

ThinkPad

ThinkPad Helix Hardware Maintenance Manual

Machine Type: 20CG and 20CH

Note: Before using this information and the product it supports, be sure to read the general information under Appendix A “Notices” on page 79.

Fourth Edition (July 2015)

© Copyright Lenovo 2014, 2015.

LIMITED AND RESTRICTED RIGHTS NOTICE: If data or software is delivered pursuant a General Services Administration “GSA” contract, use, reproduction, or disclosure is subject to restrictions set forth in Contract No. GS-35F-05925.

Contents

About this manual	iii	Recovery overview for the Windows 10 operating system	32
Chapter 1. Safety information	1	Resetting your tablet	32
General safety	1	Using advanced startup options	32
Electrical safety	1	Recovering your operating system if Windows 10 fails to start	33
Safety inspection guide	3	Creating and using a recovery USB drive	33
Handling devices that are sensitive to electrostatic discharge	3	Passwords	34
Grounding requirements	4	Power-on password	34
Safety notices (multilingual translations)	4	Supervisor password	34
		Hard disk password	35
Chapter 2. Important service information	19	Symptom-to-FRU index	35
Strategy for replacing FRUs	19	Error codes	36
Important notice for replacing a system board	19	Intermittent problems	37
How to use error message	20	Undetermined problems	37
Strategy for replacing FRUs for CTO, special bid model, and standard models	20	Chapter 5. Locations	39
Product definition	20	Locating tablet controls, connectors, and indicators	39
FRU identification	20	Locating FRUs and CRUs	40
		Major FRUs	41
Chapter 3. General checkout	23	Miscellaneous kits and other parts	42
What to do first	23	Looking up FRU information	43
Checkout guide	24	Chapter 6. FRU replacement notices	45
Lenovo Solution Center	24	Screw notices	45
Quick test programs	24	Retaining serial numbers	46
UEFI diagnostic program	25	Chapter 7. Removing or replacing a FRU	47
Bootable diagnostic programs	25	General guidelines	47
Power system checkout	26	Before servicing the tablet	48
Checking the built-in battery and operational charging	26	Disabling the built-in battery	48
Checking the coin-cell battery	27	Removing the SIM card, SD card, and smart card	48
Checking the ac power adapter	27	1010 Back cover assembly, smart-card reader, and smart-card-reader cable	50
Chapter 4. Related service information	29	1020 Built-in battery	54
Restoring the factory contents by using the Recovery Disc Set	29	1030 Wireless WAN card	56
Using the Windows recovery programs on the Windows 8.1 operating system	30	1040 M.2 solid-state drive and solid-state-drive mylar	57
Refreshing your tablet	30	1050 Fingerprint-reader module	58
Resetting your tablet to the factory default settings	30	1060 LCD cable	60
Using the advanced startup options	31	1070 Digitizer cable	61
Recovering your operating system if the Windows 8.1 operating system fails to start	31	1080 Coin-cell battery	62
Creating and using recovery media	31	1090 NFC card and NFC-card cable	63

1110 Front-facing camera module and front-facing-camera-module cable	64
1120 dc-in cable and dc-in-cable bracket	65
1130 Thermal module	66
1140 USB-connector bracket	68
1150 Speakers	69
1160 I/O card and I/O-card cable	70
1170 System board	72
1180 Rear-facing camera module	74
1190 Wireless-WAN antenna assembly	74

1200 Wireless-LAN antenna assembly	76
1210 LCD module	77

Appendix A. Notices 79

Electronic emission notices.	80
Trademarks	80

Appendix B. Abbreviation and acronym table 81

About this manual

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

Machine	Machine type (MT)
ThinkPad Helix	20CG and 20CH

Important:

- This manual is intended only for trained service technicians who are familiar with ThinkPad products. Use this manual along with the advanced diagnostic tests to troubleshoot problems effectively.
- Before servicing a ThinkPad product, be sure to read all the information under Chapter 1 “Safety information” on page 1 and Chapter 2 “Important service information” on page 19.

Chapter 1. Safety information

This chapter presents following safety information that you should be familiar with before you service a ThinkPad tablet computer.

- “General safety” on page 1
- “Electrical safety” on page 1
- “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

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 working in conditions that might be hazardous to your eyes. The conditions include hammering, drilling, soldering, cutting wire, attaching springs, using solvents, and so on.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall other parts that you have removed.

