

**ThinkPad**

# Hardware Maintenance Manual

**ThinkPad X1 and X1 Hybrid**

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

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## About this manual

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

### ThinkPad X1 and X1 Hybrid

MT 1286, 1291, 1292, 1293, 1294, 1295, and 1296

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 23.



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

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### General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
  1. Make sure that you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any object that weighs more than 16 kg (35 lb) or that you think is too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, make sure that other service technicians and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your toolcase away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Make sure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, about 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

**Attention:** Metal objects are good electrical conductors.

- Wear safety glasses when you are hammering, drilling, soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.
- Fan louvers on the machine help to prevent overheating of internal components. Do not obstruct fan louvers or cover them with labels or stickers.

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## 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.

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## Safety inspection guide

The purpose of this inspection guide is to assist you in identifying potentially unsafe conditions. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury. This guide addresses only those items. You should use good judgment to identify potential safety hazards due to attachment of non-ThinkPad features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock)
- Explosive hazards, such as a damaged CRT face or a bulging capacitor
- Mechanical hazards, such as loose or missing hardware

To determine whether there are any potentially unsafe conditions, use the following checklist at the beginning of every service task. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power off the computer. Disconnect the power cord.
3. Check the power cord for:
  - a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
  - b. The power cord should be the type specified in the parts list.
  - c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-ThinkPad alterations. Use good judgment as to the safety of any non-ThinkPad alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check for cracked or bulging batteries.
9. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

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## 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.

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## 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.

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## 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**

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



خطر

تحتوي بعض البطاريات الاحتياطية على كمية صغيرة من مادتي النيكل والكاديوم. لا تقم بفك أو إعادة شحن البطارية الاحتياطية ولا تقم أيضا بإلقاءها في النار أو الماء ولا تتسبب في أحداث 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 إلى اشتعالها أو انفجارها.



خطر

تحتوي حزمة البطارية على كمية صغيرة من مادة النيكل. لا تقم بفكها أو إلقاءها في النار أو الماء ولا تتسبب في أحداث 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 إلى اشتعالها أو انفجارها.



خطر

قد تتسبب بطارية الليثيوم في حدوث حريق أو انفجار أو حدوث حروق شديدة. لا تقم بإعادة شحن البطارية أو إزالة موصل الاستقطاب الخاص بها ولا تحاول أيضا فكها أو تسخينها لأكثر من ١٠٠ درجة مئوية (٢١٢١ 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 إلى اشتعالها أو انفجارها.



خطر

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



خطر

على الرغم من أن البطاريات الرئيسية يكون لها جهد منخفض، إلا 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 بإيقاف 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

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



## PERIGO

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



## DANGER

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



## DANGER

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



## DANGER

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



## DANGER

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



## DANGER

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



## **DANGER**

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**

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 ולחשיב לגילוי קולות שקשוק. חלקי או שבבי מתכת עלולים לגרום לקצרים חשמליים.



סכנה

סוללות המתנה מסוימות מכילות כמות קטנה של ניקל וקדמיום. אין לפרק סוללת המתנה, 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 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 הגביש הנוזלי (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 מחמגע עם הנוזל נמשכים לאחר השטיפה.



סכנה

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



סכנה

אלא אם כן מותרת יחלפה חמוי 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、その極性コネクタの取り外し、バッテリー本体の分解、  
100 °C (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 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。



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。



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 달걀거리는 소리가 나지 않는지 확인하십시오. 금속 부품 또는 금속 조각은 누전을 일으킬 수 있습니다.



위험

일부 보조 배터리에는 소량의 니켈 및 카드뮴이 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 느낀다면 즉시 병원에 가서 의사의 진찰을 받아야 합니다.



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



PELIGRO

Algunas baterías de reserva contienen una pequeña cantidad de níquel y cadmio. No las desmonte, ni recargue, ni las eche al fuego o al agua ni las 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 médica si se presenta algún síntoma del fluido después de lavarse.



## **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音。  
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

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。



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## 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 23
  - “Strategy for replacing a hard disk drive” on page 24
  - “Important notice for replacing a system board” on page 24
  - “How to use the error code” on page 24
- “Strategy for replacing FRUs for CTO, CMV, and GAV” on page 24
  - “Product definition” on page 24
  - “FRU identification for CTO, CMV, and GAV products” on page 25

**Important:** UEFI BIOS and device driver fixes are customer-installable. The UEFI BIOS and device drivers are posted on the customer support site <http://www.lenovo.com/support>

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/>

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### 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.

**Important:** After a system board is replaced:

- For models with Instant Media Mode card, before you install the Instant Media Mode card, make sure that you update the system board with the original MTM and serial number of the computer. **Otherwise, data on the Instant Media Mode card will be erased at power-on stage if the MTM and serial do not match.**
- Make sure 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.

If your computer is shipped with an mSATA solid state drive and a solid state drive or hard disk drive, the mSATA solid state 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 solid state drive is installed in the wireless WAN card slot of the computer. The Lenovo preloaded software is installed on the mSATA solid state drive.

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

## Important notice for replacing a system board

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

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

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

**Important:** For models with Instant Media Mode card, after you install a new system board, prior to installing the Instant Media Mode card, make sure that you update the system board with the original MTM and serial number of the computer. **Otherwise, data on the Instant Media Mode card will be erased at power-on stage if the MTM and serial do not match.**

## How to use the error code

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.

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## Strategy for replacing FRUs for CTO, CMV, and GAV

### Product definition

#### Dynamic Configure To Order (CTO)

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

## Custom Model Variant (CMV)

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

- The MTM portion of the machine label is the 4-digit MT and 3-digit model, where model = “CTO” (Example: 1829-CTO). The PRODUCT ID portion of the machine label is the 4-digit MT and 3-digit CMV model (Example: 1829-W15).
- The PEW record is the 4-digit MT and 3-digit model, where model = “CTO” (Example: 1829-CTO).
- eSupport will show both the CTO and CMV machine type models (Example: 1829-CTO and 1829-W15 will be found on the eSupport site.)
- The HMM will have the 4-digit MT and 3-digit CTO model only (Example: 1829-CTO). Again, CMVs are custom models and are not found in the HMM.

## General Announce Variant (GAV)

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

## FRU identification for CTO, CMV, and GAV products

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

### Using PEW

- **PEW** is the primary source for identifying FRU part numbers and FRU descriptions for the key commodities for CTO, CMV and GAV products at a MT - serial number level. An example of key commodities are hard disk drives, system boards, microprocessors, Liquid Crystal Displays (LCDs), and memory.
- Remember, all CTO and CMV products are loaded in PEW under the 4-digit MT and 3-digit model, where model = “CTO” (Example: 1829-CTO). GAVs are loaded in PEW under the 4-digit MT and 3-digit model, where model = a “fixed part number”, not “CTO” (Example: 1829-F1U).
- PEW can be accessed at the following Web site:  
<http://www.lenovo.com/support/site.wss/document.do?Indocid=LOOK-WARNTY>  
Select Warranty lookup. Input the MT and the Serial number and the list of key commodities will be returned in the PEW record under COMPONENT INFORMATION.

### Using eSupport

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

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

To view the warranty status of the key commodities on your computer, do the following:

1. Go to <http://www.lenovo.com/support>.
2. Click **Warranty & Services**.
3. Click **Check Warranty Status**.
4. On the Warranty Status Lookup page, click **Parts Lookup**.
5. Type your machine type and serial number, and then click **Submit**.

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

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

To view the complete list of FRUs, do the following:

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

#### **Using the *Hardware Maintenance Manual***

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

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

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## Chapter 3. General checkout

This chapter presents following information:

- “What to do first” on page 27
- “Checkout guide” on page 28
  - “System supporting the Lenovo ThinkVantage Toolbox program and the PC-Doctor for DOS diagnostics program” on page 28
  - “System supporting the Lenovo diagnostics programs” on page 32
- “Power system checkout” on page 34

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, 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 for warranty:** During the warranty period, the customer may be responsible for repair costs if the computer damage was caused by misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance by the customer.

Following is a list of some common items that are not covered under warranty and some symptoms that might indicate that the system was subjected to stress beyond normal use.

Before checking problems with the computer, determine whether the damage is covered under the warranty by referring to the following list:

**The following are not covered under warranty:**

- LCD panel cracked from the application of excessive force or from being dropped
- Scratched (cosmetic) parts
- Distortion, deformation, or discoloration of the cosmetic parts
- Plastic parts, latches, pins, or connectors that have been cracked or broken by excessive force
- Damage caused by liquid spilled into the system
- Damage caused by the improper insertion of a PC Card or the installation of an incompatible card
- Fuses blown by attachment of a nonsupported device
- Forgotten computer password (making the computer unusable)
- Sticky keys caused by spilling a liquid onto the keyboard
- Use of an incorrect ac 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.

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## Checkout guide

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

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

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

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

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

### Diagnostics using PC-Doctor for DOS

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

**Note:** PC-Doctor for DOS is available at the following Web site: <http://www.lenovo.com/support>. To create the PC-Doctor diagnostic CD, follow the instructions on the Web site.

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

To enter the ThinkPad Setup program, do as follows:

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

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

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

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

### Testing the computer

In this product, you need an external optical drive to use the PC-Doctor diagnostic CD to test the hardware features.

**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 34, and check the power sources.

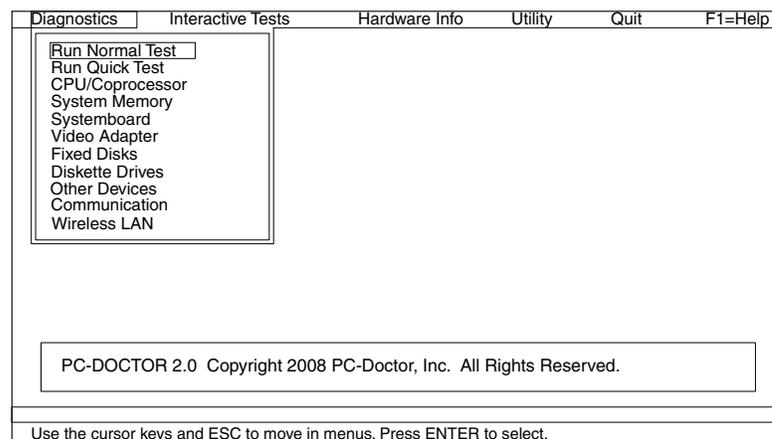
If an error code appears, go to “Symptom-to-FRU index” on page 42.

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.



The options on the test menu are as follows:

Diagnostics	Interactive Tests
<ul style="list-style-type: none"> <li>• Run Normal Test</li> <li>• Run Quick Test</li> <li>• CPU/Coprocessor</li> <li>• System Memory</li> <li>• Systemboard</li> <li>• Video Adapter</li> <li>• Fixed Disks</li> <li>• Diskette Drives</li> <li>• Other Devices</li> <li>• Communication</li> <li>• Wireless LAN</li> </ul>	<ul style="list-style-type: none"> <li>• Keyboard</li> <li>• Video</li> <li>• Internal Speaker</li> <li>• Mouse</li> <li>• Diskette</li> <li>• System Load</li> <li>• Optical Drive Test</li> <li>• Intel WLAN Radio Test</li> </ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• In the <b>Keyboard</b> test in <b>Interactive Tests</b>, the Fn key should be held down for at least 2 seconds; otherwise, it cannot be sensed.</li> <li>• <b>Video Adapter</b> 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.</li> <li>• To test <b>Digital Signature Chip</b>, the security chip must be set to Active.</li> <li>• For models with no internal optical drives, <b>Optical Drive Test</b> can not be selected.</li> </ul>	

10. Run the applicable function test.
11. Follow the instructions on the screen. If there is a problem, PC-Doctor shows messages describing it.
12. To exit the test, select **Quit — Exit Diag**. To cancel the test, press Esc.

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

### Detecting system information with PC-Doctor

PC-Doctor can detect the following system information:

#### Hardware Info

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

#### Utility

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

## Lenovo ThinkVantage Toolbox

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

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

To run this program, do as follows:

### Windows 7:

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

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

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

### PC-Doctor for Windows

In some models of ThinkPad Notebook, PC-Doctor for Windows enables you to troubleshoot and resolve problems related to the computer.

Select one of the categories listed below to display symptoms and solutions:

- Check System Health
- System and Device Tests
- Lenovo Troubleshooting Center
- System Reports
- Updates and Support

### FRU tests

The following table shows the test for each FRU.

Table 1. FRU tests

FRU	Applicable test
System board	1. <b>Diagnostics → CPU/Coprocessor</b> 2. <b>Diagnostics → Systemboard</b>
Power	<b>Diagnostics → ThinkPad Devices → ac Adapter, Battery 1 (Battery 2)</b>
LCD unit	1. <b>Diagnostics → Video Adapter</b> 2. <b>Interactive Tests → Interactive Tests → Video</b>
Audio	Enter the ThinkPad Setup program and change Serial ATA (SATA) setting to <b>Compatibility</b> , and run <b>Diagnostics → Other Devices → Conexant Audio</b>
Speaker	<b>Interactive Tests → Internal Speaker</b> <b>Note:</b> If no sound is heard in this test, turn off and turn on the computer. Then, run this test again.
PC Card slot	<b>Diagnostics → Systemboard → PCMCIA</b>
ExpressCard slot	1. Insert a PCI-Express/USB Wrap card into the ExpressCard slot. 2. Turn on the computer. 3. Run <b>Diagnostics → ThinkPad Devices → ExpressCard slot</b> .
Keyboard	1. <b>Diagnostics → Systemboard → Keyboard</b> 2. <b>Interactive Tests → Keyboard</b>
Hard disk drive	Enter the ThinkPad Setup program and change Serial ATA (SATA) setting to <b>Compatibility</b> , and run <b>Diagnostics → Fixed Disks</b> .
Diskette drive	1. <b>Diagnostics → Diskette Drives</b> 2. <b>Interactive Tests → Diskette</b>

Table 1. FRU tests (continued)

FRU	Applicable test
Memory	<ol style="list-style-type: none"> <li>1. If two DIMMs are installed, remove one of them and run <b>Diagnostics → PM Memory</b>.</li> <li>2. If the problem does not recur, return the DIMM to its place, remove the other one, and run the test again.</li> </ol>
TrackPoint or pointing device	<p>If the TrackPoint does not work, check the configuration as specified in the ThinkPad Setup program. If the TrackPoint is disabled, select Automatic to enable it.</p> <p>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.</p> <p>If enabling the TrackPoint does not correct the problem, continue with the following:</p> <ul style="list-style-type: none"> <li>• <b>Interactive Tests → Mouse</b>.</li> </ul>

## 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 34, and check the power sources. If an error code is displayed, go to “Symptom-to-FRU index” on page 42 for error code descriptions and troubleshooting hints.
2. When the ThinkPad logo is displayed, repeatedly press and release the 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
<ul style="list-style-type: none"><li>• Quick Memory Test</li><li>• Quick Storage Device Test</li><li>• Exit Application</li></ul>	<ul style="list-style-type: none"><li>• System Information</li><li>• Recover Bad Sectors Tool</li></ul>

### 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 34, and check the power sources. If an error code is displayed, go to “Symptom-to-FRU index” on page 42 for error code descriptions and troubleshooting hints.
  3. When the ThinkPad logo is displayed, repeatedly press and release the F12 key. When the Boot Menu window opens, release the F12 key.
  4. Use the arrow keys to select **USB HDD** and then press Enter. The diagnostic program will be launched automatically.
  5. Follow the instructions on the screen to use the diagnostic program.
- If you have created the bootable diagnostic medium on a CD, do the following:
  1. Turn on the computer. If the computer cannot be turned on, go to “Power system checkout” on page 34, and check the power sources. If an error code is displayed, go to “Symptom-to-FRU index” on page 42 for error code descriptions and troubleshooting hints.
  2. Insert the CD into the optical drive.
  3. Restart the computer.
  4. When the ThinkPad logo is displayed, repeatedly press and release the F12 key. When the Boot Menu window opens, release the F12 key.
  5. Use the arrow keys to select **ATAPI CDx** (x: 0, 1, ...) and then press Enter. The diagnostic program will be launched automatically.
  6. Follow the instructions on the screen to use the diagnostic program.

---

## Power system checkout

To verify a symptom, do the following:

1. Turn off the computer.
2. Connect the ac adapter.
3. Turn on the computer. Then press F1 to enter the ThinkPad Setup program.
4. Check that power is supplied when you turn on the computer.
5. Insert a straightened paper clip into the emergency reset hole to reset the computer. Confirm the system is still powered on.
6. Turn off the computer.
7. Disconnect the ac adapter.
8. 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 34
- “Checking operational charging” on page 35
- “Checking the backup battery” on page 35

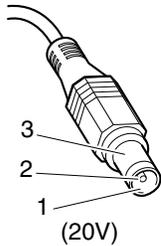
## Checking the ac power adapter

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

- If the ac power status 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 35.

To check the ac power adapter, do the following:

1. Unplug the ac power adapter cable from the computer.
2. Measure the output voltage at the plug of the ac power adapter cable. See the following figure:



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

- Note:** Output voltage across pin 2 of the ac power adapter might differ from the one you are servicing.
3. If the voltage is not correct, replace the ac power adapter.
  4. If the voltage is acceptable, do the following:
    - Replace the system board.
    - If the problem persists and your system supports the PC doctor for DOS program, go to “FRU tests” on page 31.

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

## Checking operational charging

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

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

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

## Checking the battery pack

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

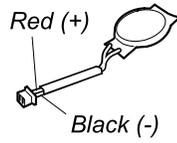
To check your battery, move your cursor to the Power Manager Battery Gauge icon in the icon tray of the Windows taskbar and wait for a moment (but do not click), and the percentage of battery power remaining is displayed. To get detailed information about the battery, double-click the Power Manager Battery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

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

## Checking the backup battery

Do the following:

1. Disable the battery pack in the UEFI BIOS. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.
2. Remove the backup battery (see “1040 Backup battery” on page 65).
3. Measure the voltage of the backup battery. See the following figure.



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.

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## Chapter 4. Related service information

This chapter presents following information:

- “Restoring the factory contents by using Product Recovery discs” on page 37
- “Restoring the factory contents by using Recovery Disc Set” on page 37
- “Passwords” on page 39
- “Power management” on page 40
- “Symptom-to-FRU index” on page 42

### Service Web site:

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

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### 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 112.

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.

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### 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 112.

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 Setup Utility 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 Setup Utility configuration changes. Follow the instructions on the screen to begin the recovery process.
4. Select your language and click **Next**.
5. Read the license. If you agree with the terms and conditions, select **I accept these terms and conditions** and then click **Next**. If you do not agree with the terms and conditions, follow the instructions on the screen.
6. Click **Yes** in the displayed window to begin the operating system recovery process.
7. Insert the *Applications and Drivers Recovery Disc* when prompted and then click **OK** to begin the applications and drivers recovery process.
8. If you have a *Supplemental Recovery Disc*, insert it when prompted and click **Yes**. If you do not have a *Supplemental Recovery Disc*, click **No**.
9. When all of the data has been copied from the last disc in the set and has been processed, remove the disc and restart the computer.

**Note:** The rest of the recovery process is fully automated and no action is required by you. The computer will restart into the Microsoft Windows desktop several times and you might experience periods when no activity is apparent on the screen for several minutes at a time. This is normal.

10. When the recovery process is complete, the Set Up Windows screen is displayed. Follow the instructions on the screen to complete the Windows setup.
11. After you have completed the Windows setup, you might want to restore the original startup sequence. Start the Setup Utility program and then press F9 to restore the default settings. Press F10 to save and exit the Setup Utility.

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

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## Passwords

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

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

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

## Power-on password

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

## Hard-disk password

There are two hard-disk passwords (HDPs):

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

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

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

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

## Supervisor password

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

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

## How to remove the power-on password

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

*(A) If no SVP has been set:*

1. Disable the battery pack in the UEFI BIOS. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.
2. Remove the backup battery. For how to remove the backup battery, see “1040 Backup battery” on page 65.

3. Turn on the computer and wait until the POST ends. After the POST ends, the password prompt does not appear. The POP has been removed.
4. Make sure that the battery pack is disabled in the UEFI BIOS. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.
5. Reinstall the backup battery.

*(B) If an SVP has been set and is known by the service technician:*

1. Turn on the computer.
2. When the ThinkPad logo comes up, immediately press F1 to enter the ThinkPad Setup program. When POP icon is appearing on the screen, enter the POP.
3. Select **Security**, using the cursor directional keys to move the menu.
4. Select **Password**.
5. Select **Power-On Password**.
6. Type the current SVP 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 Notice window, select **Yes**.

## How to remove the hard-disk password

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

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

1. Turn on the computer.
2. When the ThinkPad logo comes up, immediately press F1 to enter the ThinkPad Setup program. When POP icon is appearing on the screen, enter the POP.
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 HDP**.
7. Type the current master HDP in the **Enter Current Password** field. then leave the **Enter New Password** field blank, and press Enter twice.
8. Press F10.
9. Select **Yes** in the Setup Configuration window. Both user HDP and master HDP will have been removed.

---

## Power management

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

## 2. Select **Power off display (keep current power plan)**.

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 mode

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

- The LCD is powered off.
- The hard disk drive or the solid state drive is powered off.
- The CPU stops.

To enter sleep 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 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 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 mode and resumes operation:

- The ring indicator (RI) is signaled by a serial device or a PC Card device. (*does not support the ring indicator (RI) resume by PC Card device.*)
- The time set on the resume timer elapses.

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

## Hibernation mode

In hibernation mode, the following occurs:

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

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

- Click **Start**, and then click the arrow next to the **Shut down** button. Then select **Hibernate**.
- 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.

