer-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgfcm)

When installing: Make sure that the connector on the bottom side of the card is attached firmly to the system board.

1130 DC-in sub card

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.
- Remove the "1030 Top case assembly" on page 54.
- Remove the "1080 Battery pack" on page 58.

Removal steps of DC-in sub card
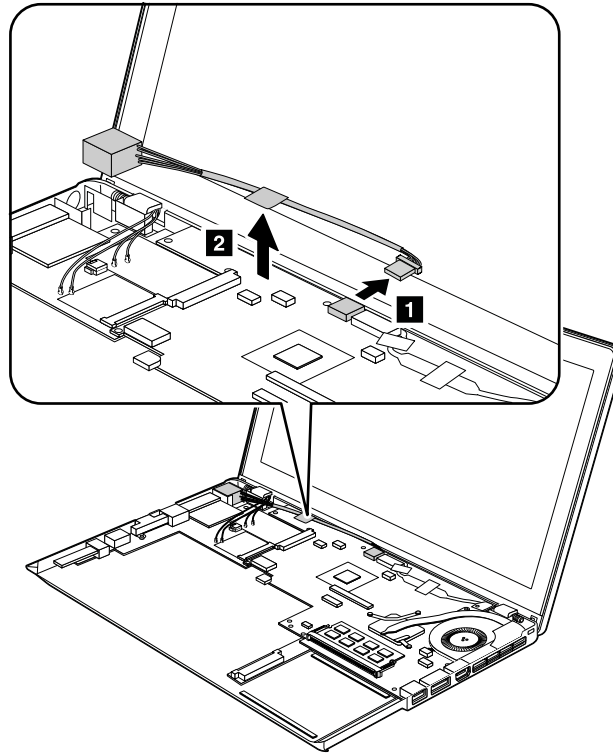
Note: Applying labels to the base cover The new base cover FRU is shipped with a kit containing labels of several kinds.

If the Windows Certificate of Authentication label (COA) **5** is attached to a part that is replaced, return the old part with the label attached to the customer, or provide a letter to the customer stating what the label was originally on the system and what the label part number, serial number, and product key were.

When you replace the base cover, apply the following labels:

    1 FCC label
    4 Serial number label

Following labels need to be peeled off from the old base cover, and need to be put on the new base cover.

    2 GEO label
    3 Rating label
    5 Ethernet label
    6 Windows Certificate of Authentication label (COA)
    7 Wireless WAN MAC label

For some models, you need to apply two FCC labels. Check the old base cover; if it has two FCC labels, apply both to the new base cover.

For the location of each label, refer to the following figure:
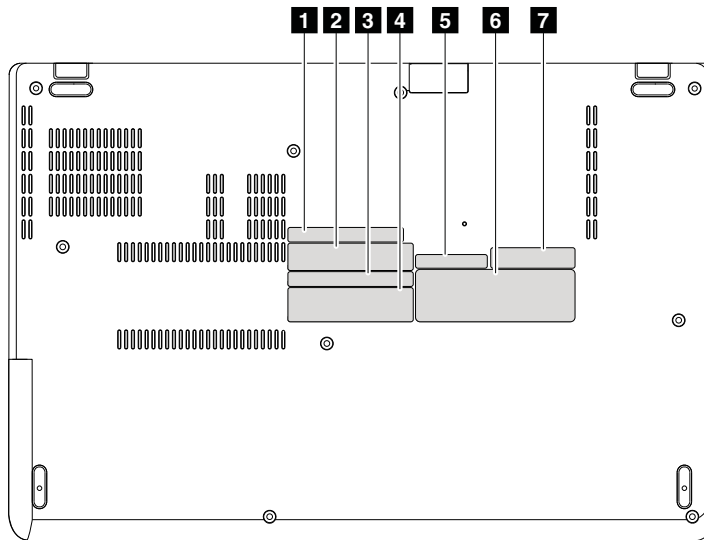
1140 System board assembly and fan assembly

Important notices for handling the system board:

When handling the system board, bear the following in mind.

- The system board has an accelerometer, which can be broken by applying several thousands of G-forces.

  Note: Dropping a system board from a height of as little as 6 inches so that it falls flat on a hard bench can subject the accelerometer to as much as 6,000 G's of shock.

- Be careful not to drop the system board on a bench top that has a hard surface, such as metal, wood, or composite.

- If a system board is dropped, you must test it, using PC-Doctor for DOS if the system supports PC-Doctor for DOS, to make sure that the HDD Active Protection System™ still functions.

  Note: If the test shows that the HDD Active Protection System is not functioning, be sure to document the drop in any reject report, and replace the system board.

- Avoid rough handling of any kind.

- At every point in the process, be sure not to drop or stack the system board.

- If you put a system board down, be sure to put it only on a padded surface such as an ESD mat or a corrugated conductive surface.

If you computer supports PC-Doctor for DOS, after replacing the system board, run PC-Doctor for DOS to make sure that the HDD Active Protection System still functions. The procedure is as follows:

1. Place the computer on a horizontal surface.

2. Run **Diagnostics → ThinkPad Devices → HDD Active Protection Test**.

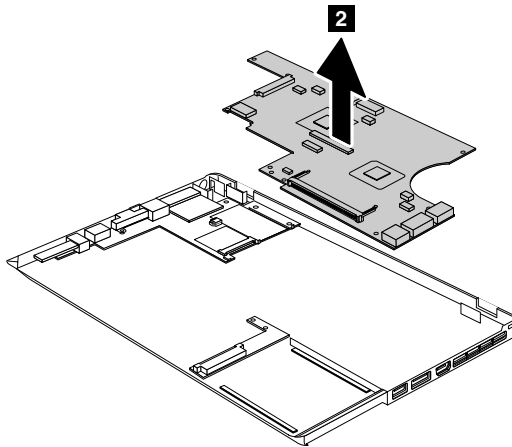   **Attention:** Do not apply physical shock to the computer while the test is running.

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.
- Remove the "1030 Top case assembly" on page 54.
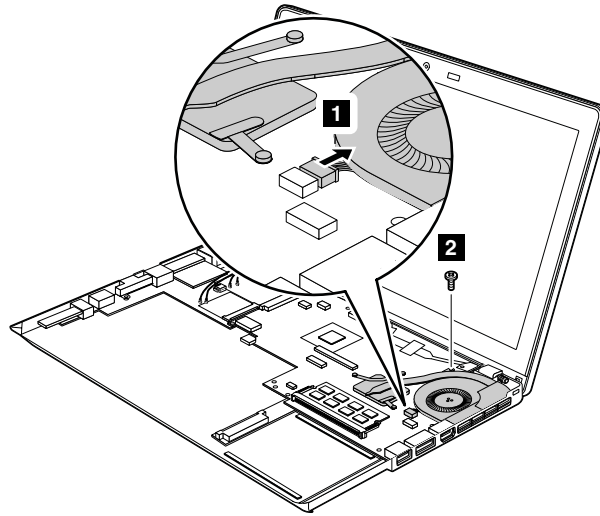- Remove the "1080 Battery pack" on page 58.