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 disconnect 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, disconnect the power cord. If you cannot unplug it, power off the wall box that supplies power to the machine, and lock the wall box in the off position.
- If you 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
 - Motor generators
 - Similar units to listed aboveThis practice ensures correct grounding of the units.
- If an electrical accident occurs:
 - Use caution; do not become a victim yourself.
 - Switch off power.
 - Send another person to get medical aid.

Safety inspection guide

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

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

Consider these conditions and the safety hazards they present:

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

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

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Turn off the tablet.
3. Disable the built-in battery. For the instruction on how to disable the built-in battery, see “Disabling the built-in battery” on page 48.
4. Disconnect the power cord.
5. Check the power cord for the following:
 - a. Make sure that a third-wire ground connector is in good condition. Use a meter to measure the third-wire ground continuity. Ensure that the continuity between the external ground pin and the frame ground is 0.1 ohm or less.
 - b. The power cord is the type specified in the parts list.
 - c. Insulation is not frayed or worn.
6. Remove the LCD module assembly.
7. Check for cracked or bulging built-in batteries.
8. Check for any obvious non-ThinkPad alterations. Use good judgment as to the safety of any non-ThinkPad alterations.
9. 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.
10. Check for worn, frayed, or pinched cables.
11. Check that the built-in battery fasteners (screws or rivets) have not been removed or tampered with.

Handling devices that are sensitive to electrostatic discharge

Any tablet 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 tablets.

Grounding requirements

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

Safety notices (multilingual translations)

The safety notices in this section are provided in the following languages:

- English
- Arabic
- Brazilian Portuguese
- French
- German
- Hebrew
- Japanese
- Korean
- Spanish
- Traditional Chinese



DANGER

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



DANGER

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



DANGER

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



DANGER

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



DANGER

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



DANGER

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



DANGER

Though the main batteries have low voltage, a short-circuited or grounded battery can produce enough current to burn personnel or combustible materials.



DANGER

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



خطر

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



خطر

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



خطر

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



خطر

قد تتسبب بطارية الليثيوم في حدوث حريق أو انفجار أو حدوث حروق شديدة. لا تقم باعادة شحن البطارية أو ازالة موصل الاستقطاب الخاص بها ولا تحاول أيضا فكها أو تسخينها لأكثر من ١٠٠ درجة 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 الى 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

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



خطر

على الرغم من أن البطاريات الرئيسية يكون لها جهد منخفض، 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

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



PERIGO

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



PERIGO

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



DANGER

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



DANGER

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



DANGER

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



DANGER

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



DANGER

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



DANGER

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



DANGER

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



DANGER

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



VORSICHT

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



VORSICHT

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



VORSICHT

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



VORSICHT

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



VORSICHT

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



VORSICHT

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



VORSICHT

Obwohl Hauptbatterien eine niedrige Spannung haben, können sie doch bei Kurzschluß oder Erdung genug Strom abgeben, um brennbare Materialien zu entzünden oder Verletzungen bei Personen hervorzurufen.



VORSICHT

Wenn ein Austausch der FRU bei laufendem Betrieb nicht erlaubt ist, gehen Sie beim Austausch der FRU wie folgt vor: Schalten Sie den Computer aus, ziehen Sie alle Netzkabel von den Netzsteckdosen ab, entfernen Sie den Akku und ziehen Sie alle miteinander verbundenen Kabel ab.



סכנה

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



סכנה

סוללות המתנה מסוימות מכילות כמוט 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 התמוצות של הסוללה.



סכנה

מארז הסוללה מכיל כמוט 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 התמוצות של הסוללה.



סכנה

סוללת הליתייום עלולה לגרום לשריפה, להתמוצות 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 התמוצות.



סכנה

אם מסך הגביש חנולי (LCD) משבר וחנוול מתוך המסך בא במגע עם עיניכם או ידיכם, שטפו את האזורים הנוגעים מיד במים במשך 15 דקות לפחות. פנו לקבלת עזרה רפואית אם תסמינים הנובעים מתגעגע עם חנוול נמשכים לאחר השטיפה.



