ThinkPad

Hardware Maintenance Manual

ThinkPad T420s and T420si

Note

Before using this information and the product it supports, be sure to read the general information under Appendix A "Notices" on page 143.

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About this manual

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

ThinkPad T420s and T420si   Machine types (MT) 4170, 4171, 4172, 4173, 4174, 4175, and 4176

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 31.

Chapter 1. Safety information

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

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. Check for cracked or bulging batteries.
5. Remove the cover.
6. Check for any obvious non-ThinkPad alterations. Use good judgment as to the safety of any non-ThinkPad alterations.
7. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
8. Check for worn, frayed, or pinched cables.
9. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling devices that are sensitive to electrostatic discharge

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD.) ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

  Note: The use of a grounding system to guard against ESD damage is desirable but not necessary.

  – Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
  – When working on a double-insulated or battery-operated system, use an ESD common ground or reference point. You can use coax or connector-outside shells on these systems.
  – Use the round ground prong of the ac plug on ac-operated computers.

Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Safety notices (multilingual translations)

The safety notices in this section are provided in the following languages:
- English
- Arabic
- Brazilian Portuguese
- French
- German
- Hebrew
- Japanese
- Korean
- Spanish
- Traditional Chinese

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 بالقاءها 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.

خطر

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

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 بإصدار تيار يكفي لحدوث حروق للأفراد
أو تعرض المواد القابلة للاشتعال للحريق.

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 بإزالة حزمة البطارية ثم قم بفصل أي كابلات متصلة.

PERIGO

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

PERIGO

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.

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 המתגנה מסויימות מכילות כמות קטנה של ניקל וקדמיום. אין לפרק סוללת המתגנה,
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 המתאימה בזמן
החלפת מארז הסוללה. שימוש בסוללה לא מתאימה עלול לגרום להצתה או התפוצצות של
הסוללה.

⚠️ סכנה

סוללת הליתיום 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 התא 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 תצביש תצוזלי (LCD) נשבר והנוזל מתוך המסך בא במגע עם עיניכם או ידיכם, שטפו את
האזורים הנגועים מיד במים במשך 15 דקות לפחות. פנו לקבלת עזרה רפואית אם תסמינים הנובעים
מהמגע עם הנוזל נמשכים לאחר השטיפה.

סכנה

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

סכנה

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

סכנה

אלא אם כן מותרת יהחלפה חמהי 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 있는지 확인하십시오. 컴퓨터를 흔들어 달깍거리는 소리가 나지 않는지 확인하십시오. 금속 부품 또는 금속 조각은 누전을 일으킬 수 있습니다.

⚠️ 위험

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

⚠️ 위험

리튬 배터리는 화재, 폭발 또는 심각한 화상을 일으킬 수 있습니다. 리튬 배터리를 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 배터리만 사용하십시오. 올바르지 않은 배터리를 사용하면 배터리가 발화되거나 폭발할 수 있습니다.

⚠️ 위험

LCD가 파손되어 LCD 내부의 액체가 눈에 들어가거나 손에 묻으면 즉시 깨끗한 물로 15분 이상 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。

Laser compliance statement (multilingual translations)

The laser compliance statements in this section are provided in the following languages:
- English
- Arabic
- Brazilian Portuguese
- French
- German
- Hebrew
- Japanese
- Korean
- Spanish
- Traditional Chinese

⚠️

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**

- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

⚠️**DANGER**

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

تحذير:

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

- لا تقم بنزع الغطاء. قد ينتج عن نزع غطاء منتج ليزر التعرض لأشعة ليزر في منتهى الخطورة. لا توجد أجزاء يمكن صيانتها داخل الجهاز.

- قد ينتج عن استخدام مفاتيح أو تنفيذ عمليات ضبط أو اجراءات بطريقة مختلفة عما هو محدد هنا التعرض لأشعة ليزر في منتهى الخطورة.

 خطر

تحتوي بعض منتجات الليزر على صمام ثنائي ليزري مضمن من Class 3A أو Class 3B. لاحظ ما يلي.
توجد أشعة ليزر عند الفتح. لا تنظر للشعاع ولا تنظر بطريقة مباشرة باستخدام أدوات ضوئية وتجنب التعرض المباشر للشعاع.

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

- Não remova as tampas. A remoção das tampas do produto a laser pode resultar em exposição prejudicial à radiação de laser. Não há peças que permitam manutenção no interior do dispositivo.

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

PERIGO

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

Radiação a laser quando aberta. Não olhe diretamente para o feixe a olho nu ou com instrumentos óticos e evite exposição direta ao feixe.

ATTENTION :

Si des produits laser (tels que des unités de CD, DVD, à fibre optique ou des émetteurs) sont installés, lisez les informations suivantes :

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

DANGER

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

Rayonnement laser lorsque le carter est ouvert. Evitez toute exposition directe au rayon laser. Evitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques.

Vorsicht:

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

- **Die Abdeckungen nicht entfernen. Durch Entfernen der Abdeckungen des Lasergeräts können gefährliche Laserstrahlungen freigesetzt werden. Das Gerät enthält keine zu wartenden Teile.**

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

Gefahr

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

Laserstrahlung bei geöffneter Verkleidung. Nicht in den Strahl blicken. Keine Lupen oder Spiegel verwenden. Strahlungsbereich meiden.

זהירות:
כאשר מוצרי לייזר (כגון תקליטורים, כונני DVD, התקני סיבים אופטיים או משדרים) מותקנים, שימו לב להנחיות הבאות:

- אל תסירו את הכיסויים. הסרת הכיסויים של מוצר הלייזר עלולה לגרום לחשיפה מסוכנת לקרינת לייזר. ההתקן אינם כוללים רכיבים להחלפה עצמית.

- שימוש בבקרות ובהתאמות שלא צוינו או ביצוע תהליכים שלא צוינו, יכולים לגרום לחשיפה מסוכנת לקרינה.

 סכנה

כמה ממוצרי הלייזר מכילים דיודת לייזר מובנית Class 3A או Class 3B. שימו לב לדברים שלהלן.
קיימת פליטת קרני לייזר כאשר המוצר פתוח. אל תביטו ישירות אל הקרן, אל תביטו אל הקרן ישירות דרך אמצעים אופטיים, והימנעו מחשיפה ישירה לקרן.

⚠

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

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

⚠ **危険**

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

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

⚠

경고:
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- 덮개를 제거하지 마십시오. 레이저 제품의 덮개를 제거하면 유해한 레이저 복사에 노출될 위험이 있습니다. 장치 내부에는 사용자가 수리할 수 있는 부분이 없습니다.
- 본 내용에서 설명한 이외의 방법으로 드라이브를 조정하거나 제어 또는 작동하는 경우, 해로운 레이저 복사에 노출될 수 있습니다.

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일부 레이저 제품은 임베디드 클래스 3A 또는 클래스 3B 레이저 다이오드가 포함되어 있습니다. 다음 주의사항을 유의하십시오.

드라이브의 덮개를 열면 전자파가 발생합니다. 광선 또는 광 장치를 직접 보거나 광선에 노출되지 않도록 주의하십시오.

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

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

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

PELIGRO

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

Emite radiación láser cuando está abierto. No fije la vista en el rayo, no lo mire directamente con instrumentos ópticos y evite la exposición directa al rayo.

警告：
安裝雷射產品（如 CD-ROM、DVD 光碟機、光纖裝置或轉送器）時，請注意下列事項：

- 請勿卸下外蓋。卸下雷射產品的外蓋可能導致曝露於危險的雷射輻射。裝置內沒有可維修的零件。

- 若不遵守本文規定的控制、調整或操作程序，可能會導致危險的輻射外洩。

危險

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

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

Chapter 2. Important service information

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

- "Strategy for replacing FRUs" on page 31
    - "Strategy for replacing a hard disk drive" on page 32
    - "Important notice for replacing a system board" on page 32
    - "How to use error message" on page 32
- "Strategy for replacing FRUs for CTO, CMV, and GAV" on page 32
    - "Product definition" on page 32
    - "FRU identification for CTO, CMV, and GAV products" on page 33

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, do as follows:

1. Go to http://www.lenovo.com/support.
2. Enter the product number of the computer or press Auto-detect button on the screen.
3. Select **Downloads and drivers**.
4. Follow the directions on the screen and 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 HMM.

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 list of key commodities built in a particular machine serial (this is the same record found in PEW).
- eSupport can be accessed at the following Web site:
http://www.lenovo.com/support
- To view the key commodities, do the following:
    1. Click **Products & Service Warranty**.
    2. Click **Check Warranty Status**.
    3. On the Warranty Status Lookup page, click **Parts Lookup**.
    4. Type your machine type and serial number, and then click **Submit**. The key commodities will be displayed.

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

- eSupport can be used to view the complete list of FRUs for a machine type and model.
- To view the complete list of FRUs, do the following:

1. Click **Product & Parts Detail** and then follow the instructions on the screen to reach the Product and Parts Details page.
2. Click the **Parts Detail** tab to view the list of service parts.

Using the HMM

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

Use the HMM as a back-up to PEW and eSupport to view the complete list of FRUs at the MT Model level.

Chapter 3. General checkout

This chapter presents the following information:

- "What to do first" on page 35
- "Checkout guide" on page 36
    - "System supporting the Lenovo ThinkVantage Toolbox program and the PC-Doctor for DOS diagnostics program" on page 36
    - "System supporting the Lenovo diagnostics programs" on page 40
- "Power system checkout" on page 42

The descriptions in this chapter apply to any ThinkPad model that supports the PC-Doctor® for DOS diagnostics program. Some descriptions 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 computers.

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 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/supportTo 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 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

PC-Doctor cannot be used to test a device that is in the docking station, even if the computer supports the docking station. To test a USB device, connect it to the USB connector of the computer.

Testing the computer

Note: The PC-Doctor for DOS CD-R/CD-RW disc supports only test of internal optical disc drives (CD-RW, CD-RW/DVD Combo, and DVD Multi drives) on ThinkPad computers. It does not support test of any optical disc drives connected through USB devices, PC cards, CardBus cards, or similar. The USB limitation only applies to testing of the device. Using a bootable PC-Doctor for DOS CD/DVD, the system can be started from a USB attached optical drive.
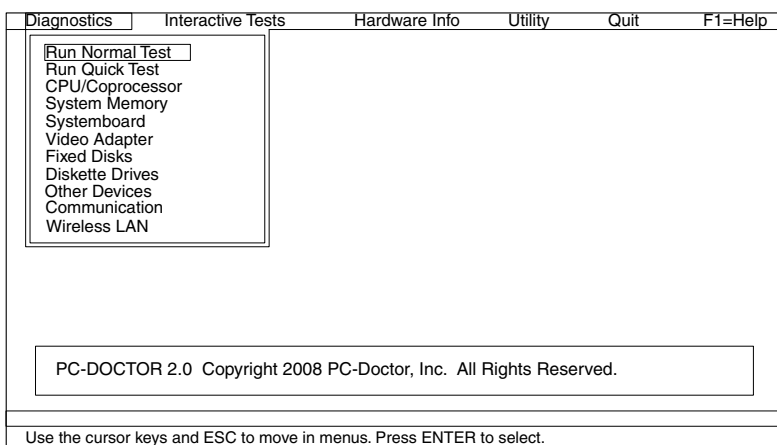
To run the test, do as follows:

1. Turn off the computer.
2. Make sure that the optical drive that is supported as a startup device is installed to the computer.
3. Turn on the computer. If the computer cannot be powered on, go to "Power system checkout" on page 42, and check the power sources. If an error code appears, go to "Symptom-to-FRU index" on page 52.
4. When the ThinkPad logo comes up, immediately press F12 to enter the 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 • Systemboard • 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. If you have an external monitor attached to your 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.

Notes:

- The latest Lenovo ThinkVantage Toolbox is available at the following Web site: http://web.lenovothinkvantagetoolbox.com/

- To install the latest Lenovo ThinkVantage Toolbox on the computer, click **Download Lenovo ThinkVantage Toolbox**, and then follow the instructions on the Web site.

To run this program, do as follows:

Windows 7:
While the Windows operating system is running, press the ThinkVantage button.

To start this program, do the following:

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

Windows Vista and Windows XP:
Click **Start → All Programs → ThinkVantage → Lenovo ThinkVantage Toolbox**

Follow the instructions on the screen. Lenovo ThinkVantageToolbox 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**. 3. If the docking station or the port replicator is attached to the ThinkPad Notebook, detach it.
Power	**Diagnostics → ThinkPad Devices → AC Adapter, Battery 1 (Battery 2)**.
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**. 2. **Interactive Tests → Keyboard**.
Hard disk drive or solid state drive	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.
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 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/diags.

To run the Lenovo Solution Center program, 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.

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/diags, 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 42, and check the power sources. If an error code is displayed, go to "Symptom-to-FRU index" on page 52 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/diags.

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 42, and check the power sources. If an error code is displayed, go to "Symptom-to-FRU index" on page 52 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 42, and check the power sources. If an error code is displayed, go to "Symptom-to-FRU index" on page 52 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. Remove the battery pack.

3. Connect the ac power adapter.

4. Check that power is supplied when you turn on the computer.

5. Turn off the computer.

6. Disconnect the ac power adapter and install the charged battery pack.

7. Check that the battery pack supplies power when you turn on the computer.

If you suspect a power problem, see the appropriate one of the following power supply checkouts:

- "Checking the ac power adapter" on page 43
- "Checking operational charging" on page 44
- "Checking the battery pack" on page 44
- "Checking the backup battery" on page 44

Checking the ac power adapter

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

- If the power problem occurs only when the docking station or the port replicator is used, replace the docking station or the port replicator.
- If the power-on indicator does not turn on, check the power cord of the ac power adapter for correct continuity and installation.
- If the computer does not charge during operation, go to "Checking operational charging" on page 44.

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:
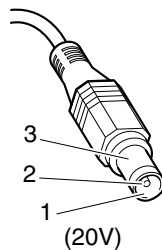
Pin	Voltage (V dc)
1	+20
2	0
3	Ground

Note: Output voltage of pin no.2 of the ac power adapter may 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 and your system supports the PC doctor for DOS, go to "FRU tests" on page 39.

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, remove the battery pack and let it return to room temperature. Reinstall the battery pack. If the charge indicator or icon still does not turn on, replace the battery pack.

If the charge indicator still does not turn on, replace the system board. Then reinstall the battery pack. If it is still not charged, go to the next section.

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.

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

To check the battery pack, do the following:
1. Power off the computer.
2. Remove the battery pack and measure the voltage between battery terminals 1 (+) and 7 (-). See the following figure:
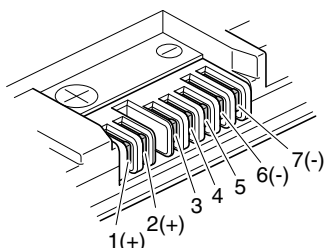
Terminal	Voltage (V dc)
1	+ 0 to + 12.6
7	Ground (-)

3. If the voltage is less than +11.0 V dc, the battery pack has been discharged.

   Note: Recharging will take at least 3 hours, even if the indicator does not turn on.

   If the voltage is still less than +11.0 V dc after recharging, replace the battery.
4. If the voltage is more than +11.0 V dc, measure the resistance between battery terminals 5 and 7. The resistance must be 4 to 30 K Ω. If the resistance is not correct, replace the battery pack. If the resistance is correct, replace the system board.

Checking the backup battery

Do the following:
1. Power off the computer, and unplug the ac adapter from it.
2. Turn the computer upside down.
3. Remove the battery pack (see "1010 Battery pack" on page 68).
4. Remove the backup battery (see "1090 Backup battery" on page 83).

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

Red (+)
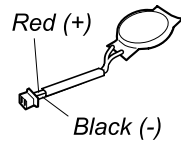
Black (-)

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 Product Recovery discs" on page 47
- "Restoring the factory contents by using Recovery Disc Set" on page 47
- "Passwords" on page 49
- "Power management" on page 50
- "Symptom-to-FRU index" on page 52

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 Product Recovery discs

When the hard disk drive (HDD) or solid state drive (SSD) is replaced because of a failure, no Product Recovery program is on the new drive. In this case, you must use the recovery discs for the computer. Order the recovery discs 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 136.

To install the factory contents by using Product Recovery discs, 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. Insert the bootable **Start Recovery Disc** into the DVD drive.
2. Select your language and click **Next**.
3. Read the license. If you agree with the terms, select **I accept these terms and conditions** and then click **Next**.
4. Insert the *Operating System Recovery Disc*, when prompted and click **Yes** to begin the operating system recovery process.
5. Insert the *Product Recovery Disc*, when prompted and click **OK**.
6. 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**.

   Note: Not all recovery disc sets come with a *Supplemental Recovery Disc*. If there is a *Supplemental Recovery Disc*, it will be clearly marked as such.
7. When all of the data has been copied from the last disc in the set, a message is displayed prompting you to restart the computer. Remove the disc and then click **Yes**.

   Note: The remainder of the recovery process is fully automated and no action is required by you. The computer will restart into the 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.
8. When the recovery process is complete, the Welcome to Microsoft Windows screen is displayed. Follow the instructions on the screen to complete the Windows setup.

Restoring the factory contents by using Recovery Disc Set

When the hard disk drive (HDD) or solid state drive (SSD) 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 136.

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 can take one to two hours to complete. The length of time depends on the method you use. If you use recovery discs, the recovery process will take about two 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 program 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 ThinkPad Setup and then press F9 to restore the default settings. Press F10 to save and exit 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: the power-on password, the hard disk password, and the supervisor password.

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

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

Power-on password

A power-on password protects the system from being powered on by an unauthorized person. The password must be turned on before an operating system can be started. For instructions on how to remove the power-on password, see "How to remove the power-on password" on page 49.

Hard disk password

There are two hard disk passwords:

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

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

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

For how to remove the hard disk password, see "How to remove the hard disk password" on page 50.

Supervisor password

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

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

How to remove the power-on password

To remove a power-on password that you have forgotten, do the following:

(A) If no supervisor password has been set:
1. Turn off the computer.
2. Remove the battery pack. For how to remove the battery pack, see "1010 Battery pack" on page 68.

3. Remove the backup battery. For how to remove the backup battery, see "1090 Backup battery" on page 83.

4. Turn on the computer and wait until the POST ends. After the POST ends, the password prompt does not appear. The power-on password has been removed.

5. Reinstall the backup battery and the battery pack.

(B) If an supervisor password 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 to enter ThinkPad Setup. When power-on password icon is appearing on the screen, enter the power-on password.

3. Select **Security**, using the cursor directional keys to move the menu.

4. Select **Password**.

5. Select Power-On Password.

6. Type the current supervisor password in the **Enter Current Password** field. then leave the **Enter New Password** field blank, and press Enter twice.

7. In the Changes have been saved window, press Enter.

8. Press F10; then, in the Setup confirmation window, select **Yes**.

How to remove the hard disk password

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

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

1. Turn on the computer.

2. When the ThinkPad logo comes up, immediately press F1 to enter ThinkPad Setup. When power-on password icon is appearing on the screen, enter the power-on password.

3. Select **Security**, using the cursor directional keys to move 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 hard disk password**.

7. Type the current master hard disk password in the **Enter Current Password** field. then leave the **Enter New Password** field blank, and press Enter twice.

8. Press F10.

9. Select **Yes** in the Setup Configuration window. Both user hard disk password and master hard disk password 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

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

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

1. Press Fn+F3. A panel for selecting a power plan (in Windows XP, power scheme) appears.
2. Select **Power off display (keep current power plan)** (in Windows XP, keep current power scheme).

You can also put the computer into screen blank mode, press ThinkVantage button and use the ThinkVantage Productivity Center.

Note: If the computer is a Windows 7 model, it does not support ThinkVantage Productivity Center.

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.

To enter sleep (standby) mode, press Fn+F4.

Note: You can change the action of the Fn+F4 key combination by changing the settings in Power Manager.

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.

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

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

- Press the Fn+F12 keys.
- If you have defined one of the following actions as the event that causes the system to go into hibernation mode, perform that action.
  - Closing the lid.
  - Pressing the power button.
  - Pressing Fn+F4 keys.

Also, the computer goes into hibernation mode automatically 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 53
- "Error messages" on page 54
- "Beep symptoms" on page 54
- "No-beep symptoms" on page 55
- "LCD-related symptoms" on page 55
- "Intermittent problems" on page 56
- "Undetermined problems" on page 56

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 56.

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

Numeric error codes

Table 2. Numeric error codes

Symptom or error	FRU or action, in sequence
0177 Bad SVP data, stop POST task—The checksum of the supervisor password in the EEPROM is not correct.	**System board.**
0182 Bad CRC2. Enter BIOS Setup and load Setup defaults.—The checksum of the CRS2 setting in the EEPROM is not correct.	1. Run **ThinkPad Setup**. Press F9, and Enter to load the default setting. Then save the current setting by pressing F10. 2. System board.
0183 Bad CRC of Security Settings in EFI Variable. Enter ThinkPad Setup.	
0187 EAIA data access error—The access to EEPROM is failed.	**System board.**
0188 Invalid RFID Serialization Information Area.	
0189 Invalid RFID configuration information area—The EEPROM checksum is not correct.	
0190 Critical low-battery error	**System board.**
0191 System Security—Invalid Remote Change requested.	**System board.**
0199 System Security— Security password retry count exceeded.	1. **Run ThinkPad Setup, and then save the current setting by pressing F10.** 2. System board.
0251 System CMOS checksum bad— Default configuration used.	1. **Charge the backup battery for more than 8 hours by connecting the ac power adapter.** 2. Replace the backup battery and run ThinkPad Setupto reset the time and date.
1802 Unauthorized network card is plugged in—Turn off and remove the miniPCI network card.	1. **Remove Mini PCI network card.** 2. System board.
1820 More than one external fingerprint reader is attached. Power off and remove all but the reader that you set up within your main operating system.	**Remove all but the reader that you set up for the authentication.**
2000 Hard Drive Active Protection sensor diagnostics failed.Press <Esc> to continue.Press <F1> to enter SETUP	1. Undock docking station or port replicator if it is attached to the ThinkPad Notebook. 2. Place the ThinkPad Notebook on a horizontal surface. Do not apply any physical shock to the computer. 3. Run **Diagnostics ➔ ThinkPad Device ➔ HDD Active Protection Test**.
2100 Detection error on HDD0 (Main HDD)	1. **Reseat the hard disk drive.** 2. Main hard disk drive. 3. System board.
2101 Detection error on HDD1 (Ultrabay HDD)	1. **Reseat the hard disk drive.** 2. Ultrabay hard disk drive. 3. System board.

Table 2. Numeric error codes (continued)

Symptom or error	FRU or action, in sequence
2102 Detection error on HDD2 (Mini SATA)	1. **Reseat the Mini SATA device.** 2. Mini SATA device. 3. System board.
2110 Read error on HDD0 (Main HDD)	1. **Reseat the hard disk drive.** 2. Main hard disk drive. 3. System board.
2111 Read error on HDD1 (Ultrabay HDD)	1. **Reseat the hard disk drive.** 2. Ultrabay hard disk drive. 3. System board.
2112 Read error on HDD2 (Mini SATA)	1. **Reseat the Mini SATA device.** 2. Mini SATA device. 3. System board.
2200 Machine Type and Serial Number are invalid.	**System board.**
2201 Machine UUID is invalid.	**System board.**

Error messages

Table 3. Error messages

Symptom or error	FRU or action, in sequence
Fan error.	1. **Fan.** 2. Thermal grease. 3. System board.
Thermal sensing error.	**System board**.
This system does not support batteries that are not genuine Lenovo-made or authorized. The system will continue to boot, but may not charge unauthorized batteries. ATTENTION: Lenovo has no responsibility for the performance or safety of unauthorized batteries, and provides no warranties for failures or damage arising out of their use.	**Replace the battery.**

Beep symptoms

Table 4. Beep symptoms

Symptom or error	FRU or action, in sequence
One beep and a blank, unreadable, or flashing LCD.	1. **Reseat the LCD connector**. 2. LCD assembly. 3. External CRT. 4. System board.
One long and two short beeps, and a blank or unreadable LCD.	1. **System board**. 2. LCD assembly. 3. DIMM.
Two short beeps with error codes.	**POST error. See Numeric error codes.**
Two short beeps and a blank screen.	1. **System board**. 2. DIMM.

Table 4. Beep symptoms (continued)

Symptom or error	FRU or action, in sequence
Two or more beeps, or a continuous beep. Operating system starts successfully.	If a mini-PCI Ethernet card is installed, confirm that **Alert On LAN 2** in ThinkPad Setup is **disabled**.
Three short beeps, pause, three more short beeps, and one short beep.	1. **DIMM**. 2. System board
One short beep, pause, three short beeps, pause, three more short beeps, and one short beep.	
Only the cursor appears.	**Reinstall the operating system**.
Four cycles of four short beeps and a blank screen.	**System board** (security chip)
Five short beeps and a blank screen.	**System board**

No-beep symptoms

Table 5. 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 Notebooks 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 6. 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.