Removal steps of system board
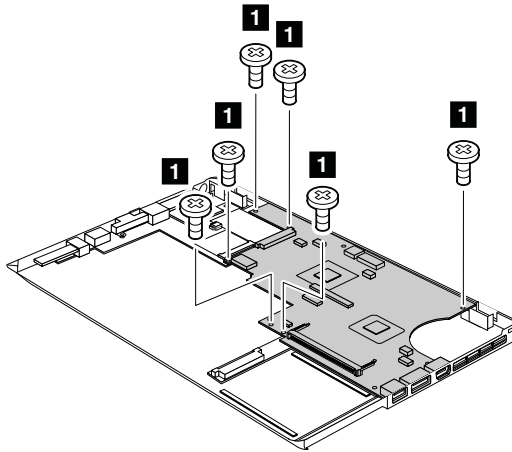
Step	Screw (quantity)	Color	Torque
2	M2 × 3 mm, wafer-head, nylon-coated (3)	Black	0.181 Nm (1.85 kgfcm)

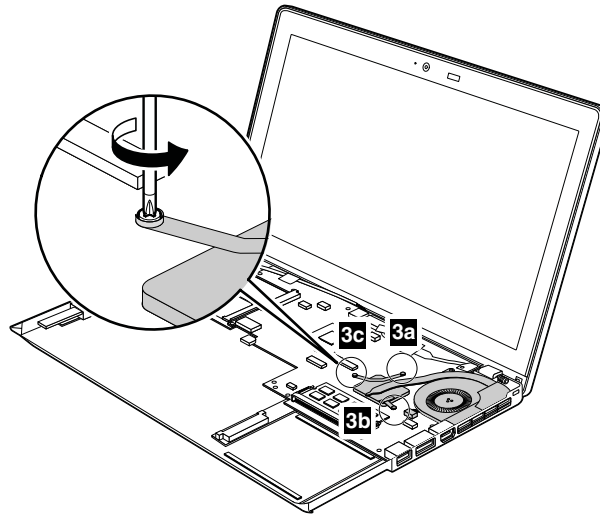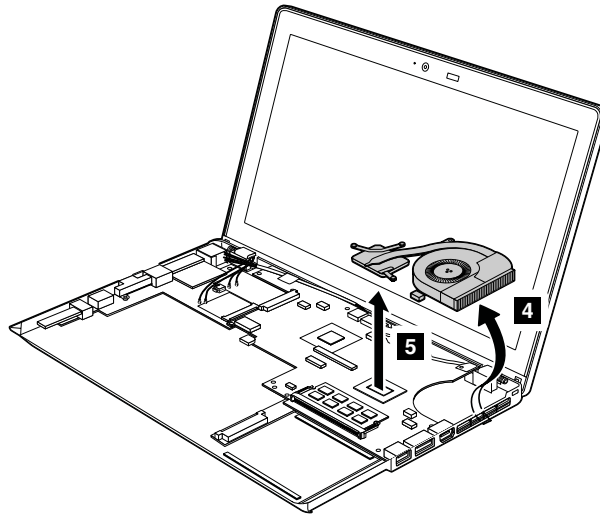**When installing:** Make sure that the connectors are attached firmly.

Removal steps of fan assembly

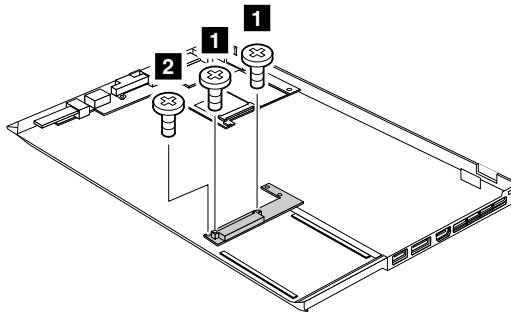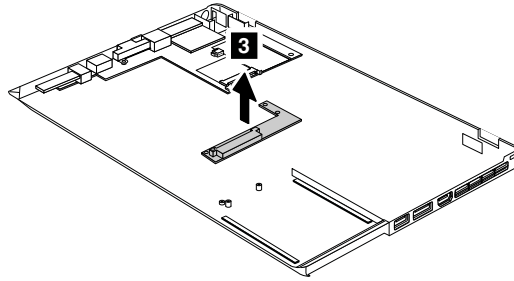| Step	Screw (quantity)	Color	Torque
2	M2 × 3 mm, wafer-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgfcm)

1150 HDD sub card

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.
- Remove the "1030 Top case assembly" on page 54.
- Remove the "1080 Battery pack" on page 58.
- Remove the "1140 System board assembly and fan assembly" on page 64

Removal steps of HDD sub card

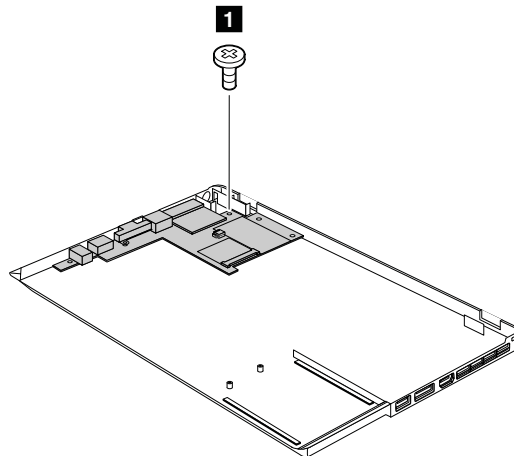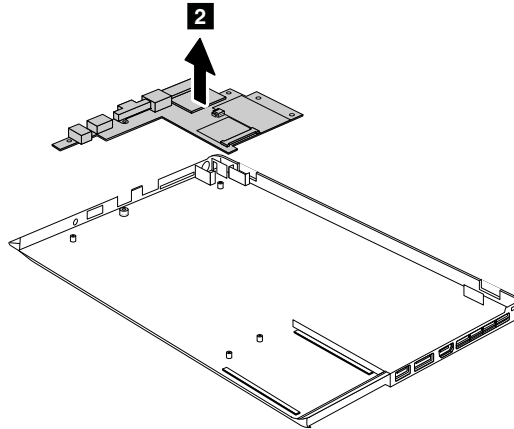| Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, wafer-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
2	M2 x 3 mm, wafer-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgfcm)

1160 I/O sub card

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.
- Remove the "1030 Top case assembly" on page 54.
- Remove the "1080 Battery pack" on page 58.
- Remove the "1140 System board assembly and fan assembly" on page 64
- Remove the "1150 HDD sub card" on page 67

Removal steps of I/O sub card

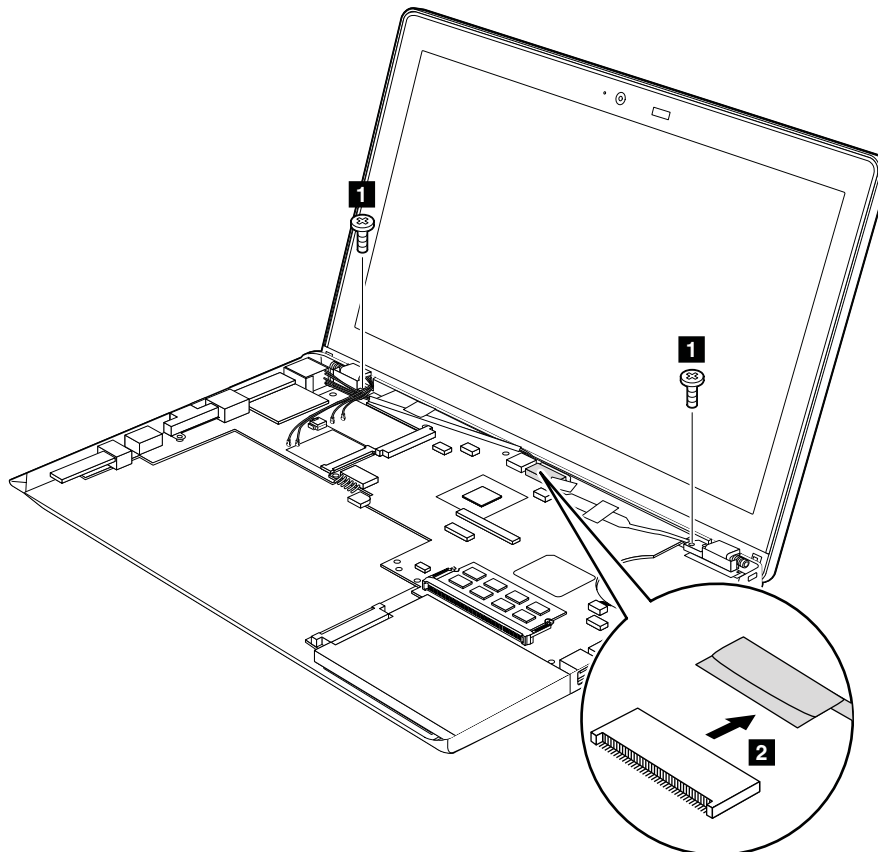| Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, wafer-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgfcm)