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## Symptom-to-FRU index

This section contains following information:

- “Numeric error codes” on page 42
- “Error messages” on page 44
- “Beep symptoms” on page 44
- “No-beep symptoms” on page 45
- “LCD-related symptoms” on page 45
- “Intermittent problems” on page 45
- “Undetermined problems” on page 46

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

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

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

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

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

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

## Numeric error codes

Table 2. Numeric error codes

Symptom or error	FRU or action, in sequence
<b>0177</b> Bad SVP data, stop POST task—The checksum of the supervisor password in the EEPROM is not correct.	<b>System board.</b>
<b>0182</b> Bad CRC2. Enter ThinkPad Setup and load Setup defaults.—The checksum of the CRS2 setting in the EEPROM is not correct.	<ol style="list-style-type: none"> <li>1. <b>Run the ThinkPad Setup program. Press F9, and Enter to load the default setting. Then save the current setting by pressing F10.</b></li> <li>2. System board.</li> </ol>

Table 2. Numeric error codes (continued)

Symptom or error	FRU or action, in sequence
<b>0183</b> Bad CRC of Security Settings in EFI Variable. Enter the ThinkPad Setup program.	
<b>0187</b> EAIA data access error—The access to EEPROM is failed.	<b>System board.</b>
<b>0188</b> Invalid RFID Serialization Information Area.	<b>System board.</b>
<b>0189</b> Invalid RFID configuration information area—The EEPROM checksum is not correct.	<b>System board.</b>
<b>0190</b> Critical low-battery error	<ol style="list-style-type: none"> <li>1. <b>Charge the battery pack.</b></li> <li>2. Battery pack.</li> </ol>
<b>0191</b> System Security—Invalid Remote Change requested.	<ol style="list-style-type: none"> <li>1. <b>Run the ThinkPad Setup program, and then save current setting by pressing F10.</b></li> <li>2. System board.</li> </ol>
<b>0199</b> System Security— Security password retry count exceeded.	<ol style="list-style-type: none"> <li>1. <b>Run the ThinkPad Setup program, and then save the current setting by pressing F10.</b></li> <li>2. System board.</li> </ol>
<b>0230</b> Shadow RAM error—Shadow RAM fails at offset nnnn.	<b>System board.</b>
<b>0251</b> System CMOS checksum bad— Default configuration used.	<ol style="list-style-type: none"> <li>1. <b>Charge the backup battery for more than 8 hours by connecting the ac power adapter.</b></li> <li>2. Replace the backup battery and run the ThinkPad Setup program to reset the time and date.</li> </ol>
<b>0271</b> Real-time clock error. Check date and time settings.	<b>Run the ThinkPad Setup program to reset the time and date.</b>
<b>1802</b> Unauthorized network card is plugged in—Turn off and remove the miniPCI network card.	<ol style="list-style-type: none"> <li>1. <b>Remove Mini PCI network card.</b></li> <li>2. System board.</li> </ol>
<b>1820</b> 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.	<b>Remove all but the reader that you set up for the authentication.</b>
<b>2000</b> Hard Drive Active Protection sensor diagnostics failed.Press <Esc> to continue.Press <F1> to enter SETUP	<ol style="list-style-type: none"> <li>1. Undock docking station or port replicator if it is attached to the ThinkPad Notebook.</li> <li>2. Place the ThinkPad Notebook on a horizontal surface. Do not apply any physical shock to the computer.</li> <li>3. Run <b>Diagnostics → ThinkPad Devices → HDD Active Protection Test.</b></li> </ol>
<b>2100</b> Detection error on HDD0 (Main HDD)	<ol style="list-style-type: none"> <li>1. <b>Reseat the hard disk drive.</b></li> <li>2. Main hard disk drive.</li> <li>3. System board.</li> </ol>
<b>2101</b> Detection error on HDD1 (Ultrabay HDD)	<ol style="list-style-type: none"> <li>1. <b>Reseat the hard disk drive.</b></li> <li>2. Ultrabay hard disk drive.</li> <li>3. System board.</li> </ol>
<b>2102</b> Detection error on HDD2 (Mini SATA)	<ol style="list-style-type: none"> <li>1. <b>Reseat the Mini SATA (mSATA) device.</b></li> <li>2. mSATA device.</li> <li>3. System board.</li> </ol>

Table 2. Numeric error codes (continued)

Symptom or error	FRU or action, in sequence
<b>2110</b> Read error on HDD0 (Main HDD)	<ol style="list-style-type: none"> <li>1. <b>Reseat the hard disk drive.</b></li> <li>2. Main hard disk drive.</li> <li>3. System board.</li> </ol>
<b>2101</b> Read error on HDD0 (Main HDD)	<ol style="list-style-type: none"> <li>1. <b>Reseat the hard disk drive.</b></li> <li>2. Ultrabay hard disk drive..</li> <li>3. System board.</li> </ol>
<b>2112</b> Read error on HDD2 (Mini SATA)	<ol style="list-style-type: none"> <li>1. <b>Reseat the Mini SATA (mSATA) device.</b></li> <li>2. mSATA device.</li> <li>3. System board.</li> </ol>
<b>2200</b> Machine Type and Serial Number are invalid.	System board.
<b>2201</b> Machine UUID is invalid.	System board.

## Error messages

Table 3. Error messages

Symptom or error	FRU or action, in sequence
Fan error.	<ol style="list-style-type: none"> <li>1. <b>Fan.</b></li> <li>2. Thermal grease.</li> <li>3. System board.</li> </ol>
Thermal sensing error.	<b>System board.</b>

## Beep symptoms

Table 4. Beep symptoms

Symptom or error	FRU or action, in sequence
One beep and a blank, unreadable, or flashing LCD.	<ol style="list-style-type: none"> <li>1. <b>Reseat the LCD connector.</b></li> <li>2. LCD assembly.</li> <li>3. External CRT.</li> <li>4. System board.</li> </ol>
One long and two short beeps, and a blank or unreadable LCD.	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> <li>2. LCD assembly.</li> <li>3. DIMM.</li> </ol>
Two short beeps with error codes.	<b>POST error. See “Numeric error codes” on page 42.</b>
Two short beeps and a blank screen.	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> <li>2. DIMM.</li> </ol>
Two or more beeps, or a continuous beep. Operating system starts successfully.	If a mini-PCI Ethernet card is installed, confirm that <b>Alert On LAN 2</b> in the ThinkPad Setup program is <b>disabled</b> .
Three short beeps, pause, three more short beeps, and one short beep.	<ol style="list-style-type: none"> <li>1. <b>DIMM.</b></li> <li>2. System board</li> </ol>
One short beep, pause, three short beeps, pause, three more short beeps, and one short beep.	
Only the cursor appears.	<b>Reinstall the operating system.</b>
Four cycles of four short beeps and a blank screen.	<b>System board</b> (security chip)
Five short beeps and a blank screen.	<b>System board</b>

## 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.	<ol style="list-style-type: none"> <li>1. <b>Make sure that every connector is connected tightly and correctly.</b></li> <li>2. DIMM.</li> <li>3. System board.</li> </ol>
No beep, power-on indicator on, and LCD blank during POST.	<ol style="list-style-type: none"> <li>1. <b>Reseat DIMM.</b></li> <li>2. System board.</li> </ol>
The power-on password prompt appears.	A power-on password or a supervisor password is set. Type the password and press <b>Enter</b> .
The hard-disk password prompt appears.	A hard-disk password is set. Type the password and press <b>Enter</b> .

## 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.	<b>System board.</b>
<ul style="list-style-type: none"> <li>• LCD backlight not working.</li> <li>• LCD too dark.</li> <li>• LCD brightness cannot be adjusted.</li> <li>• LCD contrast cannot be adjusted.</li> </ul>	<ol style="list-style-type: none"> <li>1. <b>Reseat the LCD connectors.</b></li> <li>2. LCD assembly.</li> <li>3. System board.</li> </ol>
<ul style="list-style-type: none"> <li>• LCD screen unreadable.</li> <li>• Characters missing pixels.</li> <li>• Screen abnormal.</li> <li>• Wrong color displayed.</li> </ul>	<ol style="list-style-type: none"> <li>1. <b>See important note for “LCD-related symptoms.”</b></li> <li>2. Reseat all LCD connectors.</li> <li>3. LCD assembly.</li> <li>4. System board.</li> </ol>
Horizontal or vertical lines displayed on LCD.	<b>LCD assembly.</b>

## 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 34.)

1. Disable the battery pack in the UEFI BIOS. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.
2. Turn off the computer.
3. Visually check each FRU for damage. Replace any damaged FRU.
4. Remove or disconnect all of the following devices:
  - a. Non-ThinkPad devices
  - b. Printer, mouse, and other external devices
  - c. Hard disk drive
  - d. External diskette drive or optical drive
  - e. DIMM
5. Turn on the computer.
6. Determine whether the problem has been solved.
7. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
8. If the problem remains, replace the following FRUs one at a time (do not replace a nondefective FRU):
  - a. System board
  - b. LCD assembly

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## Chapter 5. Status indicators

This chapter presents the system status indicators that show the status of the computer.

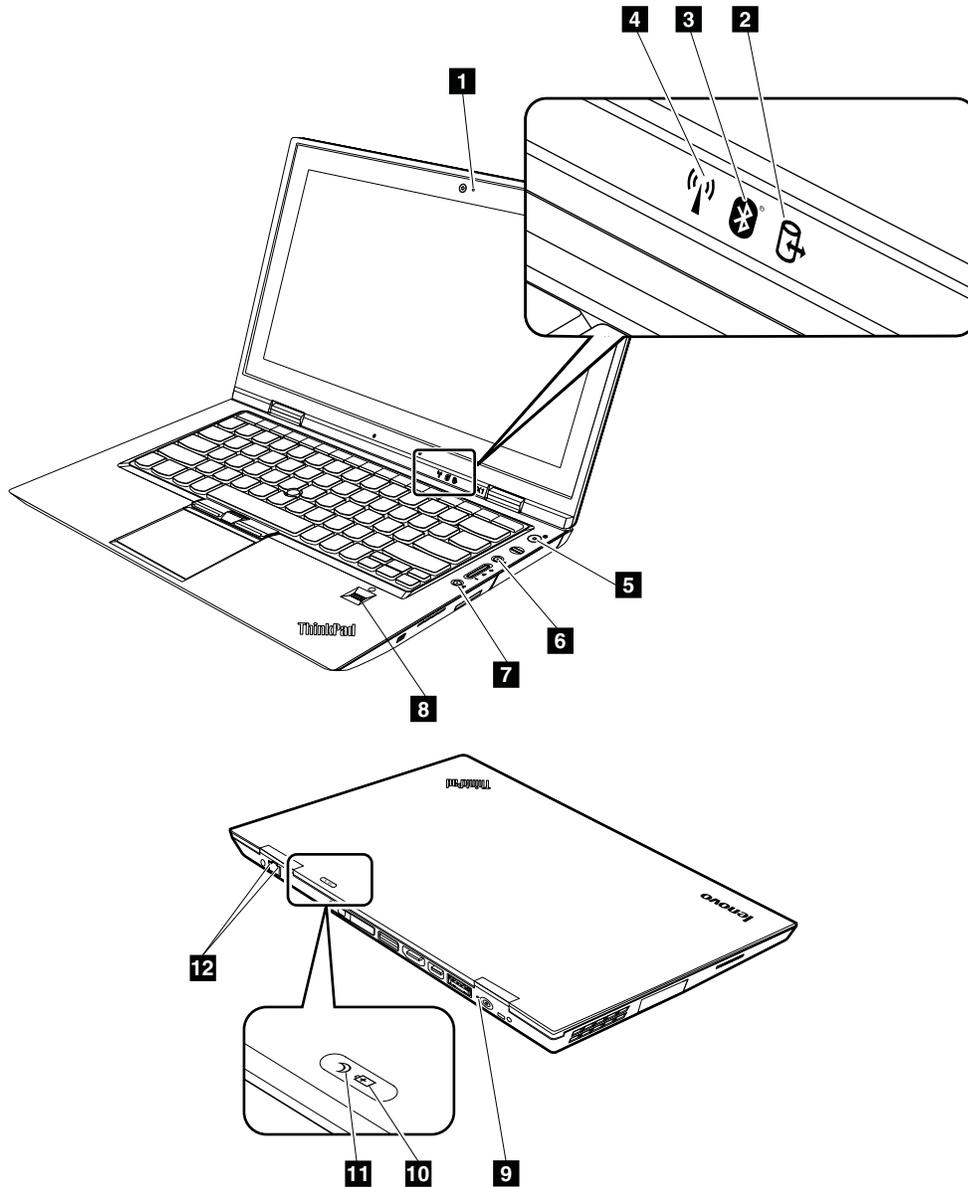


Table 7. Status indicators

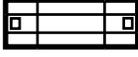
Indicator	Meaning
<b>1</b> Camera status 	Green: The camera application is launched.
<b>2</b> Drive in use 	Green: Data is being read from or written to the hard disk drive, the diskette drive. When this indicator is on, do not put the computer into sleep mode or turn off the computer.  <b>Note:</b> Do not move the system while the green drive-in-use light is on. Sudden physical shock could cause drive errors.
<b>3</b> Bluetooth wireless 	Green: The Bluetooth wireless feature is on, and the radio link is ready for use.  Blinking green: Data is being transmitted (for some models).
<b>4</b> 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.  Blinking green: Data is being transmitted (for some models).
<b>5</b> 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 and is not in sleep mode.  <b>Note:</b> This indicator blinks when the computer is in sleep mode.
<b>6</b> Microphone status 	Red: The microphone is mute.
<b>7</b> Speaker status 	Red: The speaker is mute.
<b>8</b> Fingerprint reader status 	Green: The fingerprint reader is ready to swipe.  Blinking green: The fingerprint is being authenticated or has been authenticated.  Blinking amber: The fingerprint could not be authenticated.
<b>9</b> ac power status 	Green: The computer is connected to the ac power supply.

Table 7. Status indicators (continued)

Indicator	Meaning
<p><b>10</b> Battery status</p> 	<p>Green: The battery charge level is 20% or higher.</p> <p>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 mode or hibernation mode.</p> <p>Orange: The battery charge level is between 5% and 20%.</p> <p>Fast blinking orange: The battery charge level is lower than 5%.</p> <p>Slow blinking orange: The battery is being charged. When it reaches 20%, the blinking color changes to green.</p> <p>Quick blinking orange: An error occurred in the battery.</p> <p>The battery status indicator blinks three times: The ac power adapter is attached to the computer.</p> <p>The battery status indicator is off: The battery pack of the computer is fully charged or detached.</p>
<p><b>11</b> Sleep status</p> 	<p>Green: The computer is in sleep mode.</p> <p>Blinking green: The computer is entering sleep mode or hibernation mode, or is resuming normal operation.</p>
<p><b>12</b> Ethernet status indicators</p> 	<p>Solid green: The upper right indicator is solid green when your computer connects to a LAN and a session with the network is available.</p> <p>Blinking yellow: The upper left indicator blinks yellow when data is being transmitted.</p>



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## Chapter 6. Special keys and buttons

This chapter introduces the functions of Fn key combinations and some function keys in Instant Media Mode.

### 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 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 appears. <b>Notes:</b> <ol style="list-style-type: none"><li>1. To use the Fn+F3 key combination, you must have the ThinkPad PM device driver installed on the computer.</li><li>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.</li><li>3. You cannot turn off the computer display by pressing Fn+F3.</li></ol>
Fn+F4	Put the computer in sleep mode. To return to normal operation, press the Fn key only, without pressing a function key. <b>Notes:</b> <ol style="list-style-type: none"><li>1. To use the Fn+F4 key combination, you must have the ThinkPad PM device driver installed on the computer.</li><li>2. If you want to use the combination to put the computer into hibernation mode or do-nothing mode, change the settings in the Power Manager.</li></ol>
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. <b>Notes:</b> If you want to use Fn+F5 to enable the wireless feature, the following device drivers must be installed on the computer beforehand: <ul style="list-style-type: none"><li>• ThinkPad Power Management driver</li><li>• OnScreen Display Utility</li><li>• Wireless device drivers</li></ul>
Fn+F6	Launch the camera and audio settings
Fn+F7	Switch between the computer display and an external monitor. Windows will show these display options: <ul style="list-style-type: none"><li>• Computer display only (LCD)</li><li>• Computer display and external monitor (same image)</li><li>• Computer display and external monitor (extended desktop)</li><li>• External monitor only</li></ul> <b>Notes:</b> <ul style="list-style-type: none"><li>• To switch between the computer display and an external monitor, the Win+P key combination is also available.</li><li>• Multiple users can log on to a single operating system by using different user IDs. Each user needs to change the settings.</li></ul>

Table 8. Fn key combinations (continued)

Key combination	Description
Fn+F8	The computer display becomes dimmer.  The purpose of this method is to change the brightness level temporarily. To change the default brightness level, change the settings of the Power Option in Control Panel or use Power Manager.
Fn+F9	The computer display becomes brighter.  The purpose of this method is to change the brightness level temporarily. To change the default brightness level, change the settings of the Power Option in Control Panel or use Power Manager.
Fn+F10	Previous track or scene
Fn+F11	Play or pause
Fn+F12	Next track or scene
Fn+Spacebar	This combination is used to control the keyboard backlight. There are three states for the keyboard backlight: On (Low), On (High), and Off. Press Fn+Spacebar once to turn on the keyboard backlight in low brightness level. To adjust the backlight to a high brightness level, press the key combination again. Pressing the key combination for a third time turns off the keyboard backlight.

### Function keys in Instant Media Mode

The following table shows the special function of some function keys in Instant Media Mode.

Table 9. Function keys in Instant Media Mode

Key combination	Description
Esc	Go back to the previous page.
Home	Go to the Instant Media Mode Home screen.
End	Open the search tool.
Insert	Display the main menu of the active application.

---

## Chapter 7. FRU replacement notices

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

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## 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.

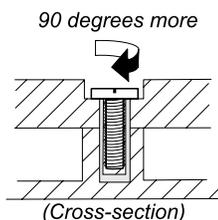
Do the following when you service this machine:

- Keep the screw kit in your tool bag. For the part number of the screw kit, see “Miscellaneous parts” on page 109.
- 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:

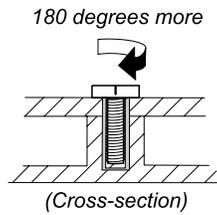
- **Plastic to plastic**

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



- **Logic card to plastic**

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



- **Torque driver**

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 54
- “Retaining the UUID” on page 55
- “Reading or writing the ECA information” on page 55

## Restoring the serial number of the system unit

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

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

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

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.73 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 ThinkPad Hardware Maintenance Diskette version 1.73 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 '1STTTTMMSSSSSS'.

**Important:** For models with Instant Media Mode card, after you install a new system board, prior to installing the Instant Media Mode card, make sure that you update the system board with the original MTM and serial number of the computer. **Otherwise, data on the Instant Media Mode card will be erased at power-on stage if the MTM and serial do not match.**

## 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 ThinkPad Hardware Maintenance Diskette Version 1.73 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 ThinkPad Hardware Maintenance Diskette Version 1.73 or later.

1. Insert the ThinkPad Hardware Maintenance Diskette Version 1.73 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 ThinkPad Hardware Maintenance Diskette Version 1.73 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 ThinkPad Hardware Maintenance Diskette Version 1.73 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.



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## 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 53.
3. Begin by removing any FRUs that have to be removed before the failing FRU. Any such FRUs are listed at the top of the page. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing the 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 the 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 93.
8. When replacing a FRU, use the correct screw as shown in the procedures.



**Before removing any FRU, turn off the computer. Restart the computer to UEFI BIOS. Disable the battery pack in the UEFI BIOS (see “1000 Disabling the battery pack in the UEFI BIOS” on page 58). Unplug all power cords from electrical outlets, and then disconnect any interconnecting cables.**

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

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

### 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.

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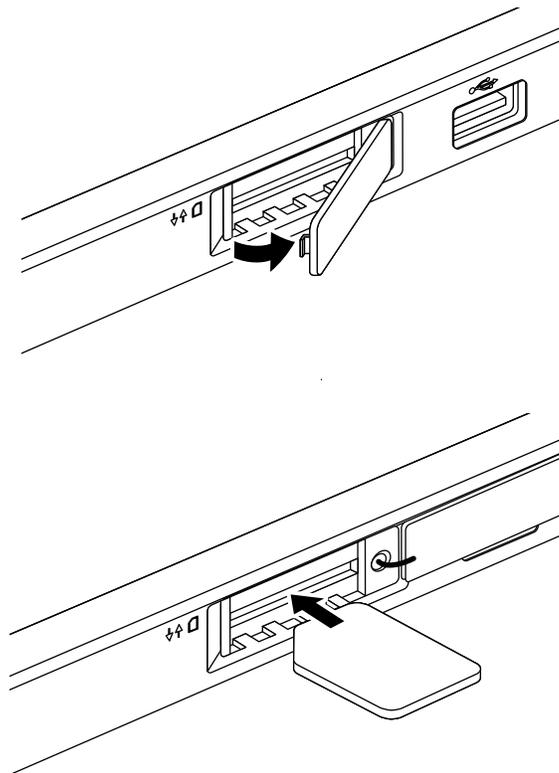
## Before servicing ThinkPad X1 and X1 Hybrid models

### Removing the SIM card:

Some models of the ThinkPad X1 and X1 Hybrid you are servicing might have the SIM card that the customer has installed.

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

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



---

## 1000 Disabling the battery pack in the UEFI BIOS

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

1. Turn off your computer and disconnect the ac power adapter and all cables from the computer.
2. Turn on your computer. Press F1 to enter the ThinkPad Setup program when the ThinkPad logo is displayed.
3. Select **Config** → **Power**. The submenu will be displayed.