Table 6. LCD-related symptoms (continued)

Symptom or error	FRU or action, in sequence
• 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 42.)
1. Turn off the computer.
2. Visually check each FRU for damage. Replace any damaged FRU.
3. Remove or disconnect all of the following devices:
    a. Non-ThinkPad devices
    b. Devices attached to the docking station or the port replicator
    c. Printer, mouse, and other external devices
    d. Battery pack
    e. Hard disk drive
    f. External diskette drive or optical drive
    g. DIMM
    h. Optical disk or diskette in the internal drive
    i. 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.
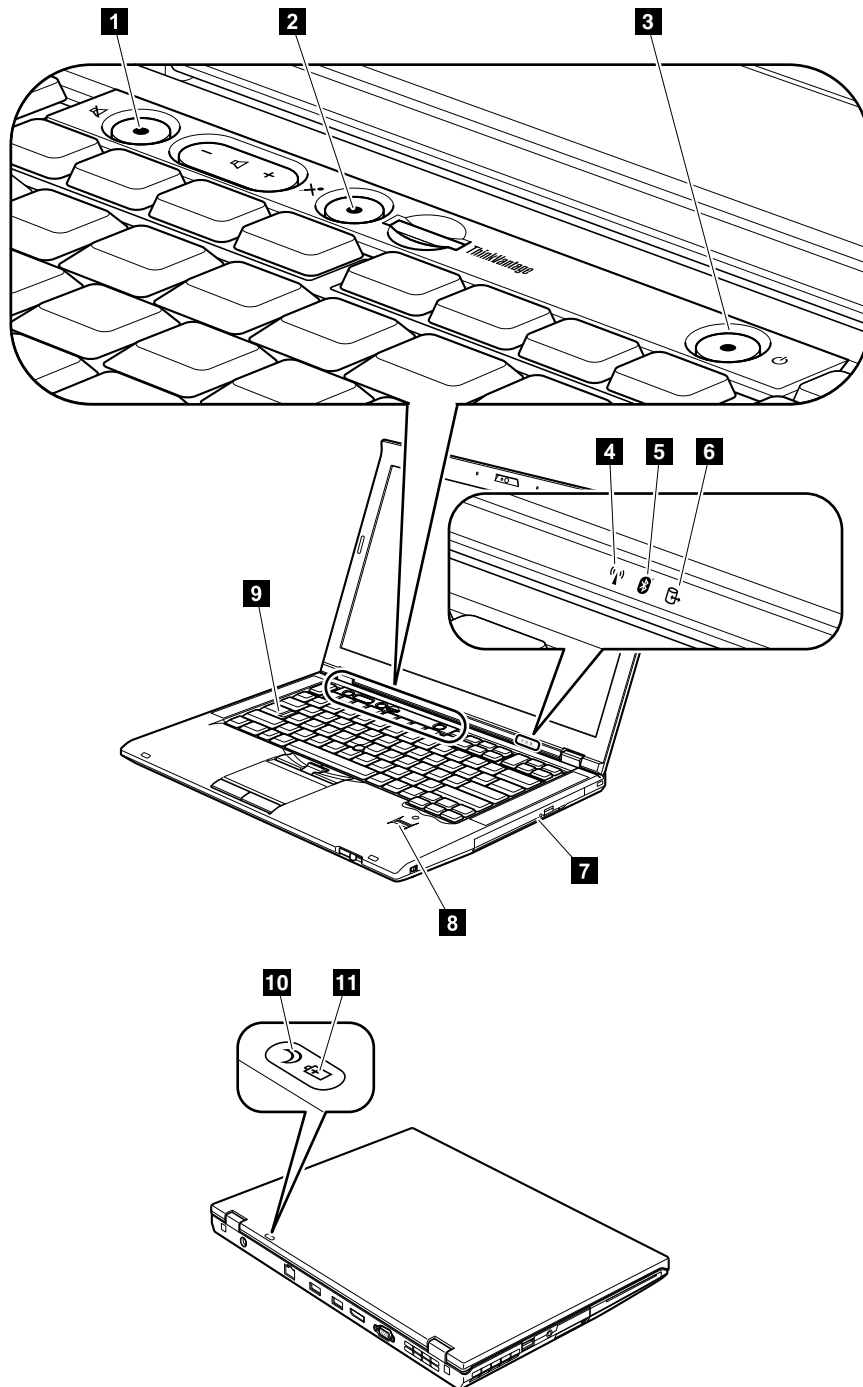
Table 7. Status indicators

Indicator	Meaning
1 Speaker mute	Orange: The speaker is on mute. To set the speakers on mute or unmute, press the speaker mute button.
2 Microphone mute	Orange: The microphone is on mute. None of the recording devices is available while the microphone mute is on by default.
3 Power on	Green: The computer is on and ready to use. This indicator stays lit around the power-on button whenever the computer is on. Blinking green: The computer is in sleep (standby) mode. Turn off: The computer is off.
4 Wireless LAN, Wireless WAN, or WiMAX status	Green: The wireless LAN feature (the IEEE 802.11 b/g standard, 802.11 a/b/g, or 802.11n), wireless WAN feature, or WiMax feature is on, and the radio link is ready for use, or the data is being transmitted. Off: Wireless network devices are disabled or the radio is turned off.
5 *Bluetooth* wireless or Wireless USB status	Green: The *Bluetooth* wireless feature or wireless USB feature is on, and the radio link is ready for use, or the data is being transmitted. Off: The *Bluetooth* feature is disabled.
6 Device access	Green: Data is being read from or written to the hard disk drive, the diskette drive, or the drive in the Serial Ultrabay Slim device. When this indicator is on, do not put the computer into sleep (standby) mode or turn off the computer. **Note:** Do not move the system while the green device access light is on. Sudden physical shock could cause drive errors.
7 Serial Ultrabay Slim device status	Green: A Serial Ultrabay Slim device is installed and in use. Blinking green: A Serial Ultrabay Slim device is in the process of being detached. Turn off: A Serial Ultrabay Slim device is ready to be attached or detached.
8 Fingerprint reader status	Green: The fingerprint reader is ready to swipe. Blinking green: The fingerprint is being authenticated or has been authenticated. Blinking orange: The fingerprint could not be authenticated.
9 Caps lock	Green: Caps Lock mode is enabled. To enable or disable Caps Lock mode, press the Caps Lock key.

Table 7. Status indicators (continued)

Indicator	Meaning	
10 Sleep (standby for Windows XP) status	Green:	The computer is in sleep (standby) mode.
	Blinking green:	The computer is entering sleep (standby) mode or hibernation mode, or is resuming normal operation.
11 Battery status	Green:	The battery charge level is 20% or higher.
	Orange:	The battery charge level is between 5% and 20%.
	Fast blinking orange:	The battery charge level is lower than 5% .
	Slow blinking orange:	The battery is being charged. When it reaches 20%, the blinking color changes to green.
	Slow blinking green:	The battery charge level is between 20% and 80%, and charging is continuing. When the battery reaches 80% charge, the battery status indicator stops blinking, but the charging may continue until the battery is 100% charged. **Note:** If the computer is operating on battery power, the battery status indicator does not work while the computer is turned off or is in sleep (standby) mode or hibernation mode.
	Quick blinking orange:	An error occurred in the battery.
	The battery status indicator blinks three times:	The ac power adapter is attached to the computer.
	The battery status indicator is off:	The battery pack of the computer is fully charged or detached.

Chapter 6. Fn key combinations

The following table shows the function of each combination of Fn with a function key.

Table 8. Fn key combinations

Key combination	Description
Fn+F1	Reserved.
Fn+F2	Lock the computer.
Fn+F3	Select a power plan (in Windows XP, power scheme) that has been created by Power Manager, or adjust the power level by using the slider control. When you press this combination, a panel for selecting a power plan (power scheme) appears. 1. To use the Fn+F3 key combination, you must have the ThinkPad PM device driver installed on the computer. 2. If you have logged on with an administrator user ID, and you press Fn+F3, the panel for selecting a power plan (power scheme) appears. If you have logged on with another user ID, and you press Fn+F3, the panel does not appear. 3. You cannot turn off the computer display by pressing Fn+F3.
Fn+F4	Put the computer in sleep (standby) mode. To return to normal operation, press the Fn key only, without pressing a function key. 1. To use the Fn+F4 key combination, you must have the ThinkPad PM device driver installed on the computer. 2. If you want to use the combination to put the computer into hibernation mode or do-nothing mode (in Windows XP, shut the computer down or show the panel for turning off the computer), change the settings in the Power Manager.
Fn+F5	Enable or disable the built-in wireless networking features and the Bluetooth features. If you press Fn+F5, a list of wireless features is displayed. You can quickly change the power state of each feature in the list. **Note:** If you want to use Fn+F5 to enable the feature specified in IEEE standard 802.11, the following device drivers must be installed on the computer beforehand: • ThinkPad Power Management driver • OnScreen Display Utility • Wireless device drivers
Fn+F6	Change the camera settings and the setting of the microphone mute button. When you press Fn+F6, the camera setting window is opened. **Note:** For Window XP models, the setting of the microphone mute button cannot be changed.
Fn+F7	Apply a presentation scheme directly, with no need to start Presentation Director. To disable this function and use the Fn+F7 key combination for switching a display output location, start Presentation Director, and change the settings. **Note:** If the computer is an Windows 7 model, it does not support presentation schemes, but the Fn+F7 combination is available for switching a display output location.
	For Windows 7: Switch a display output location • Computer display only (LCD) • Computer display and external monitor (same image) • Computer display and external monitor (extended desktop)

Table 8. Fn key combinations (continued)

Key combination	Description
	• External monitor only **Note:** To switch between the computer display and an external monitor, the Win+P key combination is also available. **For Windows Vista and Windows XP:** Switch a display output location • External monitor • Computer display (LCD) and external monitor • Computer display (LCD) • This function is not supported if different desktop images are displayed on the computer display and the external monitor (the Extend desktop function). • This function does not work while a DVD movie or a video clip is playing. To enable this function, start Presentation Director, and change the Fn+F7 settings. **Note:** Multiple users can log on to a single operating system by using different user IDs. Each user needs to change the settings.
Fn+F8	Change the settings of the UltraNav® pointing device.
Fn+F9	Reserved.
Fn+F10	Reserved.
Fn+F11	Reserved.
Fn+F12	Put the computer into hibernation mode. To return to normal operation, press the power button for less than four seconds. **Note:** To use Fn+F12 for hibernation, you must have the ThinkPad PM device driver installed on the computer.
Fn+PgUp	Turn the ThinkLight® on or off. **Note:** This function is supported only on the ThinkPad Notebooks that have the ThinkLight. The on or off status of the ThinkLight is shown on the screen for a few seconds when you press Fn+PgUp.
Fn+Home	The computer display becomes brighter.
Fn+End	The computer display becomes dimmer.
Fn+Spacebar	Enable the FullScreen Magnifier function.
Fn+PrtSc	Has the same function as the SysRq key.
Fn+ScrLk	Enable or disable the numeric keypad. The indicator of numeric lock will be displayed on the screen.
Fn+Pause	Has the same function as the Break key.
Fn+cursor keys	These key combinations work with Windows Media Player. Fn+down arrow key works for the Play or Pause button, Fn+up arrow key for the Stop button, Fn+right arrow key for the Next Track button, and Fn+left arrow key for the Previous Track button.

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 in your tool bag. For the part number of the screw kit, see "Miscellaneous parts" on page 134.
- 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)
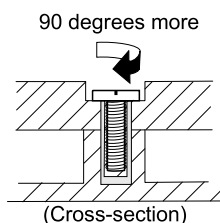
- **Logic card to plastic** Turn an additional **180 degrees** after the screw head touches the surface of the logic card:

180 degrees more

(Cross-section)
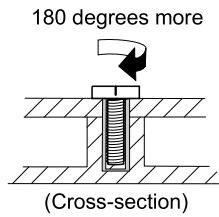
- If you have a torque driver, refer to the**Torque** column in the screw information table for each step.
- Make sure that you use the correct screw. It is recommended to use new screws for replacements. If you have a torque screwdriver, tighten all screws firmly to the torque specified in the screw 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" on page 64
- "Retaining the UUID" on page 65
- "Reading or writing the ECA information" on page 65

Restoring the serial number of the system unit

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

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

Before replacing the system board, save the original serial number by doing the following:
1. Install the 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 63.
3. Begin by removing any FRUs that have to be removed before replacing the failing FRU. Such FRUs are listed in each FRU replacement section. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing a FRU, as given in the drawings by the numbers in square callouts.
5. When turning a screw 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 115.
8. When replacing a FRU, use the correct screws as shown in the procedures.

⚠ **DANGER**

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

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

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 T420s and T420si models

Removing the SIM card:

Some models of the ThinkPad T420s and T420si 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.

To remove the SIM card, you need to remove the battery pack first. (See 1010 Battery pack.)

After you finish the servicing, make sure that you insert the card back into the slot firmly.
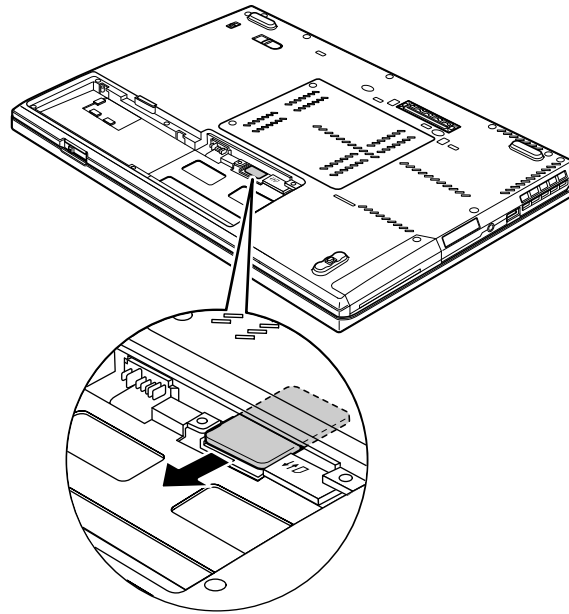
Notice on disconnecting the cable from flip-lock ZIF connector:

Some cables used in ThinkPad T420s and T420si models are connected to flip-lock ZIF connectors.

When disconnecting a cable from the flip-lock ZIF connector, do as shown in this figure.
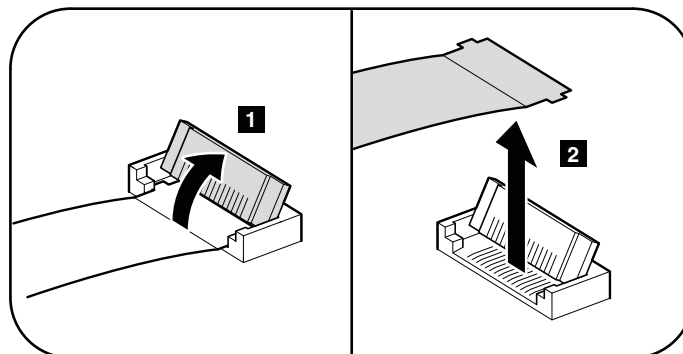
1010 Battery pack

Important notice for replacing a battery pack:

The Lenovo ThinkVantage Toolbox and Lenovo Solution Center (in Windows 7) have 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.

Table 9. 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.

Unlock the battery latch **1**. Holding the battery latch in the unlocked position **2**, remove the battery pack in the direction shown by arrows **3** and **4**.
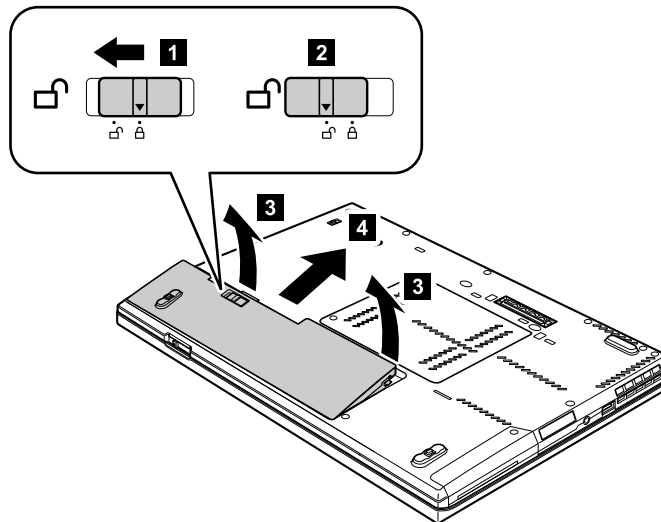
When installing:

Install the battery pack in the slot. Make sure that the battery latch is in the locked position.

1020 Serial Ultrabay Slim device or travel bezel

For access, remove this FRU:

- "1010 Battery pack" on page 68

Table 10. Removal steps of Serial Ultrabay Slim device or travel bezel

Holding the bay lock latch in the unlocked position **1**, slide the bay eject latch in the direction shown by arrow **2**, and then pull out the Serial Ultrabay Slim device or the travel bezel in the direction shown by arrow **3** to completely remove it **4**.
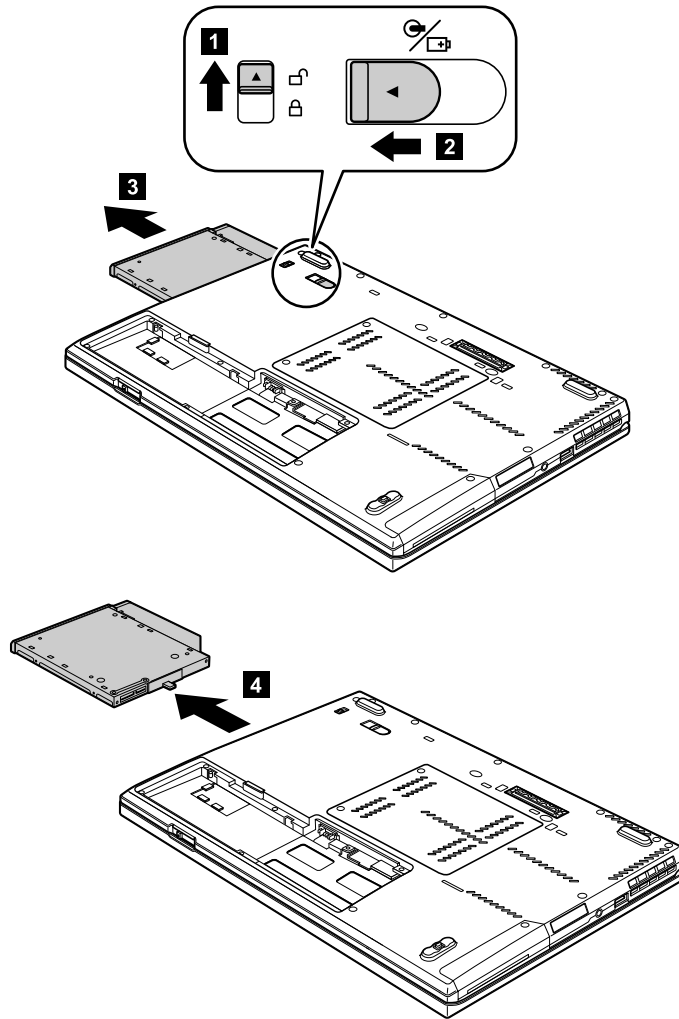
1030 Solid state drive (SSD) or hard disk drive (HDD)

For access, remove the FRU:

- "1010 Battery pack" on page 68

Attention:

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

Removal steps of SSD or HDD
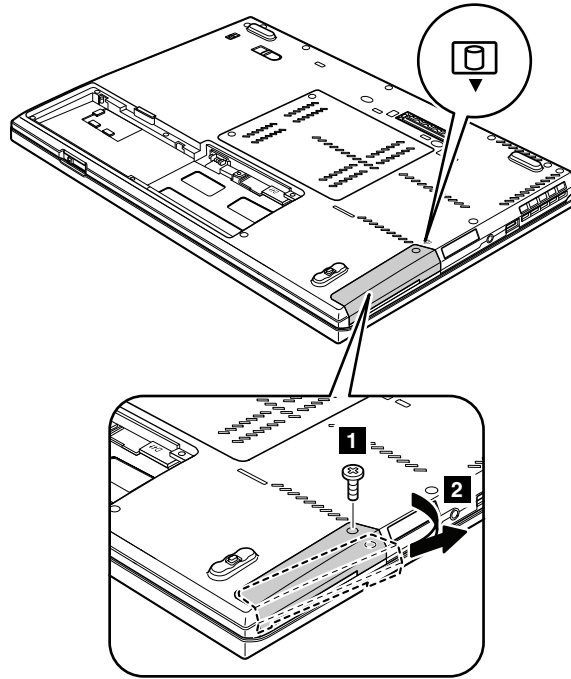
Step	Screw (quantity)	Color	Torque
1	M3 × 3 mm, flat-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgfcm)
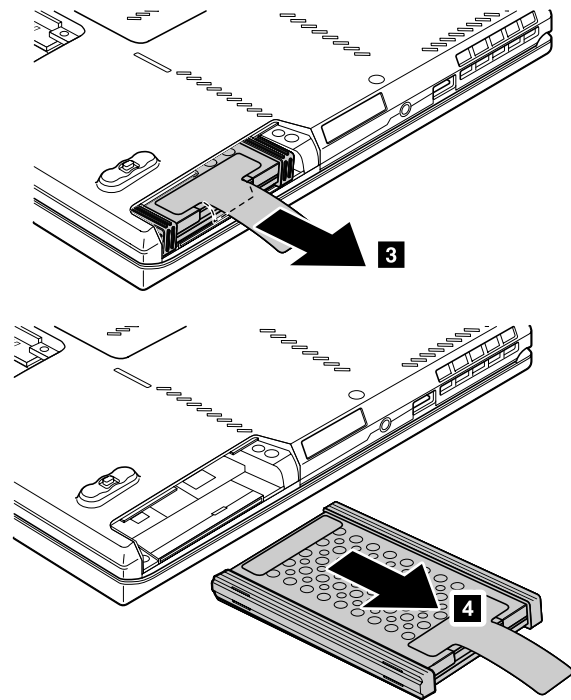
When installing:

Make sure that the SSD or HDD is firmly attached.

For HDD and HDD rubber rails:
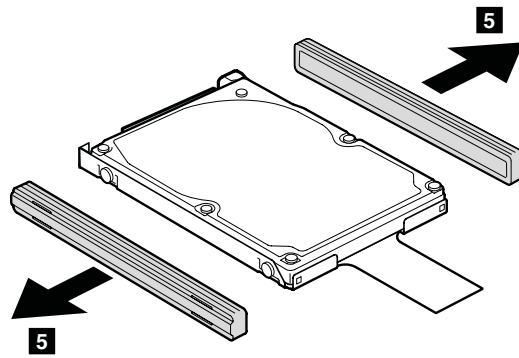
For SSD and SSD spacers:
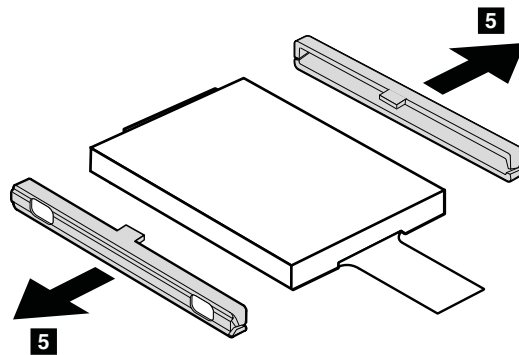
1040 DIMM

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

Removal steps of DIMM

Note: Remove the screws **1**.
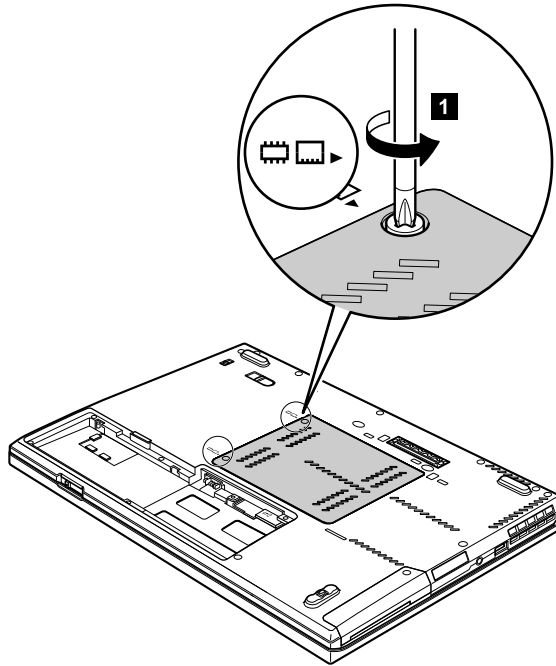
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
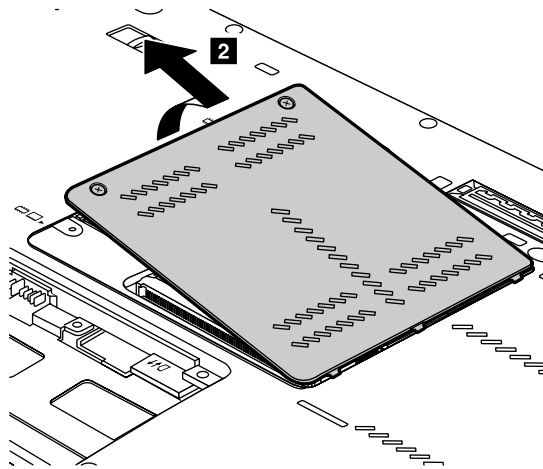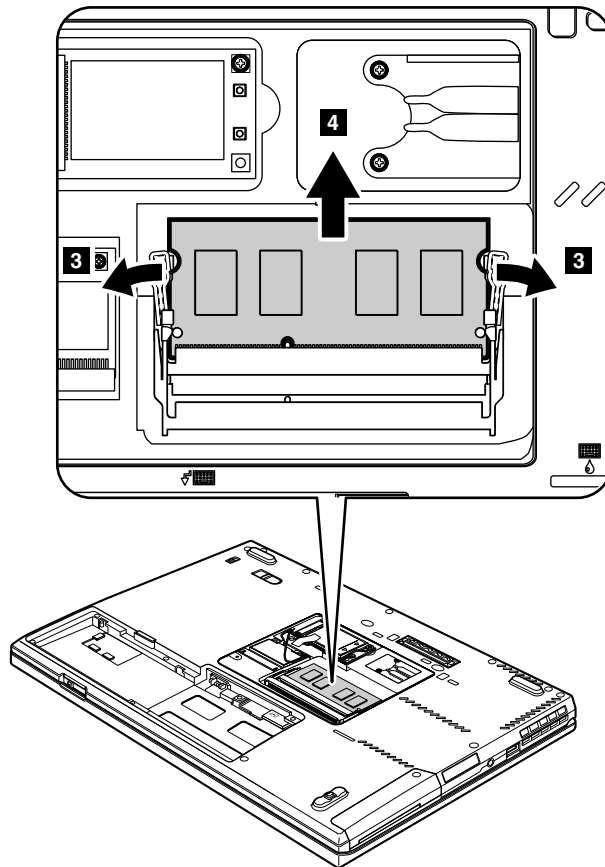
When installing:

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 attached in the slot and does not move easily.