סכנה

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



סכנה

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



סכנה

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



החלפה

FRU の交換後、ThinkPad の電源を入れる前に、ねじ、パネ、その他の小さな部品がすべて正しい位置にあり、また ThinkPad の内部で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。



החלפה

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。



החלפה

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。



החלפה

リチウム・バッテリーは、火災、爆発、または重症のやけどを引き起こすことがあります。バックアップ・バッテリーの充電、その極性コネクターの取り外し、バッテリー本体の分解、100℃ (212°F) 以上への加熱、焼却、電池の中身を水に浸すことはしないでください。バッテリーを廃棄する場合は地方自治体の条例に従ってください。適切なパーツ・リストにあるバッテリーだけを使用してください。誤ったバッテリーを使用すると、バッテリーが発火したり、爆発したりすることがあります。



危険

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



危険

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



危険

メイン・バッテリーの電圧は低くても、ショートしたり、接地したバッテリーが、作業者にやけどを負わせたり、可燃物を燃やすだけの電流を発生させる場合があります。



危険

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



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 달각거리는 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, 물 또는 물에 던지거나, 단락시키지 마십시오. 배터리 팩을 폐기할 때에는 해당 지역의 법률 규정을 따르십시오. 배터리 팩을 교체할 때에는 올바른 배터리를 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 배터리를 사용하십시오. 올바르지 않은 배터리를 사용하면 배터리가 발화되거나 폭발할 수 있습니다.



위험

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



위험

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



위험

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



위험

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



PELIGRO

Antes de encender el sistema 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 esponga 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

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



PELIGRO

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



PELIGRO

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



危險

完成 FRU 更換之後，在開啟電腦的電源之前，請確定所有螺絲、彈簧及其他小零件都已歸位，沒有遺留在電腦內部。
若要確認這一點，請搖晃電腦，聽聽看是否有卡嗒的聲音。
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

為避免電擊，請勿拆下轉換卡下面的塑膠護蓋。



危險

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



危險

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

Chapter 2. Important service information

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

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

Important:

- Advise customers to visit the Lenovo® Support Web site at <http://www.lenovo.com/support>. The customers can view the software fixes, download the drivers, and see the instructions for installing the drivers. For additional assistance, customers might call the Lenovo Customer Support Center. Telephone numbers for the Lenovo Support Center are available at:
<http://www.lenovo.com/support/phone>
- Service training documents, for example the videos that show the FRU removals or replacements, are provided to Lenovo authorized service technicians. The training documents are available at:
<http://www.lenovoservicetraining.com>

Strategy for replacing FRUs

Before replacing parts:

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

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

To download software fixes, drivers, and UEFI BIOS, go to <http://www.lenovo.com/ThinkPad> Drivers and follow the instructions on the screen.

- If you are instructed to replace a FRU but the replacement does not correct the problem, reinstall the original FRU before you continue.
- Some tablets 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 tablet 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.

Important notice for replacing a system board

Attention: When handling a system board:

- Do not drop a system board or apply any excessive force to it.

- Avoid rough handling of any kind.
- Avoid bending a system board and hard pushing to prevent cracking at each Ball Grid Array (BGA) chipset.

How to use error message

Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, begin the diagnosis with the first error code. Whatever causes the first error code 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 tablet you are servicing.

Strategy for replacing FRUs for CTO, special bid model, and standard models

This topic provides information about the model types and FRU identification.

Product definition

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

Dynamic Configure To Order (CTO)

This model provides the ability for a customer to configure a Lenovo solution from a web site, and have this configuration sent to fulfillment, where it is built and shipped directly to the customer. The machine label and eSupport will load these products as the 4-character MT, 4-character model and 2-character country code. The model is “CTO1” and the default country code is “WW” (example: 20AACTO1WW).

Special bid model

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

Standard model

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

FRU identification

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

To identify the major FRUs for a product, do the following:

1. Go to <http://support.lenovo.com/ibasepartslookup>.
2. Type the Machine Type and Serial Number in the corresponding fields.
3. Tap **Submit**.

eSupport also can be used to view the general FRU list for a product. The FRU list is a general list of components and does not contain specific model information.

To get the general FRU list for a product, do the following:

1. Go to <http://support.lenovo.com>.
2. Follow the instructions on the screen to select a product.
3. Tap the **Product & Parts** tab.
4. Select **System Service Parts** to view a general FRU list.