4. Select **Disable Built-in Battery**.
5. Follow the instructions on the screen.

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

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## 1010 Hard disk drive and solid state drive

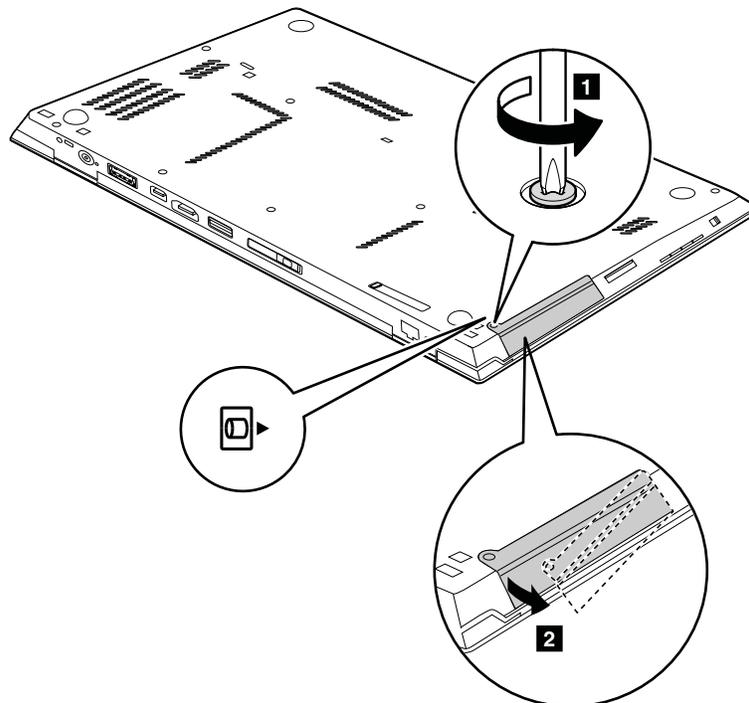
For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

### Attention:

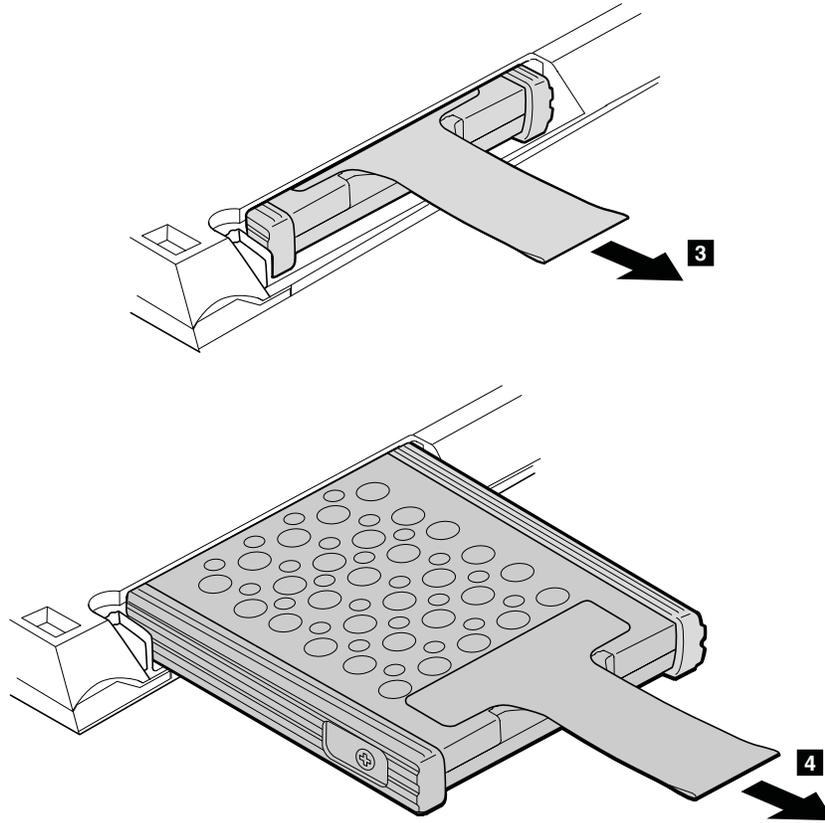
- Do not drop the hard disk drive or apply any physical shock to it. The hard disk drive is sensitive to physical shock. Improper handling can cause damage and permanent loss of data.
- Before removing the drive, have the user make a backup copy of all the information on it if possible.
- Never remove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

### Removal steps of hard disk drive and solid state drive

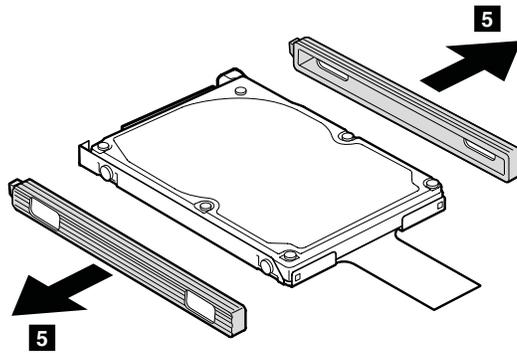
**Note:** Loosen the screw **1**, but do not remove it.



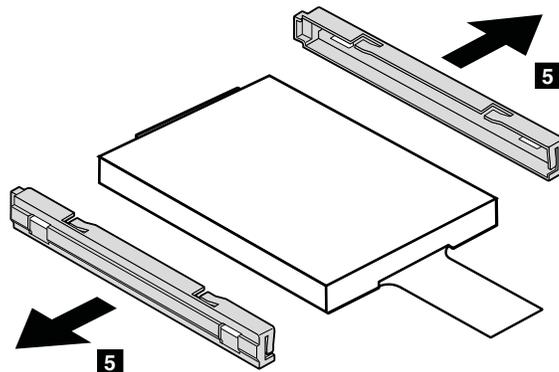
Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 x 8 mm (1)	Black	0.181 Nm (1.85 kgf-cm)



**For a hard disk drive with rubber rails:**



**For a solid state drive with spacers:**



### When installing:

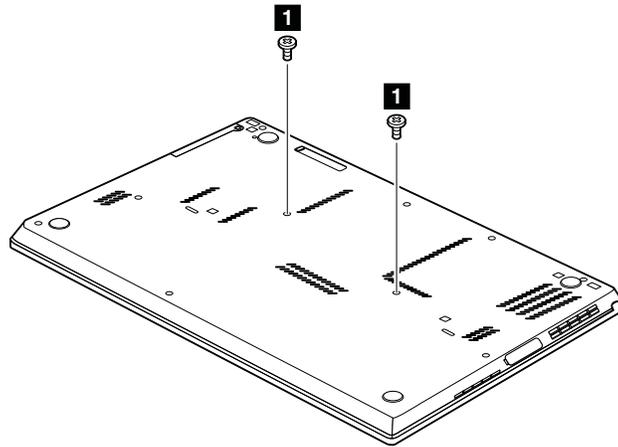
Make sure that the hard disk drive rubber rails or solid state drive spacers are attached firmly.

---

## 1020 Keyboard

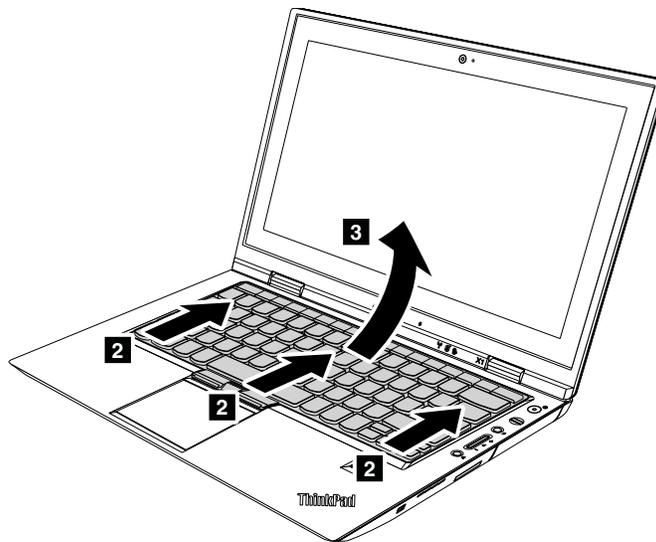
For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

### Removal steps of keyboard

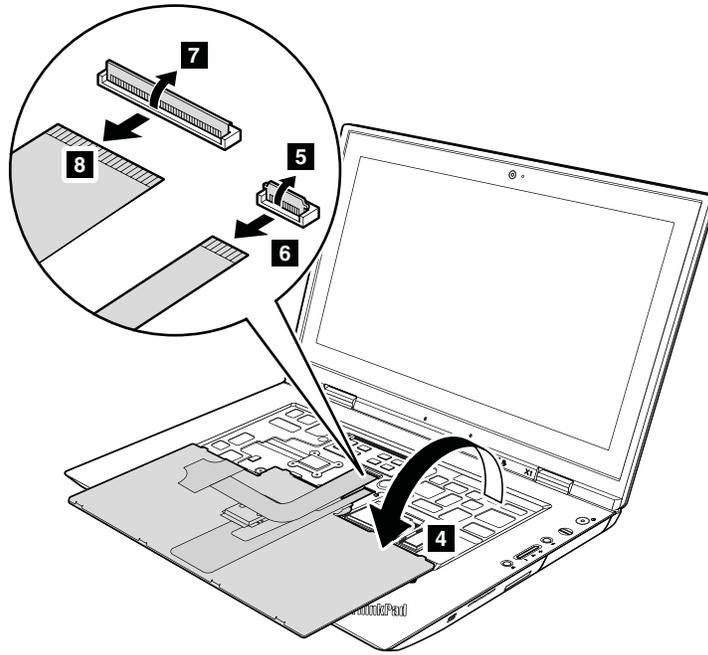


Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 x 5 mm (2)	Black	0.181 Nm (1.85 kgf-cm)

Slightly press the keyboard and slide it a little bit forward, in the direction shown by the arrow **2**, to detach the front edge of the keyboard from the frame. Then, lift up the keyboard in the direction shown by the arrow **3**.

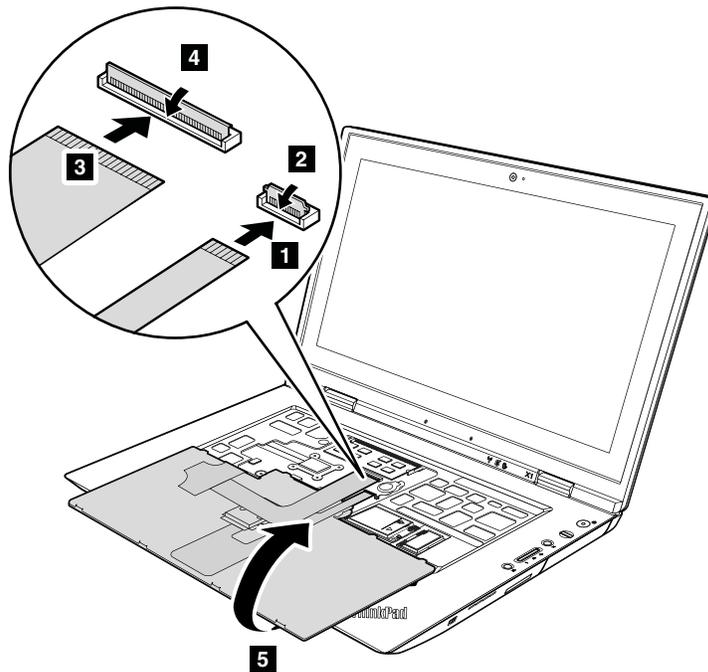


Lift the keyboard in the direction shown by the arrow **4**, and then detach the connectors.

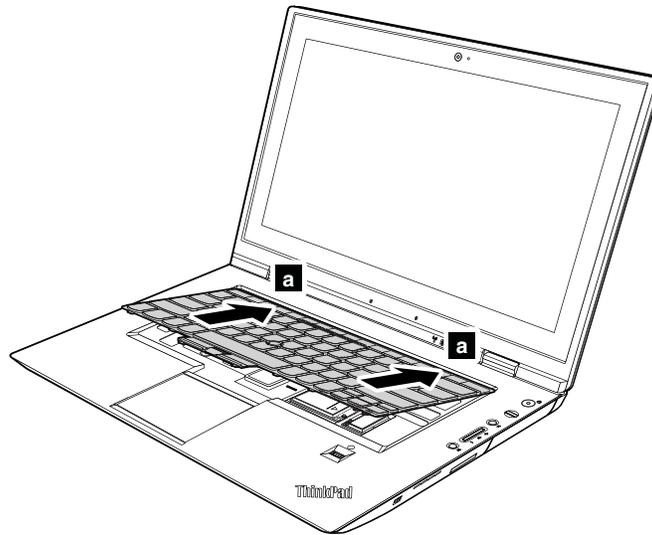


**When installing:**

1. Attach the keyboard connectors firmly. Then lift the keyboard in the direction shown by the arrow **5**



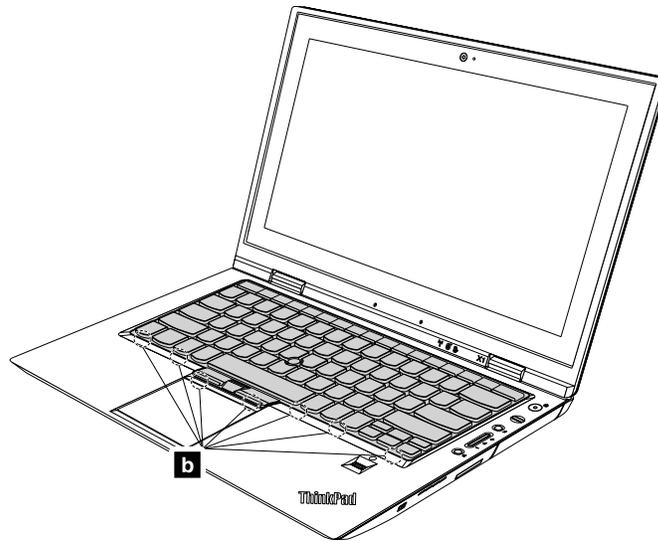
2. Attach the keyboard so that the keyboard edge **a** is under the frame as shown in the following figure.



3. Gently press the keys with your palms and try to slide the keyboard toward you until it snaps into position.



4. Make sure that the front edge of the keyboard **b** is attached firmly.



5. Secure the keyboard by tightening the screws on the bottom side of the computer.

---

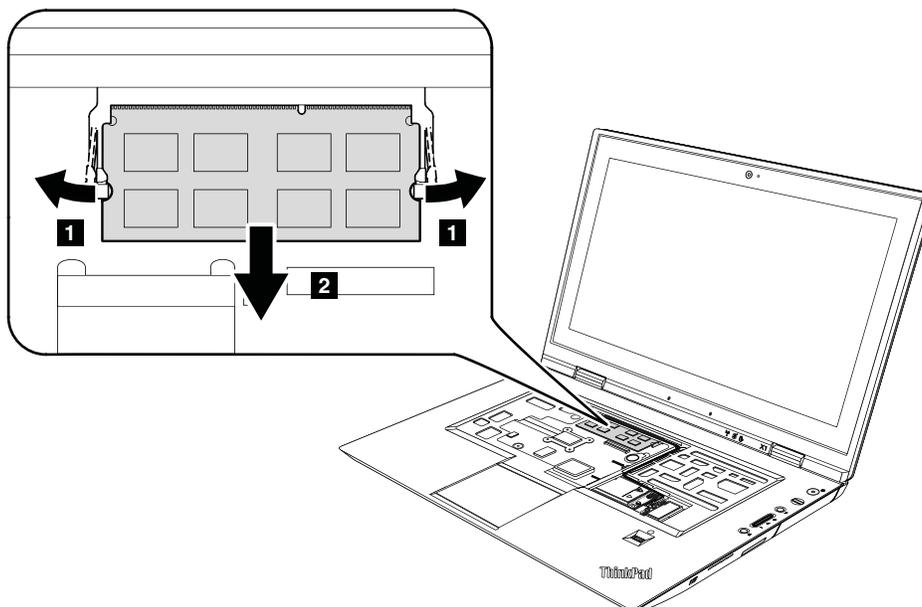
## 1030 DIMM

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove this FRU:

- “1020 Keyboard” on page 61

### Removal steps of DIMM



### When installing:

Insert the notched end of the DIMM into the socket. Press the DIMM firmly, and pivot it until it snaps into place. Make sure that it is firmly installed in the slot and does not move easily.

---

## 1040 Backup battery



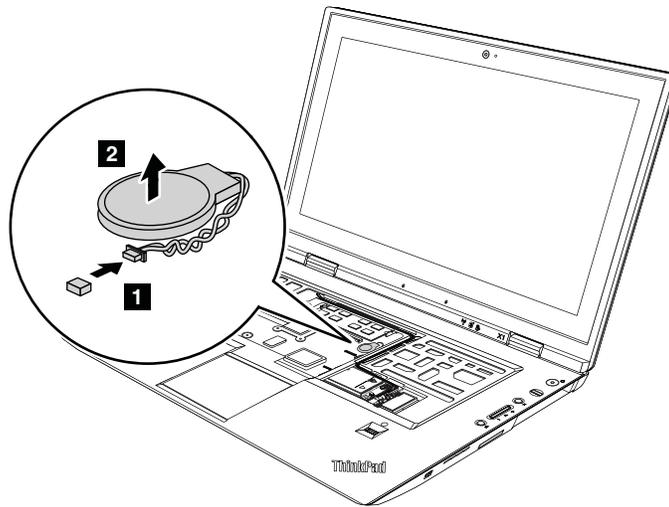
**Use only the battery specified in the parts list for your computer. Any other battery could ignite or explode.**

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove this FRU:

- “1020 Keyboard” on page 61

### Removal steps of backup battery



### When installing:

Make sure that the battery connector is attached firmly.

---

## 1050 PCI Express Mini Card for wireless LAN/WiMAX

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

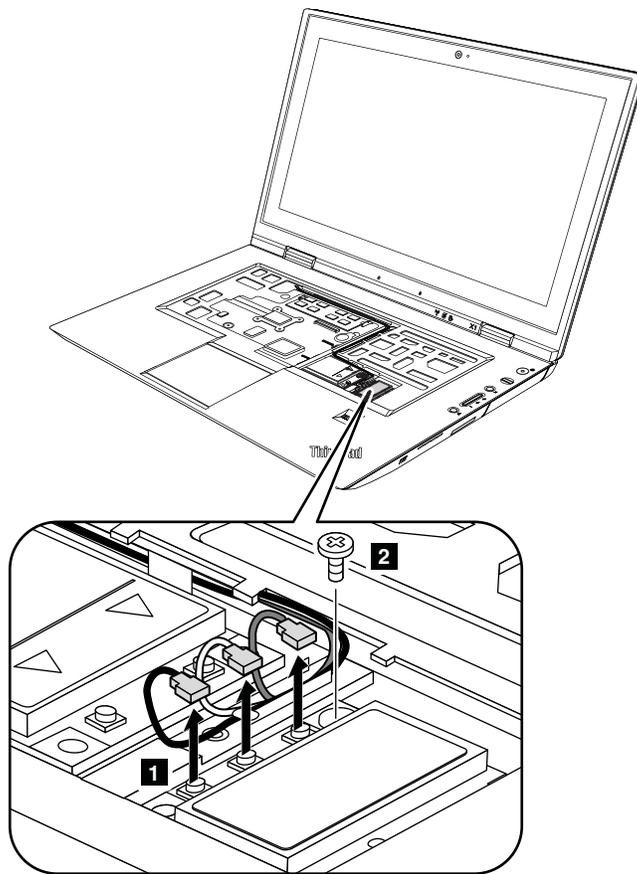
Then remove this FRU:

- “1020 Keyboard” on page 61

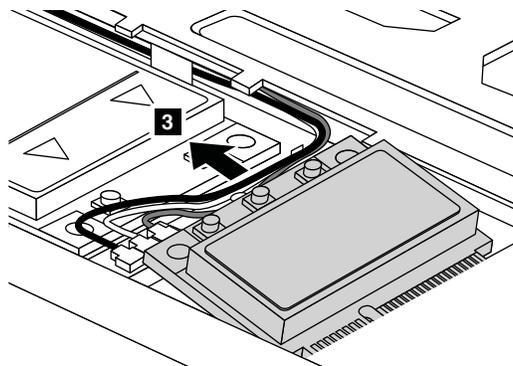
### Removal steps of PCI Express Mini Card for wireless LAN/WiMAX

**Note:** Some models might have only two antenna cables.

In step **1**, unplug the jacks by using the removal tool antenna RF connector or pick the connectors with your fingers and gently unplug them in the direction of the arrows.

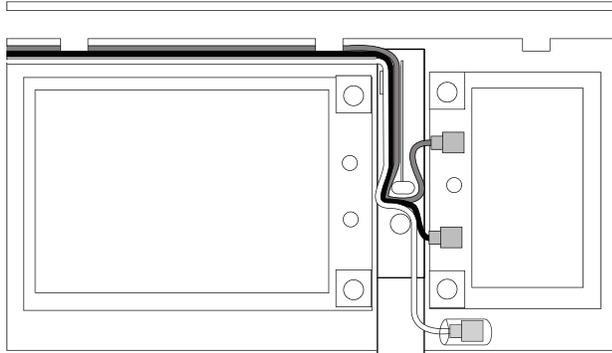


Step	Screw (quantity)	Color	Torque
<b>2</b>	M2 x 3 mm (1)	Black	0.181 Nm (1.85 kgf-cm)



**When installing:**

- In models with a wireless LAN card that has two antenna connectors, plug the gray cable into the jack marked **MAIN** or **M**, and the black cable into the jack marked **AUX** or **A** on the card. If the computer you are servicing has three cables, put the white cable in the cable protection tube and secure it with a tape as shown in the following figure.