1170 LCD unit

For access, perform the following steps in order:
- "1000 Disabling the battery pack in UEFI BIOS" on page 50
- Remove the "1010 Hard disk drive or solid state drive assembly" on page 50.
- Remove the "1020 Keyboard" on page 52.
- Remove the "1030 Top case assembly" on page 54.
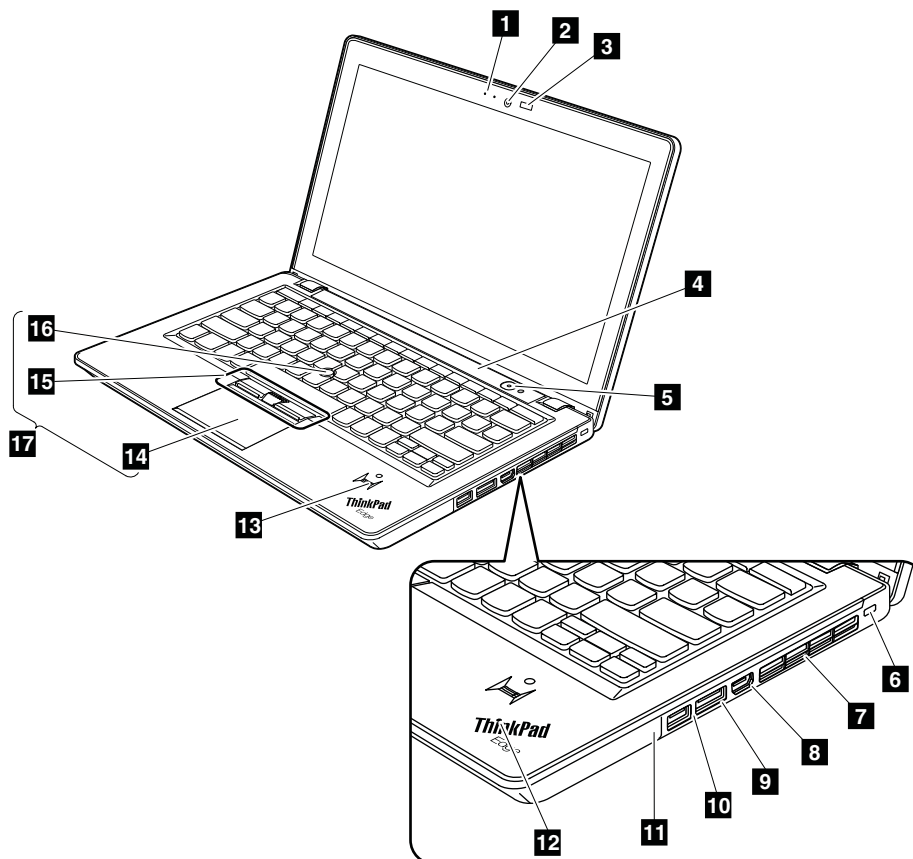- Remove the "1080 Battery pack" on page 58.

Removal steps of LCD unit

Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, wafer-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
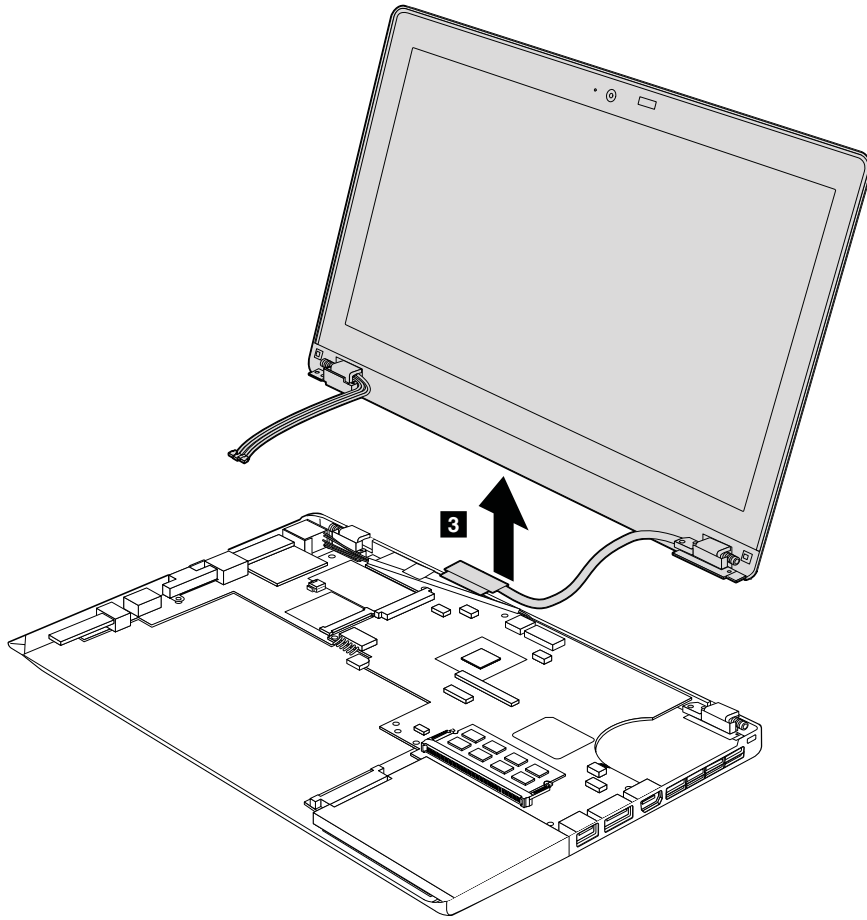
Chapter 9. Locations

This chapter presents the location of the ThinkPad Edge E220s and S220 features and hardware components.