Chapter 3. General checkout

This chapter introduces following information:

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

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

Important:

- **Only certified trained personnel should service the tablet.**
- **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.**
- **Replace a FRU only with another FRU of the correct model.** When you replace a FRU, ensure that the model of the machine and the FRU part number are correct by referring to the 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 non-defective 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. Failing FRU name and part number
6. Machine type, model number, and serial number
7. Customer's name and address

Note: During the warranty period, the customer may be responsible for repair costs if the tablet 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 tablet, 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 tablet password (making the tablet unusable)
- Sticky keys caused by spilling a liquid
- Damage caused due to use of an incorrect ac power adapter

The following symptom might indicate damage caused by nonwarranted activities:

- Missing parts might be a symptom of unauthorized service or modification.

Checkout guide

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

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

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

Lenovo Solution Center

The Lenovo Solution Center program enables you to troubleshoot and resolve tablet problems. It combines diagnostic tests, system information collection, security status, and support information, along with hints and tips for maximum system performance.

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

To run the Lenovo Solution Center program, do the following:

1. Go to Control Panel.
2. Tap **System and Security** → **Lenovo - System Health and Diagnostics**.
3. Follow the instructions on the screen.

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

Quick test programs

Run quick test programs to troubleshoot and resolve tablet problems, especially when the tablet does not have the Lenovo Solution Center program installed.

Lenovo provides the following quick test programs:

- **Lenovo Hard Drive Quick Test:** Use this program to troubleshoot and resolve internal storage problems.
- **Lenovo Memory Quick Test:** Use this program to troubleshoot and resolve memory module problems.

The quick test programs are applicable on the following operating systems:

- Microsoft® Windows® 10
- Microsoft Windows 8.1
- Microsoft Windows 8
- Microsoft Windows 7
- Microsoft Windows XP
- Microsoft Windows Server® 2003
- Microsoft Windows Server 2008

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

UEFI diagnostic program

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

To run the UEFI diagnostic program, do the following:

Note: Before you start, connect your tablet to a keyboard. Use the external keyboard to perform the following operations.

1. Restart the tablet. When the logo screen is displayed, repeatedly press and release the F10 key. The main screen of the UEFI diagnostic program is displayed.

Notes:

- If the tablet cannot be turned on, go to “Power system checkout” on page 26, and check the power sources.
 - If an error code is displayed, go to “Symptom-to-FRU index” on page 35 for error code descriptions and troubleshooting hints.
2. Follow the instructions on the screen to use the diagnostic program.

The options on the main screen are as follows:

Note: The items on the main screen of the UEFI diagnostic program are subject to change.

Table 1. Items on the main screen of the UEFI diagnostic program

Tests	Tools
<ul style="list-style-type: none">• Quick Memory Test• Quick Storage Device Test• LCD test• PCI-e test• Exit Application	<ul style="list-style-type: none">• System Information• Generate configuration file• Execute from configuration file

Bootable diagnostic programs

If the tablet 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 tablet 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 Universal Serial Bus (USB) device or CD.

To create a bootable diagnostic medium, do the following:

1. Go to <http://www.lenovo.com/diags>.
2. Tap **Lenovo Bootable Diagnostics**.
3. Follow the instructions on the Web site to create a bootable diagnostic medium.

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

1. Connect the bootable diagnostic medium to the tablet.

- Restart the tablet. When the logo screen is displayed, tap **To interrupt normal startup, press Enter or tap here** on the screen.

Notes:

- If the tablet cannot be turned on, go to “Power system checkout” on page 26, and check the power sources.
 - If an error code is displayed, go to “Symptom-to-FRU index” on page 35 for error code descriptions and troubleshooting hints.
- Tap **F12** on the screen and follow the instructions to start the tablet from the bootable diagnostic medium.
 - Follow the instructions on the screen to use the diagnostic program.

Power system checkout

To verify a symptom, do the following:

- Turn off the tablet.
- Connect the ac power adapter.
- Turn on the tablet. If the tablet can be turned on, it means that either the battery or the ac power adapter is functional.
- Insert a straightened paper clip into the emergency reset hole to reset the tablet. If the tablet is still powered on, it means that the ac power adapter is functional.
- Turn off the tablet.
- Disconnect the ac power adapter and turn on the tablet. If the tablet can be turned on, it means that the battery is functional.

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

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

Checking the built-in battery and operational charging

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

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

Move your pointer to the battery-status icon in the Windows notification area to check the battery status. The battery-status icon displays the percentage of battery power remaining and how long you can use your computer before you must charge the battery.