- In models with a wireless LAN card that has three antenna connectors, plug the gray cable (MAIN) into the jack marked **TR1**, the white cable (3rd) into jack marked **RO** or **TR3**, and the black cable (AUX) into jack marked **TR2** on the card.

## 1060 PCI Express Mini Card for wireless WAN

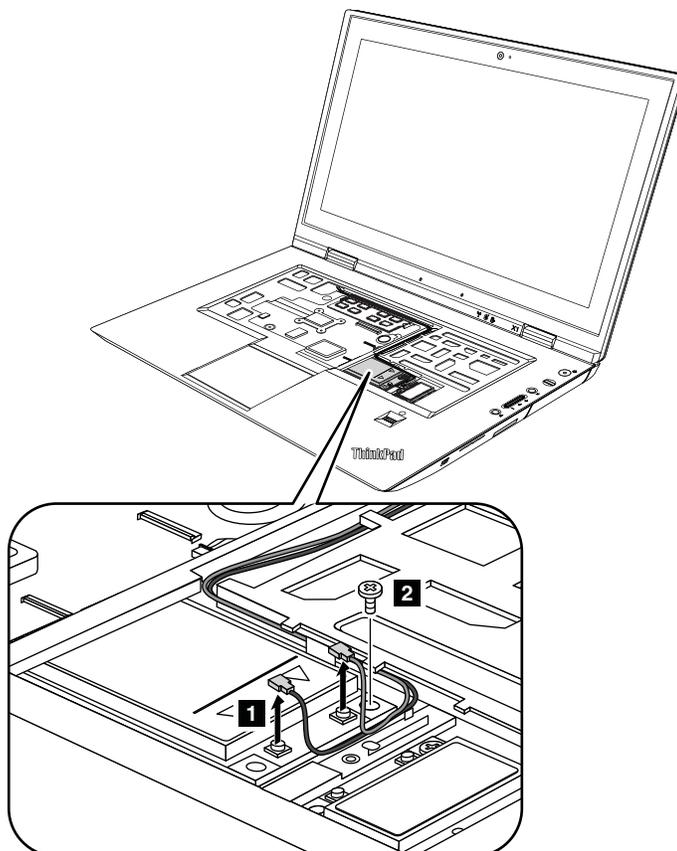
For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove this FRU in order:

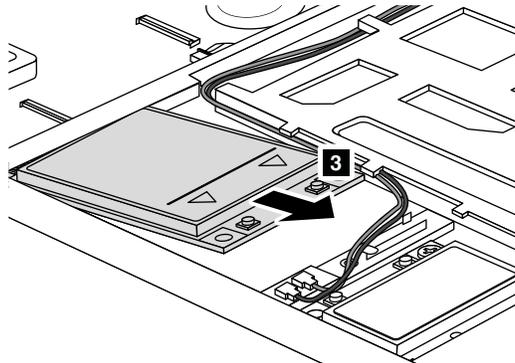
- “1020 Keyboard” on page 61

### Removal steps of PCI Express Mini Card for wireless WAN

In step **1**, unplug the jacks by using the removal tool antenna RF connector or pick the connectors with your fingers and gently unplug them in direction of the arrows.



Step	Screw (quantity)	Color	Torque
<b>2</b>	M2 x 3 mm (1)	Black	0.181 Nm (1.85 kgf-cm)



**When installing:**

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

---

## 1070 mSATA solid state drive

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

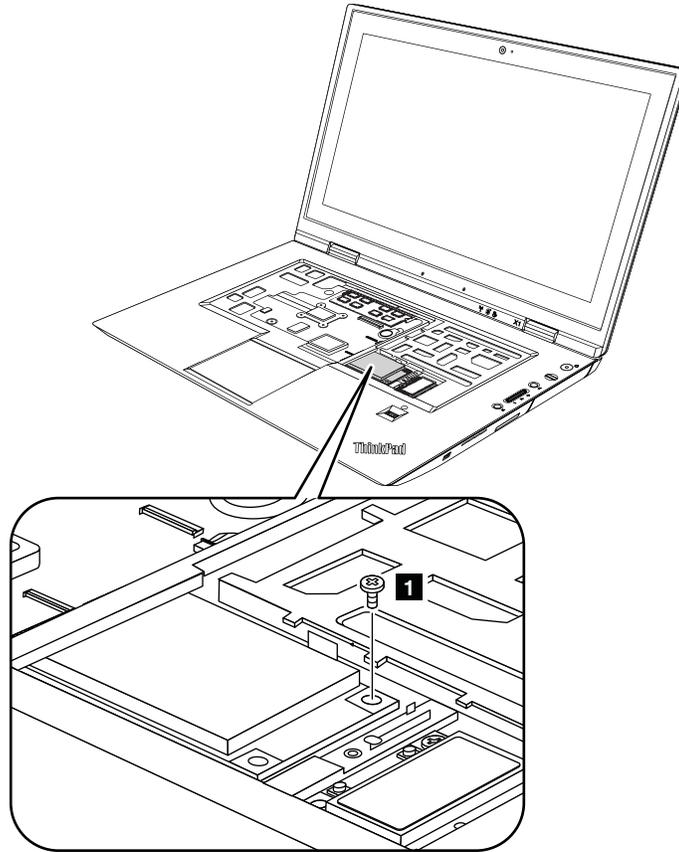
Then remove this FRU:

- “1020 Keyboard” on page 61

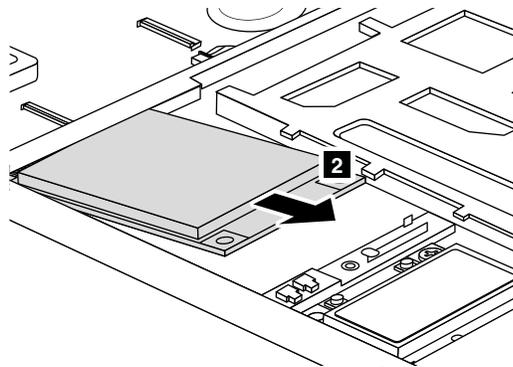
**Attention:**

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

## Removal steps of mSATA solid state drive



Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 x 3 mm (1)	Black	0.181 Nm (1.85 kgf-cm)



## 1080 Instant Media Mode card

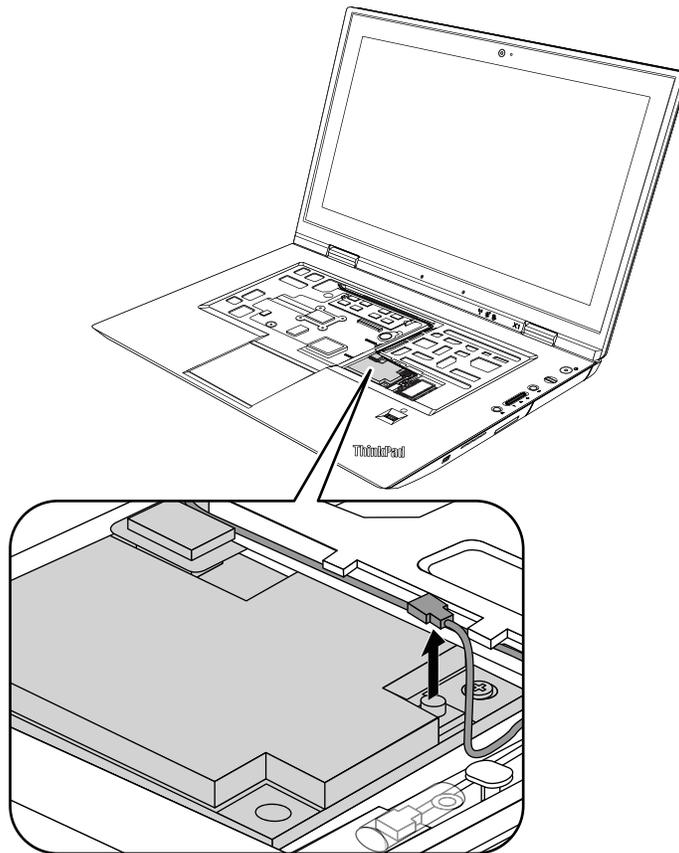
For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove this FRU:

- “1020 Keyboard” on page 61

## Removal steps of Instant Media Mode card

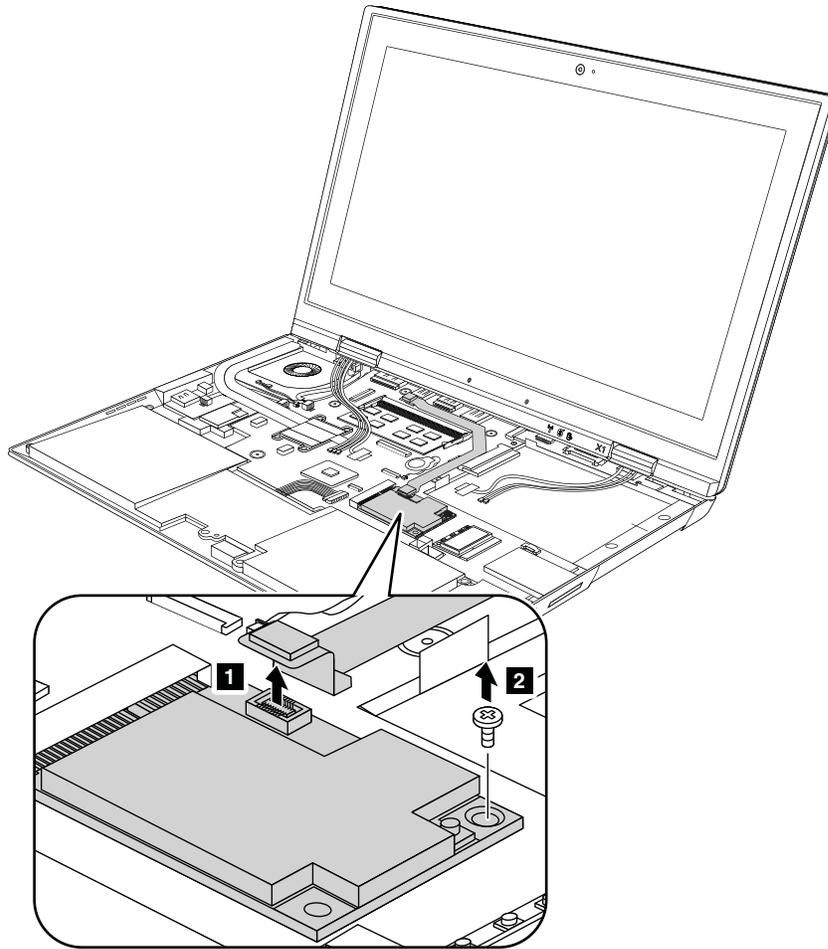
1. Disconnect the WLAN cable.



### **When installing:**

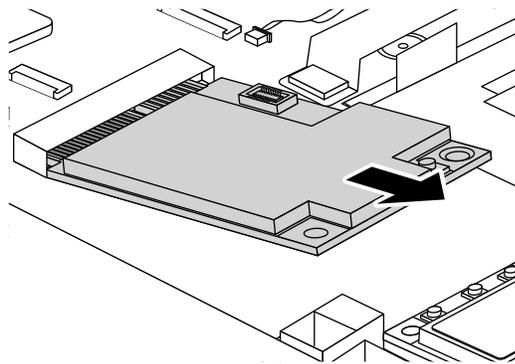
Plug the red cable in the Instant Media Mode card jack.

2. Remove the keyboard bezel assembly. See “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71.
3. Disconnect the Instant Media Mode card cable and remove the screw.



Step	Screw (quantity)	Color	Torque
<b>3</b>	M2 x 3mm (1)	Black	0.181 Nm (1.85 kgf-cm)

4. The card pops up. Remove the card and save it for future use.



## 1090 Keyboard bezel assembly with fingerprint reader and audio sub card

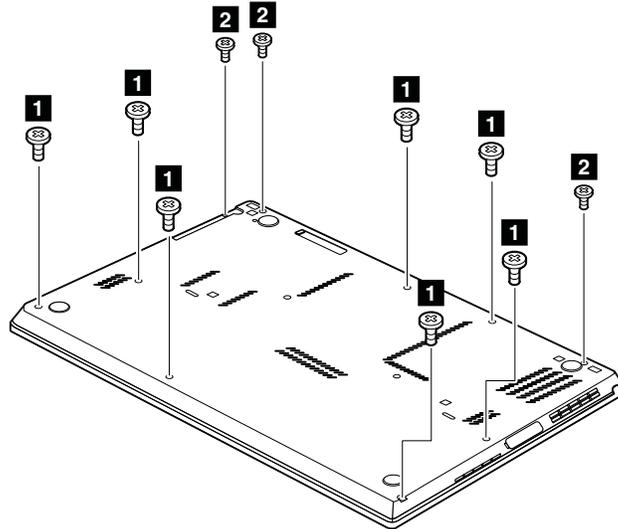
For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove these FRUs in order:

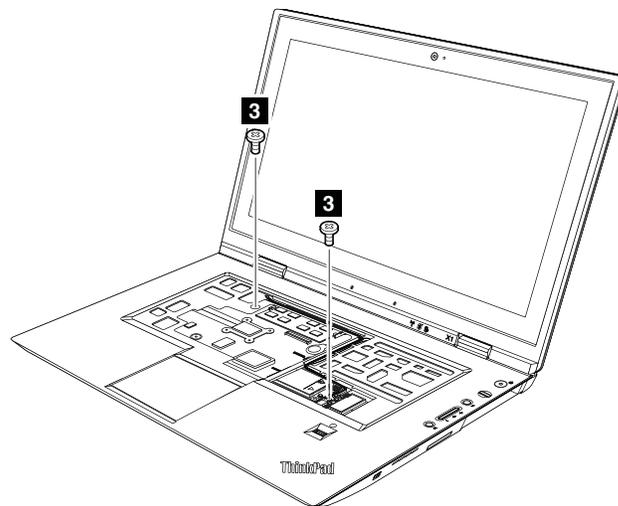
- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61

**Note:** In models with the fingerprint reader, the sensor is attached to the palm rest FRU. If the fingerprint reader has any defects, you can replace it by following the procedures given in this section, which are the same for a palm rest with or without a fingerprint reader.

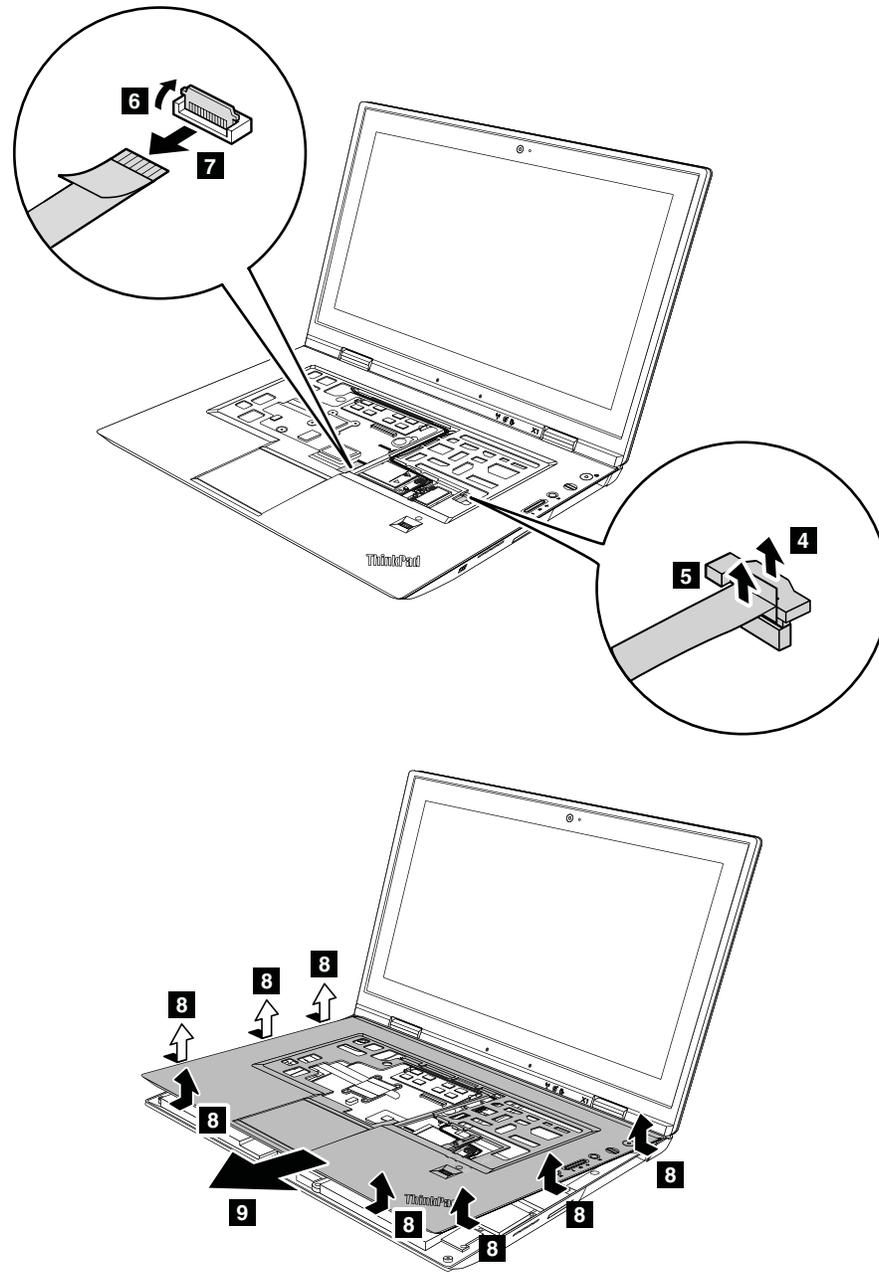
### Removal steps of keyboard bezel with fingerprint reader



Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 x 5 mm (7)	Black	0.181 Nm (1.85 kgf-cm)
<b>2</b>	M2 x 3 mm (3)	Black	0.181 Nm (1.85 kgf-cm)



Step	Screw (quantity)	Color	Torque
<b>3</b>	M2 x 3 mm (2)	Black	0.181 Nm (1.85 kgf-cm)



**When installing:**

Make sure the two connectors are attached firmly to the system board.

---

## 1100 Battery pack

**Important notice for replacing a battery pack:**

Lenovo ThinkVantage Toolbox has an automatic battery diagnostic that determines if the battery pack is defective. A battery pack FRU should not be replaced unless this diagnostic shows that the battery is defective.

The only exception to this is if the battery pack is physically damaged or a customer is reporting a possible safety issue.

If 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.

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

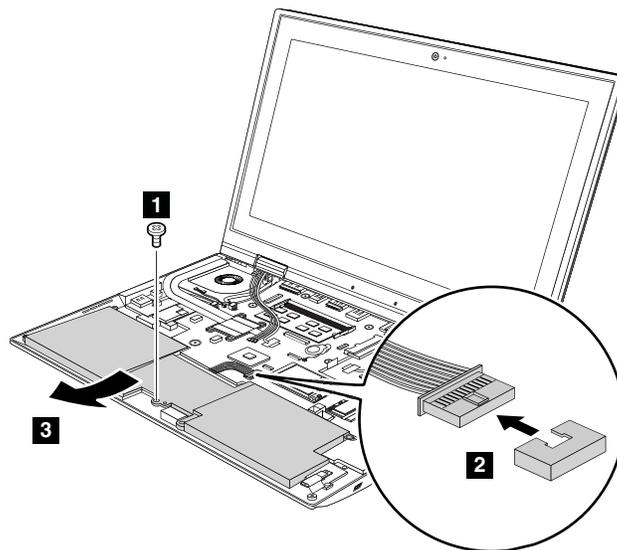
Then remove these FRUs in order:

- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71

### Removal steps of battery pack



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



Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 x 3 mm (1)	Black	0.181 Nm (1.85 kgf-cm)

#### When installing:

Make sure the connector is attached firmly to the system board.