1050 PCI Express Mini Card for wireless LAN

For access, remove this FRU:
*   "1010 Battery pack" on page 68

Removal steps of PCI Express Mini Card for wireless LAN

Note: Remove the screws **1**.
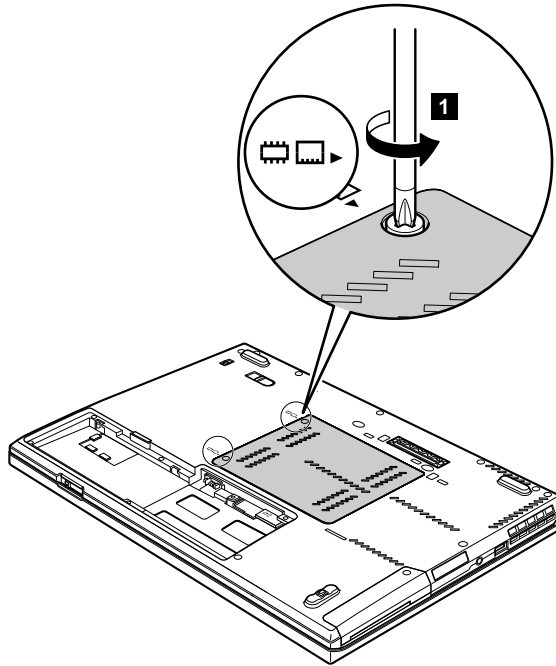
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
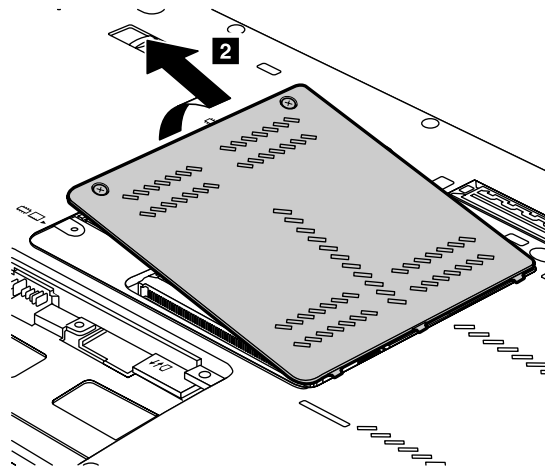
Note: Some models might have only two antenna cables.
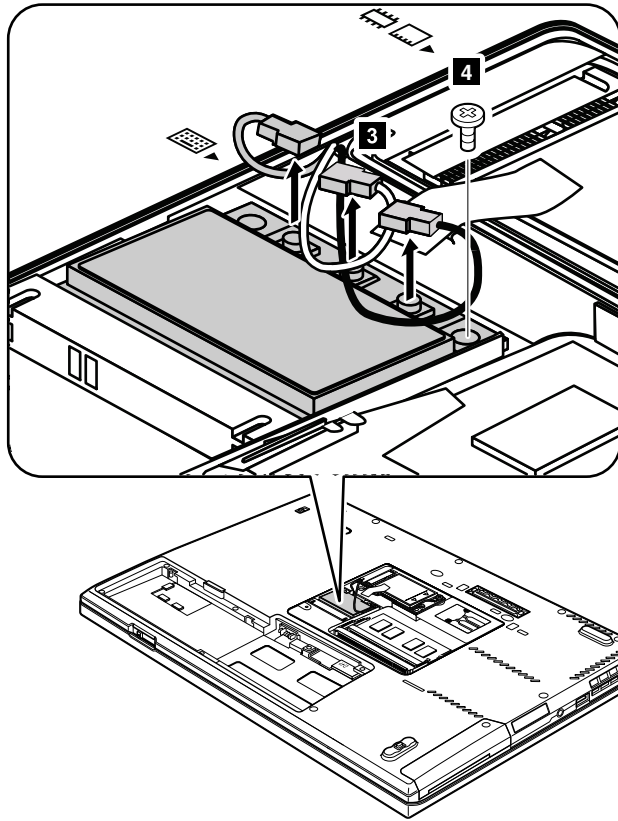
Step	Screw (quantity)	Color	Torque
4	M2 × 3 mm, small-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgfcm)
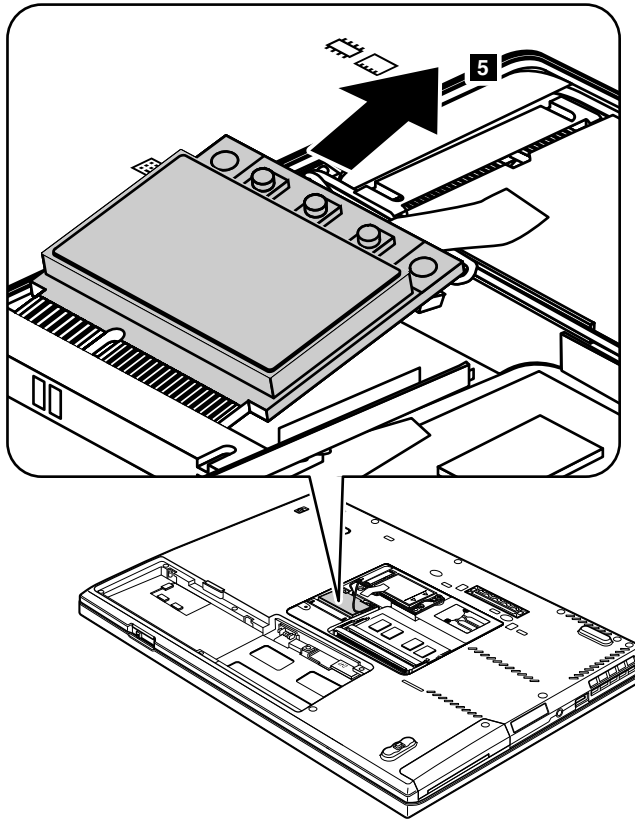
When installing:

- In models with a wireless LAN card that has two antenna connectors, plug the gray cable into the jack labeled **MAIN** or **M**, and the black cable into the jack labeled **AUX** or **A** on the card. If the computer you are servicing has three cables, put the white cable in the cable protection tube.
- In models with a wireless LAN card that has three antenna connectors, plug the gray cable (MAIN) into the jack labeled **TR1**, the white cable (third) into the jack labeled **RO** or **TR3**, and the black cable (AUX) into the jack labeled **TR2** on the card.

1060 PCI Express Mini Card for wireless WAN

For access, remove this FRU:
- 1010 Battery pack

Removal steps of PCI Express Mini Card for wireless WAN

Note: Remove the screws **1**.
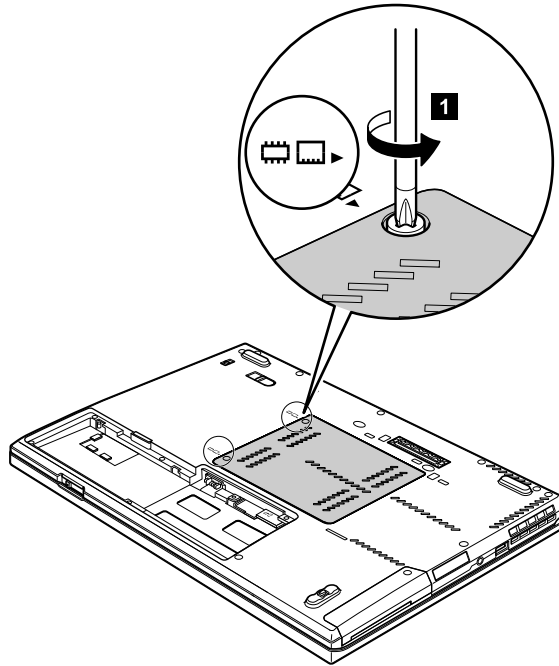
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
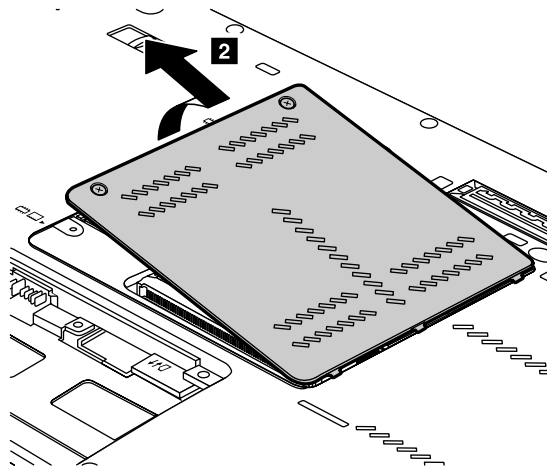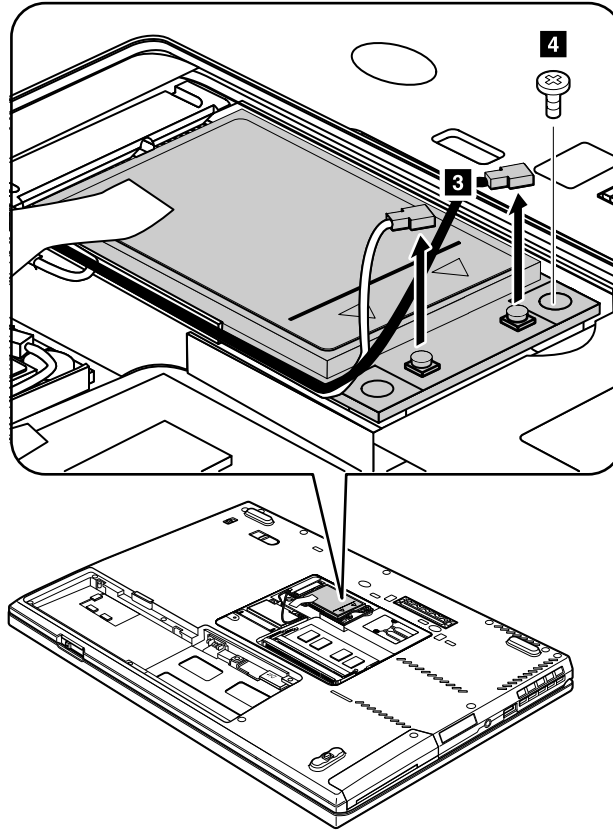
Step	Screw (quantity)	Color	Torque
4	M2 × 3 mm, small-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgfcm)
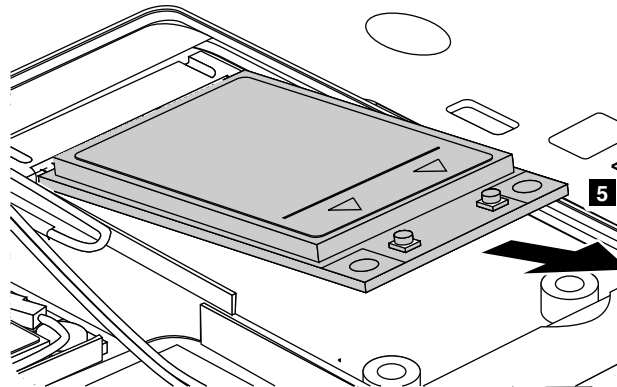
When installing:

Plug the orange cable into the jack labeled **MAIN**, and the blue cable into the jack labeled **AUX** on the card.

1070 4–in–1 media card reader

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

Removal steps of 4–in–1 media card reader
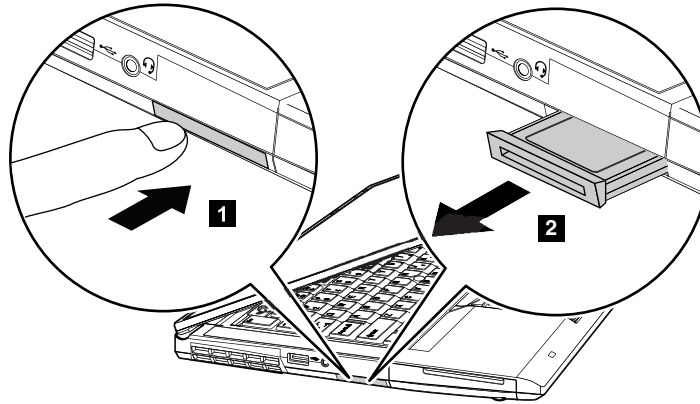
1080 Keyboard

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

Removal steps of keyboard

Note: Remove the screws **1**.
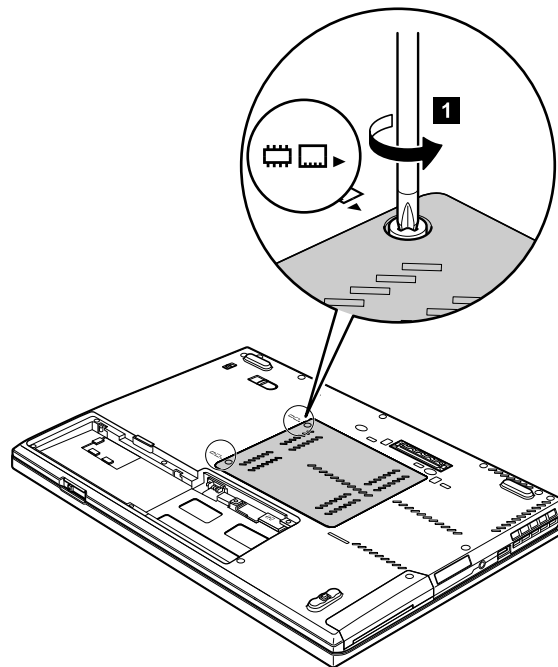
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
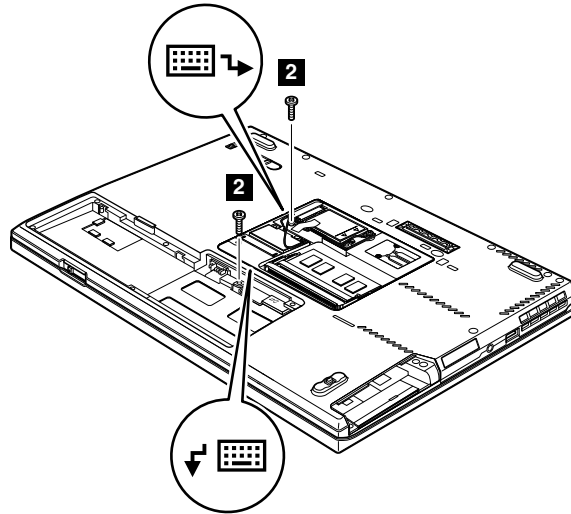
Step	Screw (quantity)	Color	Torque
2	M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)

Slightly press the keyboard and slide it a little bit forward, in the direction shown by arrow **3**, to detach the front edge of the keyboard from the frame. Then, lift up the keyboard in the direction shown by arrow **4**.
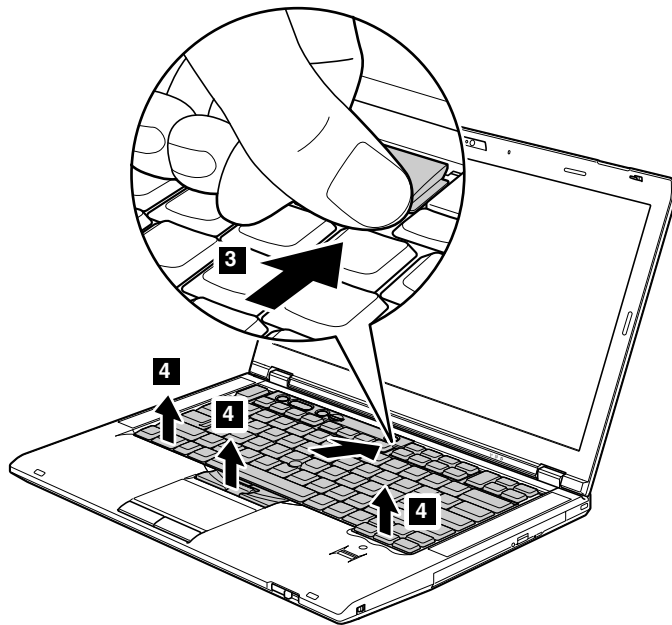
Lift the keyboard a little in the direction shown by arrow **5**, and then detach the connector **6**.
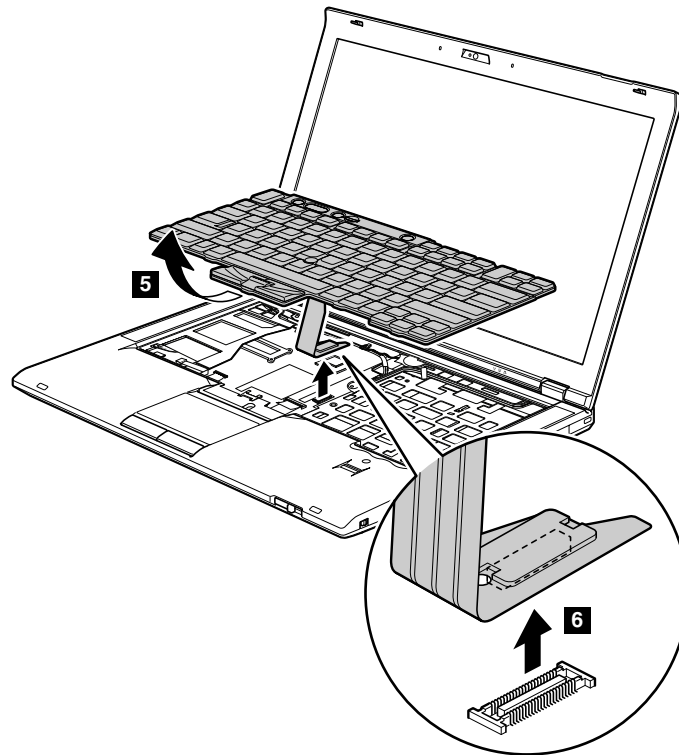
Installation steps of keyboard

When installing the keyboard, do the following:

1. Attach the keyboard connector.
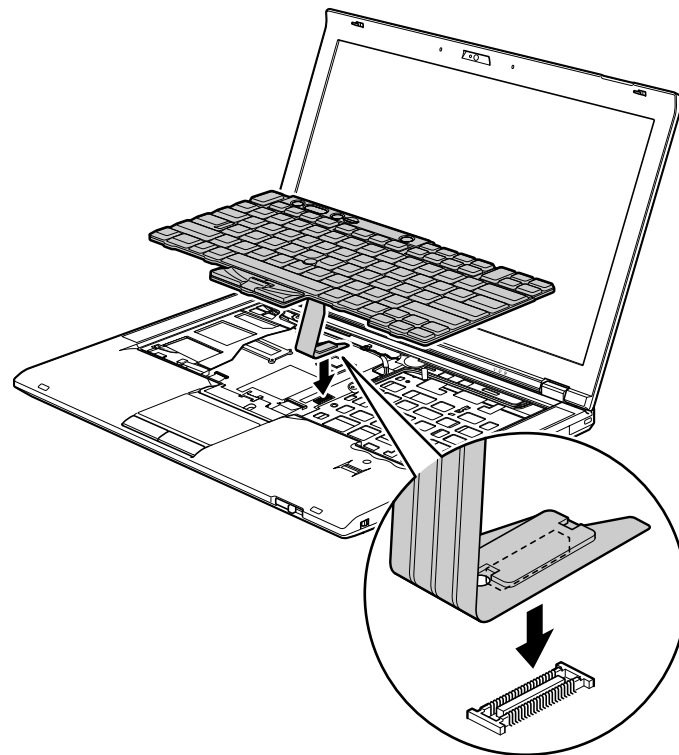
2. Attach the keyboard so that the keyboard edge **a** is under the frame as shown in the following figure.
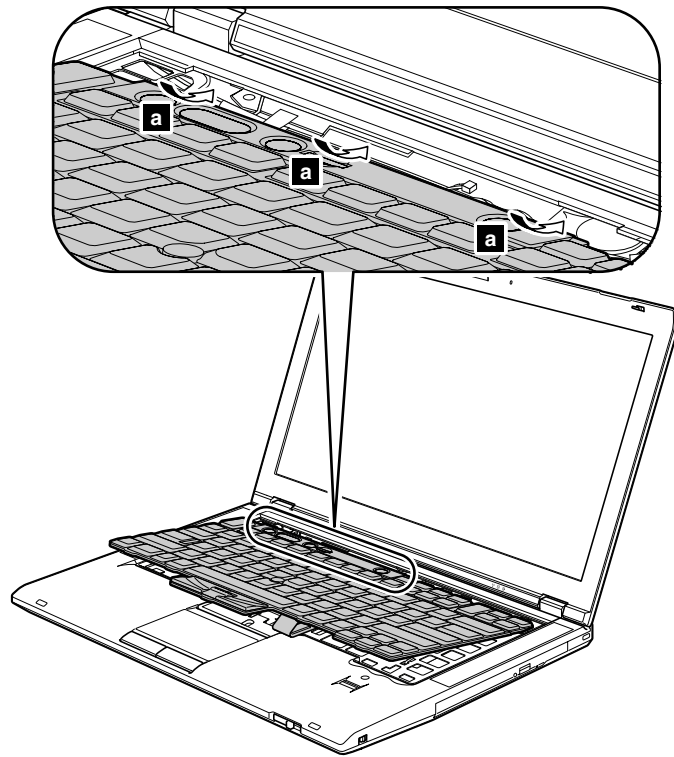
3. Gently press the keys with your palms and slightly slide the keyboard toward you until it snaps into position.
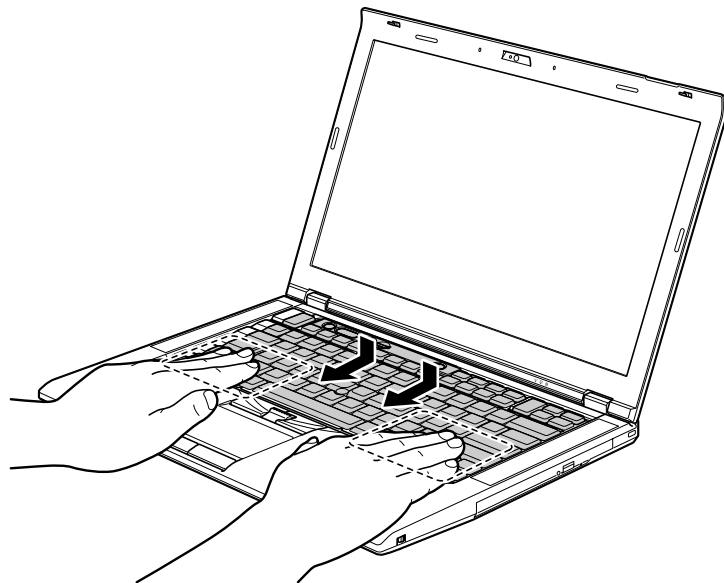
4. Secure the keyboard by tightening the screws from the bottom side of the computer.
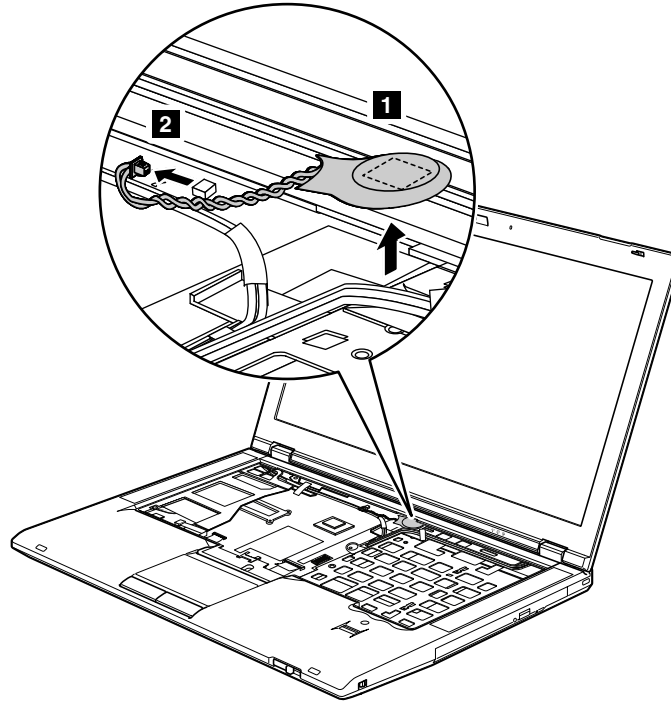
1090 Backup battery

For access, remove these FRUs in order:
- "1010 Battery pack" on page 68
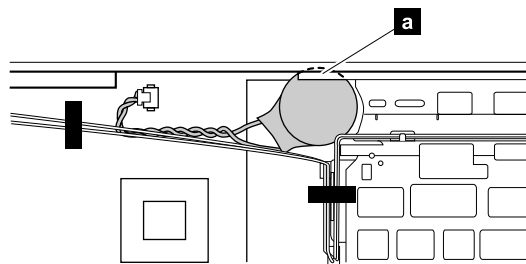
*   "1080 Keyboard" on page 80

⚠ DANGER

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

Removal steps of backup battery

When installing:

Attach the backup battery **a** in the insulation sheet as shown in the figure below and make sure that the battery connector is attached firmly.