Front view

1 Built-in microphones

3 ThinkLight®

5 Power switch

7 Fan louvers (right)

9 USB/eSATA connector

11 Hard disk drive (HDD) or solid state drive

13 Fingerprint reader (for some models)

15 TrackPoint buttons

17 UltraNav®

2 Integrated camera

4 Built-in stereo speaker

6 Security keyhole

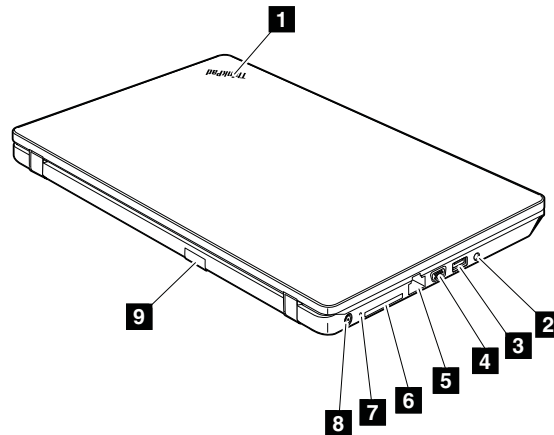**8** HDMI connector

10 USB connector

12 Power status indicator
Note: For the description of the indicator, see Chapter 5 "Status indicators" on page 41.

14 Touch pad

16 TrackPoint pointing stick

Rear view

1 Sleep (standby) status indicator
Note: For the description of the indicator, see Chapter 5 "Status indicators" on page 41.

2 Combo audio jack

3 Always On USB connector

4 Monitor connector

5 Ethernet connector

6 Media card reader slot

7 Power jack indicator

8 Power jack

9 SIM card door

Bottom view
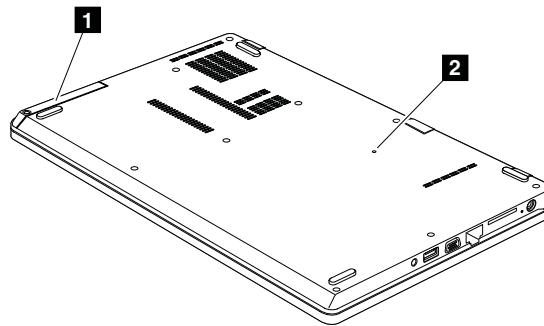
1 Hard disk drive (HDD) or solid state drive

2 Emergency reset hole

Chapter 10. Parts list

This chapter contains following lists of the service parts.
- "Overall" on page 74
- "Keyboard" on page 78
- "Miscellaneous parts" on page 79
- "AC power adapters" on page 80
- "Power cords" on page 80
- "Recovery discs" on page 81
- "Common service tools" on page 85

Notes:
- Each FRU is available for all types or models, unless specific types or models are specified.
- FRU with specific models listed and described as xxU (where U is an example of a country designator) should be used for all models ending in U.
- FRU with specific models listed and described as 3Dx (where 3D is an example of a unique configuration) should be used for all of these models, unless specific country or region designator is specified.
- A CRU (customer replaceable unit) is identified by a single asterisk (*) or two asterisks (**) in the CRU ID column. An N in the CRU ID column means that the part is not a CRU. A single asterisk (*) means that the part is a Self-service CRU; two asterisks (**) means that the part is an Optional-service CRU.

External CRU statement to customers:

Some problems with your product can be resolved 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; you may request that Lenovo installs an Optional-service CRU according to the warranty service for your product.* Where you are 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 may find a list of CRUs in the publications that ship with your product or at http://www.lenovo.com/CRUs. You may 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 may 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.

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 ac power adapter, power cord, battery, and hard disk drive. Other Self-service CRUs depending on product design may include memory, wireless card, keyboard, and palm rest with finger print reader and touchpad.
- **Optional-service CRUs:** These CRUs are isolated parts within the computer that are concealed by an access panel that is typically secured by more than two screws. Once the access panel is removed, the specific CRU is visible.
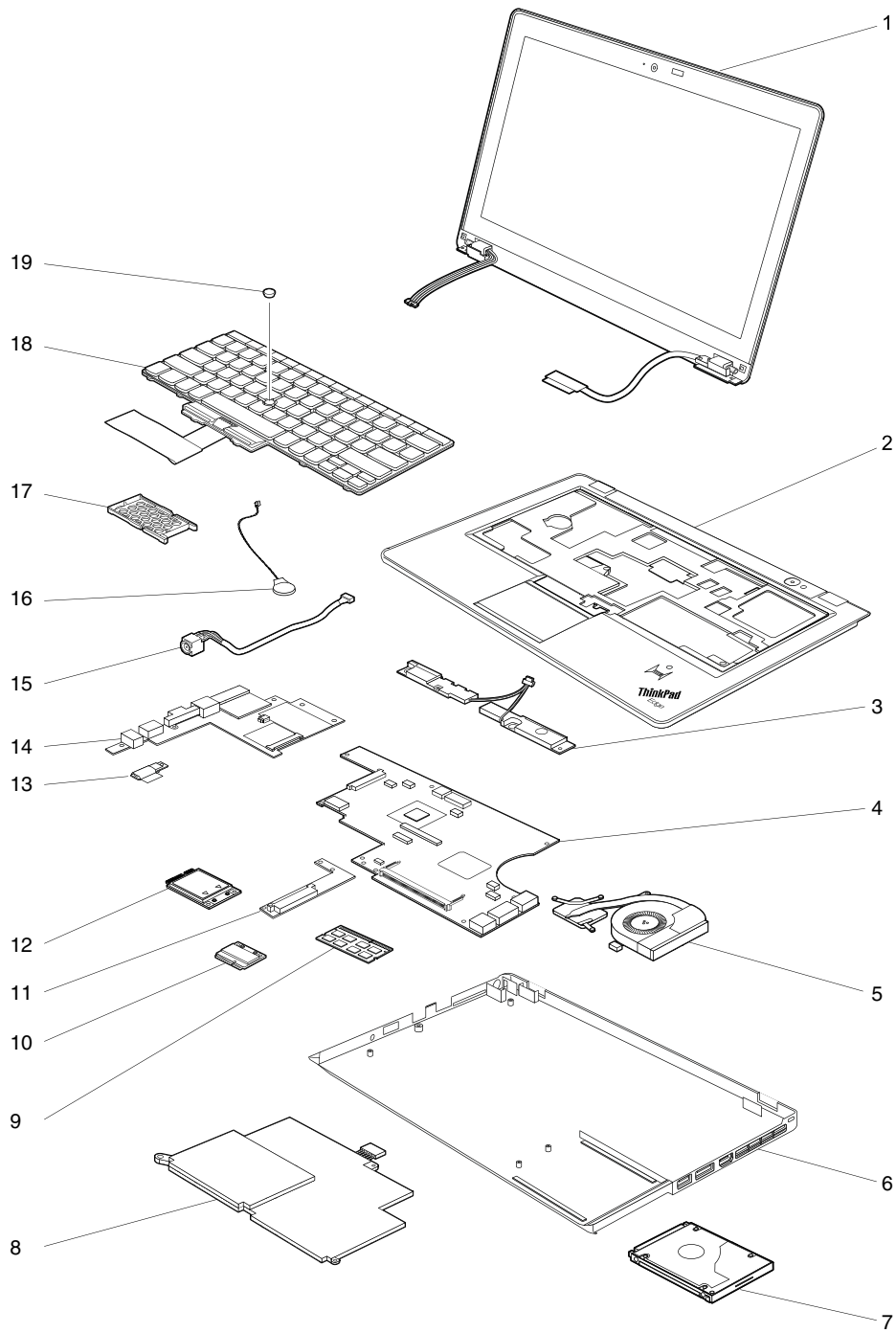- FRUs marked with **OP** are available as options.