### 1110 RJ45 sub card

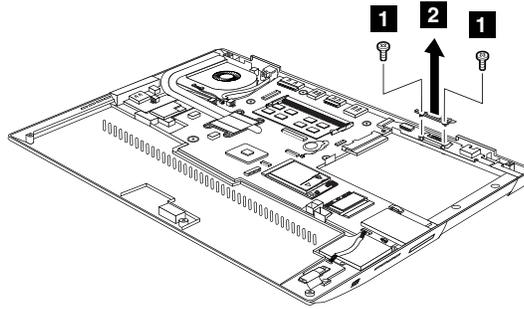
For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove these FRUs in order:

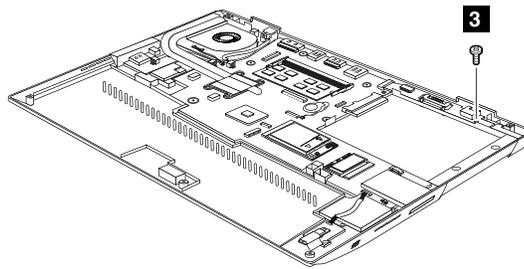
- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61

- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71

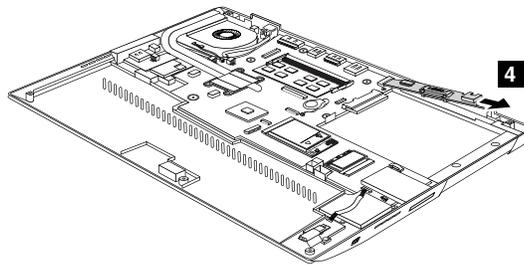
### Removal steps of RJ45 sub card



Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 x 8 mm (2)	Silver	0.181 Nm (1.85 kgf-cm)



Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 x 3 mm (1)	Black	0.181 Nm (1.85 kgf-cm)



## 1120 Fan assembly

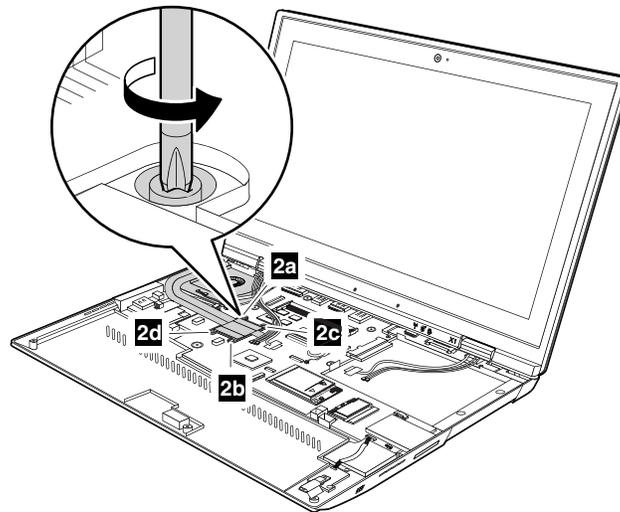
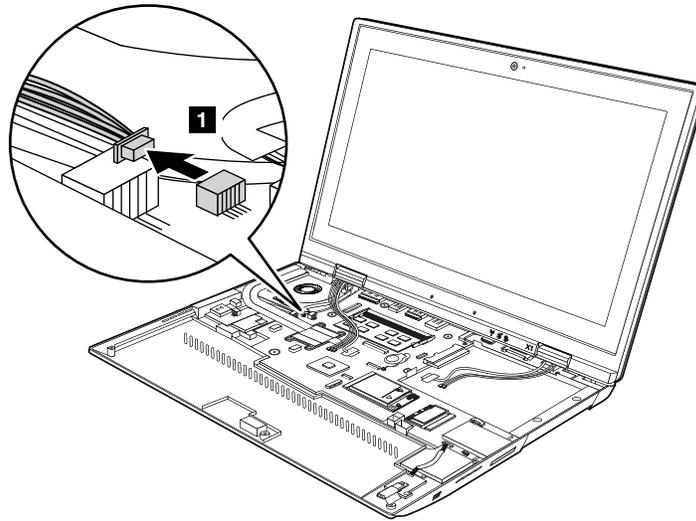
For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove these FRUs in order:

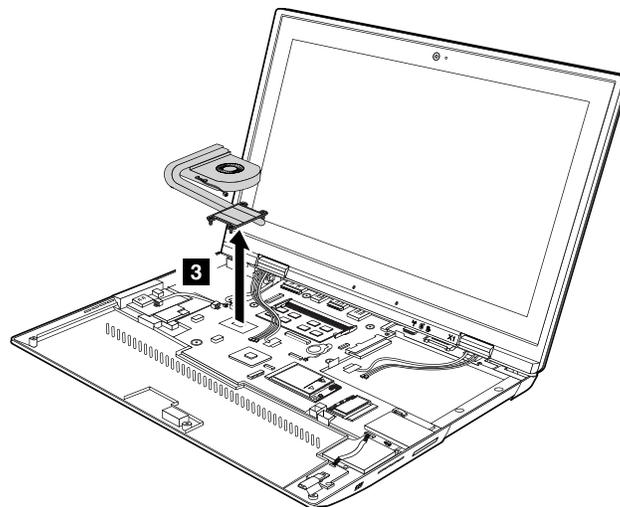
- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71

### Removal steps of fan assembly

Disconnect the fan connector from the system board.

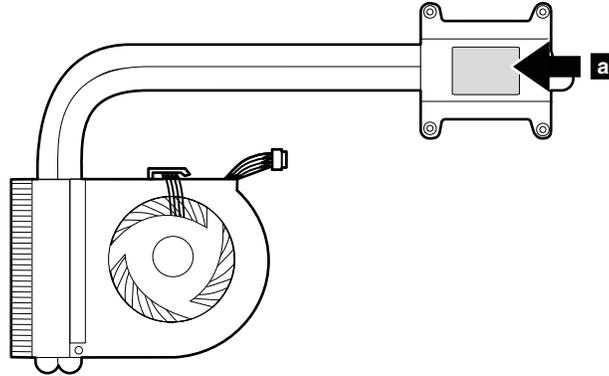


Step	Screw (quantity)	Color	Torque
<b>2</b>	Capture shoulder screw (4)	Silver	0.181 Nm (1.85 kgf-cm)



### 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.



- Make sure that the fan connector is attached firmly.

---

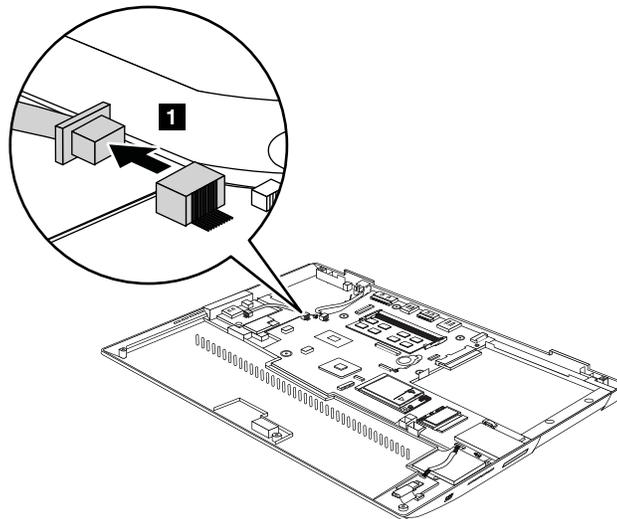
## 1130 I/O board

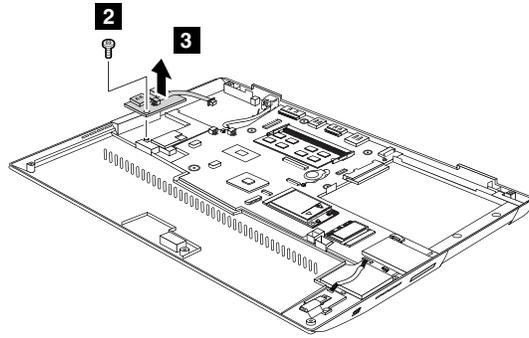
For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove these FRUs in order:

- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71
- “1120 Fan assembly” on page 75

### Removal steps of I/O board





Step	Screw (quantity)	Color	Torque
<b>2</b>	M2 x 3 mm (1)	Black	0.181 Nm (1.85 kgf-cm)

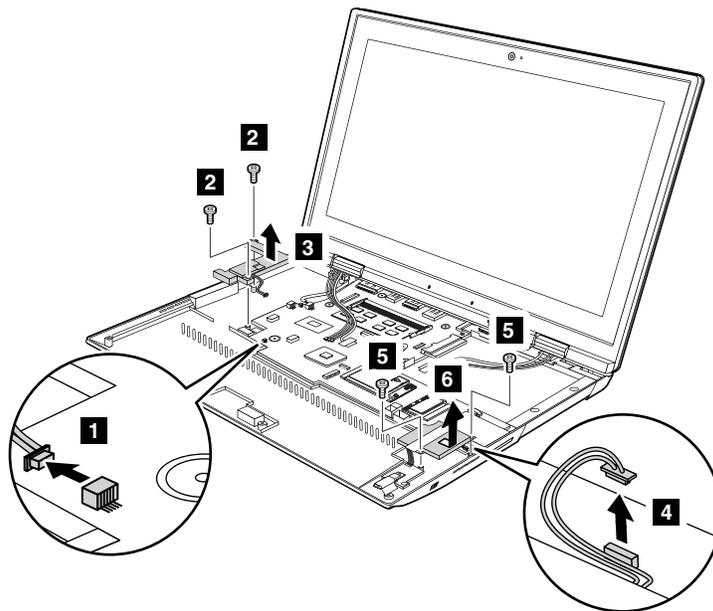
## 1140 Speaker assembly

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove these FRUs in order:

- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71
- “1120 Fan assembly” on page 75
- “1130 I/O board” on page 77

### Removal steps of speaker assembly



Step	Screw (quantity)	Color	Torque
<b>2 5</b>	M2 x 3 mm (4)	Black	0.181 Nm (1.85 kgf-cm)

### When installing:

Make sure that the speaker connectors are attached firmly.

---

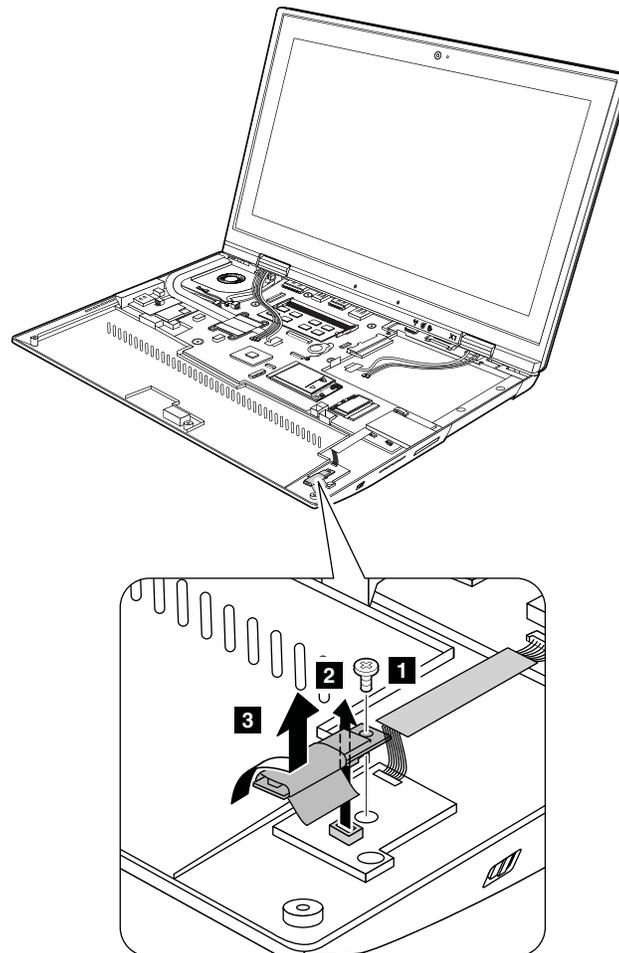
## 1150 Bluetooth daughter card and bluetooth sub card

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

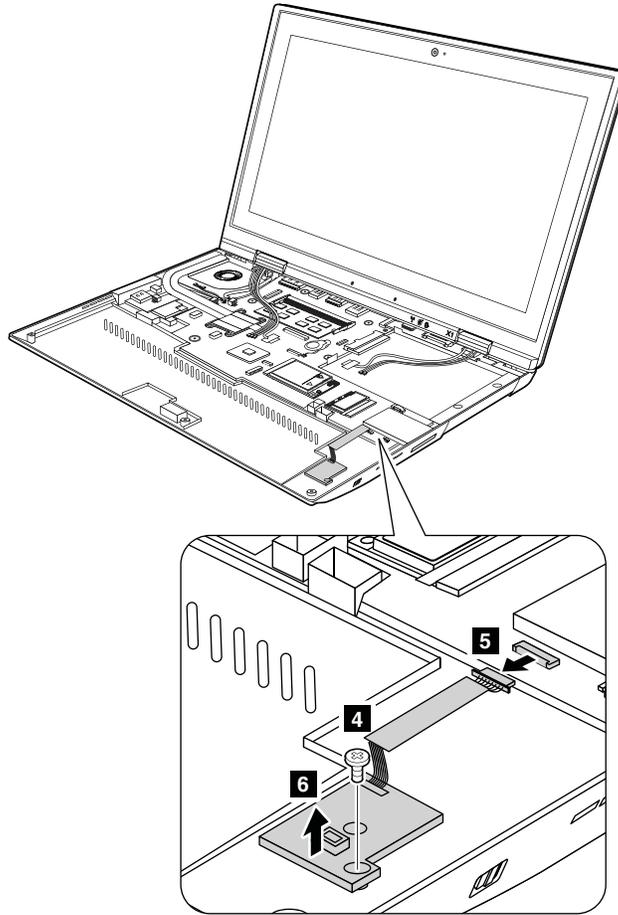
Then remove these FRUs in order:

- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71
- “1120 Fan assembly” on page 75
- “1130 I/O board” on page 77
- “1140 Speaker assembly” on page 78

### Removal steps of Bluetooth daughter card and Bluetooth sub card



Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 x 3 mm (1)	Black	0.181 Nm (1.85 kgf-cm)



Step	Screw (quantity)	Color	Torque
4	M2 x 3 mm (1)	Black	0.181 Nm (1.85 kgf-cm)

#### When installing:

Make sure that the connector **5** is attached firmly.

## 1160 System board and base cover assembly

#### Important notices for handling the system board:

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

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

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

- Be careful not to drop the system board on a bench top that has a hard surface, such as metal, wood, or composite.
- If a system board is dropped, test it using PC-Doctor for DOS if the system supports PC-Doctor for DOS, to make sure that the Active Protection System™ is still functioning.

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

- Avoid rough handling of any kind.
- At every point in the process, be sure not to drop or stack the system board.
- If you put a system board down, be sure to put it only on a padded surface such as an ESD mat or a corrugated conductive surface.

If the system supports PC-Doctor for DOS, after replacing the system board, run PC-Doctor for DOS to make sure that hard disk drive 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, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

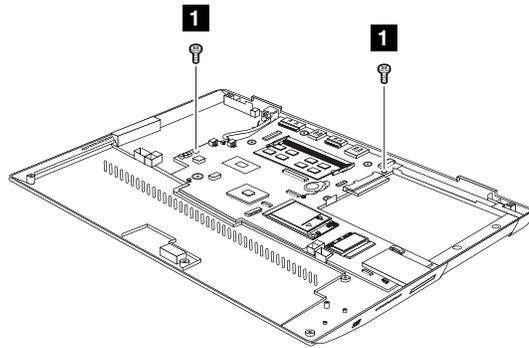
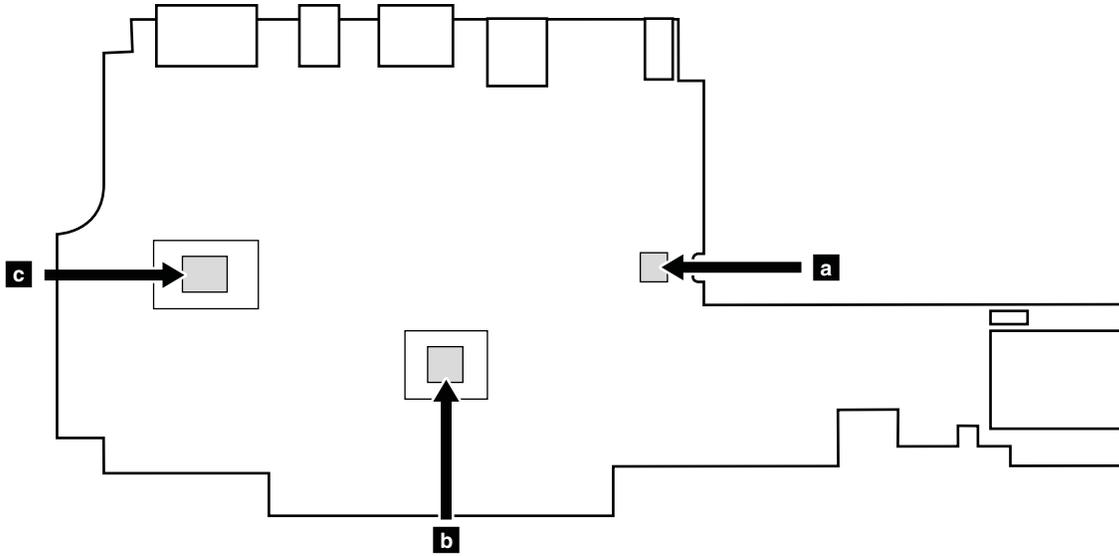
Then remove these FRUs in order:

- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1030 DIMM” on page 64
- “1040 Backup battery” on page 65
- “1050 PCI Express Mini Card for wireless LAN/WiMAX” on page 65
- “1060 PCI Express Mini Card for wireless WAN” on page 67
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71
- “1100 Battery pack” on page 73
- “1110 RJ45 sub card” on page 74
- “1120 Fan assembly” on page 75
- “1130 I/O board” on page 77
- “1140 Speaker assembly” on page 78
- “1150 Bluetooth daughter card and bluetooth sub card” on page 79

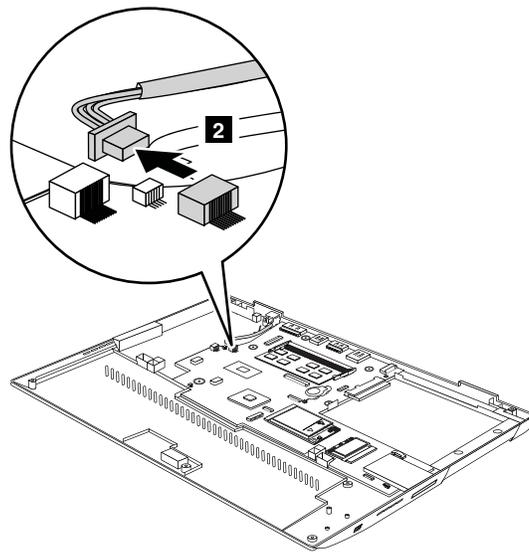
### **Removal steps of system board and base cover assembly**

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

- a** Accelerometer chip for the HDD Active Protection System
- b** Platform Controller Hub (PCH)
- c** CPU

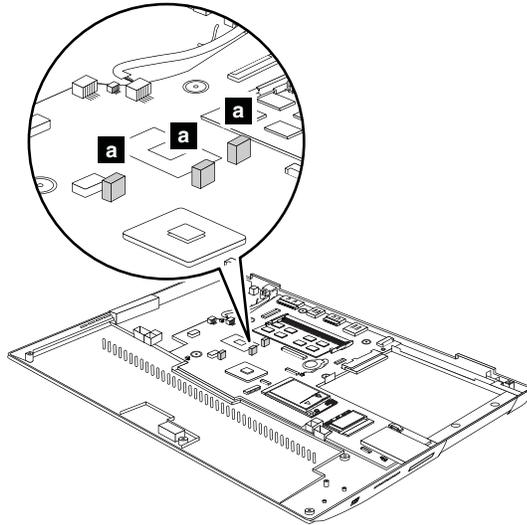


Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 x 2.5 mm (2)	Silver	0.181 Nm (1.85 kgf-cm)



**When installing:**

- Make sure that the fan connector is attached firmly.
- Make sure that the DC-in connector is attached to the system board firmly.
- Make sure that the rubbers **a** are attached on the system board when you install a new system board.



**Important:** For models with Instant Media Mode card, after you install a new system board, prior to installing the Instant Media Mode card, make sure that you update the system board with the original MTM and serial number of the computer. **Otherwise, data on the Instant Media Mode card will be erased at power-on stage if the MTM and serial do not match.**

#### Applying labels to the base cover:

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

**Note:** If the Windows Certificate of Authentication label (COA) **2** is attached to a part that is replaced, return the old part with the label to the customer, or provide the customer with a note of the label information, which includes label location, label name, label part number, serial number, and product key.

When you replace the base cover, you need to apply the following label:

- 17** Homologation label

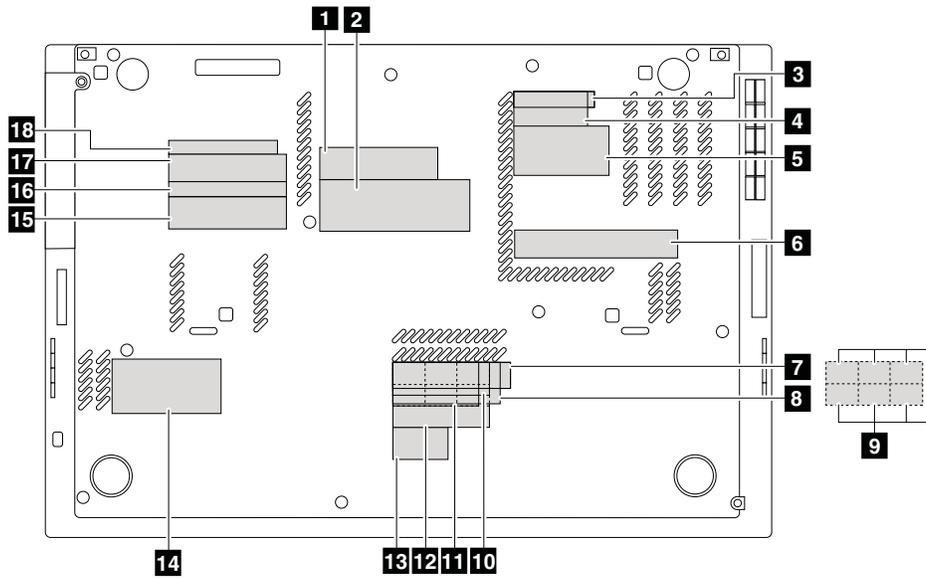
The following labels need to be peeled off from the old base cover, and applied on the new base cover.