1100 Palm rest with fingerprint reader, smart card reader, and speaker

For access, remove these FRUs in order:
*   "1010 Battery pack" on page 68
*   "1080 Keyboard" on page 80

Note: In models with the fingerprint reader, the sensor is attached to the palm rest FRU. If the fingerprint reader is defective, you can replace the palm rest by following the procedures in this section. The replacement procedures are the same for a palm rest with or without a fingerprint reader.
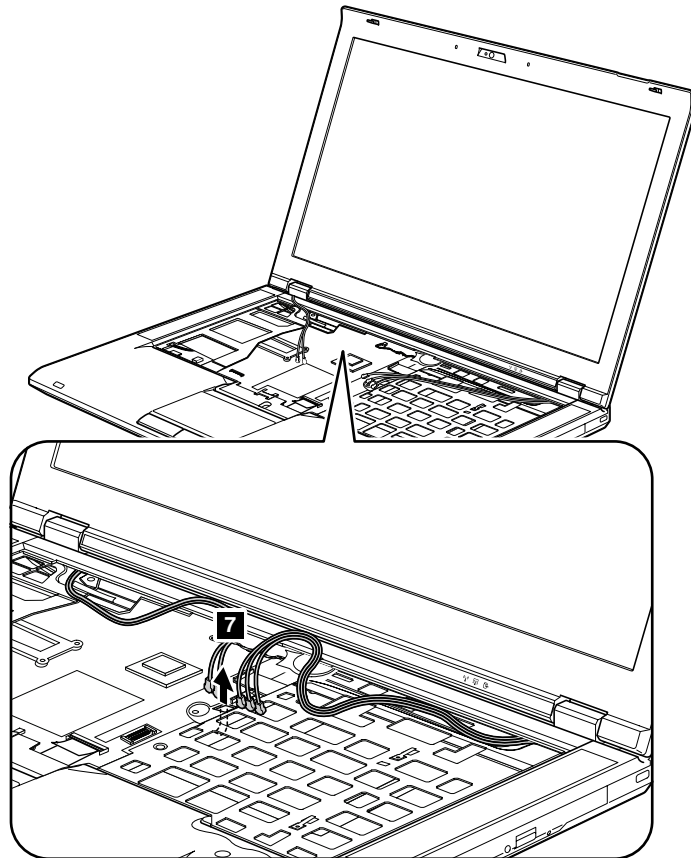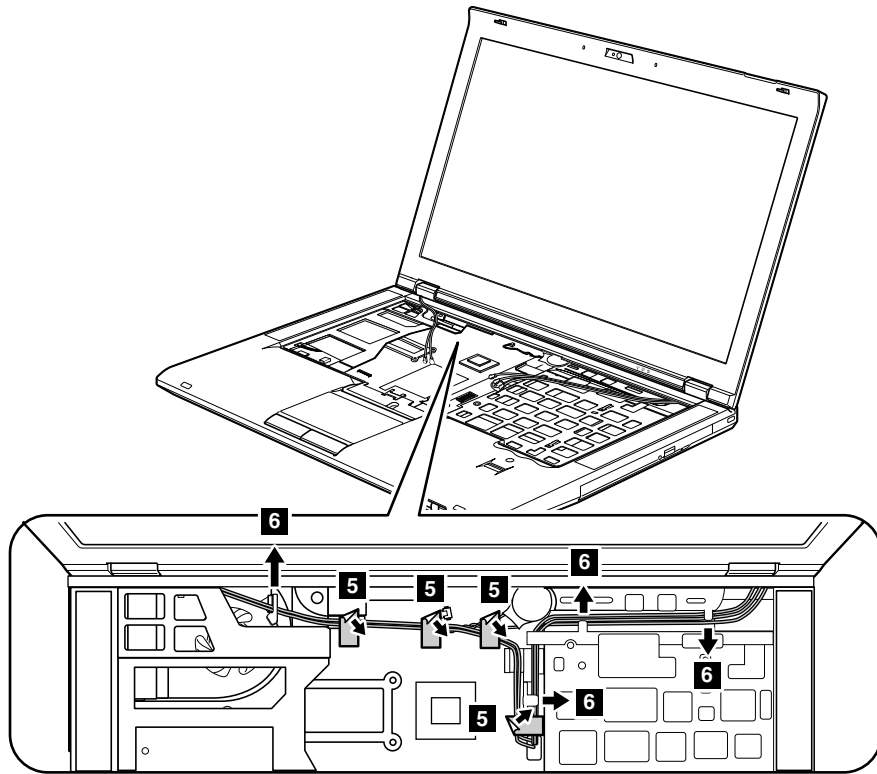
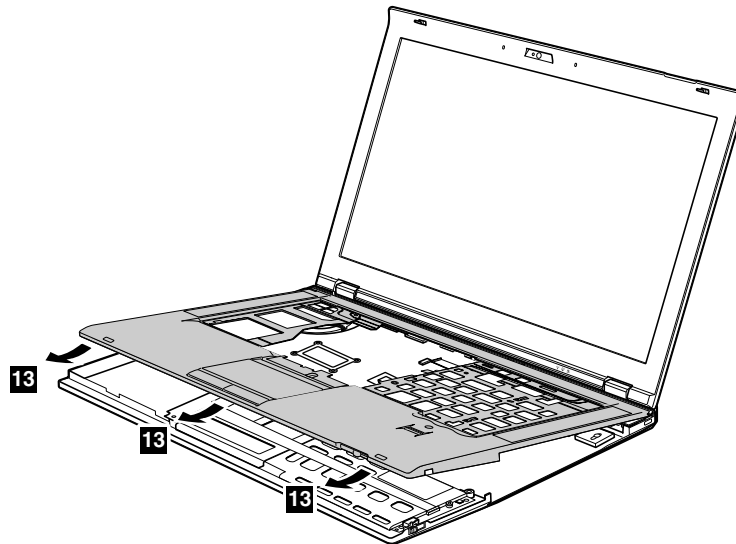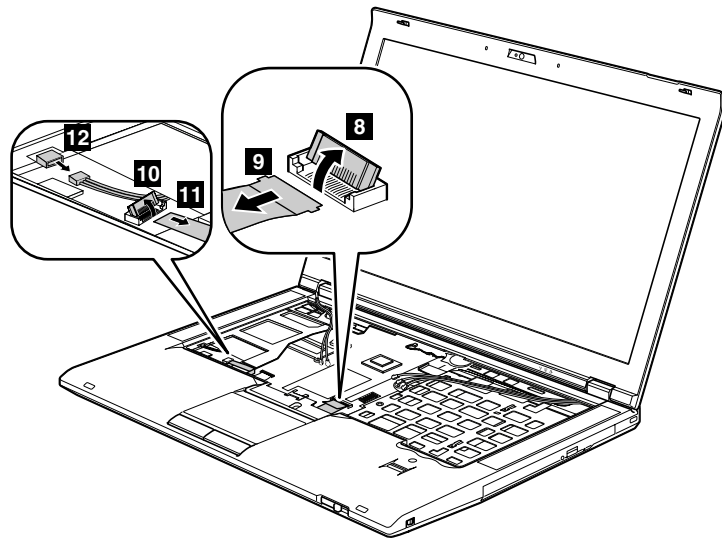**Removal steps of palm rest or palm rest with fingerprint reader**
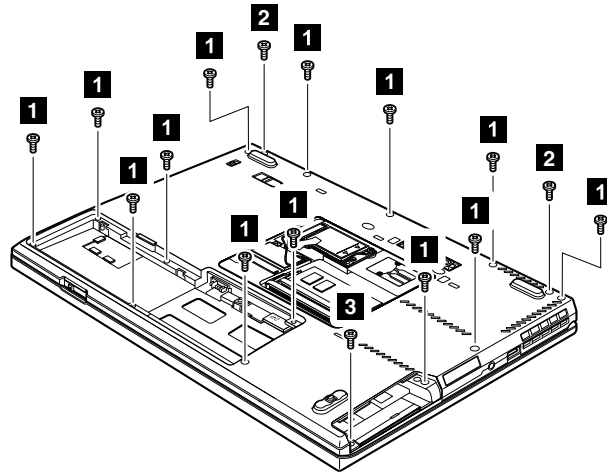
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, flat-head, nylon-coated (13)	Black	0.181 Nm (1.85 kgfcm)
2	M2.5 × 5 mm, flat-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
3	M2 × 3 mm, flat-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgfcm)
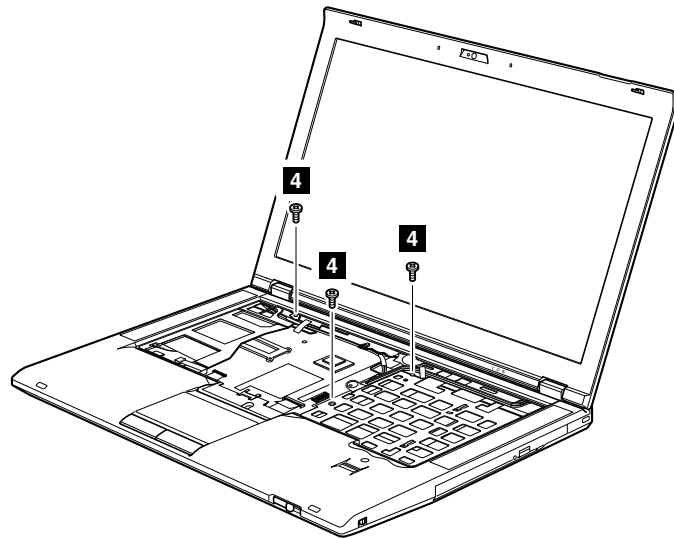
Step	Screw (quantity)	Color	Torque
4	M2 × 5 mm, flat-head, nylon-coated (3)	Black	0.181 Nm (1.85 kgfcm)

Removal steps of smart card reader
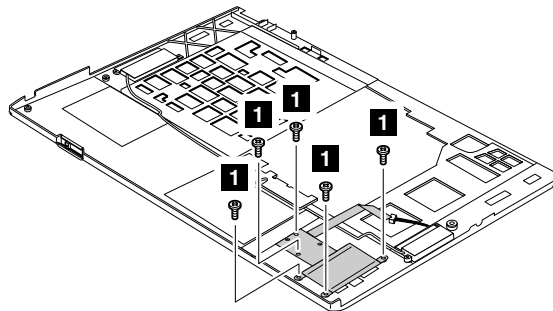
Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, flat-head, nylon-coated (5)	Silver	0.181 Nm (1.85 kgfcm)
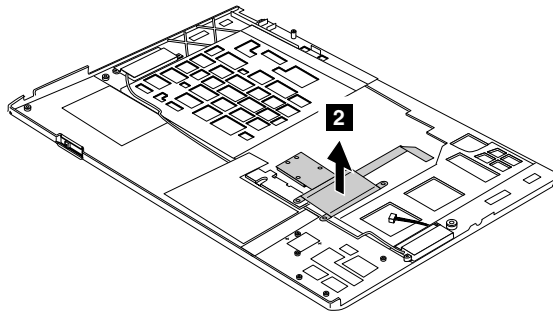
Removal steps of speaker
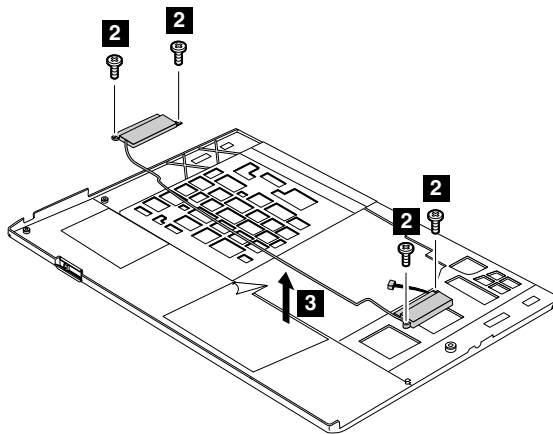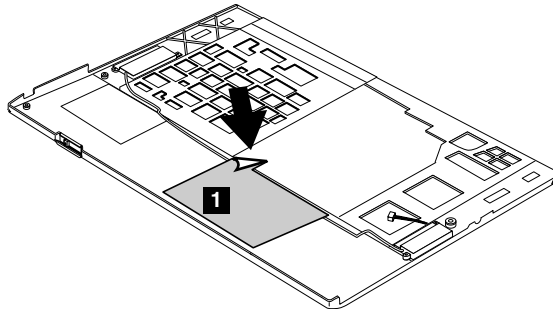
Step	Screw (quantity)	Color	Torque
2	M2 × 3 mm, flat-head, nylon-coated (4)	Silver	0.181 Nm (1.85 kgfcm)

1110 LCD unit

For access, remove these FRUs in order:
- "1010 Battery pack" on page 68
- "1080 Keyboard" on page 80
- "1100 Palm rest with fingerprint reader, smart card reader, and speaker" on page 84

Removal steps of LCD unit
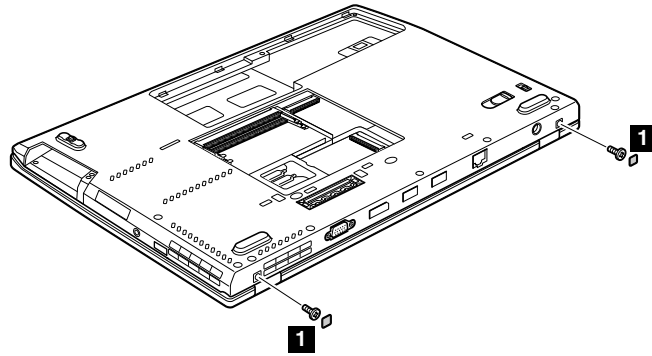
Step	Screw cap	Screw (quantity)	Color	Torque
1	☐	M2.5 × 5 mm, flat-head, nylon-coated (2)	Black	0.392 Nm (4.0 kgfcm)

When installing

- Make sure that you route the cables firmly and tape up in the proper positions as shown in the figure above.

- When you route the cables, make sure that they are not subjected to any tension. Tension could cause the cables to be damaged by the cable guides, or a wire to be broken.

1120 DC-in sub card

For access, remove these FRUs in order:
- "1010 Battery pack" on page 68
- "1080 Keyboard" on page 80
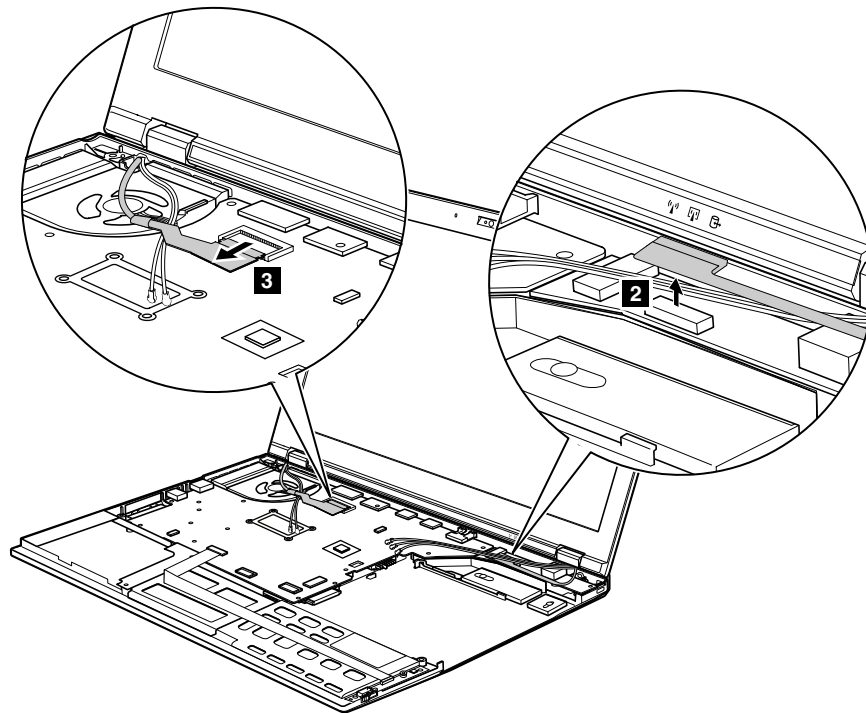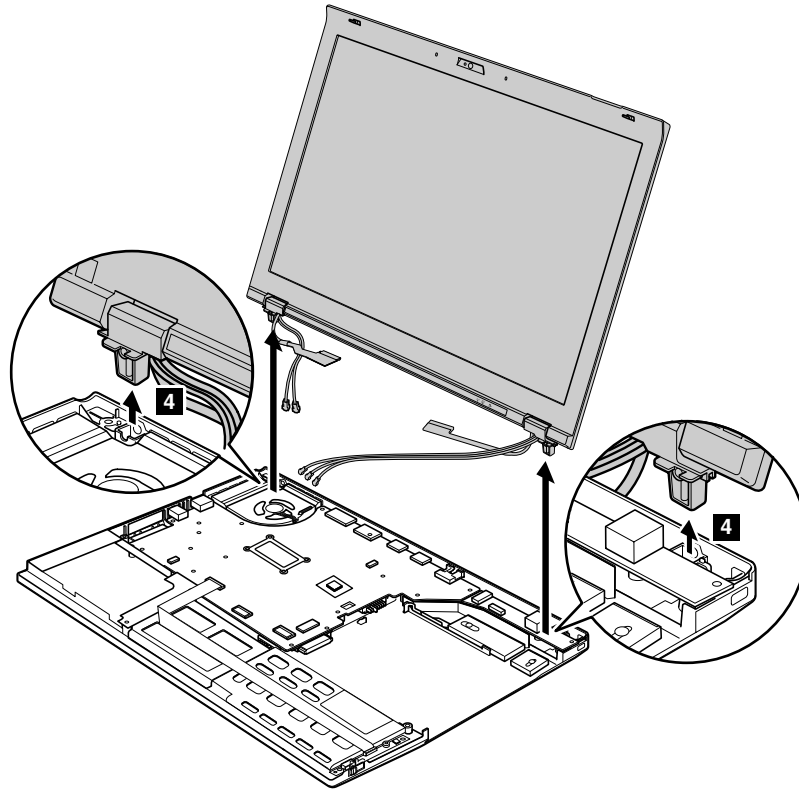- "1100 Palm rest with fingerprint reader, smart card reader, and speaker" on page 84
- "1110 LCD unit" on page 88

Removal steps of DC-in sub card
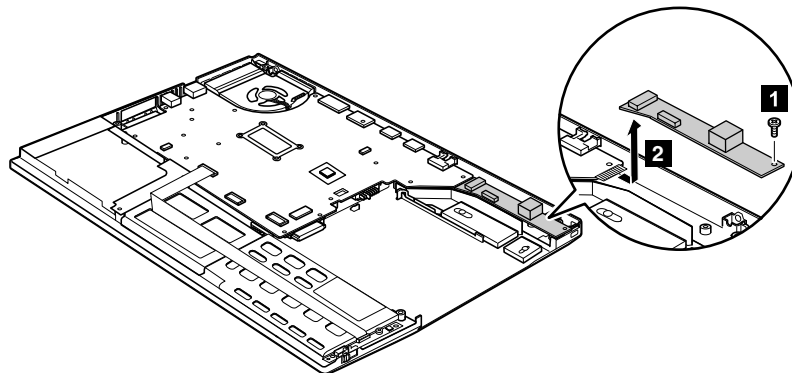
Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, shoulder-socket head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgfcm)

1130 Bluetooth daughter card (BDC-3.0)

- "1010 Battery pack" on page 68
- "1030 Solid state drive (SSD) or hard disk drive (HDD)" on page 70
- "1080 Keyboard" on page 80
- "1100 Palm rest with fingerprint reader, smart card reader, and speaker" on page 84

Removal steps of BDC-3.0
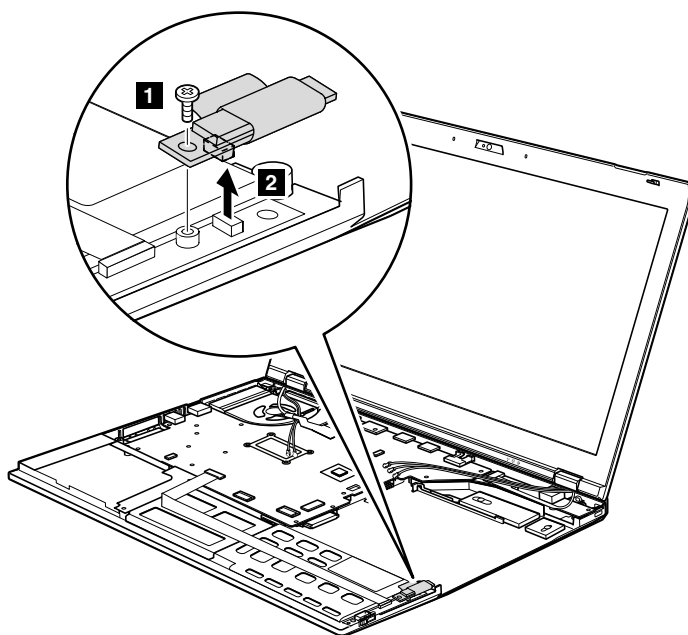
Step	Screw (quantity)	Color	Torque
1	M2 × 4 mm, flat-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgfcm)

When installing:

Make sure that the connector is attached firmly.

1140 Bluetooth-wireless radio switch FPC

For access, remove these FRUs in order:

- "1010 Battery pack" on page 68
- "1020 Serial Ultrabay Slim device or travel bezel" on page 69
- "1030 Solid state drive (SSD) or hard disk drive (HDD)" on page 70
- "1040 DIMM" on page 72
- "1050 PCI Express Mini Card for wireless LAN" on page 74

- "1060 PCI Express Mini Card for wireless WAN" on page 77
- "1070 4–in–1 media card reader" on page 79
- "1080 Keyboard" on page 80
- "1100 Palm rest with fingerprint reader, smart card reader, and speaker" on page 84
- "1110 LCD unit" on page 88
- "1130 Bluetooth daughter card (BDC-3.0)" on page 91

Removal steps of Bluetooth–wireless radio switch FPC
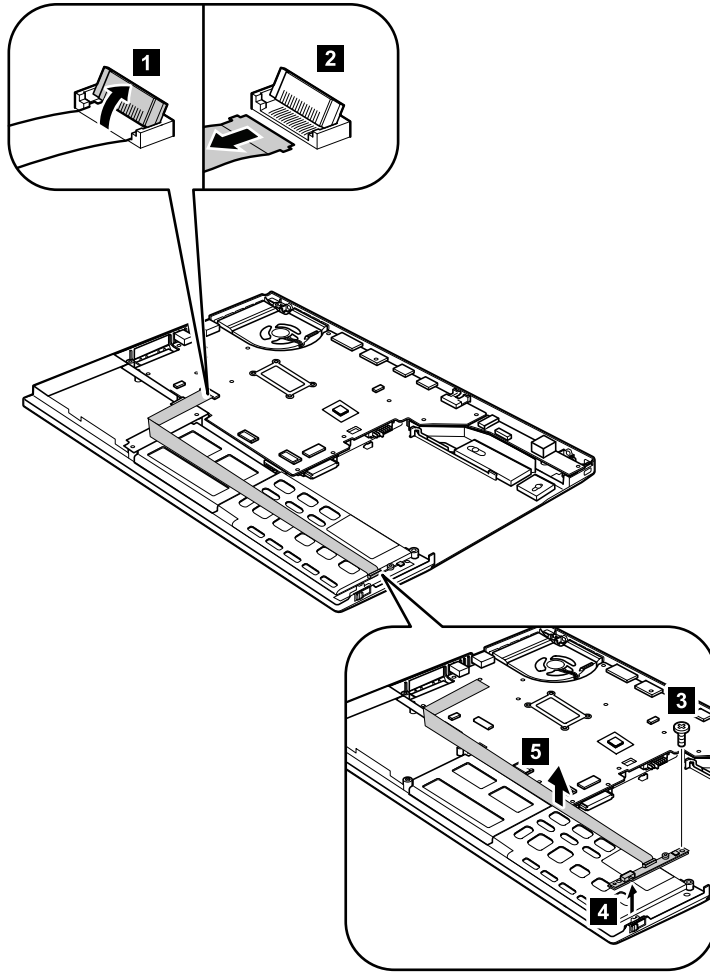
Step	Screw (quantity)	Color	Torque
3	M2 × 3 mm, bind-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgfcm)

When installing:

Attach the wireless radio switch as shown in the following figure **a**.
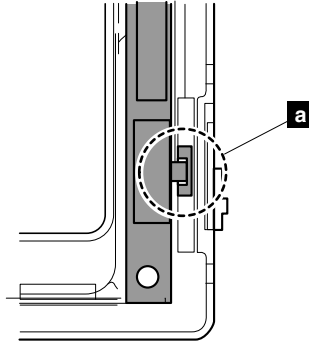
1150 System board, fan assembly, 34-mm ExpressCard reader, and base cover

Important notices for handling the system board:

When handling the system board, read the following:

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

  Note: Dropping a system board from a height of as little as 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, test it using PC-Doctor for DOS if the system supports PC-Doctor for DOS, to make sure that the HDD Active Protection™ 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 material.