Overall

Table 8. Parts list—Overall

No.	FRU (Overall)	FRU no.	CRU ID
1	LCD module assembly, 12.5-inch HD LED backlight with WWAN and camera, green • 5038-CTO, 21x, 23x, 24x, 2Ex, 2Fx, 2Hx, 2Jx, 2Yx, 2Zx, 32x, 33x, 39x, 3Bx, 3Rx, 3Sx, 3Xx, 3Yx, 44x, 45x, 4Jx, 4Kx, 4Px, 4Rx, 4Sx, 4Ux	04W1517 04W1518 04W1519	N
1	LCD module assembly, 12.5-inch HD LED backlight with camera, without WWAN, green • 5038-CTO, 3Gx, 3Hx, 3Nx, 3Px, 3Qx, 20x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Gx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 30x, 31x, 34x, 35x, 36x, 37x, 38x, 3Ax, 3Cx, 3Dx, 3Ex, 3Fx, 3Jx, 3Kx, 3Lx, 3Mx, 3Tx, 3Ux, 3Vx, 3Wx, 3Zx, 42x, 43x, 46x, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Lx, 4Mx, 4Nx, 4Qx, 4Tx, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 52x, 53x	04W1520 04W1521 04W1522	N
1	LCD module assembly, 12.5-inch HD LED backlight with camera, with WWAN, mocha black • 5038-CTO, 6Gx, 6Fx, 6Dx, 64x, 5Fx, 5Hx, 62x	04W3442 04W3443 04W3444	N
1	LCD module assembly, 12.5-inch HD LED backlight with camera, without WWAN, mocha black • 5038-CTO, 67x, 6Lx, 6Kx, 6Hx, 6Jx, 6Ex, 55x, 56x, 57x, 5Nx, 54x, 5Lx, 5Mx, 65x, 63x, 5Zx, 5Yx, 5Xx, 5Wx, 5Gx, 5Jx, 5Vx, 6Cx, 66x, 5Kx	04W3445 04W3446 04W3447	N
1	LCD module assembly, 12.5-inch HD LED backlight with camera, with WWAN, mocha black, for S220 • 5038-CTO, 5Sx, 5Tx, 5Ux, 6Bx	04W3448 04W3449 04W3450	N
1	LCD module assembly, 12.5-inch HD LED backlight with camera, without WWAN, mocha black, for S220 • 5038-CTO, 6Rx, 6Qx, 6Px, 6Nx, 6Mx, 5Qx, 58x, 59x, 5Ax, 5Bx, 5Cx, 5Dx, 5Ex, 5Px, 5Rx, 6Ax, 69x	04W3451 04W3452 04W3453	N
2	Top case assembly, green • 5038-CTO, 3Gx, 3Hx, 3Nx, 3Px, 3Qx, 20x, 21x, 23x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 30x, 31x, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Jx, 3Kx, 3Lx, 3Mx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx, 42x, 43x, 44x, 45x, 46x, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Nx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 52x, 53x	04W1523	N
2	Top case assembly, mocha black • 5038-CTO, 6Rx, 6Qx, 6Px, 6Nx, 6Mx, 5Qx, 67x, 6Lx, 6Kx, 6Hx, 6Jx, 6Gx, 6Fx, 6Ex, 6Dx, 55x, 56x, 57x, 5Nx, 54x, 58x, 59x, 5Ax, 5Bx, 5Cx, 5Dx, 5Ex, 5Lx, 5Mx, 5Sx, 5Tx, 5Ux, 65x, 64x, 63x, 5Zx, 5Yx, 5Xx, 5Wx, 5Fx, 5Gx, 5Hx, 5Jx, 5Px, 5Rx, 62x, 5Vx, 6Cx, 66x, 6Bx, 6Ax, 69x, 5Kx	04W3454	N
3	Speaker assembly	04W1879	N
4	System board assembly, Intel Core i7-2637M, AES • 5038-CTO, 58x, 59x, 5Mx, 5Sx, 64x, 63x, 5Gx, 5Hx, 5Px, 5Vx, 66x	04W3420	N
4	System board assembly, Intel Core i7-2637M, Non-AES • 5038-CTO	04W3421	N
4	System board assembly, Intel Core i7-2637M, AES for S220 • 5038-CTO, 58x, 59x, 5Sx, 5Px	04W3513	N
4	System board assembly, Intel Core i3-2357M, Non-AES • 5038-CTO, 3Ux, 43x, 44x, 45x, 46x, 47x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Jx, 4Rx, 4Zx, 52x	04W2106	N
4	System board assembly, Intel Core i5-2457M, Non-AES • 5038-CTO	04W2105	N
4	System board assembly, Intel Core i3-2367M, Non-AES • 5038-CTO, 67x, 6Dx, 57x, 54x, 5Cx, 5Dx, 5Ex, 5Ux, 5Yx, 5Wx, 5Rx, 6Cx, 69x, 5Kx	04W3422 04W1516	N

Table 8. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
4	System board assembly, Intel Core i3-2367M, Non-AES for S220 • 5038-CTO. 5Cx, 5Dx, 5Ex, 5Ux, 5Rx, 69x	04W3516	N
4	System board assembly, Intel Core i5-2467M, Non-AES • 5038-CTO, 4Qx	04W3252	N
4	System board assembly, Intel Core i5-2467M, AES for S220 • 5038-CTO, 5Qx, 5Ax, 5Bx, 5Tx, 6Bx, 6Ax	04W3515	N
4	System board assembly, Intel Core i5-2467M, AES • 5038-CTO, 5Qx, 6Lx, 6Kx, 6Hx, 6Jx, 6Gx, 6Fx, 6Ex, 55x, 56x, 5Nx, 5Ax, 5Bx, 5Lx, 5Tx, 65x, 5Zx, 5Xx, 5Fx, 5Jx, 62x, 6Bx, 6Ax, 3Sx, 3Tx, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx, 42x, 48x, 49x, 4Kx, 4Lx, 4Mx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 53x	04W3426	N
4	System board assembly, Intel Core i5-2537M, AES • 5038-CTO, 3Gx, 3Hx, 3Px, 3Qx, 21x, 23x, 24x, 26x, 27x, 28x, 29x, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Kx, 2Lx, 2Qx, 2Rx, 2Sx, 2Tx, 30x, 31x, 32x, 33x, 34x, 35x, 38x, 39x, 3Cx, 3Lx, 3Rx, 4Gx, 4Hx	04W1514	N
4	System board assembly, Intel Core i5-2537M, Non-AES • 5038-CTO, 2Ax, 3Ax, 3Ex	04W1515	N
4	System board assembly, Intel Core i5-2537M, AES for S220 • 5038-CTO	04W3514	N
4	System board assembly, Intel Core i7-2617M, AES • 5038-CTO, 3Nx, 20x, 25x, 2Gx, 2Hx, 2Jx, 2Mx, 2Nx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 36x, 37x, 3Bx, 3Fx, 3Jx, 3Mx, 4Fx	04W1512	N
4	System board assembly, Intel Core i7-2617M, Non-AES • 5038-CTO, 2Px, 3Dx, 3Kx, 4Nx, 4Px	04W1513	N
5	Thermal module with fan	04W1874 04W1873	N
6	Base cover assembly • 5038-CTO, 67x, 6Lx, 6Kx, 6Jx, 6Gx, 6Fx, 6Ex, 6Dx, 55x, 56x, 57x, 5Nx, 5Lx, 5Mx, 65x, 64x, 63x, 5Zx, 5Yx, 5Fx, 5Gx, 5Hx, 5Jx, 62x, 5Vx, 6Cx, 66x, 3Gx, 3Hx, 3Nx, 3Px, 3Qx, 20x, 21x, 23x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 30x, 31x, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Jx, 3Kx, 3Lx, 3Mx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx, 42x, 43x, 44x, 45x, 46x, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Nx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 52x, 53x, 5Kx	04W1881	N
6	Base cover assembly for Taiwan (65 W) • 5038-CTO, 28x, 29x, 54x, 5Xx, 5Wx, 6Hx	04W1882	N
6	Base cover assembly for China 65W (Mocha Black, S220) • 5038-CTO, 6Rx, 6Qx, 6Px, 6Nx, 6Mx, 5Qx, 58x, 59x, 5Ax, 5Bx, 5Cx, 5Dx, 5Ex, 5Sx, 5Tx, 5Ux, 5Px, 5Rx, 6Bx, 6Ax, 69x	04W3457	N
7	SATA hard disk drive, 250 GB, 5,400 rpm • 5038-CTO, 21x, 27x, 4Rx, 5Kx	04W1331 04W1332 04W3466 75Y5205	**
7	SATA hard disk drive, 320 GB, 5,400 rpm • 5038-CTO, 6Fx, 6Ex	04W3467	**
7	SATA hard disk drive, 500 GB, 5,400 rpm • 5038-CTO, 6Rx, 6Qx, 6Px, 6Nx, 6Mx, 5Qx, 67x, 6Lx, 6Kx, 65x, 5Zx, 5Xx, 5Wx, 5Fx, 5Gx, 5Hx, 5Jx, 5Px, 5Rx, 6Cx, 66x, 6Bx, 6Ax, 69x	04W3468	**