- 1** Non-encryption label (for non-TPM model) or Rating label (only for Indonesia)
- 3** IMEI BARCODE label for Ericsson F5521gw
- 4** IMEI BARCODE label for Gobi3000
- 5** SIM ICCID label
- 6** Wireless label for special bid
- 7** TW WWAN label
- 8** ISRAEL label
- 9** SIRIM label
- 10** Wireless card label (only for Brazil)

- 11** China 3G WWAN label
- 12** Bluetooth label (only for Brazil)
- 13** Brazil WWAN label
- 14** Asset tag
- 15** Serial No. label
- 16** System label
- 18** FCC label

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

For the location of each label, refer to the following figure:




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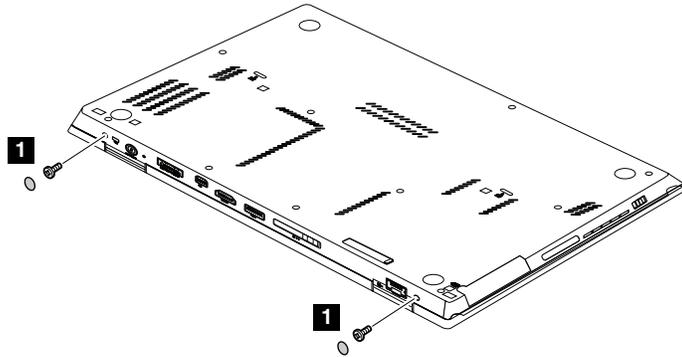
## 2010 LCD unit

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

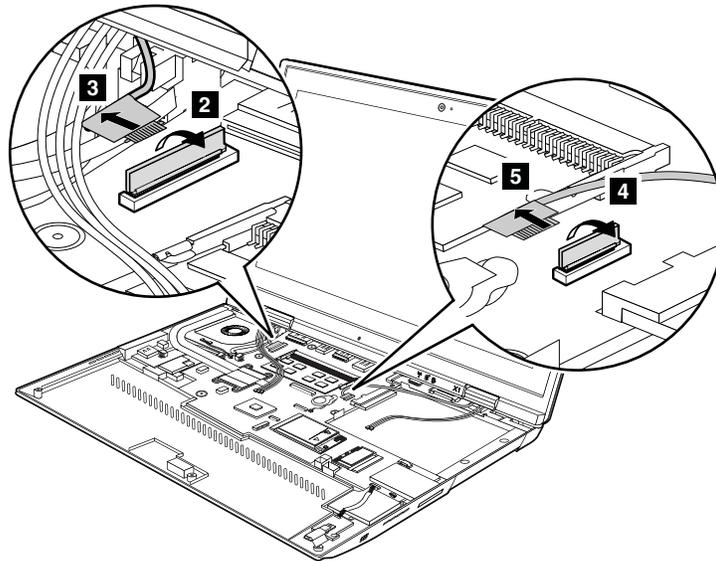
Then remove these FRUs in order:

- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71

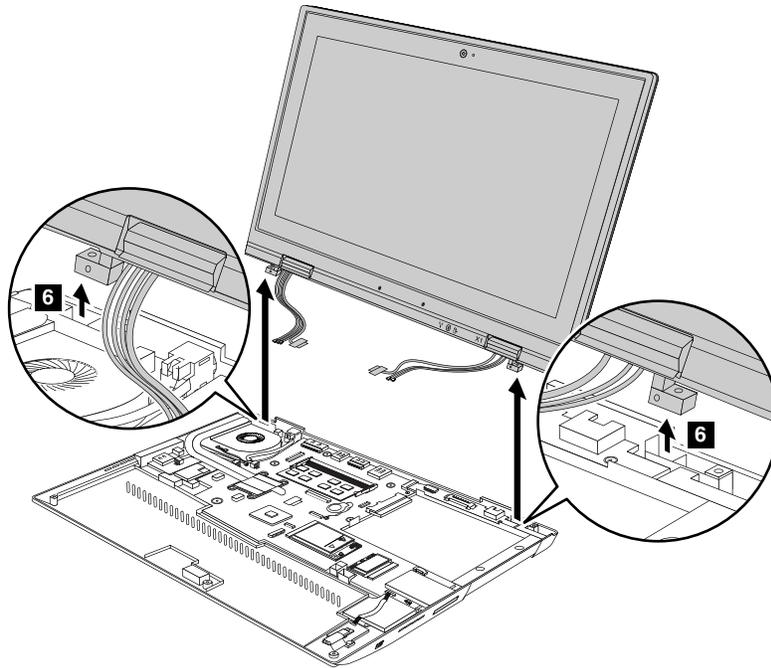
## Removal steps of LCD unit



Step	Screw Cap	Screw (quantity)	Color	Torque
<b>1</b>	○	M2.5 x 6 mm (2)	Black	0.392 Nm (4 kgf-cm)



Before step **6**, strip off the tapes securing the antenna cables, and release the cables from the cable guides of the frame.



**When installing:**

1. Route the antenna cables along the cable guides and secure them with the tapes. 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.
2. Make sure that the LCD connector is attached firmly.

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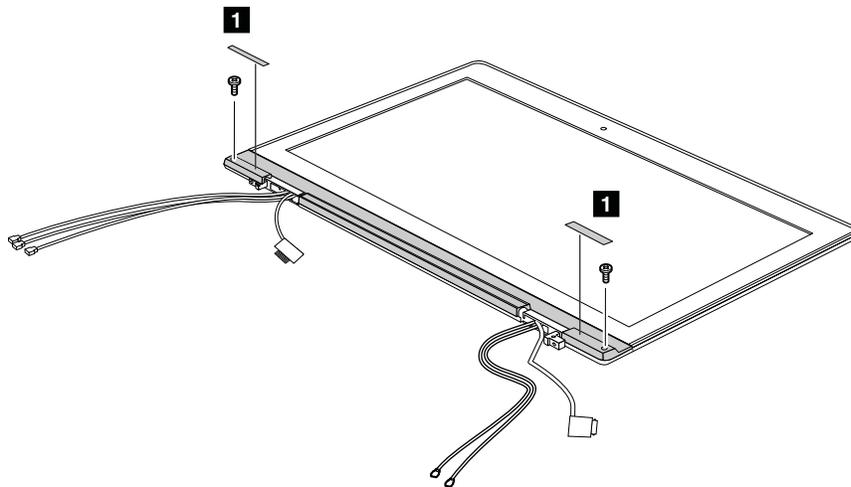
## 2020 LCD bezel cover

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

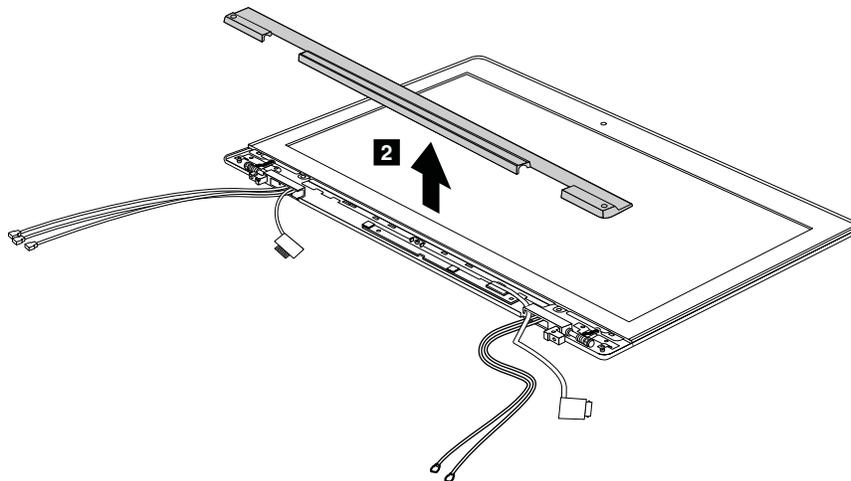
Then remove these FRUs in order:

- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71
- “2010 LCD unit” on page 84

## Removal steps of LCD bezel cover



Step	Screw Cap	Screw (quantity)	Color	Torque
1	○	M2.5 x 6 mm (2)	Black	0.392 Nm (4 kgf-cm)



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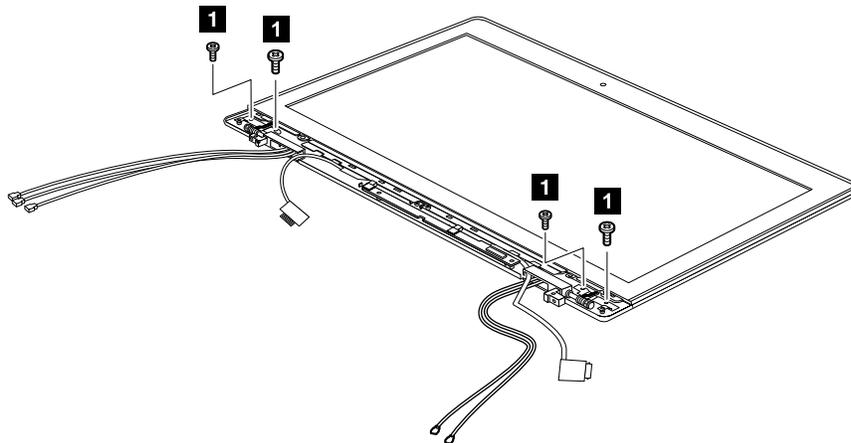
## 2030 Hinges

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove these FRUs in order:

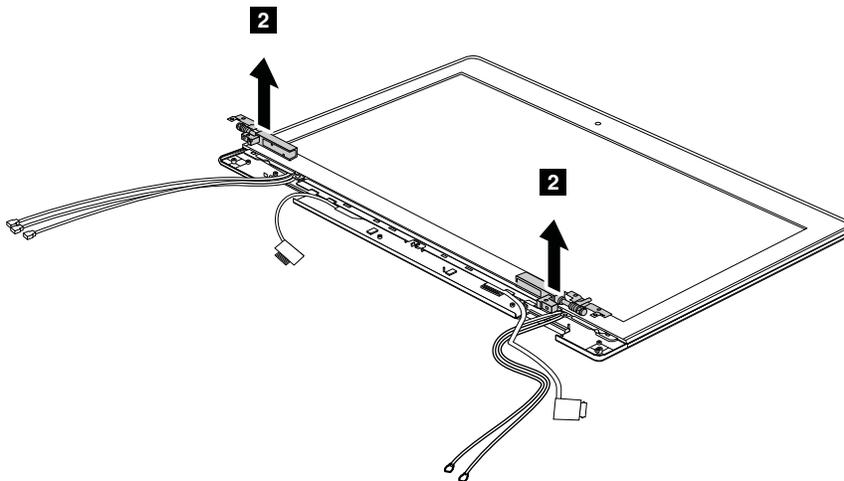
- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71
- “2010 LCD unit” on page 84
- “2020 LCD bezel cover” on page 86

## Removal steps of hinges



Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 x 3 mm (4)	Black	0.181 Nm (1.85 kgf-cm)

In step **2**, release the antenna cables from the cable guides.



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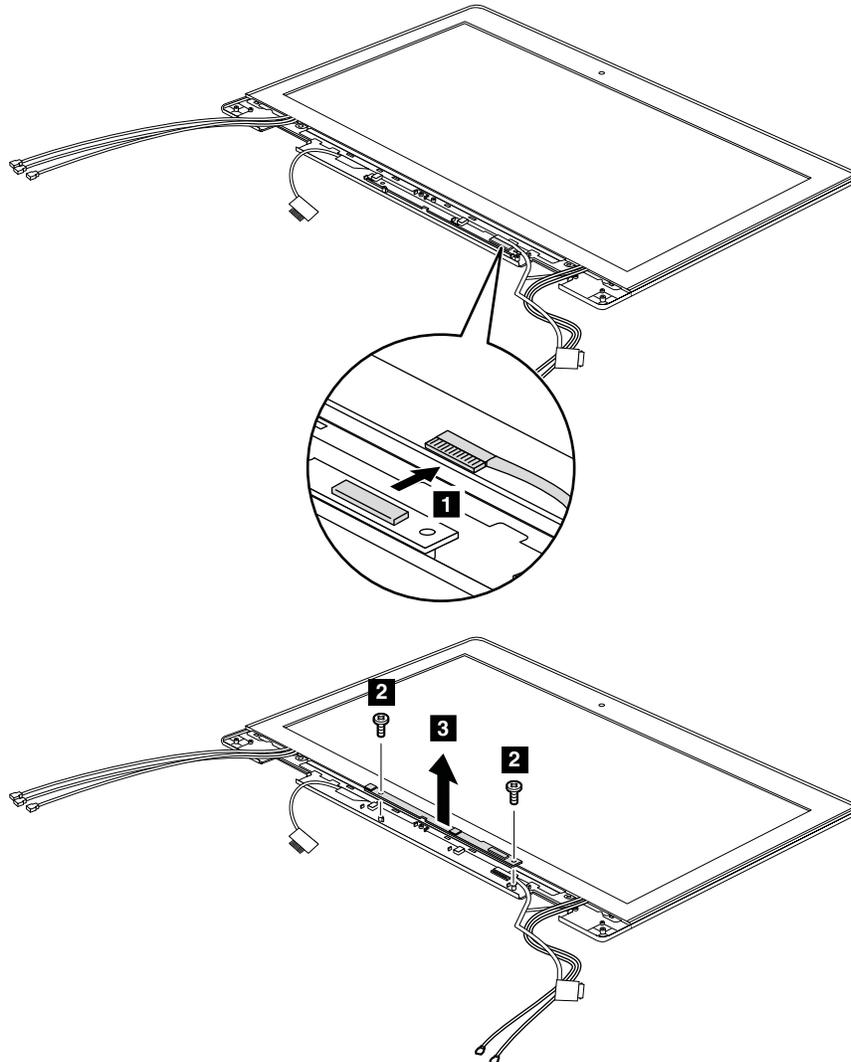
## 2040 LED sub card and microphone

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove these FRUs in order:

- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71
- “2010 LCD unit” on page 84
- “2020 LCD bezel cover” on page 86
- “2030 Hinges” on page 87

## Removal steps of LED sub card and microphone



Step	Screw (quantity)	Color	Torque
2	M 2 x 3 mm (2)	Black	0.181 Nm 1.85 kgf-cm

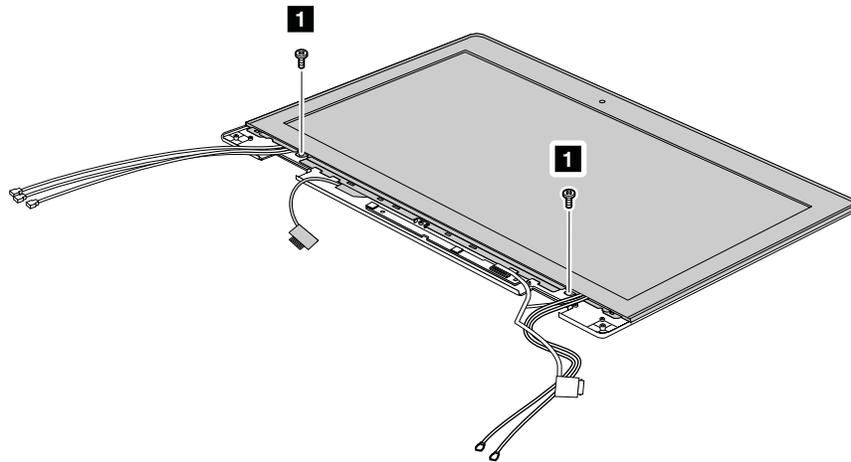
## 2050 LCD bezel assembly

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

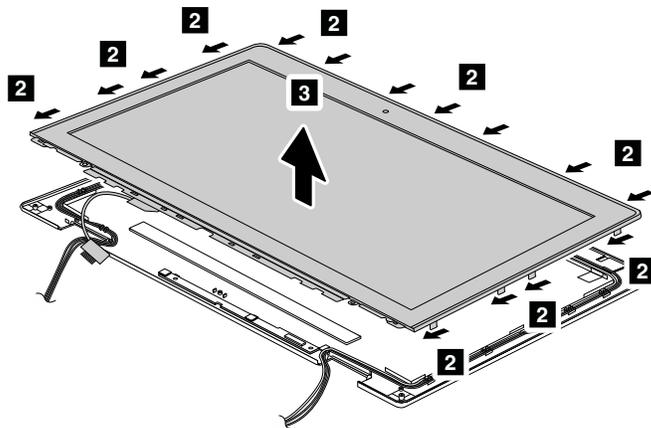
Then remove these FRUs in order:

- “1010 Hard disk drive and solid state drive” on page 59
- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71
- “2010 LCD unit” on page 84
- “2020 LCD bezel cover” on page 86
- “2030 Hinges” on page 87

## Removal steps of LCD bezel assembly



Step	Screw (quantity)	Color	Torque
1	M2 x 3 mm (2)	Black	0.181 Nm 1.85 kgf-cm



### When installing:

Make sure that all the claws are attached firmly.

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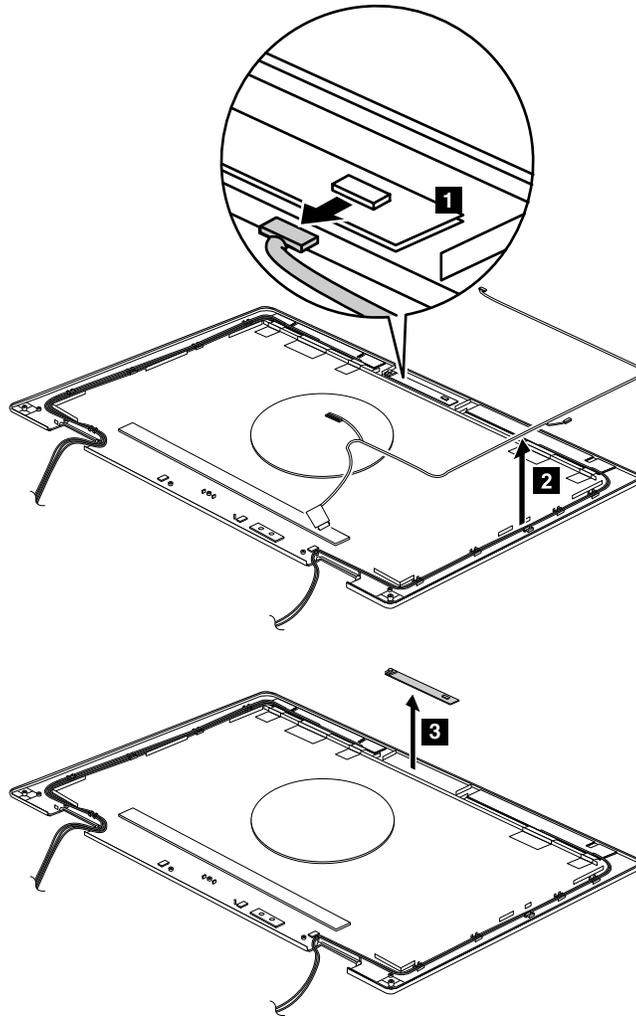
## 2060 Camera

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove these FRUs in order:

- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71
- “2010 LCD unit” on page 84
- “2020 LCD bezel cover” on page 86
- “2030 Hinges” on page 87
- “2050 LCD bezel assembly” on page 89

## Removal steps of camera



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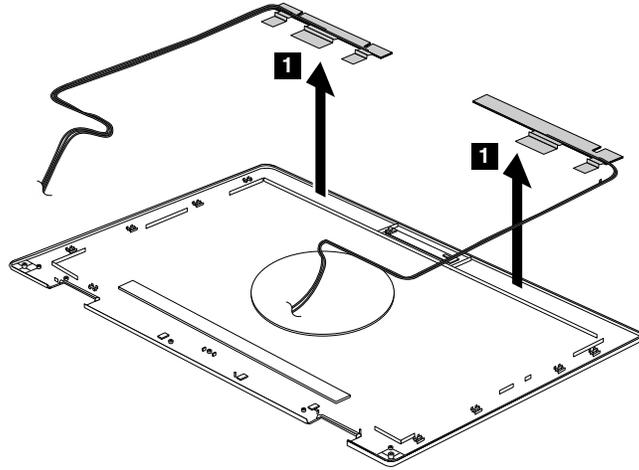
## 2070 Antenna kit and LCD rear cover assembly

For access, disable the battery pack first. Refer to “1000 Disabling the battery pack in the UEFI BIOS” on page 58 for detailed instructions.

Then remove these FRUs in order:

- “1020 Keyboard” on page 61
- “1090 Keyboard bezel assembly with fingerprint reader and audio sub card ” on page 71
- “2010 LCD unit” on page 84
- “2020 LCD bezel cover” on page 86
- “2030 Hinges” on page 87
- “2040 LED sub card and microphone” on page 88
- “2050 LCD bezel assembly” on page 89
- “2060 Camera” on page 90

## Removal steps of antenna kit and LCD rear cover assembly



**Attention:** As you route the antenna 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.

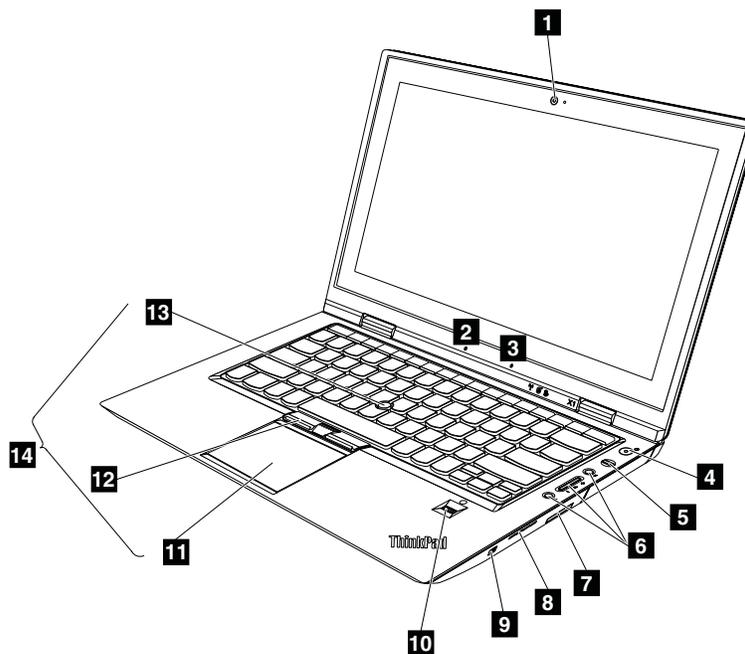
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## Chapter 9. Locations

This chapter presents the location of ThinkPad X1 and X1 Hybrid features and hardware.