If the system supports PC-Doctor for DOS, after replacing the system board, run PC-Doctor for DOS to make sure that 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, remove these FRUs, in order:

- "1010 Battery pack" on page 68
- "1020 Serial Ultrabay Slim device or travel bezel" on page 69
- "1030 Solid state drive (SSD) or hard disk drive (HDD)" on page 70
- "1040 DIMM" on page 72
- "1050 PCI Express Mini Card for wireless LAN" on page 74
- "1060 PCI Express Mini Card for wireless WAN" on page 77

- "1070 4–in–1 media card reader" on page 79
- "1080 Keyboard" on page 80
- "1100 Palm rest with fingerprint reader, smart card reader, and speaker" on page 84
- "1110 LCD unit" on page 88
- "1120 DC-in sub card" on page 90
- "1140 Bluetooth-wireless radio switch FPC" on page 91

System board, fan assembly, 34-mm ExpressCard reader, and base cover

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

a	I/O Controller Hub (ICH)
b	CPU
c	Graphics Memory Controller Hub (GMCH)
d	Accelerometer chip for the HDD Active Protection System
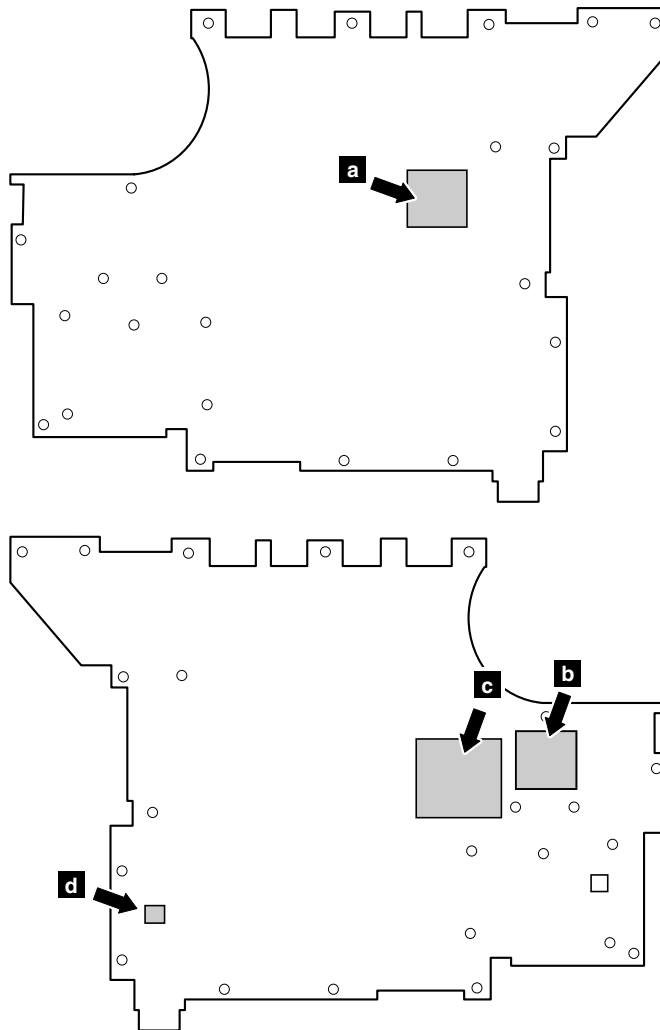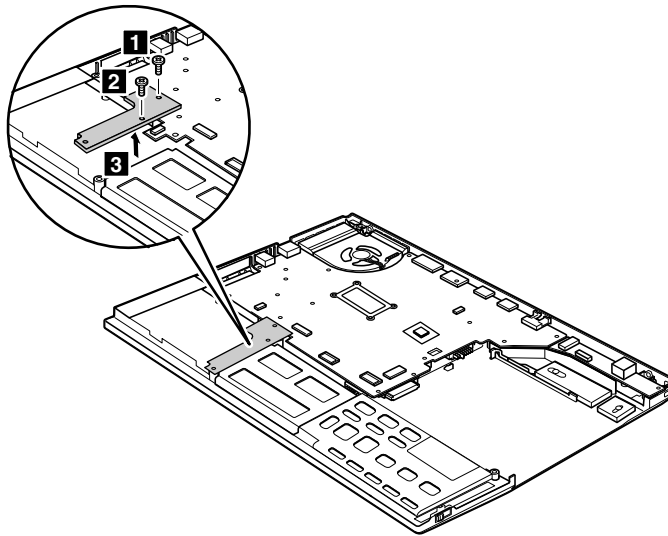
Step	Screw (quantity)	Color	Torque
1	M 2 × 9 mm, flat head, nylon-coated (1)	Black	0.181 Nm (1.85 kgfcm)
2	M2 × 3 mm, flat head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgfcm)
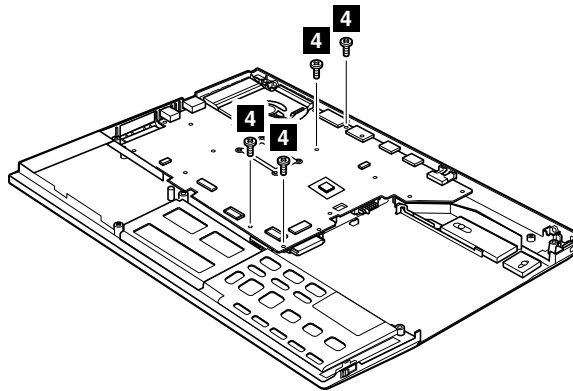
Step	Screw (quantity)	Color	Torque
4	M2 × 5 mm, big-head, nylon-coated (4)	Black	0.181 Nm (1.85 kgfcm)
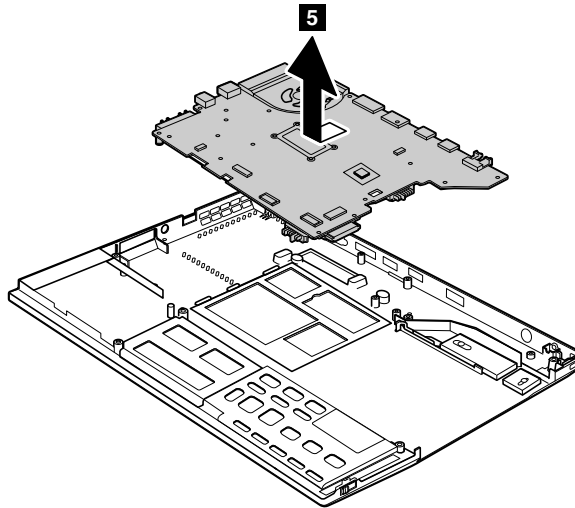
In step **5**, remove the system board with fan assembly together from the base cover assembly.

Turn the system board over, and then disconnect the fan assembly from the system board.
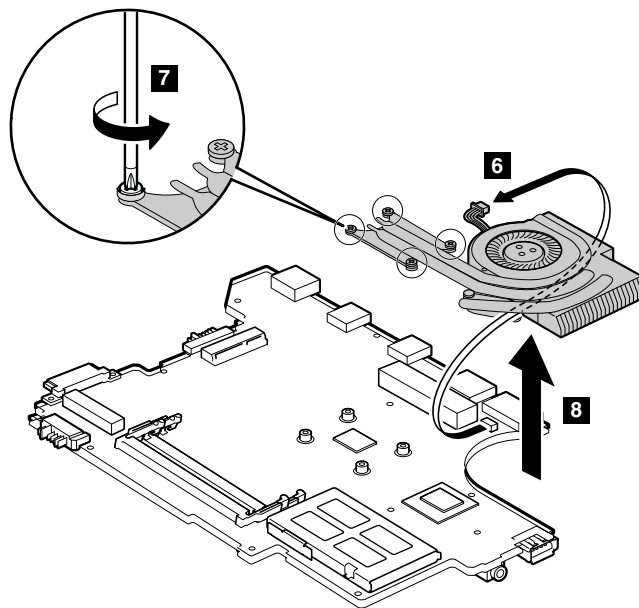
Step	Screw (quantity)	Color	Torque
7	M2 × 5 mm, big-head, nylon-coated (4)	Black	0.181 Nm (1.85 kgfcm)

When installing:

- Before you attach the fan assembly to the computer, apply thermal grease, at an amount of 0.2 grams, on the part marked **a** as in the following figure. Either too much or too less application of grease can cause a thermal problem due to imperfect contact with a component. You need to peel the thin film off from the rubber **b**.
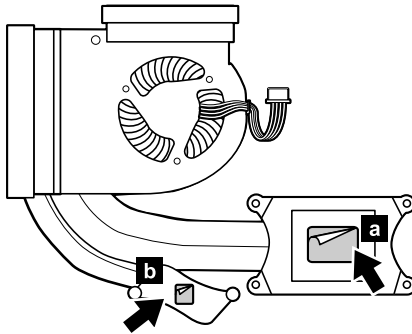
- Make sure that the fan connector is attached firmly.

Remove the three screws and then remove the 34-mm ExpressCard reader from the system board.
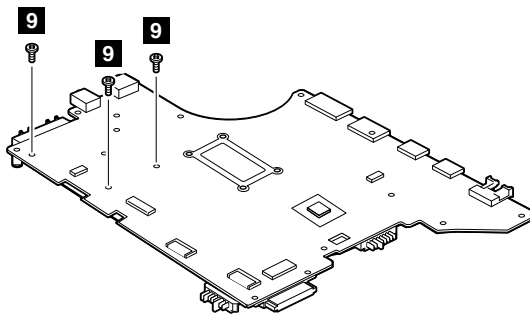
Step	Screw (quantity)	Color	Torque
9	M2 × 3 mm, flat-head, nylon-coated (3)	Silver	0.181 Nm (1.85 kgfcm)
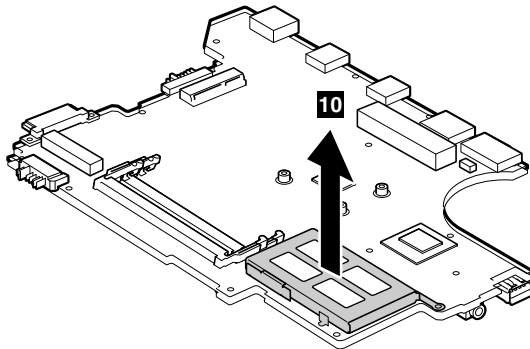
Applying labels to the base cover:

The new base cover FRU is shipped with a kit containing labels of several kinds.

The following illustration shows the location of each label.
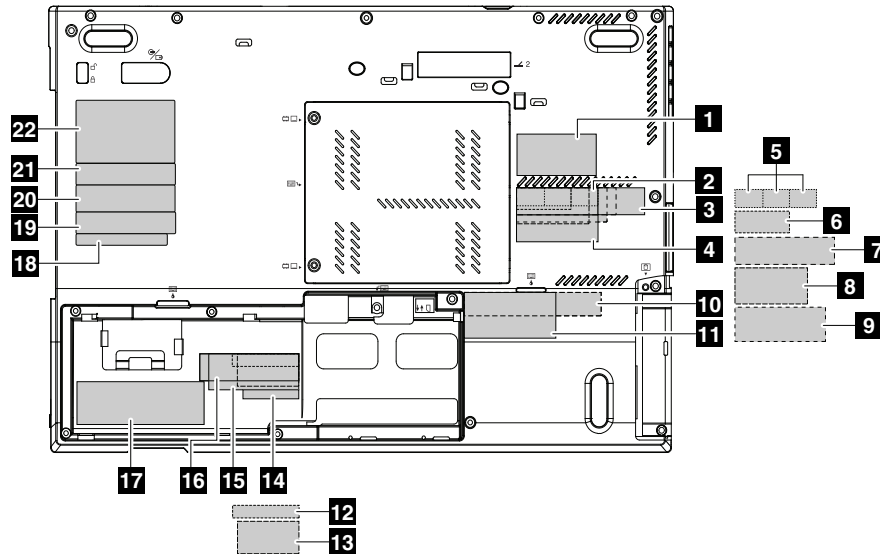
Note: If the Windows Certificate of Authentication label (COA) **17** is attached to a part that is replaced, return the old part with the label attached to the customer, or provide a letter to the customer stating what the label was originally on the system and what the label part number, serial number, and product key were.

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

18	FCC Label
20	Serial number label
21	Homologation label

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

1	SIM ICCID label
2	Brazil wireless card label
3	Brazil WWAN label
4	Brazil Bluetooth label
5	SIRIM label or Indornesia Postel label
6	China WWAN label
7	Non-encryption label or Indonesia rating label
8	China 3G WWAN label
9	Israel label
10	Wireless label for special bid
11	Asset tag
12	Ericsson WWAN label

13   IMEI/ESN label

14   Onboard LAN MAC address label

15   China Telecom label

16   China 3G WWAN label

19   Taiwan WWAN label

22   Product label

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

1160 mSATA

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

Attention:

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

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

• Never remove the drive while the system is operating or is in suspend mode.

Note: Remove the screws **1**.
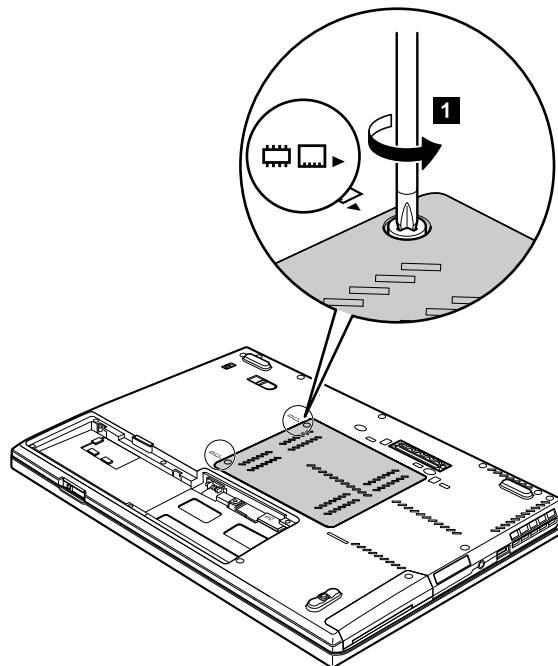
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
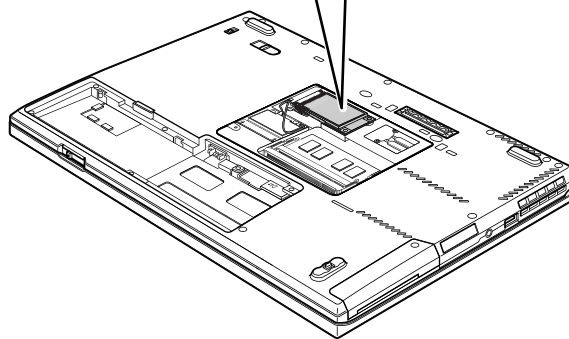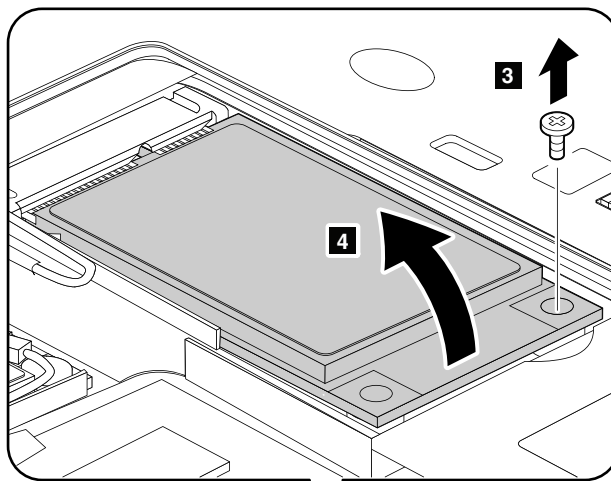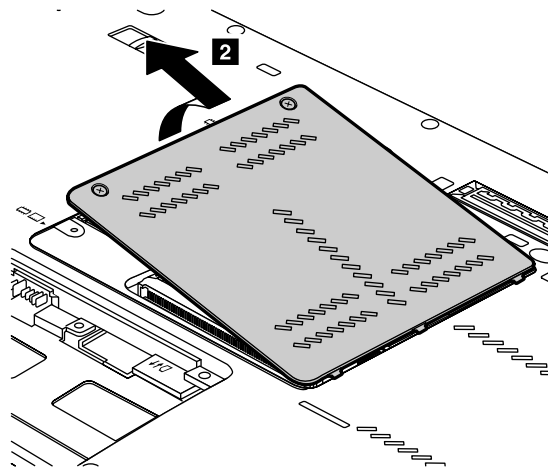
Step	Screw (quantity)	Color	Torque
3	M2 × 3 mm, small-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgfcm)
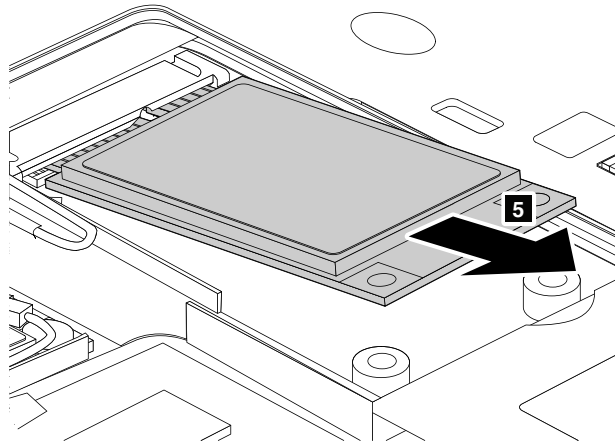
2010 LCD bezel assembly

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

Removal steps of LCD bezel assembly
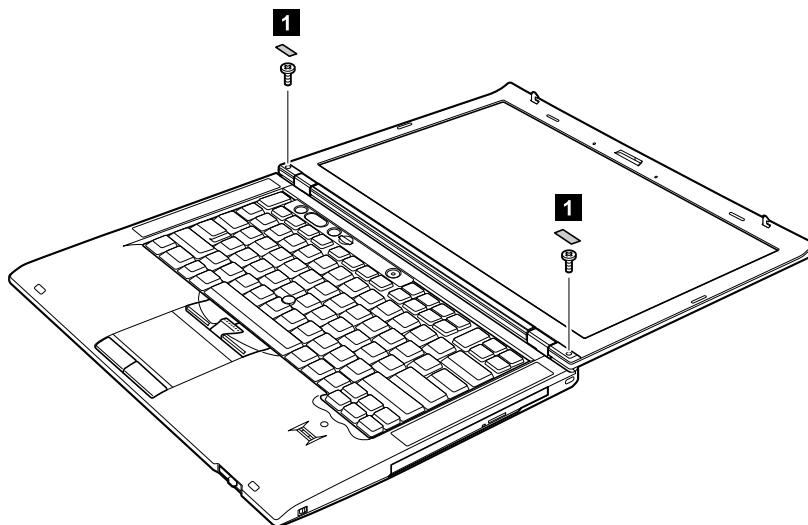
Step	Screw cap	Screw (quantity)	Color	Torque
1	☐	M2 × 5 mm, shoulder-socket head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
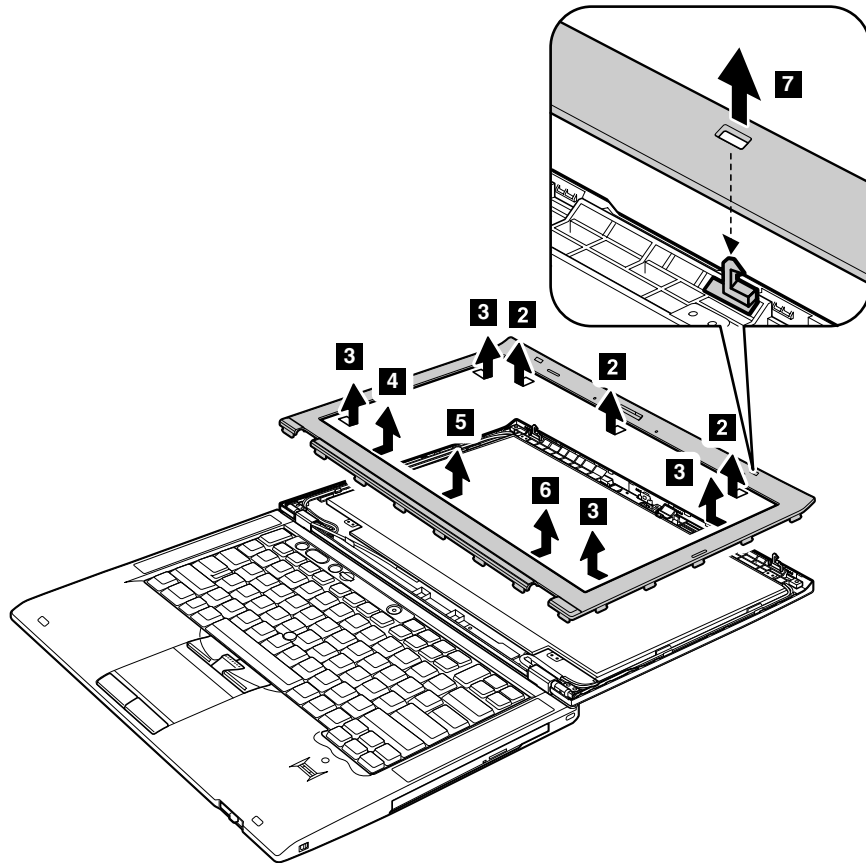
2020 LCD panel

For access, remove these FRUs, in order:

- "1010 Battery pack" on page 68
- "2010 LCD bezel assembly" on page 101

The LCD panel and the peripheral parts used in this product are very sensitive. Improper handling of the LCD panel can cause damage to the parts, and may cause a system malfunction such as a missing dot, missing line, or pixel problems.

- Do not apply any kind of pressure to the LCD panel.
- When you lift the LCD panel, always hold the left and right edges of the panel with both of your hands. Do not hold the panel with one hand or hold the top and bottom edges of the panel.
- Do not touch or apply any kind of pressure to the print circuit board or sensitive parts **a** as shown in the following figure.
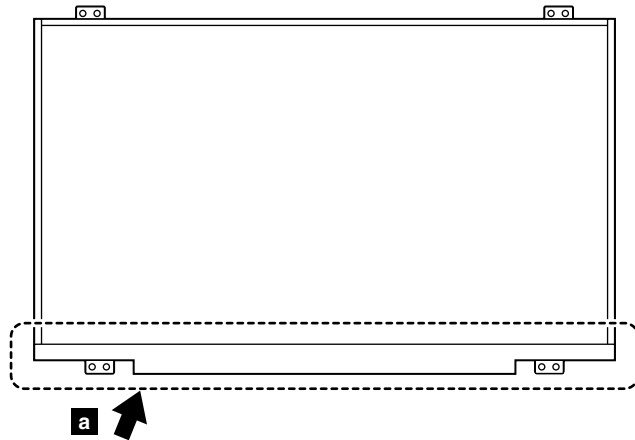
Removal steps of LCD panel

Attention: Unplug the LCD cable by holding the left and right edges of the connector with your fingers, and gently pull the connector toward you. Do not unplug the cable by pulling it. Applying tension to the cable could cause the cable to be damaged or a wire to be broken.

When installing:

- Place the LCD panel on a soft and clean sheet spread on a flat table, and plug the cable by pushing the left and right edges of the connector with your fingers.
- Do not lift the LCD panel.
- Do not plug the cable with one hand.
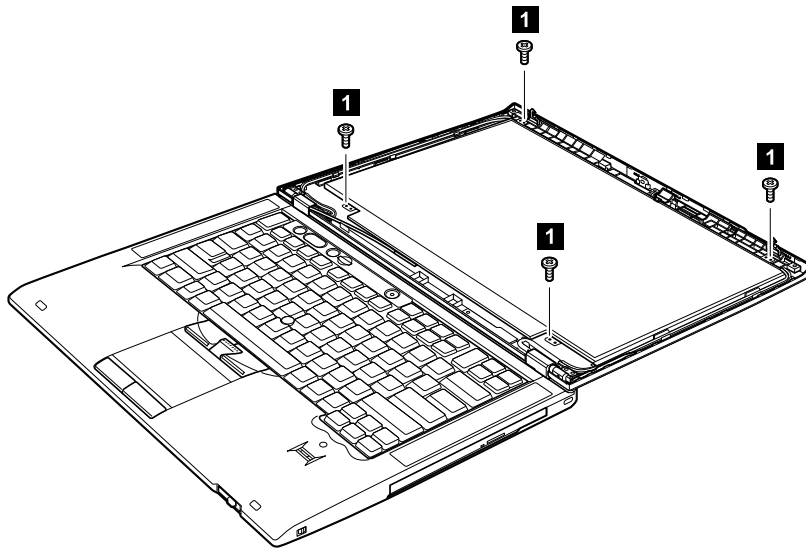
Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, small-head, nylon-coated (4)	Silver	0.181 Nm (1.85 kgfcm)
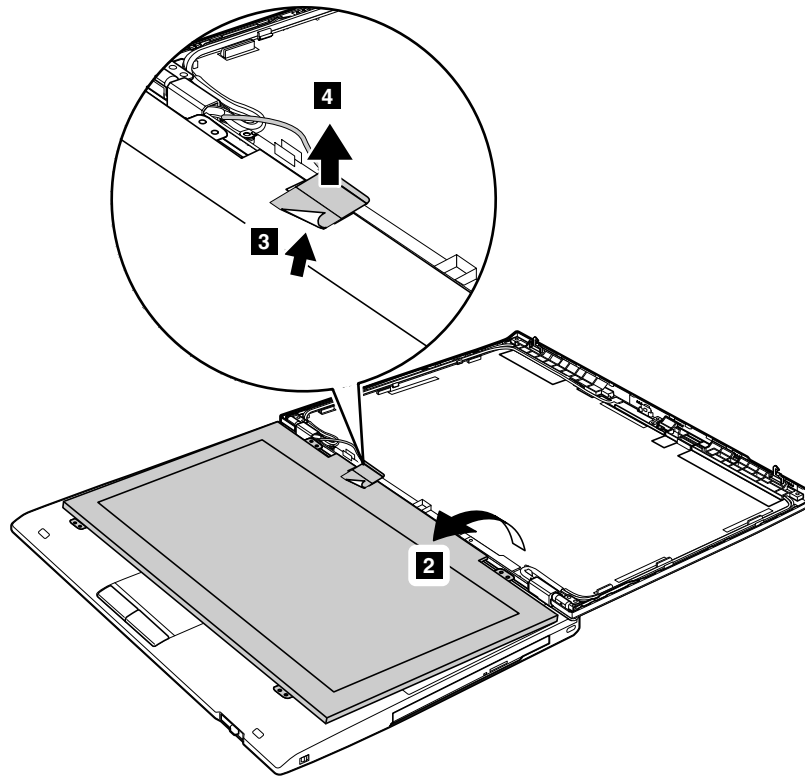
When installing:

When attaching the LCD panel to the cover, gently press the left and right edges covered with metal. Do not press the surface of the panel or apply any excessive force to the panel.