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

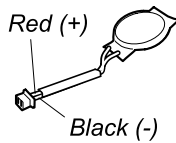
- Ensure that the tablet failure is not caused by exhausted battery power.
- Reset the tablet by inserting a straightened paper clip into the emergency reset hole. Then press the power button. If the tablet cannot be turned on, continue with the next step.
- Clear Complementary Metal Oxide Semiconductor (CMOS) by inserting a straightened paper clip into the emergency reset hole and tapping the Windows Start-screen control at the same time.
- Press the power button. If the tablet cannot be turned on, continue with the next step.
- Connect the ac power adapter and press the power button.

- If the tablet is turned on, disconnect the ac power adapter from the tablet. If the tablet turns off, it means that the built-in battery fails.
- If the tablet cannot be turned on, replace the built-in battery with another one. If the tablet can start up with the new battery installed, it means that the original battery fails.

Checking the coin-cell battery

To check the coin-cell battery, do the following:

1. Disable the internal battery pack. See “Disabling the built-in battery” on page 48.
2. Remove the coin-cell battery. See “1080 Coin-cell battery” on page 62.
3. Measure the voltage of the coin-cell battery. See the following illustration.



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 coin-cell battery.
- If the coin-cell battery discharges quickly after replacement, replace the system board.

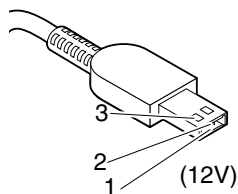
Checking the ac power adapter

When you use the ac power adapter to charge the tablet but no power is charged, see the instructions in this topic to check the ac power adapter.

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

To check the ac power adapter, do the following:

1. Disconnect the ac power adapter from the tablet.
2. Measure the output voltage at the plug of the ac power adapter. Refer to the following illustration:



Pin	Voltage (V dc)
1	+12
2	0
3	Ground

3. If the voltage is not correct, replace the ac power adapter.
4. If the voltage is acceptable, replace the system board.

Chapter 4. Related service information

This chapter presents the following information:

- “Restoring the factory contents by using the Recovery Disc Set” on page 29
- “Using the Windows recovery programs on the Windows 8.1 operating system” on page 30
- “Recovery overview for the Windows 10 operating system” on page 32
- “Passwords” on page 34
- “Symptom-to-FRU index” on page 35

Restoring the factory contents by using the Recovery Disc Set

When the main storage drive is replaced because of a failure, the replacement drive does not contain the product recovery programs. Therefore, the customer must use the Recovery Disc Set specifically designed for the tablet to reinstall the factory default contents and settings. Order the Recovery Disc Set and the drive at the same time so that the customer can use the Recovery Disc Set to restore the contents of the tablet after the new drive is installed. For information about which discs to order, go to <http://www.lenovo.com/serviceparts-lookup>.

Depending on the model, the number of recovery discs included in the Recovery Disc Set differs. The Recovery Disc Set might consist of the user instructions and the following DVDs to restore the tablet 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 tablet.
- *Supplemental Recovery Disc*: This disc contains additional content, such as updates to the software that was preinstalled on the tablet. Not all recovery disc sets come with a *Supplemental Recovery Disc*.

Notes:

- During the recovery process, all data on the main storage 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.
- 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.

To restore the tablet to the original factory configuration using the Recovery Disc Set, do the following:

1. Connect the tablet to an external CD/DVD drive. Use the external CD/DVD drive to read the recovery discs.
2. Restart the tablet. When the logo screen is displayed, tap **To interrupt normal startup, press Enter or tap here** on the screen.
3. Tap **F12** on the screen and follow the instructions to start the tablet from the CD/DVD drive.
4. Insert the *Applications and Drivers Recovery Disc* when prompted. Then follow the instructions on the screen to recover applications and drivers.
5. If you have a *Supplemental Recovery Disc*, insert it when prompted and tap **Yes**. If you do not have a *Supplemental Recovery Disc*, tap **No**.
6. 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 tablet.

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

Using the Windows recovery programs on the Windows 8.1 operating system

This section provides information about the recovery solutions for the Windows 8.1 operating system.

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

You can create recovery media as backups or replacement for the Windows recovery image. With the recovery media, you can troubleshoot and fix the problems on your tablet even if you cannot start the Windows 8.1 operating system. It is recommended that you create recovery media as early as possible, see “Creating and using recovery media” on page 31.