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### Front view

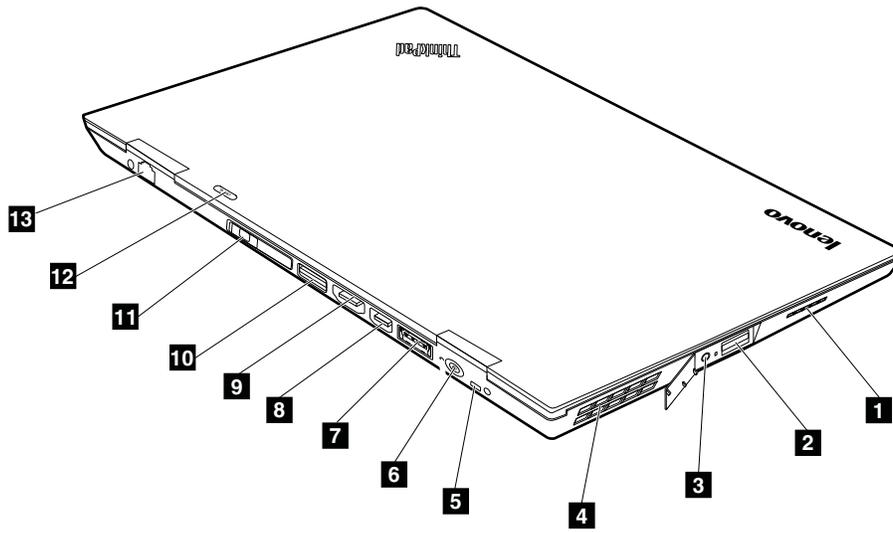


- 1** Integrated camera
- 2** Built-in microphone
- 3** Status indicators

**Note:** For the description of each indicator, see Chapter 5 “Status indicators” on page 47.

- 4** Power switch
- 5** ThinkVantage button
- 6** Volume control buttons
- 7** 4-in-1 Media Card Reader
- 8** Built-in stereo speaker (right)
- 9** Wireless radio switch
- 10** Fingerprint reader
- 11** Touch pad
- 12** TrackPoint buttons
- 13** TrackPoint pointing stick
- 14** UltraNav® pointing device

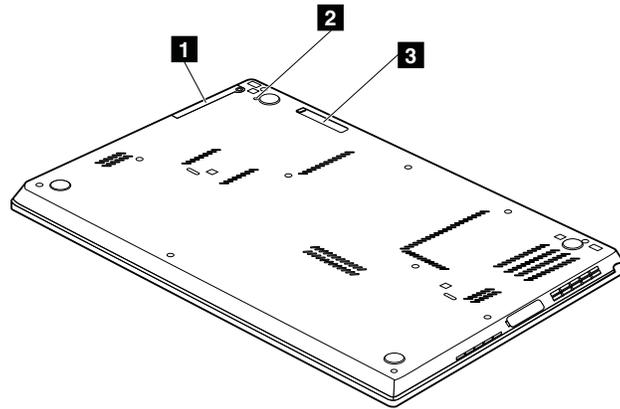
## Rear view



- 1** Built-in stereo speaker (left)
  - 2** USB connector (left)
  - 3** Combo audio jack
  - 4** Fan louvers
  - 5** Security keyhole
  - 6** Power jack
  - 7** eSATA/Always on USB combo connector (rear)
  - 8** Mini DisplayPort connector
  - 9** HDMI port
  - 10** USB connector (rear)
  - 11** SIM card slot
  - 12** Status indicators
- Note:** For the description of each indicator, see Chapter 5 “Status indicators” on page 47.
- 13** RJ-45 (Ethernet) connector

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## Bottom view



- 1** Hard disk drive or solid state drive
- 2** Emergency reset hole
- 3** Slice battery connector



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## Chapter 10. Parts list

This section contains following lists of the service parts.

- “Overall” on page 98
- “LCD FRUs” on page 107
- “Keyboard” on page 108
- “Miscellaneous parts” on page 109
- “ac power adapters” on page 110
- “Power cords” on page 111
- “Recovery discs” on page 112
- “Common service tools” on page 116

### 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. 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 an ac adapter, a power cord, a battery, and a 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.

### 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.

# Overall

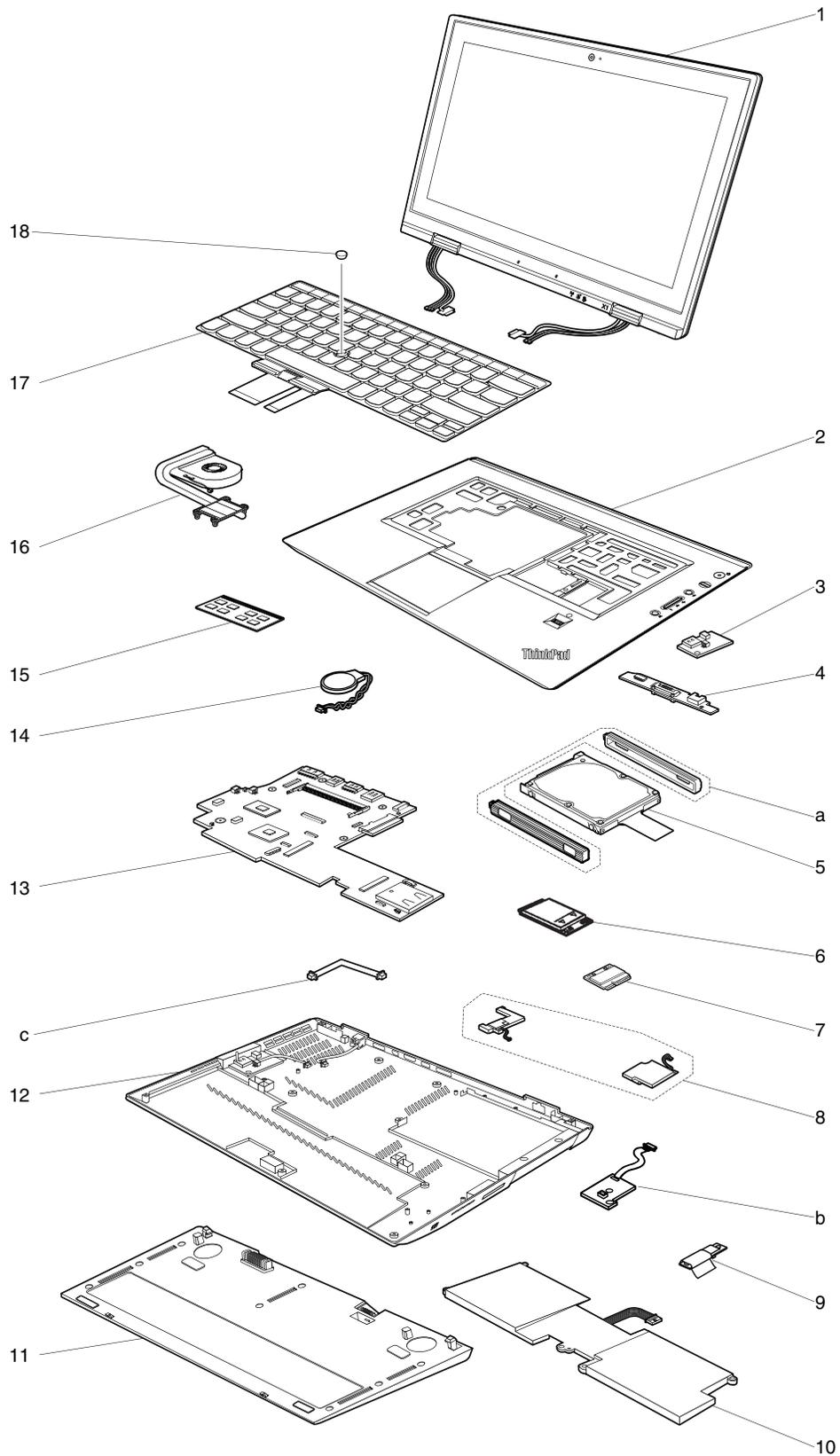


Table 10. Parts list—Overall

No.	FRU (Overall)	FRU no.	CRU ID
a - c	See “Miscellaneous parts” on page 109		
1	LCD unit (see “LCD FRUs” on page 107)		
2	Keyboard bezel assembly	04W3349	**
3	I/O board	04W2067	N
4	RJ45 sub card	04W2066	N
5	Hard disk drive, 250 GB, 7200 rpm <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	42T1163 42T1173	*
5	Hard disk drive, 320 GB, 7200 rpm <ul style="list-style-type: none"> <li>• 1286-CTO, 22x, 24x, 27x, 28x, 29x, 2Ax, 2Cx, 2Dx, 2Ex, 2Gx, 2Jx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Ux, 2Yx, 32x, 33x, 37x, 3Ax, 3Fx, 3Mx</li> <li>• 1291-CTO, 22x, 25x, 26x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Rx, 2Sx, 2Ux, 2Vx, 2Wx, 2Xx, 32x, 36x, 37x, 3Ax, 3Bx, 3Fx, 3Gx, 3Kx, 3Lx, 3Px, 3Rx</li> <li>• 1292-CTO, 23x, 25x, 27x, 2Ax, 2Dx, 2Kx</li> <li>• 1293-CTO, 23x, 24x, 26x, 28x, 2Cx, 2Ex, 2Fx, 2Gx, 2Hx, 2Kx, 2Lx, 2Mx, 2Nx, 2Qx, 2Vx, 32x, 36x, 37x, 3Bx, 3Fx, 3Mx, 3Nx, 3Px, 3Qx, 3Tx, 3Wx, 3Xx, 44x, 46x, 47x, 48x, 49x, 4Bx, 4Cx, 4Dx</li> <li>• 1294-CTO, 23x, 26x, 27x, 2Ax, 2Cx, 2Dx, 2Gx, 2Kx, 2Mx, 2Px, 2Rx, 2Sx, 3Hx, 3Rx, 3Tx, 3Ux, 44x</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	42T1159 42T1221 42T1171 42T1204	*
5	Hard disk drive, 500 GB, 5400 rpm <ul style="list-style-type: none"> <li>• 1286-CTO, 3Kx</li> <li>• 1291-CTO, 3Tx, 3Ux, 3Wx, 3Xx, 3Yx</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Nx</li> <li>• 1294-CTO, 3Zx, 3Yx, 3Xx</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	42T1217 42T1223	*
5	Solid state drive, 128 GB <ul style="list-style-type: none"> <li>• 1286-CTO, 25x, 2Hx, 34x, 39x, 3Cx, 3Ex, 3Gx</li> <li>• 1291-CTO, 28x, 29x, 2Yx, 39x, 3Dx, 3Mx, 3Nx</li> <li>• 1292-CTO, 22x, 26x, 28x, 2Bx, 2Ex, 2Hx</li> <li>• 1293-CTO, 22x, 2Bx, 2Rx, 2Ux, 2Wx, 2Zx, 33x, 35x, 3Cx, 3Gx, 3Lx, 4Ax</li> <li>• 1294-CTO, 22x, 2Bx, 2Ex, 2Lx, 3Wx</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	45N8081 45N8007 45N7981	*

Table 10. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
5	Solid state drive, 160 GB <ul style="list-style-type: none"> <li>• 1286-CTO, 23x, 26x, 2Bx, 2Fx, 2Lx, 2Sx, 2Vx, 2Wx, 2Xx, 2Zx, 35x, 36x, 38x, 3Bx, 3Dx, 3Hx, 3Jx, 3Lx, 3Nx</li> <li>• 1291-CTO, 23x, 24x, 27x, 2Px, 2Qx, 2Tx, 2Zx, 33x, 34x, 35x, 38x, 3Cx, 3Ex, 3Hx, 3Jx, 3Qx, 3Sx, 3Vx, 3Zx</li> <li>• 1292-CTO, 24x, 29x, 2Cx, 2Fx, 2Gx, 2Jx</li> <li>• 1293-CTO, 25x, 27x, 29x, 2Ax, 2Dx, 2Jx, 2Px, 2Sx, 2Tx, 2Xx, 2Yx, 34x, 38x, 39x, 3Ax, 3Dx, 3Ex, 3Jx, 3Kx, 3Rx, 3Sx, 3Ux, 3Vx, 3Yx, 42x, 43x, 45x, 4Ex</li> <li>• 1294-CTO, 28x, 29x, 2Fx, 2Jx, 2Nx, 2Qx, 3Dx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx, 3Px, 3Qx, 3Sx, 3Vx, 42x, 43x, 45x, 46x</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	45N8057	*
6	Integrated Mobile Broadband (Gobi 3000) <ul style="list-style-type: none"> <li>• 1286-CTO, 23x, 25x</li> <li>• 1291-CTO, 2Tx</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 3Cx</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	60Y3257	**
6	Integrated Mobile Broadband (Gobi 3000) for Malaysia <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	60Y3283	**
6	Ericsson F5521gw Wireless WAN card <ul style="list-style-type: none"> <li>• 1286-CTO, 2Wx</li> <li>• 1291-CTO, 23x, 24x, 2Cx, 2Hx, 2Jx, 2Nx, 2Px, 2Qx, 32x, 33x, 34x, 35x, 3Rx, 3Vx, 3Yx</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 28x, 29x, 2Gx, 2Jx, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 39x, 3Bx, 3Px, 43x, 4Dx, 4Ex</li> <li>• 1294-CTO, 29x, 2Ex, 2Fx, 2Nx, 2Px, 3Hx, 3Lx, 3Nx, 3Qx, 3Tx</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	60Y3279	**
6	Ericsson F5521gw Wireless WAN card for Malaysia <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	60Y3267	**

Table 10. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
6	mSATA solid state drive, 80GB <ul style="list-style-type: none"> <li>• 1286-CTO, 22x, 2Gx</li> <li>• 1291-CTO, 2Fx, 2Gx, 2Mx, 36x, 37x, 3Wx, 3Xx</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 2Ax, 2Fx, 2Qx, 32x, 33x, 34x, 35x, 36x, 3Ax, 3Hx, 49x, 4Bx, 4Cx, 4Lx, 4Mx</li> <li>• 1294-CTO, 3Kx</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	45N8259	**
6	Instant Media Mode card <ul style="list-style-type: none"> <li>• 1286-CTO, 2Jx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Ux, 2Vx, 2Yx, 2Zx, 32x, 3Nx</li> <li>• 1291-CTO, 3Hx, 3Jx, 3Kx, 3Mx, 3Nx, 3Zx</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 42x, 44x, 45x, 46x, 4Ax</li> <li>• 1294-CTO, 3Px, 3Ux, 3Vx, 3Wx</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	04W3275	**
7	Intel® Centrino® Wireless-N 1000 <ul style="list-style-type: none"> <li>• 1286-CTO, 24x, 2Bx, 2Lx, 2Mx, 2Wx, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx</li> <li>• 1291-CTO, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Vx, 3Cx, 3Dx, 3Lx, 3Px</li> <li>• 1292-CTO, 22x, 23x</li> <li>• 1293-CTO, 2Mx, 3Xx, 3Yx, 44x, 46x</li> <li>• 1294-CTO, 2Jx, 2Kx, 2Lx, 2Rx, 2Sx, 3Zx</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	60Y3241	**
7	Intel Centrino Advanced-N 6205 <ul style="list-style-type: none"> <li>• 1286-CTO, 22x, 26x, 2Cx, 2Dx, 2Ex, 2Fx, 2Jx, 2Nx, 2Px, 2Yx, 2Zx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 3Kx, 3Mx, 3Nx</li> <li>• 1291-CTO, 22x, 23x, 24x, 25x, 26x, 2Cx, 2Rx, 2Sx, 2Tx, 2Ux, 2Wx, 2Xx, 2Yx, 2Zx, 32x, 33x, 34x, 35x, 36x, 3Hx, 3Jx, 3Kx, 3Nx, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx</li> <li>• 1292-CTO, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx</li> <li>• 1293-CTO, 22x, 23x, 26x, 2Bx, 2Cx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Lx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Tx, 2Ux, 2Yx, 2Zx, 37x, 3Bx, 3Cx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 47x, 48x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Nx</li> <li>• 1294-CTO, 22x, 23x, 2Bx, 2Cx, 2Gx, 2Mx, 3Ux, 3Vx, 3Wx, 3Xx, 42x, 43x, 44x, 45x, 46x</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	60Y3253	**
7	Intel Centrino Ultimate-N 6300 <ul style="list-style-type: none"> <li>• 1286-CTO, 23x, 2Gx, 2Qx, 2Rx, 2Sx, 2Ux, 2Vx, 2Xx, 3Lx</li> <li>• 1291-CTO, 27x, 37x, 38x</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 24x, 25x, 27x, 28x, 29x, 2Ax, 2Dx, 2Kx, 2Vx, 2Wx, 2Xx, 32x, 33x, 34x, 35x, 36x, 38x, 39x, 3Ax, 3Dx, 3Nx, 3Px, 42x, 43x, 45x, 49x, 4Fx</li> <li>• 1294-CTO, 26x, 27x, 28x, 29x, 2Ax, 2Ex, 2Fx, 2Nx, 2Px, 2Qx, 3Dx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx, 3Px, 3Qx, 3Rx, 3Sx, 3Tx, 3Yx</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	60Y3233	**

Table 10. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
7	Intel Centrino Advanced-N + WiMAX 6250 <ul style="list-style-type: none"> <li>• 1286-CTO, 25x, 27x, 28x, 29x, 2Ax, 2Hx, 32x</li> <li>• 1291-CTO, 28x, 29x, 2Ax, 2Bx, 39x, 3Ax, 3Bx, 3Ex, 3Fx, 3Gx, 3Mx</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	60Y3195	**
7	Intel Centrino Advanced-N + WiMAX 6250 for Russia <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	60Y3209	**
8	Speaker assembly	04W2064 04W2065	N
9	Bluetooth card <ul style="list-style-type: none"> <li>• 1286-CTO, 22x, 23x, 24x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx</li> <li>• 1291-CTO, 22x, 23x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx, 3Px, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx</li> <li>• 1292-CTO, 22x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx</li> <li>• 1293-CTO, 22x, 23x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx, 3Px, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 42x, 43x, 44x, 45x, 46x, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Nx</li> <li>• 1294-CTO, 22x, 23x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 3Dx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx, 3Px, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx, 42x, 43x, 44x, 45x, 46x</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	60Y3271 60Y3275	N
10	Battery pack, 4 cell (42 wh)	42T4977	N
11	6-cell slice battery (34 Wh) <b>OP</b> <ul style="list-style-type: none"> <li>• 1286-CTO, 22x, 23x, 2Wx, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx</li> <li>• 1291-CTO, 22x, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 22x, 23x, 29x, 2Kx, 2Lx, 2Nx, 2Px, 2Qx, 38x, 39x, 3Ax, 3Rx, 3Wx, 3Yx, 42x</li> <li>• 1294-CTO, 22x, 23x</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	42T4986	*
12	Base cover assembly	04W3350 04W6860	N

Table 10. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
13	System board assembly, Intel Core™ i5-2520M AMT, TPM, AES <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	63Y1676 04W3536	N
13	System board assembly, Intel Core i5-2520M AMT, Non-TPM, Non-AES <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 2Nx, 2Px, 2Qx</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	63Y1677 04W3542	N
13	System board assembly, Intel Core i5-2520M Non-AMT, TPM, AES <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	63Y1678 04W3539	N
13	System board assembly, Intel Core i5-2520M Non-AMT, Non-TPM, Non-AES <ul style="list-style-type: none"> <li>• 1286-CTO, 2Wx, 3Bx, 3Cx</li> <li>• 1291-CTO, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	63Y1679 04W3545	N
13	System board assembly, Intel Core i3-2310M TPM, Non-AES <ul style="list-style-type: none"> <li>• 1286-CTO, 24x, 25x, 29x, 2Ax, 2Cx</li> <li>• 1291-CTO, 2Ax, 2Bx, 2Sx, 2Vx, 2Wx, 3Ax, 3Bx, 3Px</li> <li>• 1292-CTO, 23x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx</li> <li>• 1293-CTO, 26x, 2Lx, 37x, 3Fx</li> <li>• 1294-CTO, 2Ax, 3Hx</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	63Y1684	N
13	System board assembly, Intel Core i3-2310M Non-TPM, Non-AES <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	63Y1685	N

Table 10. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
13	System board assembly, Intel Core i3-2350M, TPM, Non-AES <ul style="list-style-type: none"> <li>• 1286-CTO, 2Nx, 2Px</li> <li>• 1291-CTO, 3Dx, 3Fx, 3Gx, 3Lx</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 44x, 46x, 47x, 48x, 4Hx</li> <li>• 1294-CTO, 3Rx, 3Sx, 3Tx, 3Zx</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	04W3477 04W3548	N
13	System board assembly, Intel Core i3-2350M, Non-TPM, Non-AES <ul style="list-style-type: none"> <li>• 1286-CTO, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	04W3478 04W3550	N
13	System board assembly, Intel Core i7-2620M AMT, TPM, AES <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	63Y1680	N
13	System board assembly, Intel Core i7-2620M Non-AMT, TPM, AES <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	63Y1682	N
13	System board assembly, Intel Core i7-2620M AMT, Non-TPM, Non-AES <ul style="list-style-type: none"> <li>• 1286-CTO, 3Gx</li> <li>• 1291-CTO, 34x, 35x, 36x</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 3Jx</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	63Y1681	N
13	System board assembly, Intel Core i7-2620M Non-AMT, Non-TPM, Non-AES <ul style="list-style-type: none"> <li>• 1286-CTO, 2Lx, 2Mx</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	63Y1683	N