2030 Integrated camera, microphone, or hall sensor card

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 68
- "2010 LCD bezel assembly" on page 101
- "2020 LCD panel" on page 102

Removal steps of integrated camera, microphone, or hall sensor card
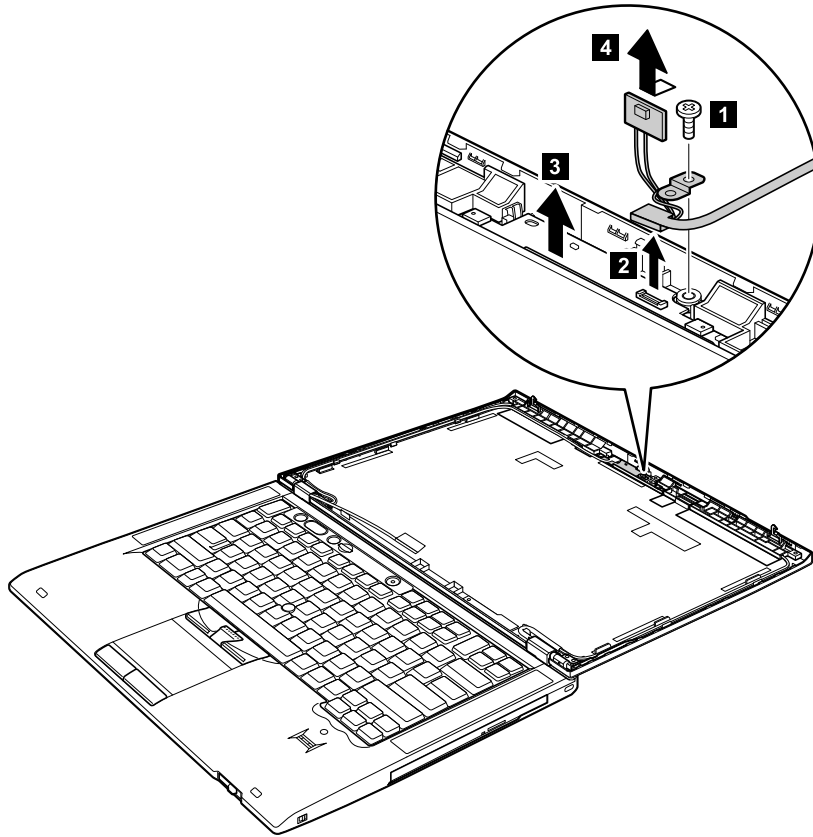
Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, small-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgfcm)

When installing:

Make sure that the connector of the integrated camera, microphone, or the hall sensor card is attached firmly.
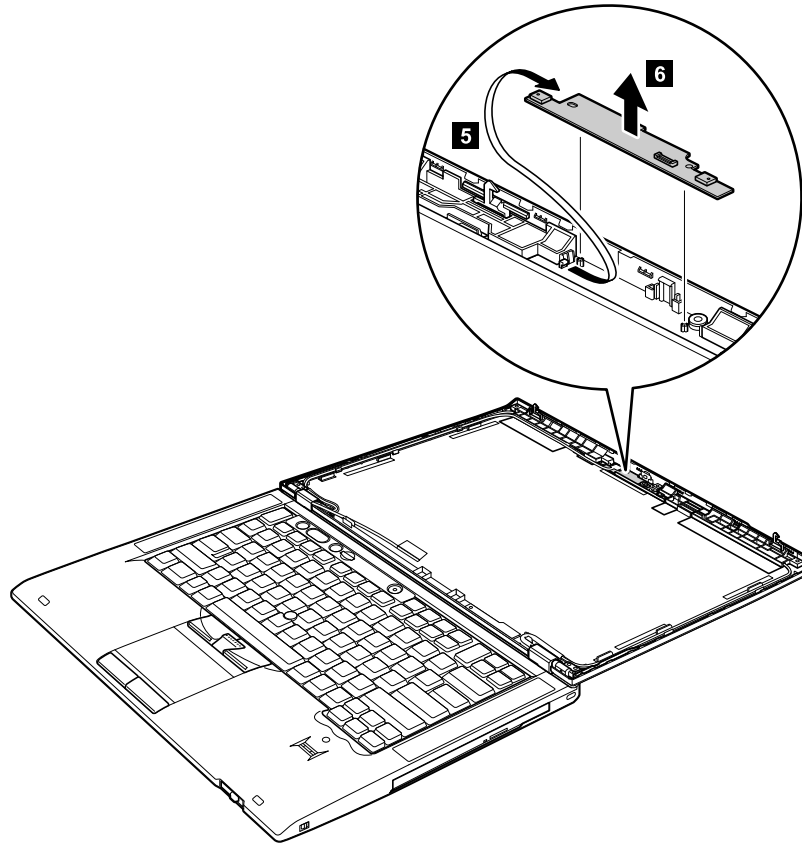
2040 LED sub card

For access, remove these FRUs in order:
- "1010 Battery pack" on page 68
- "2010 LCD bezel assembly" on page 101
- "2020 LCD panel" on page 102

Removal steps of LED sub card
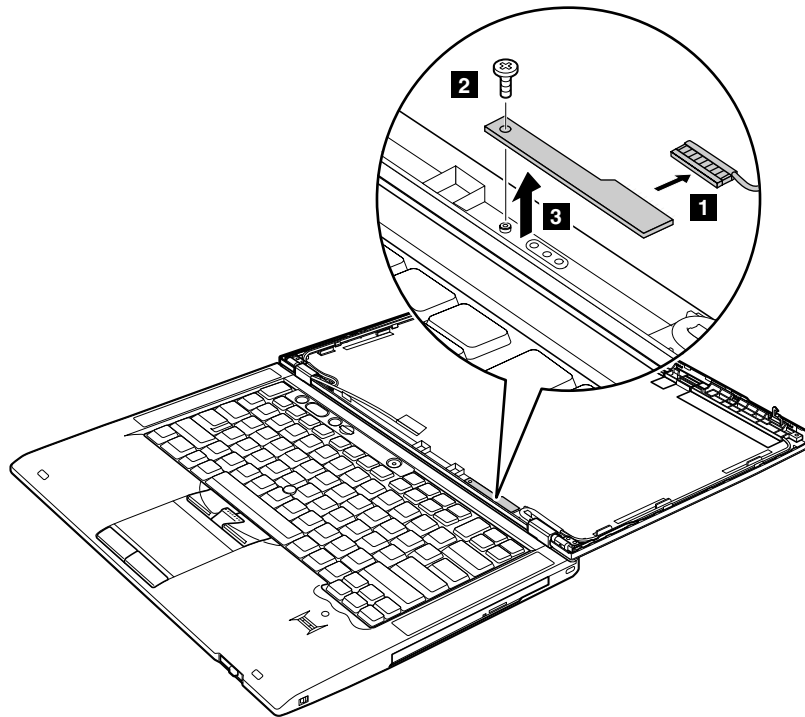
Step	Screw (quantity)	Color	Torque
2	M2 × 3 mm, small-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgfcm)

When installing:

Make sure that the connector is attached firmly.

2050 LCD cable

For access, remove these FRUs in order:

- "1010 Battery pack" on page 68
- "1020 Serial Ultrabay Slim device or travel bezel" on page 69
- "1030 Solid state drive (SSD) or hard disk drive (HDD)" on page 70
- "1040 DIMM" on page 72
- "1050 PCI Express Mini Card for wireless LAN" on page 74
- "1060 PCI Express Mini Card for wireless WAN" on page 77
- "1070 4–in–1 media card reader" on page 79
- "1080 Keyboard" on page 80
- "1100 Palm rest with fingerprint reader, smart card reader, and speaker" on page 84
- "1110 LCD unit" on page 88
- "1120 DC-in sub card" on page 90
- "1140 Bluetooth-wireless radio switch FPC" on page 91
- "1150 System board, fan assembly, 34-mm ExpressCard reader, and base cover" on page 93

- "2010 LCD bezel assembly" on page 101
- "2020 LCD panel" on page 102
- "2030 Integrated camera, microphone, or hall sensor card" on page 104
- "2040 LED sub card" on page 106

Removal steps of LCD cable

Cable routing:

When you install the LCD cable, route the cable as shown in the figure above.

2060 Hinge kit

For access, remove these FRUs in order:

- "1010 Battery pack" on page 68
- "1020 Serial Ultrabay Slim device or travel bezel" on page 69
- "1030 Solid state drive (SSD) or hard disk drive (HDD)" on page 70
- "1040 DIMM" on page 72
- "1050 PCI Express Mini Card for wireless LAN" on page 74
- "1060 PCI Express Mini Card for wireless WAN" on page 77
- "1070 4–in–1 media card reader" on page 79
- "1080 Keyboard" on page 80
- "1100 Palm rest with fingerprint reader, smart card reader, and speaker" on page 84
- "1110 LCD unit" on page 88
- "1120 DC-in sub card" on page 90
- "1140 Bluetooth-wireless radio switch FPC" on page 91
- "1150 System board, fan assembly, 34-mm ExpressCard reader, and base cover" on page 93
- "2010 LCD bezel assembly" on page 101

- "2020 LCD panel" on page 102
- "2030 Integrated camera, microphone, or hall sensor card" on page 104
- "2040 LED sub card" on page 106
- "2050 LCD cable" on page 107

Removal steps of hinge kit
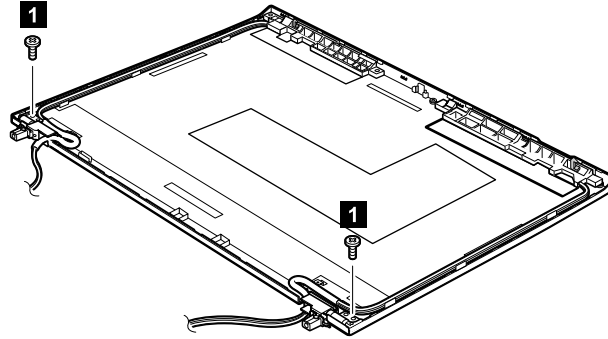
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, bind-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgfcm)
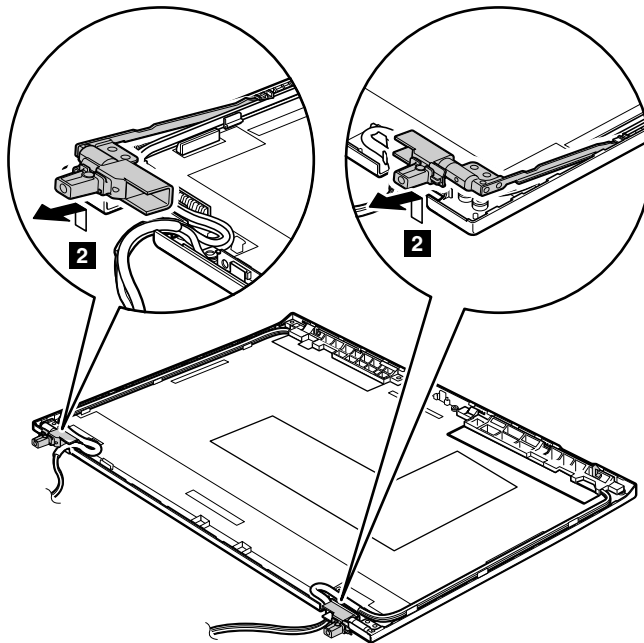
Cable routing:

When you install the hinge kit, route the cables as shown in the figure below.
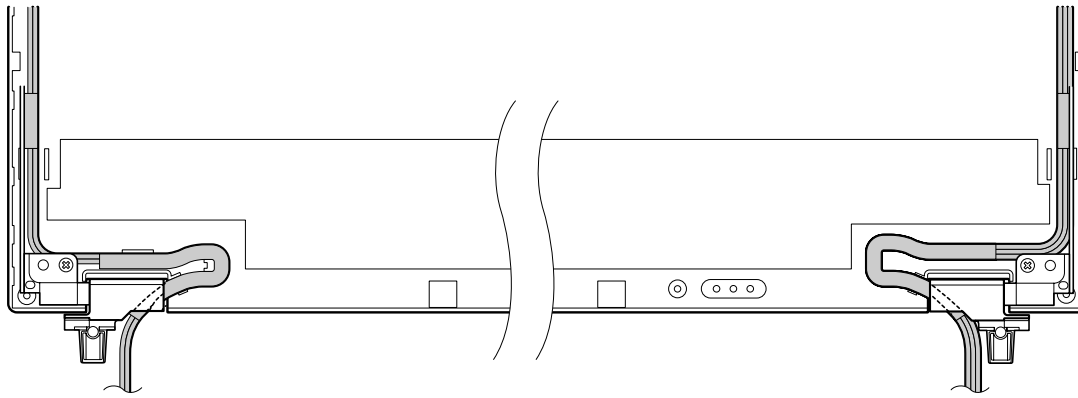
2070 LED cable

For access, remove these FRUs in order:

- "1010 Battery pack" on page 68
- "1020 Serial Ultrabay Slim device or travel bezel" on page 69
- "1030 Solid state drive (SSD) or hard disk drive (HDD)" on page 70
- "1040 DIMM" on page 72
- "1050 PCI Express Mini Card for wireless LAN" on page 74
- "1060 PCI Express Mini Card for wireless WAN" on page 77
- "1070 4–in–1 media card reader" on page 79
- "1080 Keyboard" on page 80
- "1100 Palm rest with fingerprint reader, smart card reader, and speaker" on page 84
- "1110 LCD unit" on page 88
- "1120 DC-in sub card" on page 90
- "1140 Bluetooth-wireless radio switch FPC" on page 91
- "1150 System board, fan assembly, 34-mm ExpressCard reader, and base cover" on page 93
- "2010 LCD bezel assembly" on page 101
- "2020 LCD panel" on page 102
- "2030 Integrated camera, microphone, or hall sensor card" on page 104
- "2040 LED sub card" on page 106
- "2050 LCD cable" on page 107
- "2060 Hinge kit" on page 108

Removal steps of LED cable
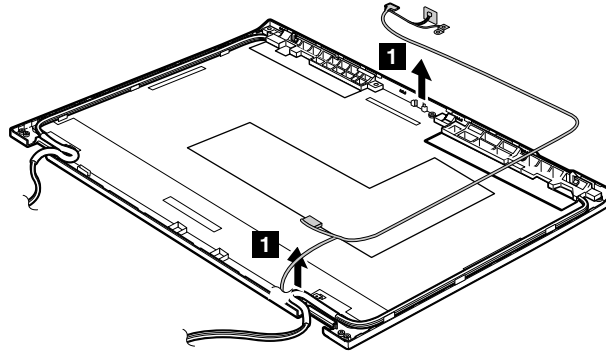
Cable routing:

When you install the LED cable, route the cable as shown in the figure below.
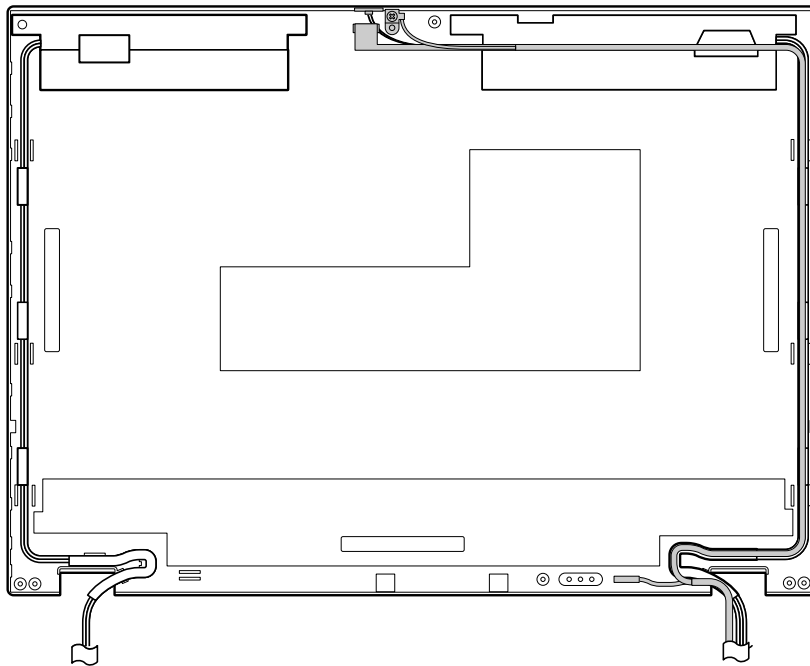
2080 Antenna kit and LCD rear cover assembly
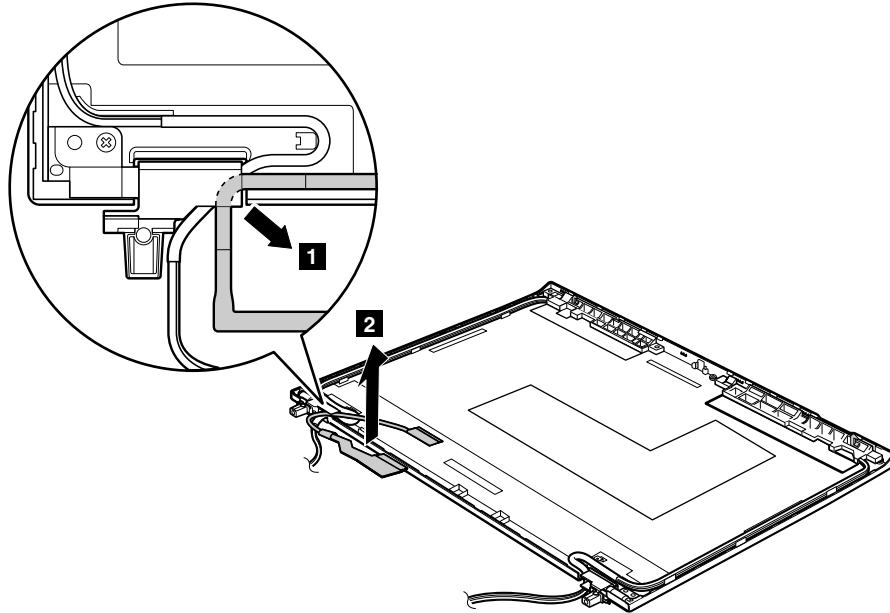
For access, remove these FRUs in order:

- "1010 Battery pack" on page 68
- "1020 Serial Ultrabay Slim device or travel bezel" on page 69
- "1030 Solid state drive (SSD) or hard disk drive (HDD)" on page 70
- "1040 DIMM" on page 72
- "1050 PCI Express Mini Card for wireless LAN" on page 74
- "1060 PCI Express Mini Card for wireless WAN" on page 77
- "1070 4–in–1 media card reader" on page 79
- "1080 Keyboard" on page 80
- "1100 Palm rest with fingerprint reader, smart card reader, and speaker" on page 84

- "1110 LCD unit" on page 88
- "1120 DC-in sub card" on page 90
- "1140 Bluetooth-wireless radio switch FPC" on page 91
- "1150 System board, fan assembly, 34-mm ExpressCard reader, and base cover" on page 93
- "2010 LCD bezel assembly" on page 101
- "2020 LCD panel" on page 102
- "2030 Integrated camera, microphone, or hall sensor card" on page 104
- "2040 LED sub card" on page 106
- "2050 LCD cable" on page 107
- "2060 Hinge kit" on page 108
- "2070 LED cable" on page 110

Removal steps of antenna kit and LCD rear cover assembly
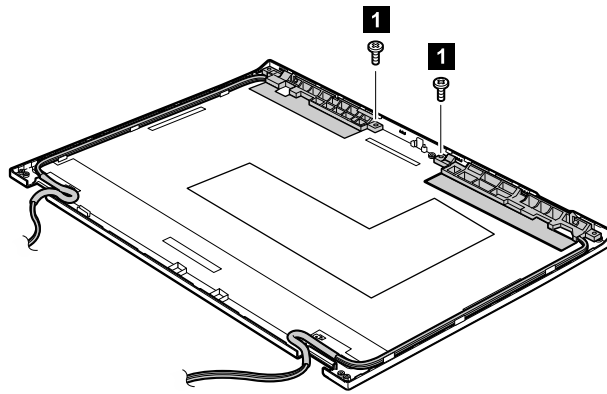
Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, flat-head, nylon-coated (2)	Silver	0.181 Nm (1.85 kgfcm)
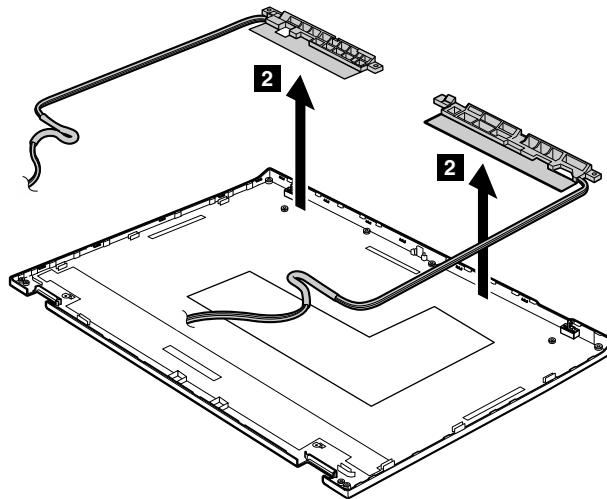
Cable routing:

When you install the antenna kit, route the cables as shown in the figures below. As you route the cables, make sure that they are not subjected to any tension. Tension could cause the cables to be damaged by the cable guides, or a wire to be broken.
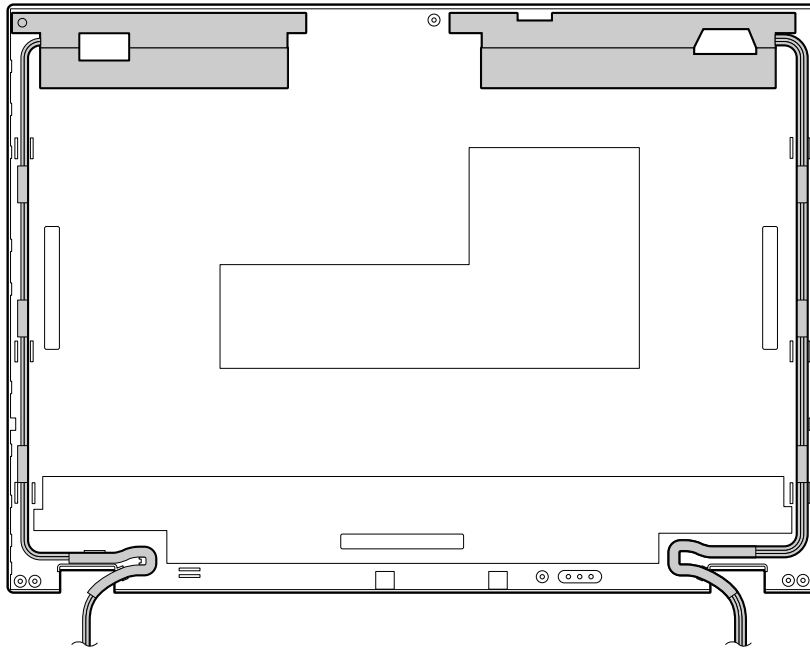
Chapter 9. Locations

This chapter presents the locations of the ThinkPad T420s and T420si hardware components.