Refreshing your tablet

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

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

To refresh your tablet, do the following:

1. Swipe in from the right edge of the screen to display the charms.
2. Tap **Settings** → **Change PC settings** → **Update and recovery** → **Recovery**.
3. In the **Refresh your PC without affecting your files** section, tap **Get started**.
4. Follow the instructions on the screen to refresh your tablet.

Resetting your tablet to the factory default settings

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

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

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

1. Swipe in from the right edge of the screen to display the charms.
2. Tap **Settings** → **Change PC settings** → **Update and recovery** → **Recovery**.
3. In the **Remove everything and reinstall Windows** section, tap **Get started**. Then tap **Next** to confirm the operation.
4. Depending on your needs, do one of the following:
 - To perform a quick format, tap **Just remove my files** to start the process. The process will take several minutes.
 - To perform a complete format, tap **Fully clean the drive** to start the process. The process will take several hours.
5. Follow the instructions on the screen to reset your tablet to the factory default settings.

Using the advanced startup options

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

To use the advanced startup options, do the following:

1. Swipe in from the right edge of the screen to display the charms.
2. Tap **Settings** → **Change PC settings** → **Update and recovery** → **Recovery**.
3. In the **Advanced startup** section, tap **Restart now** → **Troubleshoot** → **Advanced options**.
4. Select a desired startup option, then follow the instructions on the screen.

Recovering your operating system if the Windows 8.1 operating system fails to start

The Windows recovery environment preinstalled on your tablet is capable of operating independently from the Windows 8.1 operating system. This enables you to recover or repair the operating system if the Windows 8.1 operating system fails to start.

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

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

Creating and using recovery media

You can create a recovery USB drive as a backup or replacement for the Windows recovery programs. With the recovery USB drive, you can troubleshoot and fix the problems even if the preinstalled Windows recovery programs on the tablet are damaged.

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

Creating a recovery USB drive

The USB drive that you use to create the recovery USB drive should be at least 16 GB of storage. The actual USB capacity that is required depends on the size of the recovery image.

Attention: The creation process will delete anything stored on the USB drive. To avoid data loss, make a backup copy of all the data that you want to keep.

To create a recovery USB drive, do the following:

Note: Ensure that the tablet is connected to ac power during the following process.

1. Swipe in from the right edge of the screen to display the charms, and tap **Search**.
2. Type **recovery** in the **Search** field and tap the Search button. Then tap **Create a recovery drive**.
3. Tap **Yes** in the User Account Control window to allow the Recovery Media Creator program to start.
4. Ensure that you select the **Copy the recovery partition from the PC to the recovery drive** option. Then tap **Next**.
5. Connect a proper USB drive then tap **Next**.
6. Tap **Create** in the Recovery Drive window. The creation of the recovery USB drive starts.
7. When the creation finishes, do one of the following:

- To keep the recovery partition on your tablet, tap **Finish**.
- To delete the recovery partition on your tablet, tap **Delete the recovery partition**.

Attention: If you delete the recovery partition on your tablet, do keep a recovery USB drive in a safe place. The Windows recovery programs will not be stored in your tablet anymore, and you can only use the recovery USB drive to refresh or reset your tablet.

8. Remove the USB drive. The recovery USB drive is created successfully.

Using the recovery USB drive

If you cannot use the Windows recovery programs which are preinstalled on your tablet, use the recovery USB drive to recover your tablet.

To use the recovery USB drive, do the following:

Note: Ensure that the tablet is connected to ac power during the recovery process.

1. Connect the recovery USB drive to the tablet.
2. Restart the tablet. When the logo screen is displayed, tap **To interrupt normal startup, press Enter or tap here** on the screen.
3. Tap **F12** on the screen and follow the instructions to start the tablet from the recovery USB drive.
4. Follow the instructions on the screen to complete the recovery process.

For more information about the recovery solutions provided by the Windows 8.1 operating system, go to: <http://go.microsoft.com/fwlink/?LinkID=263800>

Recovery overview for the Windows 10 operating system

The Windows recovery programs enable you to reset your tablet or use advanced startup options.

It is recommended that you create a recovery USB drive as early as possible. Store the recovery USB drive as a backup or replacement for the Windows recovery programs.

For more information, see “Creating and using a recovery USB drive” on page 33.

Resetting your tablet

If your tablet does not perform well, you might consider resetting your tablet. In the resetting process, you can choose to keep your files or remove them, and then reinstall the Windows operating system.