Table 8. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
7	SATA hard disk drive, 320 GB, 7,200 rpm • 5038-CTO, 6Hx, 6Jx, 6Dx, 55x, 56x, 57x, 5Nx, 54x, 58x, 59x, 5Ax, 5Bx, 5Cx, 5Dx, 5Ex, 5Lx, 5Sx, 5Tx, 5Ux, 63x, 5Yx, 62x, 5Vx, 3Gx, 3Hx, 3Nx, 3Px, 3Qx, 20x, 23x, 24x, 26x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Tx, 2Ux, 2Wx, 2Zx, 31x, 32x, 34x, 37x, 38x, 39x, 3Cx, 3Ex, 3Fx, 3Jx, 3Kx, 3Lx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx, 42x, 43x, 44x, 45x, 46x, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Nx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 52x, 53x	04W1333 04W1334 75Y5207	**
7	Solid state drive, 128 GB • 5038-CTO, 6Gx, 5Mx, 64x, 25x, 2Rx, 2Sx, 2Vx, 2Xx, 2Yx, 30x, 33x, 35x, 36x, 3Ax, 3Bx, 3Dx, 3Mx, 3Rx, 4Px, 4Qx, 4Zx	04W1335 04W1336 04W1337 04W1872	**
8	Battery pack, 8 cell	42T4933 42T4935 42T4976 42T4984	N
9	2-GB DDR3-1333 SDRAM SO-DIMM (PC3-10600) card • 5038-CTO, 6Nx, 6Mx, 5Qx, 5Ax, 5Bx, 5Cx, 5Dx, 5Ex, 5Lx, 5Sx, 5Tx, 5Ux, 5Px, 5Rx, 6Bx, 6Ax, 69x, 3Gx, 3Hx, 3Px, 21x, 26x, 27x, 28x, 29x, 2Bx, 2Dx, 2Fx, 2Qx, 2Rx, 2Ux, 2Vx, 38x, 39x, 3Cx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx, 42x, 43x, 44x, 45x, 46x, 47x, 4Gx, 4Lx, 5Kx	55Y3716	**
9	4-GB DDR3-1333 SDRAM SO-DIMM (PC3-10600) card • 5038-CTO, 6Rx, 6Qx, 6Px, 67x, 6Lx, 6Kx, 6Hx, 6Jx, 6Gx, 6Fx, 6Ex, 6Dx, 55x, 56x, 57x, 5Nx, 54x, 58x, 59x, 5Mx, 65x, 64x, 63x, 5Zx, 5Yx, 5Xx, 5Wx, 5Fx, 5Gx, 5Hx, 5Jx, 62x, 5Vx, 6Cx, 66x, 3Nx, 3Qx, 20x, 23x, 24x, 25x, 2Ax, 2Cx, 2Ex, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Sx, 2Tx, 2Wx, 2Xx, 2Yx, 2Zx, 30x, 31x, 32x, 33x, 34x, 35x, 36x, 37x, 3Ax, 3Bx, 3Dx, 3Ex, 3Fx, 3Jx, 3Kx, 3Lx, 3Mx, 3Rx, 3Sx, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Hx, 4Jx, 4Kx, 4Mx, 4Nx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 52x, 53x	55Y3717	**
10	ThinkPad 11b/g/n Wireless LAN Mini-PCI Express Adapter II • 5038-CTO, 6Nx, 6Mx, 5Qx, 57x, 58x, 59x, 5Ax, 5Bx, 5Cx, 5Dx, 5Ex, 5Sx, 5Tx, 5Ux, 5Zx, 5Yx, 5Px, 5Rx, 6Cx, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Lx, 30x, 3Cx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx, 42x, 43x, 44x, 45x, 46x, 47x, 4Dx, 4Ex, 4Nx, 4Px, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 52x	60Y3247 60Y3249	**
10	ThinkPad 2x2 11a/b/g/n Wireless LAN PCI Express Half Mini Card Adapter • 5038-CTO, 66x, 21x, 26x, 27x, 2Qx, 2Rx, 2Sx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Fx	60Y3251	**
10	Intel Centrino Wireless-N 1000 • 5038-CTO, 6Rx, 6Qx, 6Px, 67x, 6Lx, 6Kx, 6Hx, 6Jx, 6Gx, 6Fx, 6Ex, 6Dx, 55x, 56x, 5Nx, 54x, 65x, 64x, 63x, 5Xx, 5Wx, 5Fx, 5Gx, 5Hx, 5Jx, 62x, 5Vx, 6Bx, 6Ax, 69x, 3Gx, 3Px, 20x, 23x, 24x, 25x, 28x, 29x, 2Ax, 2Jx, 2Kx, 2Mx, 2Nx, 2Px, 31x, 3Ax, 3Bx, 3Dx, 3Ex, 3Jx, 3Kx, 3Lx, 3Mx, 3Rx, 3Sx, 3Tx, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Jx, 4Kx, 4Lx, 4Mx, 4Qx, 4Rx, 4Sx, 4Tx, 53x, 5Kx	60Y3241	**
10	Intel Centrino Advanced-N x WiMAX 6250, WW SKU • 5038-CTO, 5Lx, 5Mx, 3Hx, 3Nx, 3Qx, 4Fx, 4Gx, 4Hx	60Y3195	**
10	Intel Centrino Advanced-N x WiMAX 6250, Russia SKU • 5038-CTO	60Y3209	**
11	HDD sub card • 5038-CTO	04W1876	N
12	Ericsson F5521gw Wireless WAN card • 5038-CTO	60Y3255	**