Front view
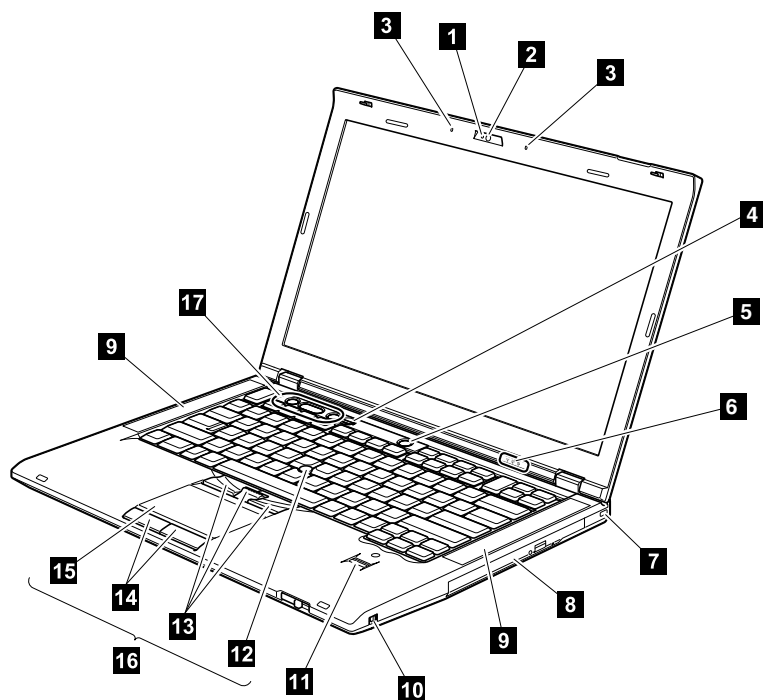
1 Integrated camera (for some models)

2 ThinkLight light

3 Built-in microphone

4 ThinkVantage button

5 Power switch

6 Status indicators[1]

7 Security keyhole

8 Ultrabay Slim Media Bay drive or travel bezel

9 Built-in stereo speakers

10 Wireless radio switch

11 Fingerprint reader (for some models)

12 TrackPoint pointing stick

13 TrackPoint buttons

14 Touch pad buttons

15 Touch pad

16 UltraNav

17 Volume control buttons

[1]: For the description of each indicator, see Chapter 5 "Status indicators" on page 57.

Rear view
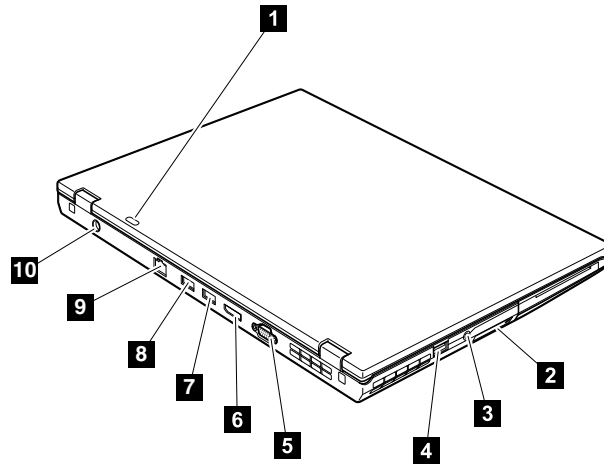
1 Status indicators[1]

2 34-mm ExpressCard slot or 4-in-1 media card reader slot

3 Combo audio jack

4 USB connector

5 Monitor connector

6 DisplayPort connector

7 Always On USB connector

8 USB connector

9 Ethernet connector

10 ac power connector

[1]: For the description of each indicator, see Chapter 5 "Status indicators" on page 57.

Bottom view
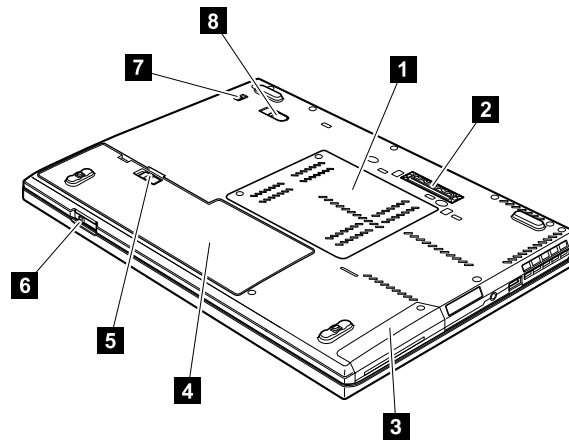
1 Expansion slot (DIMM, PCI Express Mini Card for wireless LAN and wireless WAN)

2 Docking connector

3 Solid state drive (SSD) or hard disk drive (HDD)

4 Battery pack

5 Battery pack latch

6 LCD cover latch

7 Ultrabay Slim Media Bay lock latch

8 Ultrabay Slim Media Bay eject latch

Chapter 10. Parts list

This chapter contains following lists of the service parts.

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

Overall
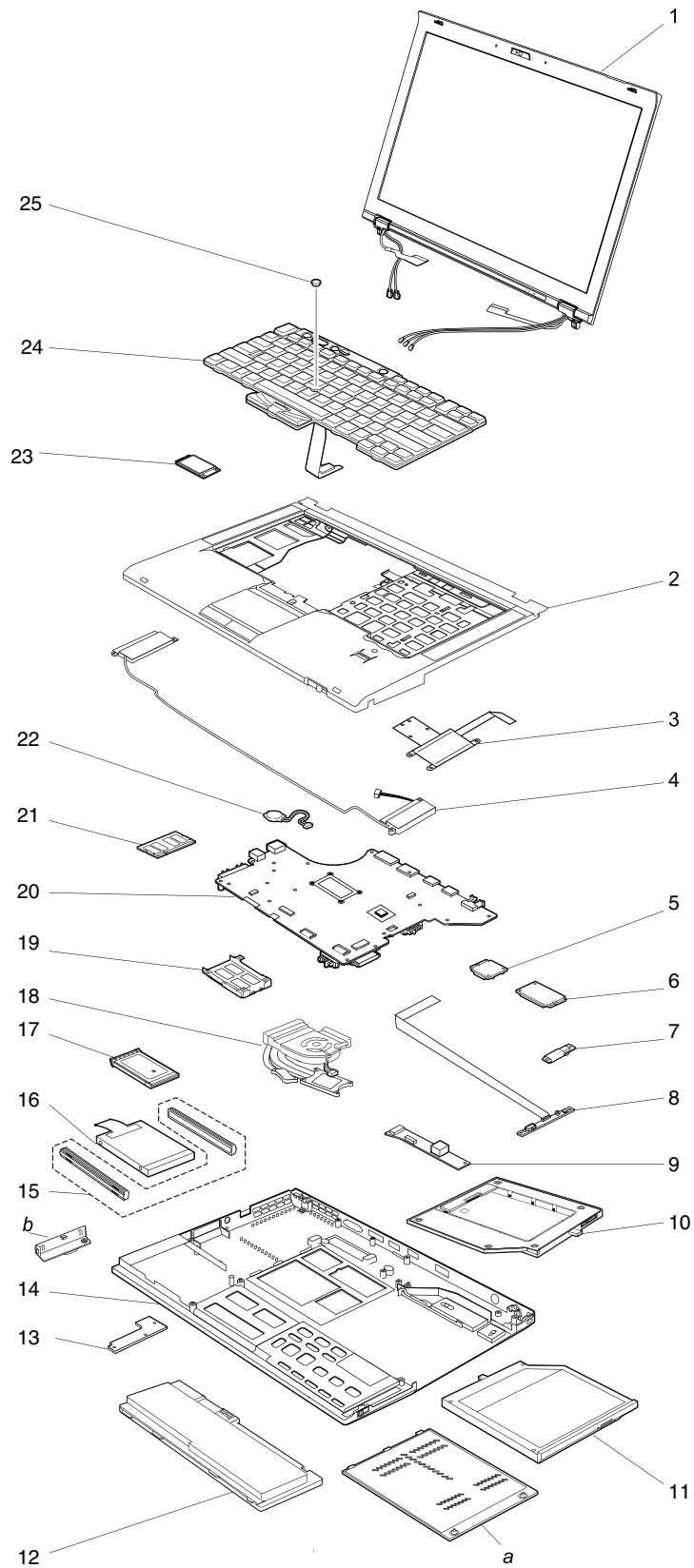
Table 11. Parts list—Overall

No.	FRU (Overall)	FRU no.	CRU ID
a, b	See "Miscellaneous parts" on page 134.		
1	LCD unit (see "LCD FRUs" on page 128.)		
2	Keyboard bezel assembly, with fingerprint reader • 4170–CTO, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx, 7Gx, 7Hx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 29x, J2x, J4x, J7x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JPx, JSx, JTx, JVx, K6x, K7x, K8x, K9x, KAx, KGx, KJx, KKx, KLx, KMx, KNx, KRx, KVx, KWx, KXx, KYx, KZx, L2x, L3x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LEx, LFx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LVx • 4174–CTO, 29x, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PKx, PLx, PMx, PNx	04W1451	N
2	Keyboard bezel assembly, without fingerprint reader • 4170–CTO, 32x, 33x, 3Dx • 4171–CTO, 52x, 53x • 4172–CTO • 4173–CTO, 28x, 2Ax, 2Bx, JNx, JUx, JWx, JXx, JYx, JZx, K2x, KFx, KQx, KSx, KTx, KUx, L5x, LDx, LUx • 4174–CTO, 28x, 2Ax, 2Bx, PJx, PPx	04W1452	N
3	Smart card reader • 4170–CTO, 32x, 38x, 39x, 3Cx, 3Hx • 4171–CTO, 54x, 55x, 6Mx, 6Nx, 6Px, 6Ux, 6Vx, 72x, 73x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Dx, 7Ex • 4172–CTO • 4173–CTO, 2Bx, JFx, JGx, KAx, L7x, LGx • 4174–CTO, NEx, NFx, NGx, NSx, NTx, NVx, P6x, P8x, P9x, PAx, PBx, PCx, PFx, PGx, PKx, PLx, PMx, PNx	04W1711	*
4	Speaker assembly	04W1688	*
5	ThinkPad 1x1 11b/g/n Wireless LAN PCI Express Half Mini Card Adapter • 4170–CTO, 37x, 3Dx • 4171–CTO, 6Qx • 4172–CTO • 4173–CTO, J7x, JTx, K9x • 4174–CTO, NEx	60Y3247	**
5	Intel Centrino Wireless-N 1000 • 4170–CTO • 4171–CTO, 74x, 79x, 7Ax, 7Bx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 2Ax, KVx, L3x, LEx, LFx, LJx • 4174–CTO	60Y3241	**

Table 11. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
5	Intel Centrino Advanced-N 6205 • 4170–CTO, 33x, 34x, 35x, 36x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 75x, 77x, 78x, 7Cx, 7Dx, 7Ex, 7Fx • 4172–CTO • 4173–CTO, 28x, 29x, 2Bx, J2x, J8x, J9x, JAx, JDx, JEx, JFx, JGx, JLx, JMx, JNx, JPx, JSx, JUx, JVx, JWx, JXx, JYx, JZx, K2x, K6x, K7x, K8x, KAx, KFx, KGx, KJx, KKx, KLx, KMx, KQx, KRx, KSx, KTx, KUx, KWx, KZx, L2x, L5x, L6x, L8x, L9x, LAx, LBx, LCx, LDx, LHx, LKx, LLx, LMx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NGx, NTx, NVx, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PFx, PHx, PJx, PLx, PMx, PPx	60Y3253	**
5	Intel Centrino Ultimate-N 6300 • 4170–CTO, 3Hx • 4171–CTO, 5Mx, 76x, 7Gx, 7Hx • 4172–CTO • 4173–CTO, J4x, JBx, JCx, JHx, JJx, JKx, KNx, KXx, KYx, L7x, LGx, LNx, LPx, LQx • 4174–CTO, NDx, NFx, NNx, NSx, P4x, PEx, PGx, PKx, PNx	60Y3233	**
5	Intel Centrino Advanced-N + WiMAX 6250 • 4170–CTO, 3Ex • 4171–CTO, 6Fx • 4172–CTO • 4173–CTO • 4174–CTO	60Y3195	**
5	Intel Centrino Advanced-N + WiMAX 6250, for Russia SKU • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	60Y3209	**
6	Integrated China Telecom Mobile Broadband (Huawei) • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	60Y3239	**
6	Integrated Mobile Broadband (Gobi 3000) • 4170–CTO • 4171–CTO, 5Tx • 4172–CTO • 4173–CTO, JLx • 4174–CTO	60Y3257	**
6	Integrated Mobile Broadband (Gobi 3000), for Malaysia sku • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	60Y3283	**

Table 11. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
6	Ericsson F5521gw Mobile Broadband Module • 4170–CTO • 4171–CTO, 5Fx, 64x, 65x, 66x, 6Nx, 6Px, 6Sx, 6Ux, 6Vx, 77x, 78x • 4172–CTO • 4173–CTO, 2Bx, J2x, J4x, JAx, JJx, JSx, JTx, JXx, K8x, KLx, KNx, KQx, KRx, KSx, KXx, KYx, L7x, L8x, LHx, LQx • 4174–CTO, NCx, NDx, NEx, NNx, NSx, NTx, P4x, PHx, PJx, PKx, PNx	60Y3279	**
6	Ericsson F5521gw Mobile Broadband Module, for Malaysia SKU • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	60Y3267	**
7	Bluetooth card • 4170–CTO, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx, 7Gx, 7Hx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J7x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JTx, JUx, JWx, JXx, JYx, JZx, K2x, K6x, K7x, K8x, K9x, KAx, KFx, KGx, KJx, KKx, KLx, KMx, KNx, KQx, KRx, KSx, KTx, KUx, KWx, KXx, KYx, KZx, L2x, L3x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LDx, LEx, LFx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx	60Y3271 60Y3275	N
8	Bluetooth–wireless radio switch FPC	04W1687	N
8	Bluetooth–wireless sub card	04W1700	N
9	DC-in sub card	04W1699	N
10	Second HDD adapter • 4170–CTO, 38x • 4171–CTO • 4172–CTO • 4173–CTO, JMx, JSx, JTx, JWx • 4174–CTO, 2Ax	43N3429	**
11	DVD-ROM drive • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO, KXx, KNx, LFx • 4174–CTO	45N7485 45N7521	*

Table 11. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
11	DVD rambo drive • 4170–CTO, 32x, 33x, 34x, 35x, 36x, 37x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx, 7Gx, 7Hx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J7x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JTx, JUx, JVx, JWx, JXx, JYx, K2x, K6x, K7x, K8x, K9x, KAx, KFx, KKx, KLx, KMx, KQx, KRx, KSx, KTx, KUx, KVx, KWx, KYx, KZx, L2x, L3x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LDx, LEx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx	45N7457	*
11	DVD rambo drive • 4170–CTO, 32x, 33x, 34x, 35x, 36x, 37x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx, 7Gx, 7Hx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J7x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JTx, JUx, JVx, JWx, JXx, JYx, K2x, K6x, K7x, K8x, K9x, KAx, KFx, KKx, KLx, KMx, KQx, KRx, KSx, KTx, KUx, KVx, KWx, KYx, KZx, L2x, L3x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LDx, LEx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx	45N7451 45N7453	*
11	Travel cover • 4170–CTO, 3Bx • 4171–CTO • 4172–CTO • 4173–CTO, JZx, KGx, KJx • 4174–CTO	45M2657	*
12	Battery pack, Li-ion (6 cell) 59+ • 4170–CTO, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx, 7Gx, 7Hx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J7x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JTx, JUx, JVx, JWx, JXx, JYx, JZx, K2x, K6x, K7x, K8x, K9x, KAx, KFx, KGx, KJx, KKx, KLx, KMx, KNx, KQx, KRx, KSx, KTx, KUx, KVx, KWx, KXx, KYx, KZx, L2x, L3x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LDx, LEx, LFx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx	42T4845 42T4847	*

Table 11. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
13	HDD sub card • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1698	N
14	Base cover assembly	04W1702 04W1703 04W1704	N
15	HDD rubber • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1716	*
15	SSD spacer • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1717	*
16	Hard disk drive, 250 GB, 5,400 rpm • 4170–CTO • 4171–CTO, 75x, 7Fx • 4172–CTO, 22x, 24x • 4173–CTO, JFx, K6x, KTx, KUx, KVx, KYx, LCx, LJx, LKx • 4174–CTO, NFx, P5x, P6x, PLx, PNx, PPx	42T1153 42T1167 42T1213	*
16	Hard disk drive, 320 GB, 5,400 rpm • 4170–CTO • 4171–CTO, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 7Dx, 7Gx, 7Hx • 4172–CTO, 23x • 4173–CTO • 4174–CTO, N2x, NSx, P4x, PAx, PBx, PCx, PDx, PEx, PKx, PMx	42T1155 42T1215	*
16	Hard disk drive, 320 GB, 7,200 rpm • 4170–CTO, 32x, 39x, 3Ax, 3Bx, 3Fx, 3Gx, 3Hx • 4171–CTO, 54x, 55x, 5Ax, 5Fx, 5Hx, 5Ux, 5Yx, 5Zx, 64x, 66x, 68x, 6Ex, 6Hx, 6Jx, 6Mx, 6Xx, 72x, 73x, 74x, 76x, 7Ax, 7Bx, 7Cx, 7Ex • 4172–CTO, 22x • 4173–CTO, 29x, J7x, JDx, JEx, JGx, JPx, JSx, JTx, JUx, JVx, JWx, JXx, JYx, K2x, K7x, K8x, K9x, KGx, KKx, KLx, KMx, KNx, KXx, L3x, L5x, L6x, L9x, LAx, LBx, LDx, LEx, LFx, LHx, LLx, LMx, LPx, LQx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 29x, NBx, NCx, NGx, NTx, NVx, PFx, PGx, PJx	42T1159 42T1217	*
16	Hard disk drive, 500 GB, 5,400 rpm • 4170–CTO, 34x • 4171–CTO, 52x, 53x, 5Dx, 5Ex, 5Mx, 5Nx, 5Px • 4172–CTO • 4173–CTO, 2Bx, J2x, J8x, J9x, JAx, JBx, JCx • 4174–CTO, 2Ax, L8x, N6x	42T1217	*

Table 11. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
16	Solid state drive, 128 GB • 4170–CTO, 35x, 38x, 3Cx, 3Dx, 3Ex • 4171–CTO, 62x, 79x • 4172–CTO • 4173–CTO, JHx, JLx, JNx, JZx, KAx, KFx, KJx, KQx, KRx, KWx, KZx, L2x, L8x, LGx, LNx • 4174–CTO, N9x, P8x, PHx	45N7995 45N7981 45N8007	*
16	Solid state drive, 160 GB • 4170–CTO, 33x, 36x, 37x • 4171–CTO, 5Bx, 5Jx, 5Rx, 5Tx, 5Vx, 5Xx, 63x, 65x, 6Fx, 6Gx, 6Yx, 6Zx, 77x, 78x • 4172–CTO • 4173–CTO, 28x, 2Ax, J4x, JJx, JKx, JMx, KSx, L7x • 4174–CTO, 28x, 2Bx, LVx, N3x, N4x, N7x, N8x, NAx, NDx, NEx, NNx, P9x	45N8027 45N8057	*
17	4-in-1 media card reader adapter	04W1701	N
18	Fan assembly, integrated	04W0416 04W1712	N
18	Fan assembly, Optimus	04W0417 04W1713	N
19	Express card slot frame	04W1689	N
20	System board assembly, with Intel Core i5-2520M processor, integrated, AMT, TPM, AES • 4170–CTO, 34x, 3Ax, 3Bx, 3Ex, 3Hx • 4171–CTO, 52x, 54x, 55x, 5Ax, 5Bx, 5Fx, 5Hx, 5Jx, 5Nx, 5Rx, 5Xx, 5Zx, 6Fx, 6Gx, 6Sx, 6Tx, 6Ux, 6Wx, 6Xx, 6Yx, 77x, 78x, 79x, 7Gx, 7Hx • 4172–CTO • 4173–CTO, 29x, 2Ax, 2Bx, J2x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JLx, JMx, JNx, JPx, JSx, JUx, JVx, JWx, JXx, JYx, JZx, K2x, K8x, KAx, KFx, KGx, KJx, KLx, KMx, KNx, KQx, KWx, KZx, L2x, L5x, L6x, L8x, LBx, LCx, LGx, LKx, LLx, LRx, LVx • 4174–CTO, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N4x, NFx, NGx, NVx, P5x, P6x, P8x, PLx	04W2002	N
20	System board assembly, with Intel Core i5-2540M processor, integrated, AMT, TPM, AES • 4170–CTO, 33x, 35x, 3Dx • 4171–CTO, 53x, 5Dx, 5Ex, 5Px, 5Yx, 6Zx, 7Ax, 7Bx • 4172–CTO • 4173–CTO, K6x, K7x, KKx, KSx, KTx, KUx, L7x, L9x • 4174–CTO, N3x, NEx, NSx, P9x, PAx	04W2003	N
20	System board assembly, with Intel Core i5-2520M processor, Optimus, AMT, TPM, AES • 4170–CTO, 3Ex • 4171–CTO, 54x, 5Hx, 5Rx, 5Zx, 6Ux, 6Xx, 79x, 7Hx • 4172–CTO • 4173–CTO, J9x, JEx, JFx, JGx, JHx, JJx, JSx, JUx, KFx, KMx, KNx, KWx, KZx, L2x, LCx, LGx, LKx, LLx, LRx • 4174–CTO, N4x, PLx	04W2004	N
20	System board assembly, with Intel Core i7-2620M processor, Optimus, AMT, TPM, AES • 4170–CTO, 3Cx, 3Ex • 4171–CTO, 5Mx, 6Hx, 6Jx, 6Vx, 72x • 4172–CTO • 4173–CTO, 28x, J4x, JKx, KRx, KXx, KYx, LAx • 4174–CTO, 28x, NDx, NNx, NTx, P4x, PBx, PCx, PDx	04W2005	N

Table 11. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
20	System board assembly, with Intel Core i3-2310M processor, Optimus, non-AMT, TPM, AES • 4170–CTO, 36x, 37x • 4171–CTO, 62x, 63x, 66x, 68x, 6Ex, 6Rx • 4172–CTO, 22x • 4173–CTO, KVx, L3x • 4174–CTO, N8x, NBx, NCx	04W2014	N
20	System board assembly, with Intel Core i5-2520M processor, integrated, AMT, non-TPM, non-AES • 4170–CTO, 38x, 3Cx • 4171–CTO, 5Tx • 4172–CTO • 4173–CTO • 4174–CTO, N6x	04W2006	N
20	System board assembly, with Intel Core i5-2540M processor, integrated, AMT, non-TPM, non-AES • 4170–CTO, 3Cx • 4171–CTO, 5Ux • 4172–CTO • 4173–CTO • 4174–CTO	04W2007	N
20	System board assembly, with Intel Core i5-2520M processor, Optimus, AMT, non-TPM, non-AES • 4170–CTO, 39x, 3Cx • 4171–CTO, 5Vx • 4172–CTO • 4173–CTO • 4174–CTO, N7x	04W2008	N
20	System board assembly, with Intel Core i7-2620M processor, Optimus, AMT, non-TPM, non-AES • 4170–CTO, 3Cx • 4171–CTO, 73x • 4172–CTO • 4173–CTO • 4174–CTO	04W2009	N
20	System board assembly, with Intel Core i3-2310M processor, Optimus, non-AMT, non-TPM, non-AES • 4170–CTO, 3Cx • 4171–CTO, 64x, 65x, 6Qx • 4172–CTO • 4173–CTO • 4174–CTO, N9x, NAx	04W2019	N
20	System board assembly, with Intel Core i5-2520M processor, integrated, non-AMT, TPM, AES • 4170–CTO, 34x, 3Ax, 3Bx, 3Cx, 3Hx • 4171–CTO, 52x, 55x, 5Ax, 5Bx, 5Fx, 5Jx, 5Nx, 5Xx, 6Fx, 6Gx, 6Sx, 6Tx, 6Wx, 6Yx, 77x, 78x, 7Gx • 4172–CTO, 23x • 4173–CTO, 29x, 2Ax, 2Bx, J2x, J8x, JAx, JBx, JCx, JDx, JLx, JMx, JNx, JPx, JVx, JWx, JXx, JYx, JZx, K2x, K8x, KAx, KGx, KJx, KLx, KQx, L5x, L6x, L8x, LBx, LVx • 4174–CTO, 29x, 2Ax, 2Bx, L8x, LVx, N2x, NFx, NGx, NVx, P5x, P6x, P8x	04W2010	N

Table 11. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
20	System board assembly, with Intel Core i5-2540M processor, integrated, non-AMT, TPM, AES • 4170–CTO, 33x, 34x, 35x, 3Dx • 4171–CTO, 53x, 5Dx, 5Ex, 5Px, 5Yx, 6Zx, 7Ax, 7Bx • 4172–CTO • 4173–CTO, K6x, K7x, KKx, KSx, KTx, KUx, L7x, L9x • 4174–CTO, N3x, NEx, NSx, P9x, PAx	04W2011	N
20	System board assembly, with Intel Core i5-2520M processor, Optimus, non-AMT, TPM, AES • 4170–CTO, 33x • 4171–CTO • 4172–CTO, 24x • 4173–CTO • 4174–CTO	04W2012	N
20	System board assembly, with Intel Core i7-2620M processor, Optimus, non-AMT, TPM, AES • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W2013	N
20	System board assembly, with Intel Core i5-2520M processor, integrated, non-AMT, non-TPM, non-AES • 4170–CTO, 33x • 4171–CTO, 6Px • 4172–CTO • 4173–CTO • 4174–CTO	04W2015	N
20	System board assembly, with Intel Core i5-2540M processor, integrated, non-AMT, non-TPM, non-AES • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W2016	N
20	System board assembly, with Intel Core i5-2520M Optimus, none-AMT, none-TPM, none-AES • 4170–CTO, 33x • 4171–CTO, 6Nx • 4172–CTO • 4173–CTO • 4174–CTO	04W2017	N
20	System board assembly, with Intel Core i7-2620M Optimus, none-AMT, none-TPM, none-AES • 4170–CTO, 33x • 4171–CTO, 6Mx • 4172–CTO • 4173–CTO • 4174–CTO	04W2018	N
20	System board assembly, with Intel Core i3-2350M Optimus, none-AMT, TPM, AES • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W3469	N

Table 11. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
20	System board assembly, with Intel Core i3-2350M Optimus, none-AMT, none-TPM, non-AES • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W3470	N
20	System board assembly, with Intel Core i7-2640M Optimus, AMT, TPM, AES • 4170–CTO, 33x, 3Fx, 3Gx • 4171–CTO, 76x, 7Cx, 7Dx, 7Ex, 7Fx • 4172–CTO • 4173–CTO, LHx, LMx, LNx, LPx, LQx, LSx, LTx, LUx • 4174–CTO, PEx, PFx, PGx, PHx, PJx, PKx, PMx, PPx	04W3609	N
20	System board assembly, with Intel Core i7-2640M Optimus, AMT, none-TPM, none-AES • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W3610	N
20	System board assembly, with Intel Core i7-2640M Optimus, none-AMT, TPM, AES • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W3611	N
20	System board assembly, with Intel Core i7-2640M Optimus, none-AMT, none-TPM, AES • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W3612	N
20	System board assembly, with Intel Core i7-2640M integrated, AMT, TPM, AES • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W3613	N
20	System board assembly, with Intel Core i7-2640M integrated, none-AMT, TPM, AES • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W3614	N
21	1-GB DDR3-1333 SDRAM SO-DIMM card • 4170–CTO, 33x • 4171–CTO • 4172–CTO, 22x • 4173–CTO, JXx, JYx, KFx, KMx, KVx, L3x • 4174–CTO	55Y3715	*

Table 11. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
21	2-GB DDR3-1333 SDRAM SO-DIMM card • 4170–CTO, 33x, 34x, 36x, 38x, 39x, 3Cx, 3Hx • 4171–CTO, 5Bx, 5Px, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Qx, 6Sx, 6Xx, 79x • 4172–CTO, 22x, 23x • 4173–CTO, J7x, JAx, JBx, JCx, JDx, JNx, JPx, JTx, JVx, JWx, JXx, JYx, K2x, K8x, K9x, KFx, KGx, KJx, KMx, KNx, KUx, KVx, L3x, L5x, LDx, LEx, LGx, LRx • 4174–CTO, L8x, N3x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NFx, NGx, NVx, PAx	55Y3716	*
21	4-GB DDR3-1333 SDRAM SO-DIMM card • 4170–CTO, 32x, 33x, 35x, 37x, 3Ax, 3Bx, 3Dx, 3Ex, 3Fx, 3Gx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Rx, 5Zx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Rx, 6Tx, 6Ux, 6Vx, 6Wx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx, 7Gx, 7Hx • 4172–CTO, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J8x, J9x, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JSx, JUx, JZx, K6x, K7x, KAx, KKx, KLx, KQx, KRx, KSx, KTx, KWx, KXx, KYx, KZx, L2x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LFx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, LVx, N2x, N4x, NDx, NEx, NNx, NSx, NTx, P4x, P5x, P6x, P8x, P9x, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx	55Y3717	*
22	Backup battery	04W3253	**
23	mSATA, 80 GB • 4170–CTO, 32x • 4171–CTO, 75x • 4172–CTO • 4173–CTO • 4174–CTO	45N8259	**
24	Keyboard (see "Keyboard" on page 133.)		
25	TrackPoint caps	91P9642	*
—	Thermal grease	91P8835	N
—	ac power adapter (see "ac power adapter" on page 134.)		