Table 10. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
13	System board assembly, Intel Core i7-2640M, AMT, TPM, AES <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	04W3473 04W3537	N
13	System board assembly, Intel Core i7-2640M, Non-AMT, TPM, AES <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	04W3474 04W3540	N
13	System board assembly, Intel Core i7-2640M, AMT, Non-TPM, Non-AES <ul style="list-style-type: none"> <li>• 1286-CTO, 3Dx, 3Ex, 3Fx</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	04W3475 04W3543	N
13	System board assembly, Intel Core i7-2640M, Non-AMT, Non-TPM, Non-AES <ul style="list-style-type: none"> <li>• 1286-CTO</li> <li>• 1291-CTO</li> <li>• 1292-CTO</li> <li>• 1293-CTO</li> <li>• 1294-CTO</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	04W3476 04W3546	N
14	Backup battery	02K7078 04W3253	**
15	2-GB DDR3-1333 SDRAM SO-DIMM card <ul style="list-style-type: none"> <li>• 1286-CTO, 25x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Nx, 2Qx, 3Ax</li> <li>• 1291-CTO, 2Ax, 2Bx, 2Rx, 2Sx, 2Wx, 2Xx, 2Yx, 3Ax, 3Bx, 3Fx, 3Gx</li> <li>• 1292-CTO, 22x, 23x, 24x, 25x, 26x, 2Ax, 2Bx, 2Cx, 2Gx, 2Hx, 2Jx, 2Kx</li> <li>• 1293-CTO, 2Ex, 2Fx, 2Mx, 2Rx, 2Sx, 2Yx, 2Zx, 34x, 35x, 36x, 37x, 3Bx, 3Fx, 3Gx, 3Hx, 3Mx, 3Qx, 3Xx, 44x, 46x, 47x</li> <li>• 1294-CTO, 26x, 2Gx, 2Jx, 2Kx, 2Lx, 2Qx, 2Rx, 3Jx, 42x, 43x</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	55Y3716	*

Table 10. Parts list—Overall (continued)

No.	FRU (Overall)	FRU no.	CRU ID
15	4-GB DDR3-1333 SDRAM SO-DIMM card <ul style="list-style-type: none"> <li>• 1286-CTO, 22x, 24x, 26x, 27x, 28x, 2Ex, 2Fx, 2Hx, 2Jx, 2Lx, 2Mx, 2Px, 2Rx, 2Sx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 32x, 33x, 34x, 35x, 36x, 37x, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx</li> <li>• 1291-CTO, 22x, 23x, 25x, 26x, 27x, 28x, 29x, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Tx, 2Ux, 2Vx, 2Zx, 32x, 33x, 34x, 36x, 39x, 3Dx, 3Ex, 3Hx, 3Kx, 3Lx, 3Mx, 3Nx, 3Px, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx</li> <li>• 1292-CTO, 27x, 28x, 29x, 2Dx, 2Ex, 2Fx</li> <li>• 1293-CTO, 23x, 24x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Gx, 2Hx, 2Jx, 2Lx, 2Nx, 2Px, 2Qx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 32x, 33x, 38x, 39x, 3Ax, 3Cx, 3Dx, 3Ex, 3Jx, 3Kx, 3Lx, 3Nx, 3Px, 3Tx, 3Ux, 3Vx, 3Wx, 3Yx, 42x, 43x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Nx</li> <li>• 1294-CTO, 23x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Mx, 2Px, 2Sx, 3Dx, 3Hx, 3Px, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx, 44x, 45x, 46x</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	55Y3717	*
15	8-GB DDR3-1333 SDRAM SO-DIMM card <ul style="list-style-type: none"> <li>• 1286-CTO, 23x, 2Gx, 38x, 39x, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx</li> <li>• 1291-CTO, 24x, 2Qx, 35x, 37x, 38x, 3Cx, 3Jx</li> <li>• 1292-CTO</li> <li>• 1293-CTO, 22x, 25x, 2Dx, 2Kx, 3Rx, 3Sx, 45x</li> <li>• 1294-CTO, 22x, 2Fx, 2Nx, 3Kx, 3Lx, 3Mx, 3Nx, 3Qx</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	03X6401	*
16	Fan assembly	75Y5774	N
17	Keyboard (see “Keyboard” on page 108)		
18	TrackPoint cap	91P9642	*
—	Thermal grease	91P8835	*
—	ac adapter (see “ac power adapters” on page 110)		

## LCD FRUs

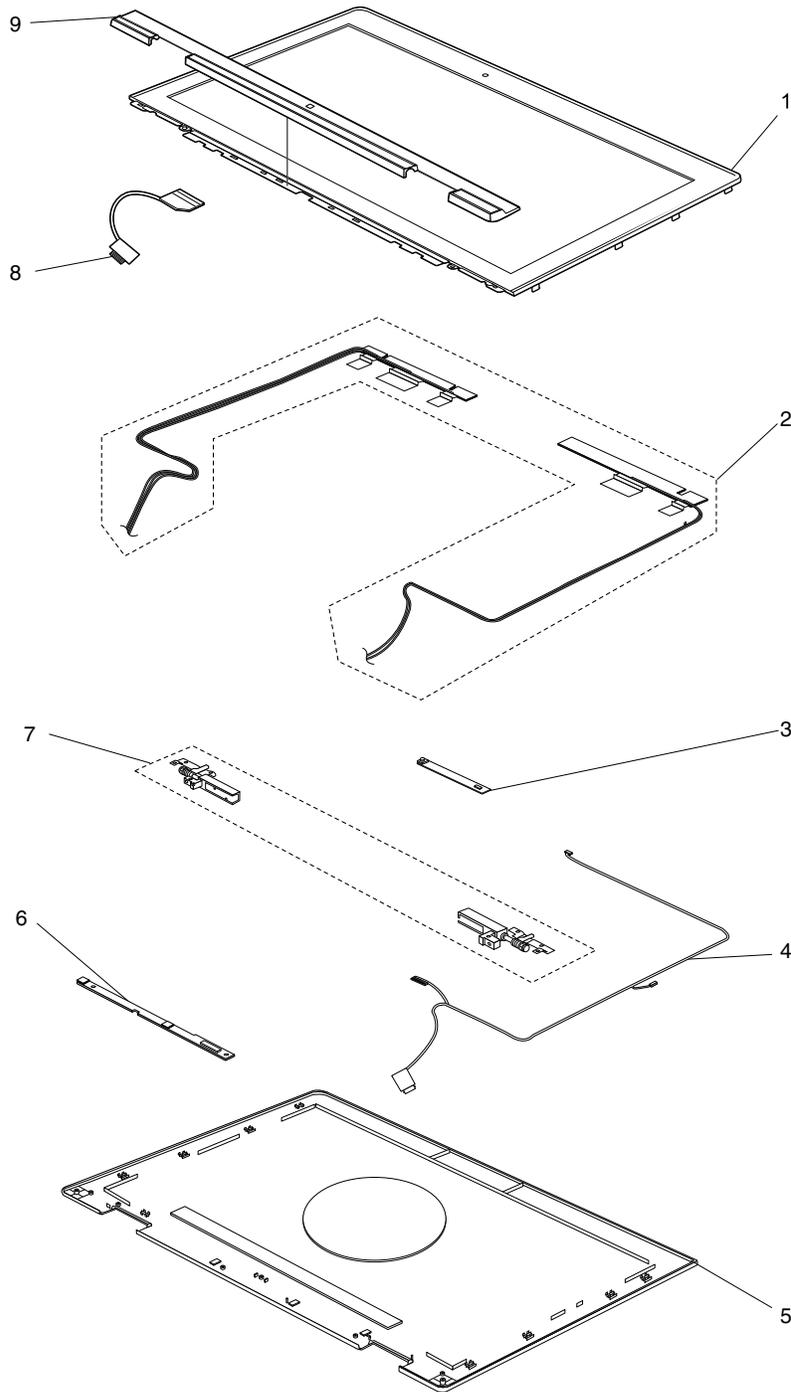


Table 11. Parts list

No.	FRU	FRU no.	CRU ID
1	LCD assembly	04W1768	N
2	Antenna kit	04W2060 04W2061	N

Table 11. Parts list (continued)

No.	FRU	FRU no.	CRU ID
3	Camera module	04W1665	N
4	LED cable	04W2058	N
5	Rear cover assembly	04W2055	N
6	LED sub card and microphone	04W2062	N
7	Hinge kit	04W2057	N
8	LCD cable	04W2059	N
9	Bezel cover for X1 only <ul style="list-style-type: none"> <li>• 1286-CTO, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Lx, 2Mx, 2Wx, 2Xx, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx</li> <li>• 1291-CTO, 22x, 23x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Lx, 3Px, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx</li> <li>• 1292-CTO, 22x, 23x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx</li> <li>• 1293-CTO, 22x, 23x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Hx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 2Yx, 2Zx, 32x, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx, 3Px, 43x, 47x, 48x, 49x, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx</li> <li>• 1294-CTO, 22x, 23x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Fx, 2Gx, 2Jx, 2Kx, 2Lx, 2Mx, 2Nx, 2Px, 2Qx, 2Rx, 2Sx, 3Dx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx, 3Qx, 3Rx, 3Sx, 3Tx, 3Xx, 3Yx, 3Zx, 42x, 43x, 44x, 45x, 46x</li> <li>• 1295-CTO</li> <li>• 1296-CTO</li> </ul>	04W2056	N
9	Bezel cover for X1 and X1 Hybrid <ul style="list-style-type: none"> <li>• 1286-all</li> <li>• 1291-all</li> <li>• 1292-all</li> <li>• 1293-all</li> <li>• 1294-all</li> <li>• 1295-all</li> <li>• 1296-all</li> </ul>	04W3480	N

## Keyboard

Table 12. Parts list—Keyboard

Language	FRU No.	CRU ID
Arabic	04W0985	*
Belgian	04W0986	
Brazil Portuguese	04W0984	
Bulgarian	04W0987	
Canadian French (058)	04W0982	
Canadian French (Acnor)	04W0981	
Czech	04W0988	
Danish	04W0989	

Table 12. Parts list—Keyboard (continued)

Language	FRU No.	CRU ID
Finnish, Swedish	04W1006	
French	04W0991	
German	04W0992	
Greek	04W0993	
Hebrew	04W0994	
Hungarian	04W0995	
Icelandic	04W0996	
India	04W1048	
Italian	04W0997	
Japanese	04W1011	
Kazakhstan	04W0998	
Korean	04W1012	
Latin American Spanish	04W0983	
Netherlands	04W0999	
Norwegian	04W1000	
Polish	04W1001	
Portuguese	04W1002	
Russian	04W1003	
Slovak	04W1004	
Slovenia	04W1005	
Spanish	04W0990	
Swiss	04W1007	
Thai	04W1014	
Traditional Chinese	04W1013	
Turkish	04W1008	
UK English	04W1009	
US English	04W0980	
US English International	04W1010	
Turkish (F Type)	04W1015	

## Miscellaneous parts

Table 13. Parts list—Miscellaneous parts

FRU	FRU No.	CRU ID
Base miscellaneous kit <ul style="list-style-type: none"> <li>• Battery Door</li> <li>• DCIN Lens</li> <li>• DCIN Cable</li> <li>• DCIN Bracket</li> </ul>	04W3328	**

Table 13. Parts list—Miscellaneous parts (continued)

FRU	FRU No.	CRU ID
<ul style="list-style-type: none"> <li>• I/O Door</li> <li>• Knob for Wireless Switch Black</li> <li>• Knob for Wireless Switch Green</li> <li>• Rubber Foot Front</li> <li>• Rubber Foot Rear</li> <li>• SIM Door</li> <li>• Mesh Sheet for Base Cover</li> <li>• SIM Knob</li> <li>• SIM Spring</li> </ul>		
System miscellaneous kit <ul style="list-style-type: none"> <li>• (a) HDD Rubber</li> <li>• HDD Dummy Spacer</li> <li>• SSD spacer right</li> <li>• SSD spacer left</li> <li>• Antenna Cable Guide</li> <li>• HDD Door</li> <li>• CPU Bracket</li> </ul> <b>Note:</b> Italicized letters in parentheses are references to the exploded view in “Overall” on page 98.	04W2069	N
Seal kit <ul style="list-style-type: none"> <li>• Screw Cap Long</li> <li>• Screw Cap Circle</li> <li>• Thermal Pad</li> </ul>	04W2072	N
Screw kit <ul style="list-style-type: none"> <li>• M2 x L3 (27)</li> <li>• M2 x 2.5 (6)</li> <li>• M2.5 x 6 (6)</li> <li>• M2 x 5 (9)</li> <li>• M2 x 8 (2)</li> </ul>	04W2073	N
Cable kit for X1 <ul style="list-style-type: none"> <li>• (b) Bluetooth sub card</li> <li>• (c) I/O cable</li> <li>• Audio board flat cable</li> </ul> <b>Note:</b> Italicized letters in parentheses are references to the exploded view in “Overall” on page 98.	04W2074	N
Cable kit for X1 and X1 Hybrid <ul style="list-style-type: none"> <li>• (b) Bluetooth sub card</li> <li>• (c) I/O cable</li> <li>• Instant Media Mode card cable</li> <li>• Audio board flat cable</li> </ul>	04W3274	N

## ac power adapters

Table 14. Parts list—2-pin ac power adapters

FRU	FRU no.	CRU ID
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 15. Parts list—3-pin ac power adapters

FRU	FRU no.	CRU ID
3-pin (90 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4425	*
3-pin (90 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4429	
3-pin (90 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	42T4433	
3-pin (90 W, 20 V) adapter (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY)	45N0068	

## Power cords

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

Table 16. 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 xxU, xxL, xxF, xxS	42T5008, 42T5093	
Japan • models -CTO xxE, xxJ	42T5014, 42T5099	

Table 17. Parts list—3-pin power cords

Country or region	FRU No.	CRU ID
Australia, New Zealand • models -CTO xxM	42T5050, 42T5135	*
Bangladesh, South Africa, Sri Lanka • 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	

Table 17. Parts list—3-pin power cords (continued)

Country or region	FRU No.	CRU ID
Taiwan • models -CTO xxV	42T5071, 42T5156	
U.K., China (Hong Kong S.A.R.) • models -CTO xxG, xxB, xxH	42T5035, 42T5120	

## Recovery discs

### Windows 7 Home Basic (64-bit) DVDs

- 1286-CTO
- 1291-CTO
- 1292-CTO
- 1293-CTO
- 1294-CTO
- 1295-CTO
- 1296-CTO

Table 18. Parts list—Windows 7 Home Basic (64-bit) DVDs

Language	P/N	CRU ID
Simplified Chinese	04T4024	*

### Windows 7 Home Premium (32-bit) DVDs

- 1286-CTO, 2Nx
- 1291-CTO
- 1292-CTO, 25x, 26x, 2Gx
- 1293-CTO, 47x
- 1294-CTO
- 1295-CTO
- 1296-CTO

Table 19. Parts list—Windows 7 Home Premium (32-bit) DVDs

Language	P/N	CRU ID
Simplified Chinese	04T4025	*
English (for India)	04T4026	
US English	04T4027	

### Windows 7 Home Premium (64-bit) DVDs

- 1286-CTO, 26x, 27x, 28x, 29x, 2Ax, 2Hx, 2Px, 32x, 33x, 34x, 35x
- 1291-CTO, 2Dx, 2Fx, 2Hx, 2Kx, 2Ux
- 1292-CTO, 27x, 28x, 29x
- 1293-CTO, 2Lx, 3Ex, 46x, 48x, 4Hx
- 1294-CTO
- 1295-CTO
- 1296-CTO

Table 20. Parts list—Windows 7 Home Premium (64-bit) DVDs

Language	P/N	CRU ID
Arabic and English	04T4028	*
Brazilian Portuguese	04T4029	
Simplified Chinese	04T4030	
Traditional Chinese and English	04T4031	
Czech and English	04T4032	
French	04T4033	
Greek and English	04T4034	
German	04T4035	
Hebrew and English	04T4036	
Traditional Chinese (Hong Kong S.A.R.) and English	04T4037	
Hungarian and English	04T4038	
Japanese	04T4039	
Korean and English	04T4040	
Polish	04T4041	
Portuguese and English	04T4042	
Romanian and English	04T4043	
Russian	04T4044	
Slovakian and English	04T4045	
Spanish	04T4046	
Serbian-Latin and English	04T4047	
Turkish and English	04T4048	
US English Disable	04T4049	
English	04T4050	
C & L Nordics (Danish/Finland/Swedish/Norway/English)	04T4051	
C & L EMEA (Dutch/French/German/Italian/English)	04T4052	
C & L Croatian (English/Slovenian/Croatian)	04T4053	

## Windows 7 Professional with Service Pack 1 (32-bit) DVDs (plus IE9)

- 1286–CTO, 2Cx, 2Dx, 2Qx
- 1291–CTO, 2Ax, 2Bx, 2Rx, 2Sx, 3Ax, 3Bx, 3Fx, 3Gx
- 1292–CTO, 2Ax, 2Bx, 2Cx, 2Hx, 2Jx, 2Kx
- 1293–CTO, 2Ex, 2Fx, 2Rx, 2Sx, 2Yx, 2Zx, 34x, 35x, 36x, 37x, 3Bx, 3Mx, 4Jx, 4Kx
- 1294–CTO, 2Gx
- 1295–CTO
- 1296–CTO

Table 21. Parts list—Windows 7 Professional (32-bit) DVDs

Language	P/N	CRU ID
Simplified Chinese	04T3982	*
English (for India)	04T3983	
Japanese	04T3987	
English	04T3989	
French	04T3984	
German	04T3985	
Traditional Chinese (Hong Kong S.A.R.) and English	04T3986	
Spanish	04T3988	
C & L Nordics (Danish/Finland/Swedish/Norway/English)	04T3990	
C & L EMEA (Dutch/French/German/Italian/English)	04T3991	

## Windows 7 Professional with Service Pack 1 (32-bit) DVDs (for RapidBoot)

- 1286-CTO, 2Xx
- 1291-CTO
- 1292-CTO
- 1293-CTO
- 1294-CTO
- 1295-CTO
- 1296-CTO

Table 22. Parts list—Windows 7 Professional with Service Pack 1 (32-bit) DVDs

Language	P/N	CRU ID
Chinese Simplified	04T3992	*
Japanese	04T3993	
English	04T3994	

## Windows 7 Professional (64-bit) with Service Pack 1 DVDs

- 1286-CTO, 22x, 23x, 24x, 25x, 2Bx, 2Ex, 2Fx, 2Gx, 2Jx, 2Lx, 2Mx, 2Rx, 2Sx, 2Ux, 2Vx, 2Wx, 2Yx, 2Zx, 36x, 37x, 38x, 39x, 3Ax, 3Bx, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx
- 1291-CTO, 33x, 34x, 35x, 36x, 37x, 38x, 39x, 3Cx, 3Dx, 3Ex, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx, 3Px, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx
- 1292-CTO, 22x, 2Dx, 2Ex, 2Fx
- 1293-CTO, 22x, 23x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Gx, 2Hx, 2Jx, 2Kx, 2Mx, 2Nx, 2Px, 2Qx, 2Tx, 2Ux, 2Vx, 2Wx, 2Xx, 32x, 33x, 38x, 39x, 3Ax, 3Cx, 3Dx, 3Fx, 3Gx, 3Hx, 3Jx, 3Kx, 3Lx, 3Nx, 3Px, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 42x, 43x, 44x, 45x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Lx, 4Mx, 4Nx
- 1294-CTO, 22x, 23x, 26x, 27x, 28x, 29x, 2Ax, 2Bx, 2Cx, 2Dx, 2Ex, 2Jx, 2Mx, 2Nx, 2Px, 2Rx, 2Sx, 3Dx, 3Hx, 3Jx, 3Kx, 3Lx, 3Mx, 3Nx, 3Px, 3Qx, 3Rx, 3Sx, 3Tx, 3Ux, 3Vx, 3Wx, 3Xx, 3Yx, 3Zx, 42x, 43x, 44x, 45x, 46x
- 1295-CTO
- 1296-CTO

Table 23. Parts list—Windows 7 Professional (64-bit) DVDs

Language	P/N	CRU ID
Arabic and English	04T3995	*
Brazilian Portuguese	04T3996	
Simplified Chinese	04T3997	
Traditional Chinese and English	04T3998	
Czech and English	04T3999	
English (for India)	04T4000	
French	04T4001	
Greek and English	04T4002	
German	04T4003	
Hebrew and English	04T4004	
Traditional Chinese (Hong Kong S.A.R.) and English	04T4005	
Hungarian and English	04T4006	
Japanese	04T4007	
Korean and English	04T4008	
Polish	04T4009	
Portuguese and English	04T4010	
Romanian and English	04T4011	
Russian	04T4012	
Slovakian and English	04T4013	
Spanish	04T4014	
Serbian-Latin and English	04T4015	
Turkish and English	04T4016	
US English Disable	04T4017	
English	04T4018	
C & L Nordics (Danish/Finland/Swedish/Norway/English)	04T4019	
C & L EMEA (Dutch/French/German/Italian/English)	04T4020	
C & L Croatian (English/Slovenian/Croatian)	04T4021	

## Windows 7 Ultimate with Service Pack 1 (32-bit) DVDs

- 1286–CTO
- 1291–CTO
- 1292–CTO
- 1293–CTO
- 1294–CTO
- 1295–CTO
- 1296–CTO

Table 24. Parts list—Windows 7 Ultimate with Service Pack 1 (32-bit) DVDs

Language	P/N	CRU ID
English	04T4022	*

## Windows 7 Ultimate (64-bit) DVDs

- 1286-CTO
- 1291-CTO
- 1292-CTO
- 1293-CTO
- 1294-CTO
- 1295-CTO
- 1296-CTO

Table 25. Parts list—Windows 7 Ultimate (64-bit) DVDs

Language	P/N	CRU ID
English	04T4023	*

## Common service tools

Table 26. 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 <b>Note:</b> Download the file from the following Web site: <a href="http://www.lenovo.com/support">http://www.lenovo.com/support</a>	—

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## Appendix A. Notices

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