Table 8. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
12	Ericsson F5521gw Wireless WAN card (US & EU) • 5038-CTO, 6Gx, 6Fx, 6Dx, 64x, 5Fx, 5Hx, 62x, 21x, 23x, 24x, 2Ex, 2Fx, 2Hx, 2Jx, 3Bx, 3Rx, 3Sx, 4Jx, 4Kx, 4Px, 4Rx, 4Sx	60Y3279	**
12	Ericsson F5521gw for Malaysia Wireless WAN card • 5038-CTO	60Y3267	**
12	Huawei EM660 Wireless WAN card • 5038-CTO, 5Sx, 5Tx, 5Ux, 6Bx, 2Yx, 2Zx, 32x, 33x, 39x, 3Xx, 3Yx, 44x, 45x, 4Ux	60Y3239	**
12	mSATA solid state drive, 80GB • 5038-CTO, 6Rx, 58x, 5Ax, 5Cx, 65x, 5Gx, 20x, 25x, 2Gx, 2Px, 30x, 31x, 34x, 35x, 36x, 37x, 38x, 3Jx, 3Wx, 3Zx, 43x, 46x, 4Nx, 4Vx, 4Wx, 53x	45N8259	**
13	Bluetooth daughter card (BDC-3.0) • 5038-CTO, 6Rx, 6Qx, 6Px, 6Nx, 6Mx, 5Qx, 67x, 6Lx, 6Kx, 6Hx, 6Jx, 6Gx, 6Fx, 6Ex, 6Dx, 55x, 56x, 5Nx, 54x, 58x, 59x, 5Ax, 5Bx, 5Cx, 5Dx, 5Lx, 5Mx, 5Sx, 5Tx, 5Ux, 65x, 64x, 63x, 5Zx, 5Yx, 5Xx, 5Wx, 5Fx, 5Gx, 5Hx, 5Jx, 5Px, 5Rx, 62x, 5Vx, 6Cx, 66x, 6Bx, 6Ax, 69x, 3Gx, 3Hx, 3Nx, 3Px, 3Qx, 20x, 23x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 30x, 31x, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Jx, 3Kx, 3Lx, 3Mx, 3Rx, 3Sx, 3Tx, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx, 42x, 43x, 44x, 45x, 46x, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Nx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 52x, 53x, 5Kx	60Y3271 60Y3275	N
14	I/O sub card	04W1875	N
15	DC-in cable	04W1880	N
16	Backup battery	04W1884	N
17	Media Card Reader slot blank bezel	04W1751	N
18	Keyboard (see "Keyboard" on page 78.)		
19	TrackPoint caps	91P9642	*
—	Hard disk drive cover	04W1883	**
—	AC adapter (see "AC power adapters" on page 80.)		

Keyboard

Table 9. Parts list—Keyboard

Language	FRU no.		CRU ID
Arabic	04W0913	04W0949	**
Belgian	04W0914	04W0950	
Brazilian Portuguese	04W0912	04W0948	
Bulgarian	04W0915	04W0951	
Canadian French (058)	04W0910	04W0946	
Canadian French (Acnor)	04W0909	04W0945	
Czech	04W0916	04W0952	
Danish	04W0917	04W0953	
Dutch	04W0927	04W0963	

Table 9. Parts list—Keyboard (continued)

Language	FRU no.		CRU ID
Finnish, Swedish	04W0934	04W0970	
French	04W0919	04W0955	
German	04W0920	04W0956	
Greek (U.S. English and Greek layout)	04W0921	04W0957	
Hebrew	04W0922	04W0958	
Hungarian	04W0923	04W0959	
Icelandic	04W0924	04W0960	
India	04W1043	04W1042	
Italian	04W0925	04W0961	
Japanese	04W0939	04W0975	
Kazakhstan	04W0926	04W0962	
Korean	04W0940	04W0976	
Latin American Spanish	04W0911	04W0947	
Norwegian	04W0928	04W0964	
Polish	04W0929	04W0965	
Portuguese	04W0930	04W0966	
Russian	04W0931	04W0967	
Slovak	04W0932	04W0968	
Slovenian	04W0933	04W0969	
Spanish	04W0918	04W0918	
Swiss	04W0935	04W0935	
Thai	04W0942	04W0942	
Traditional Chinese	04W0941	04W0941	
Turkish	04W0936	04W0936	
Turkish-F	04W0943	04W0943	
U.K. English	04W0937	04W0973	
U.S. English	04W0908	04W0944	
U.S. English (International, with a Euro symbol)	04W0938	04W0974	

Miscellaneous parts

Table 10. Parts list—Miscellaneous parts

FRU	FRU no.	CRU ID
Screw kit (including nylon-coated screws):	04W1878	N
System miscellaneous kit	04W1877	N

AC power adapters

Table 11. Parts list—2-pin ac power adapters

FRU	FRU no.	CRU ID
2-pin (65 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T5282	*
2-pin (65 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4423	
2-pin (65 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4419	

Table 12. Parts list—3-pin ac power adapters

FRU	FRU no.	CRU ID
3-pin (65 W, 20 V) adapter (models CTO, xxA, xxB, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	42T5283	*
3-pin (65 W, 20 V) adapter (models CTO, xxA, xxB, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	42T4421	
3-pin (65 W, 20 V) adapter (models CTO, xxA, xxB, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	42T4417	

Power cords

A ThinkPad power cord for a specific country or region is usually available only in that country or region:

Table 13. Parts list—2-pin power cords

Country or region	FRU no.		CRU ID
Argentina • models -CTO, xxY	42T5020	42T5105	*
Brazil • models -CTO, xxP	42T5180	42T5183	
Canada, U.S. • models -CTO, xxF, xxL, xxS, xxU	42T5008	42T5093	
Japan • models -CTO, xxE, xxJ	42T5014	42T5099	

Table 14. Parts list—3-pin power cords

Country or region	FRU no.		CRU ID
Australia, New Zealand • models -CTO, xxM	42T5050	42T5135	*
Bangladesh, Sri Lanka, South Africa • models -CTO, xxG	42T5056	42T5141	
Canada, U.S. • models -CTO, xxG, xxT	42T5004	42T5089	
China (P.R.C.) (other than Hong Kong S.A.R.) • models -CTO, xxC	42T5065	42T5150	
Denmark • models -CTO, xxG	42T5041	42T5126	
European countries • models -CTO, xxG	42T5029	42T5114	
India • models -CTO, xxQ	42T5083	42T5168	

Table 14. Parts list—3-pin power cords (continued)

Country or region	FRU no.		CRU ID
Israel • models -CTO, xxG	42T5062	42T5147	
Italy • models -CTO, xxG	42T5047	42T5132	
Korea • models -CTO, xxK	42T5077	42T5162	
Switzerland • models -CTO, xxG	42T5044	42T5129	
Taiwan • models -CTO, xxV	42T5071	42T5156	
U.K., China (Hong Kong S.A.R.) • models -CTO, xxB, xxG, xxH	42T5035	42T5120	

Recovery discs

Windows XP Professional DVDs

Note: The Windows XP Professional recovery DVDs are available only for models with a valid Microsoft Windows XP Professional certificate of authenticity (COA) affixed to the system. Due to a Microsoft licensing limitation, if a model came with Windows XP Professional preinstalled from the factory, but has either a Windows 7 or Windows Vista COA affixed to the system, that model is eligible only for recovery DVDs that match the operating system specified on the COA.