LCD FRUs

14.1-inch HD+ TFT LCD (Table 12 "Parts list—14.1-inch HD+ TFT LCD" on page 129)
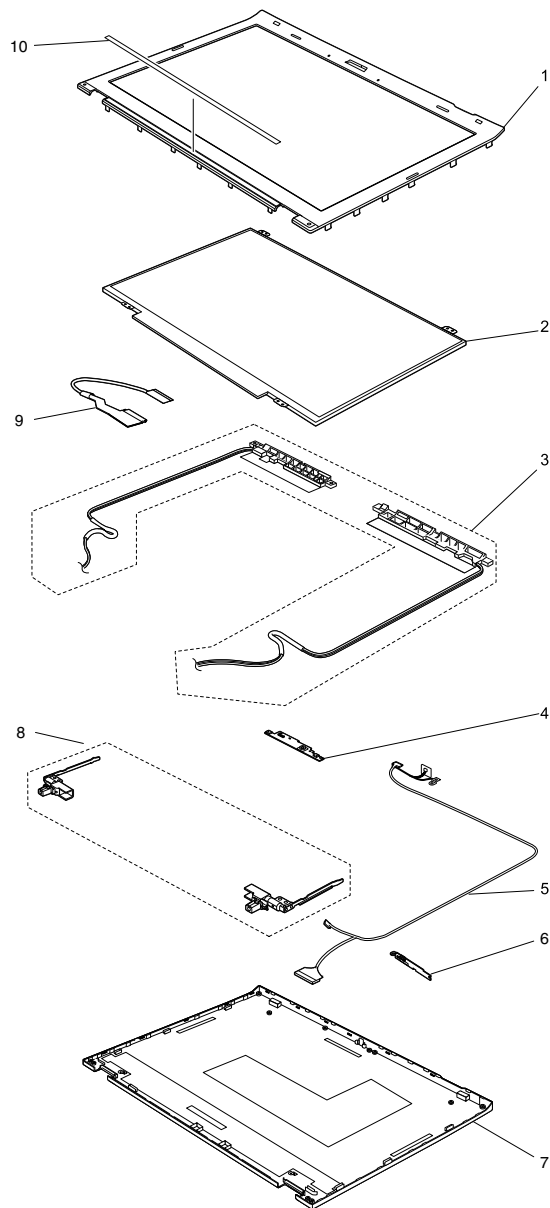
Table 12. Parts list—14.1-inch HD+ TFT LCD

No.	FRU (14.1-inch HD+ TFT LCD)	FRU no.	CRU ID
1	LCD bezel assembly • 4170–CTO, 23x, 24x, 25x, 26x, 27x, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J7x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JTx, JUx, JVx, JWx, JXx, JYx, JZx, K2x, K6x, K7x, K8x, K9x, KAx, KFx, KGx, KJx, KKx, KLx, KMx, KNx, KQx, KRx, KSx, KTx, KUx, KVx, KWx, KXx, KYx, KZx, L2x, L3x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LDx, LEx, LFx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LUx, LVx	04W1675	N

Table 12. Parts list—14.1-inch HD+ TFT LCD (continued)

No.	FRU (14.1-inch HD+ TFT LCD)	FRU no.	CRU ID
	• 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx		
1	LCD bezel assembly, multitouch • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1706	N
2	LCD module, 14.0-inch HD, for multitouch panel • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1787	N
2	LCD module, 14.0-inch HD • 4170–CTO, 23x, 24x, 25x, 26x, 27x, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J7x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JTx, JUx, JVx, JWx, JXx, JYx, JZx, K2x, K6x, K7x, K8x, K9x, KAx, KFx, KGx, KJx, KKx, KLx, KMx, KNx, KQx, KRx, KSx, KTx, KUx, KVx, KWx, KXx, KYx, KZx, L2x, L3x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LDx, LEx, LFx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx	93P5689 93P5693 93P5685	N
3	Antenna kit • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1683 04W1684	N
4	Microphone sub card • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1697	N

Table 12. Parts list—14.1-inch HD+ TFT LCD (continued)

No.	FRU (14.1-inch HD+ TFT LCD)	FRU no.	CRU ID
4	Integrated camera • 4170–CTO, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx, 7Gx, 7Hx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JTx, JUx, JVx, JWx, JXx, JYx, JZx, K6x, K7x, K8x, K9x, KAx, KJx, KLx, KMx, KNx, KQx, KRx, KSx, KTx, KUx, KVx, KWx, KXx, KYx, KZx, L2x, L3x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LEx, LFx, LGx, LHx, LJx, LKx, LLx, LNx, LPx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PNx, PPx	60Y9994	N
4	Hall sensor sub card • 4170–CTO • 4171–CTO • 4173–CTO • 4174–CTO	04W1678	N
5	LED cable assembly • 4170–CTO, 23x, 24x, 25x, 26x, 27x, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J7x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JTx, JUx, JVx, JWx, JXx, JYx, JZx, K2x, K6x, K7x, K8x, K9x, KAx, KFx, KGx, KJx, KKx, KLx, KMx, KNx, KQx, KRx, KSx, KTx, KUx, KVx, KWx, KXx, KYx, KZx, L2x, L3x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LDx, LEx, LFx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx	04W1685	N
5	LED cable assembly, with multitouch • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1709	N
6	LED sub card • 4170–CTO, 39x, 38x, 3Ax, 35x, 34x, 22x, 23x, 24x, 25x, 26x, 27x, 33x, 32x, 37x, 36x • 4171–CTO, 6Tx, 6Sx, 6Px, 6Nx, 6Mx, 6Jx, 6Hx, 6Gx, 6Fx, 5Zx, 5Yx, 5Xx, 5Vx, 5Ux, 5Tx, 5Rx, 5Px, 5Nx, 5Mx, 5Jx, 5Hx, 5Fx, 5Ex, 5Dx, 5Bx, 5Ax, 55x, 54x, 53x, 52x, 6Rx, 6Qx, 6Ex, 68x, 66x, 65x, 64x, 63x, 62x • 4172–CTO, 22x • 4173–CTO, L5x, L2x, KZx, KYx, KXx, KWx, KUx, KTx, KSx, KRx, KQx, KNx, KMx, KLx, KKx, KJx, KGx, KFx, KAx, K9x, K8x, K7x, K6x, K2x, JZx, JYx, JXx, JWx, JVx, JUx, JTx, JSx, JPx, JNx, JMx, JLx, JKx, JJx, JHx, JGx, JFx, JEx, JDx, JCx, JBx, JAx, J9x, J8x, J7x, 28x, 29x, 2Ax, 2Bx, J4x, J2x, L3x, KVx • 4174–CTO, PBx, PAx, P9x, P8x, P6x, P5x, P4x, NVx, NTx, NSx, NNx, NGx, NFx, NEx, NDx, N7x, N6x, N4x, N3x, N2x, 28x, 29x, 2Ax, 2Bx, NCx, NBx, NAx, N9x, N8x	04W1696 04W1697	N

Table 12. Parts list—14.1-inch HD+ TFT LCD (continued)

No.	FRU (14.1-inch HD+ TFT LCD)	FRU no.	CRU ID
7	LCD rear cover assembly • 4170–CTO, 23x, 24x, 25x, 26x, 27x, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J7x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JTx, JUx, JVx, JWx, JXx, JYx, JZx, K2x, K6x, K7x, K8x, K9x, KAx, KFx, KGx, KJx, KKx, KLx, KMx, KNx, KQx, KRx, KSx, KTx, KUx, KVx, KWx, KXx, KYx, KZx, L2x, L3x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LDx, LEx, LFx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx	04W3415	N
7	LCD rear cover assembly, with multitouch • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1705	N
8	Hinge kit • 4170–CTO, 23x, 24x, 25x, 26x, 27x, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx • 4171–CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Ex, 6Fx, 6Gx, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Yx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx • 4172–CTO, 22x, 23x, 24x • 4173–CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J7x, J8x, J9x, JAx, JBx, JCx, JDx, JEx, JFx, JGx, JHx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JTx, JUx, JVx, JWx, JXx, JYx, JZx, K2x, K6x, K7x, K8x, K9x, KAx, KFx, KGx, KJx, KKx, KLx, KMx, KNx, KQx, KRx, KSx, KTx, KUx, KVx, KWx, KXx, KYx, KZx, L2x, L3x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LDx, LEx, LFx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LUx, LVx • 4174–CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NNx, NSx, NTx, NVx, P4x, P5x, P6x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx	04W3413 04W3414	N
8	Hinge kit, with multitouch • 4170–CTO, 22x • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1707	N
9	LCD cable assembly	04W1686	N
10	Clear plate for LCD bezel • 4170–CTO • 4171–CTO • 4172–CTO • 4173–CTO • 4174–CTO	04W1682	N

Keyboard

Table 13. Parts list—Keyboard

Language	FRU no.			CRU ID
Arabic	45N2076	45N2146	45N2216	*
Belgian	45N2077	45N2147	45N2217	
Brazilian Portuguese	45N2075	45N2145	45N2215	
Bulgarian	45N2078	45N2148	45N2218	
Canadian French (058)	45N2073	45N2143	45N2213	
Canadian French (Acnor)	45N2072	45N2142	45N2212	
Czech	45N2079	45N2149	45N2219	
Danish	45N2080	45N2150	45N2220	
Dutch	45N2090	45N2160	45N2230	
Finnish, Swedish	45N2097	45N2167	45N2237	
French	45N2082	45N2152	45N2222	
German	45N2083	45N2153	45N2223	
Greek (U.S. English and Greek layout)	45N2084	45N2154	45N2224	
Hebrew	45N2085	45N2155	45N2225	
Hungarian	45N2086	45N2156	45N2226	
Icelandic	45N2087	45N2157	45N2227	
Italian	45N2088	45N2158	45N2228	
Japanese	45N2102	45N2172	45N2242	
Kazakhstan	45N2089	45N2159	45N2229	
Korean	45N2103	45N2173	45N2243	
Latin American Spanish	45N2074	45N2144	45N2214	
Norwegian	45N2091	45N2161	45N2231	
Polish	45N2092	45N2162	45N2232	
Portuguese	45N2093	45N2163	45N2233	
Russian	45N2094	45N2164	45N2234	
Slovak	45N2095	45N2165	45N2235	
Slovenian	45N2096	45N2166	45N2236	
Spanish	45N2081	45N2151	45N2221	
Swiss	45N2098	45N2168	45N2238	
Thai	45N2105	45N2175	45N2245	
Traditional Chinese	45N2104	45N2174	45N2244	
Turkish	60Y9552	60Y9554	60Y9550	
U.K. English	45N2100	45N2170	45N2240	
U.S. English	45N2071	45N2141	45N2211	
U.S. English (International, with a Euro symbol)	45N2101	45N2171	45N2241	

Miscellaneous parts

Table 14. Parts list—Miscellaneous parts

FRU	FRU no.	CRU ID
Screw kit	04W1693	N
Seal kit	04W1694	N
Base miscellaneous parts	04W1690	N
Keyboard bezel miscellaneous parts	04W1691	N
System miscellaneous parts: • *(a)* DIMM slot cover assembly • *(b)* Hard disk drive cover assembly • Express dummy card • Connector cap **Note:** Italicized letters in parentheses are references to the exploded view in "Overall" on page 118.	04W1692	N
LCD miscellaneous parts	04W1695	N

ac power adapter

Table 15. 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)	92P1214	
2-pin (65 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	92P1159	
2-pin (65 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4419	
2-pin (65 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4423	
2-pin (90 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4427	
2-pin (90 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4431	
2-pin (90 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4435	
2-pin (90 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4439	

Table 16. Parts list—3-pin ac power adapters

FRU	FRU no.	CRU ID
3-pin (65 W, 20 V) adapter (models CTO, xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	42T5283	*
3-pin (65 W, 20 V) adapter (models CTO, xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	92P1212	
3-pin (65 W, 20 V) adapter (models CTO, xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	92P1157	
3-pin (65 W, 20 V) adapter (models CTO, xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	42T4417	
3-pin (65 W, 20 V) adapter (models CTO, xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	42T4421	
3-pin (90 W, 20 V) adapter (models CTO, xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	42T4425	
3-pin (90 W, 20 V) adapter (models CTO, xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	42T4429	
3-pin (90 W, 20 V) adapter (models CTO, xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	42T4433	
3-pin (90 W, 20 V) adapter (models CTO, xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxQ, xxT, xxV)	45N0068	

Table 17. Parts list — 2-pin ac and 3-pin dc power adapters

FRU	FRU no.	CRU ID
2-pin ac(90 W, 100 - 240 V) and 3-pin dc (90 W, 10.5 - 18V) combo adapter (models CTO, xxE, xxF, xxJ, xxG, xxP, xxS, xxU, xxY)	41R0140	*

Power cords

Table 18. 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 19. 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	
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 (32 bit) 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 (32 bit) is preinstalled as the operating system in the following models:

- 4170-CTO
- 4171-CTO
- 4172-CTO
- 4173-CTO
- 4174-CTO

Table 20. Parts list—Windows 7 Professional (32 bit) recovery DVDs

Language	P/N	CRU ID
C&L EMEA (Dutch/French/German/Italian/English)	04T3655	*
C&L Nordics (Danish/Finnish/Swedish/Norwegian/English)	04T3654	
French	04T3648	
German	04T3649	
Japanese	04T3651	
Simplified Chinese	04T3647	
Spanish	04T3652	
Traditional Chinese for Hong Kong S.A.R (English-enable)	04T3650	
US English	04T3653	

Windows Vista Home Basic (32 bit) DVDs

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

Windows Vista Home Basic (32 bit) is preinstalled as the operating system in the following models:

- 4170-CTO
- 4171-CTO
- 4172-CTO
- 4173-CTO
- 4174-CTO

Table 21. Parts list—Windows Vista Home Basic (32 bit) recovery DVDs

Language	P/N	CRU ID
English	04T3646	*

Windows Vista Business (32 bit) DVDs

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

Windows Vista Business (32 bit) is preinstalled as the operating system in the following models:

- 4170-CTO
- 4171-CTO
- 4172-CTO
- 4173-CTO
- 4174-CTO

Table 22. Parts list—Windows Vista Business (32 bit) recovery DVDs

Language	P/N	CRU ID
Indian English	04T3644	*
Japanese	04T3645	

Windows 7 Home Basic (32 bit) DVDs

Windows 7 Home Basic (32 bit) is preinstalled as the operating system in the following models:

- 4170-CTO, 36x
- 4171-CTO, 6Ex
- 4172-CTO, 22x
- 4173-CTO, KLx, KMx, KNx, KVx, KWx, L3x, LEx
- 4174-CTO

Table 23. Parts list—Windows 7 Home Basic (32 bit) recovery DVDs

Language	P/N	CRU ID
Arabic	04T3685	*
Brazilian-Portuguese	04T3686	
Simplified Chinese	04T3689	
Indian English	04T3688	
French	04T3690	
Portuguese	04T3691	
Russian	04T3693	

Language	P/N	CRU ID
Spanish	04T3687	
Serbian-latin	04T3692	
Turkish	04T3694	
English	04T3695	

Windows 7 Home Basic (64 bit) DVDs

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

- 4170-CTO
- 4171-CTO
- 4172-CTO
- 4173-CTO
- 4174-CTO

Table 24. Parts list—Windows 7 Home Basic (64 bit) recovery DVDs

Language	P/N	CRU ID
Simplified Chinese	04T3696	*

Windows 7 Ultimate (32 bit) DVDs

Windows 7 Ultimate (32 bit) is preinstalled as the operating system in the following models:

- 4170-CTO
- 4171-CTO
- 4172-CTO
- 4173-CTO
- 4174-CTO

Table 25. Parts list—Windows 7 Ultimate (32 bit) recovery DVDs

Language	P/N	CRU ID
English	04T3656	*

Windows 7 Ultimate (64 bit) DVDs

Windows 7 Ultimate (64 bit) is preinstalled as the operating system in the following models:

- 4170-CTO
- 4171-CTO
- 4172-CTO
- 4173-CTO
- 4174-CTO

Table 26. Parts list—Windows 7 Ultimate (64 bit) recovery DVDs

Language	P/N	CRU ID
English	04T3684	*

Windows 7 Home Premium (32 bit) DVDs

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

- 4170-CTO
- 4171-CTO
- 4172-CTO
- 4173-CTO
- 4174-CTO, P6x

Table 27. Parts list—Windows 7 Home Premium (32 bit) recovery DVDs

Language	P/N	CRU ID
Indian English	04T3698	*
Simplified Chinese	04T3697	
US English	04T3699	

Windows 7 Home Premium (64 bit) DVDs

Windows 7 Home Premium (64 bit) is preinstalled as the operating system in the following models:

- 4170-CTO, 3Ex
- 4171-CTO
- 4172-CTO
- 4173-CTO
- 4174-CTO, NNx

Table 28. Parts list—Windows 7 Home Premium (64 bit) recovery DVDs

Language	P/N	CRU ID
Arabic (English-enable)	04T3700	*
Brazilian Portuguese	04T3701	
Czech (English-enable)	04T3704	
C&L Nordics (Danish/Finnish/Swedish/Norwegian/English)	04T3723	
C&L EMEA (Dutch/French/German/Italian/English)	04T3724	
C&L Croatian (English/Slovenian/Croatian)	04T3725	
French	04T3705	
German	04T3707	
Greek (English-enable)	04T3706	
Hebrew (English-enable)	04T3708	
Hungarian (English-enable)	04T3710	

Language	P/N	CRU ID
Japanese	04T3711	
Korean (English-enable)	04T3712	
Polish	04T3713	
Portuguese (English-enable)	04T3714	
Romanian (English-enable)	04T3715	
Russian	04T3716	
Serbian-Latin (English-enable)	04T3719	
Simplified Chinese	04T3702	
Slovak (English-enable)	04T3717	
Spanish	04T3718	
Traditional Chinese (English-enable)	04T3703	
Traditional Chinese for Hong Kong S.A.R (English-enable)	04T3709	
Turkish (English-enable)	04T3720	
US English	04T3722	
US English disable	04T3721	

Windows 7 Professional (32 bit) DVDs

Windows 7 Professional (32 bit) is preinstalled as the operating system in the following models:

- 4170-CTO
- 4171-CTO, 6Fx, 6Gx, 6Yx
- 4172-CTO
- 4173-CTO, J7x, J8x, JCx, JDx, JEx, JHx, JTx, JVx, JWx, JXx, K9x, KQx, LDx
- 4174-CTO, NVx, NTx

Table 29. Parts list—Windows 7 Professional (32 bit) recovery DVDs

Language	P/N	CRU ID
English	04T1402	*
French	04T1398	
German	04T1399	
HongKong/English	04T1612	
Japanese	04T1400	
Simplified Chinese	04T1397	
Spanish	04T1401	
Nordics (DK/FI/SV/NO/EN)	04T1403	
EMEA (NL/FR/GR/IT/EN)	04T1404	

Windows 7 Professional (64 bit) DVDs

Windows 7 Professional (64 bit) is preinstalled as the operating system in the following models:

- 4170-CTO, 32x, 33x, 34x, 35x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Fx, 3Gx, 3Hx

- 4171-CTO, 52x, 53x, 54x, 55x, 5Ax, 5Bx, 5Dx, 5Ex, 5Fx, 5Hx, 5Jx, 5Mx, 5Nx, 5Px, 5Rx, 5Tx, 5Ux, 5Vx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 65x, 66x, 68x, 6Hx, 6Jx, 6Mx, 6Nx, 6Px, 6Qx, 6Rx, 6Sx, 6Tx, 6Ux, 6Vx, 6Wx, 6Xx, 6Zx, 72x, 73x, 74x, 75x, 76x, 77x, 78x, 79x, 7Ax, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx, 7Gx, 7Hx

- 4172-CTO, 23x, 24x

- 4173-CTO, 28x, 29x, 2Ax, 2Bx, J2x, J4x, J9x, JAx, JBx, JFx, JGx, JJx, JKx, JLx, JMx, JNx, JPx, JSx, JUx, JYx, JZx, K2x, K6x, K7x, K8x, KAx, KFx, KGx, KJx, KKx, KRx, KSx, KTx, KUx, KXx, KYx, KZx, L2x, L5x, L6x, L7x, L8x, L9x, LAx, LBx, LCx, LFx, LGx, LHx, LJx, LKx, LLx, LMx, LNx, LPx, LQx, LRx, LSx, LTx, LUx, LVx

- 4174-CTO, 28x, 29x, 2Ax, 2Bx, L8x, LVx, N2x, N3x, N4x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx, NFx, NGx, NSx, P4x, P5x, P8x, P9x, PAx, PBx, PCx, PDx, PEx, PFx, PGx, PHx, PJx, PKx, PLx, PMx, PNx, PPx

Table 30. Parts list—Windows 7 Professional (64 bit) recovery DVDs

Language	P/N	CRU ID
Arabic/Enlish	04T3657	*
Brazilian Portuguese	04T3658	
Simplified Chinese	04T3659	
Traditional Chinese/Enlish	04T3660	
Czech/Enlish	04T3661	
Indian English	04T3662	
French	04T3663	
Greek/Enlish	04T3664	
German	04T1414	
Hebrew/Enlish	04T3666	
Hong Kong/Enlish	04T3667	
Hungarian/Enlish	04T3668	
Japanese	04T3669	
Korean/English	04T3670	
Polish	04T3671	
Portuguese/Enlish	04T3672	
Romanian/Enlish	04T3673	
Russian	04T3674	
Slovak/Enlish	04T3675	
Spanish	04T3676	
Serbian-Latin/Enlish	04T3677	
Turkish/Enlish	04T3678	
English disabled	04T3679	
English	04T3680	
Nordics (DK/FI/SV/NO/EN)	04T3681	

Language	P/N	CRU ID
EMEA (NL/FR/GR/IT/EN)	04T3682	
Croatian (EN/SL/CR)	04T3683	

Windows 7 Professional (32 bit) Rapid Boot DVDs

Windows 7 Professional (32 bit) Rapid Boot is preinstalled as the operating system in the following models:

- 4170-CTO, 3Dx
- 4171-CTO
- 4172-CTO
- 4173-CTO
- 4174-CTO

Table 31. Parts list—Windows 7 Professional (32 bit) Rapid Boot recovery DVDs

Language	P/N	CRU ID
English	04T2738	*
Japanese	04T2749	
Simplified Chinese	04T2737	

Common service tools

Table 32. 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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