Windows XP Professional is preinstalled as the operating system in the following models:
• 5038-CTO

Table 15. Parts list—Windows XP Professional recovery DVDs

Language	P/N	CRU ID
Japanese	04T2535	*
US English	04T2536	

Windows 7 Professional (32 bit) DVDs

Windows 7 Professional (32 bit) is preinstalled as the operating system in the following models:
• 5038-CTO, 5Lx, 3Gx, 3Hx, 3Nx, 3Px, 3Qx, 2Qx, 2Rx, 2Ux, 2Vx, 38x, 39x, 3Yx, 3Zx, 42x, 43x, 44x, 4Gx, 4Vx, 4Xx, 5Kx

Table 16. Parts list—Windows 7 Professional (32 bit) recovery DVDs

Language	P/N	CRU ID
C&L EMEA (Dutch/French/German/Italian/English)	04T3305	*
C&L Nordics (Danish/Finnish/Swedish/Norwegian/English)	04T3304	
French	04T3299	
German	04T3300	
Indian English	04T3298	
Japanese	04T3301	
Simplified Chinese	04T3297	
Spanish	04T3302	
US English	04T3303	

Windows 7 Professional (64 bit) DVDs

Windows 7 Professional (64 bit) is preinstalled as the operating system in the following models:
• 5038-CTO, 67x, 6Kx, 6Jx, 6Gx, 6Fx, 6Ex, 6Dx, 56x, 57x, 5Nx, 58x, 59x, 5Mx, 65x, 64x, 63x, 5Zx, 5Yx, 5Gx, 5Hx, 5Jx, 62x, 6Cx, 23x, 25x, 29x, 2Cx, 2Ex, 2Gx, 2Hx, 2Jx, 2Kx, 2Nx, 2Px, 2Sx, 2Tx, 2Wx, 2Xx, 2Yx, 2Zx, 30x, 31x, 32x, 33x, 34x, 35x, 36x, 37x, 3Ax, 3Bx, 3Cx, 3Jx, 3Mx, 3Rx, 3Sx, 48x, 4Ax, 4Bx, 4Ex, 4Fx, 4Mx, 4Qx, 4Sx, 4Zx, 52x, 53x

Table 17. Parts list—Windows 7 Professional (64 bit) recovery DVDs

Language	P/N	CRU ID
Arabic	04T3306	*
Brazilian Portuguese	04T3307	
C&L Croatian (English/Slovenian/Croatian)	04T3332	
C&L EMEA (Dutch/French/German/Italian/English)	04T3330	
C&L Hong Kong S.A.R. (Traditional Chinese/Simplified Chinese/English)	04T3331	
C&L Nordics (Danish/Finnish/Swedish/Norwegian/English)	04T3329	
Czech	04T3310	
French	04T3312	
German	04T3314	
Greek	04T3313	
Hebrew	04T3315	
Hungarian	04T3316	
Indian English	04T3311	
Japanese	04T3317	
Korean	04T3318	
Polish	04T3319	
Portuguese	04T3320	
Romanian	04T3321	
Russian	04T3322	
Serbian-Latin	04T3325	
Simplified Chinese	04T3308	

Language	P/N	CRU ID
Slovak	04T3323	
Spanish	04T3324	
Traditional Chinese	04T3309	
Turkish	04T3326	
US English	04T3328	
US English disable	04T3327	

Windows 7 Ultimate (64 bit) DVDs

Windows 7 Ultimate (64 bit) can be installed as the operating system in the following models:
- 5038-CTO, 20x, 4Nx, 4Px, 4Rx

Table 18. Parts list—Windows 7 Ultimate (64 bit) recovery DVDs

Language	P/N	CRU ID
US English	04T3333	*

Windows 7 Home Basic (32 bit) DVDs

Windows 7 Home Basic (32 bit) is preinstalled as the operating system in the following models:
- 5038-CTO, 6Px, 6Mx, 5Qx, 5Ax, 5Bx, 5Cx, 5Dx, 5Ex, 5Sx, 5Tx, 5Ux, 5Px, 5Rx, 6Bx, 6Ax, 69x, 26x, 27x, 2Dx, 3Dx, 3Ex, 3Ux, 3Vx, 3Wx, 3Xx, 45x, 46x, 47x, 4Ux, 4Wx, 4Yx

Table 19. Parts list—Windows 7 Home Basic (32 bit) recovery DVDs

Language	P/N	CRU ID
Arabic	04T3334	*
Brazilian Portuguese	04T3335	
French	04T3338	
Indian English	04T3337	
Portuguese	04T3339	
Russian	04T3340	
Serbian-Latin	04T3342	
Simplified Chinese	04T3336	
Spanish	04T3341	
Turkish	04T3343	
US English	04T3344	

Windows 7 Home Basic (64 bit) DVDs

Windows 7 Home Basic (64 bit) is preinstalled as the operating system in the following models:
- 5038-CTO

Table 20. Parts list—Windows 7 Home Basic (64 bit) recovery DVDs

Language	P/N	CRU ID
Arabic	04T3345	*
Brazilian Portuguese	04T3346	
French	04T3349	
Indian English	04T3348	
Portuguese	04T3350	
Russian English	04T3351	
Russian	04T3352	
Serbian-Latin	04T3354	
Simplified Chinese	04T3347	
Spanish	04T3353	
Turkish	04T3355	
US English	04T3356	

Windows 7 Home Premium (32 bit) DVDs

Windows 7 Home Premium (32 bit) is preinstalled as the operating system in the following models:
• 5038-CTO

Table 21. Parts list—Windows 7 Home Premium (32 bit) recovery DVDs

Language	P/N	CRU ID
Indian English	04T3358	*
Simplified Chinese	04T3357	
US English	04T3359	

Windows 7 Home Premium (64 bit) DVDs

Windows 7 Home Premium (64 bit) is preinstalled as the operating system in the following models:
• 5038-CTO, 6Rx, 6Lx, 6Hx, 55x, 54x, 5Xx, 5Wx, 5Vx, 66x, 21x, 28x, 2Ax, 2Lx, 2Mx, 3Fx, 3Kx, 3Lx, 3Tx, 49x, 4Cx, 4Dx, 4Hx, 4Lx

Table 22. Parts list—Windows 7 Home Premium (64 bit) recovery DVDs

Language	P/N	CRU ID
Arabic	04T3360	*
Brazilian Portuguese	04T3361	
C&L Croatian (English/Slovenian/Croatian)	04T3385	
C&L EMEA (Dutch/French/German/Italian/English)	04T3383	
C&L Hong Kong S.A.R. (Traditional Chinese/Simplified Chinese/English)	04T3384	
C&L Nordics (Danish/Finnish/Swedish/Norwegian/English)	04T3382	
Czech	04T3364	
French	04T3365	
German	04T3367	
Greek	04T3366	

Table 22. Parts list—Windows 7 Home Premium (64 bit) recovery DVDs (continued)

Language	P/N	CRU ID
Hebrew	04T3368	
Hungarian	04T3369	
Japanese	04T3370	
Korean	04T3371	
Polish	04T3372	
Portuguese	04T3373	
Romanian	04T3374	
Russian	04T3375	
Serbian-Latin	04T3378	
Simplified Chinese	04T3362	
Slovak	04T3376	
Spanish	04T3377	
Traditional Chinese	04T3363	
Turkish	04T3379	
US English	04T3381	
US English disable	04T3380	

Common service tools

Table 23. Parts list—Common service tools

Tool	P/N
Screwdriver kit	95F3598
1/4" drive spinner handle	1650840
1/4" Sq. to 1/4" hex torx adapter	93F2838
TR7-TR-10 tamper resistant torx bits	00P6967
Removal tool antenna RF connector	08K7159
USB 2.0 CD-RW/DVD-ROM combo drive II	40Y8687
USB cable	40Y8704
USB floppy diskette drive for maintenance diskette	05K9283
USB floppy diskette drive tool kit	27L3452
Test card for integrated Smart Card	42W7820
LENOVO ThinkPad Hardware Maintenance Diskette Version 1.76 or later **Note:** Download the file from the following Web site: http://www.lenovo.com/support	—

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