To reset your tablet, do the following:

Note: The graphical user interface (GUI) items of the operating system might change without notice.

1. Open the Start menu and then tap **Settings**. If **Settings** is not displayed, tap **All apps** to display all programs, and then tap **Settings → Update & security → Recovery**.
2. In the **Reset this PC** section, tap **Get started**.
3. Follow the instructions on the screen to reset your tablet.

Using advanced startup options

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

To use advanced startup options, do the following:

Note: The GUI items of the operating system might change without notice.

1. Open the Start menu and then tap **Settings**. If **Settings** is not displayed, tap **All apps** to display all programs, and then tap **Settings** → **Update & security** → **Recovery**.
2. In the **Advanced startup** section, tap **Restart now** → **Troubleshoot** → **Advanced options**.
3. Select a desired startup option, then follow the instructions on the screen.

Recovering your operating system if Windows 10 fails to start

The Windows recovery environment on your tablet is capable of operating independently from the Windows 10 operating system. This enables you to recover or repair the operating system even if the Windows 10 operating system fails to start.

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

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

Creating and using a recovery USB drive

You can create a recovery USB drive as a backup for the Windows recovery programs. With the recovery USB drive, you can troubleshoot and fix the problems even if the preinstalled Windows recovery programs are damaged.

Creating a recovery USB drive

The USB drive that you use to create the recovery USB drive must be at least 16 GB of storage. The actual USB capacity that is required depends on the size of the recovery image.

Attention: The creation process deletes anything stored on the USB drive. To avoid data loss, make a backup copy of all the data that you want to keep.

To create a recovery USB drive, do the following:

Note: Ensure that your tablet is connected to ac power during the following process.

1. Connect a proper USB drive (at least 16 GB of storage).
2. Type *recovery* in the search box on the taskbar. Then tap **Create a recovery drive**.
3. Tap **Yes** in the User Account Control window to allow the Recovery Media Creator program to start.
4. In the Recovery Drive window, follow the on-screen instructions to create a recovery USB drive.

Using the recovery USB drive

If you cannot start your tablet, use the recovery USB drive to recover your tablet.

To use a recovery USB drive, do the following:

Note: Ensure that your tablet is connected to ac power.

1. Connect the recovery USB drive to the tablet.
2. Restart the tablet. When the logo screen is displayed, tap **To interrupt normal startup, press Enter or tap here** on the screen.
3. Select the recovery USB drive as the boot device.
4. Select a preferred keyboard layout.

5. Tap **Troubleshoot** to display the optional recovery solutions.
6. Select a corresponding recovery solution according to your situation. Then follow the instructions on the screen to complete the process.

Passwords

Three passwords might be available: the power-on password, the hard disk password, and the supervisor password.

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

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

Power-on password

A power-on password protects the system from being powered on by an unauthorized person. The users must enter the power-on password in order to start the operating system.

If the customer forgets the power-on password, the service technician can remove the power-on password by doing one of the following:

- If no supervisor password has been set, do the following to remove the power-on password:
 1. Turn off the tablet.
 2. Illustration showing how to disconnect the built-in battery, and remove the coin-cell battery. See “1080 Coin-cell battery” on page 62.
 3. Install the coin-cell battery and connect the built-in battery. See “1080 Coin-cell battery” on page 62. The power-on password is removed.
- If a supervisor password has been set, do the following to remove the power-on password:

Note: The supervisor password must be entered to open the ThinkPad Tablet Setup program. If the customer forgets the supervisor password, there is no service procedure to reset the password. The system board must be replaced for a scheduled fee.

1. Restart the tablet. When the logo screen is displayed, tap **To interrupt normal startup, press Enter or tap here** on the screen.
2. Tap **F1** on the screen to start the ThinkPad Tablet Setup program. When prompted, enter the supervisor password.
3. Tap **Security → Password**. Then tap **Enter** next to the **Power-On Password** item. The Power-On Password window opens.
4. Type the supervisor password in the **Enter Current Password** field, and leave the other fields blank, then tap **OK**.
5. A Setup Notice message is displayed. Tap **Continue**. The power-on password is removed.
6. Tap **Home → Restart → Exit Saving Changes**.
7. A confirmation message is displayed. Tap **Yes** to restart the tablet.

Supervisor password

The supervisor password protects the system information stored in the ThinkPad Tablet Setup program. If a supervisor password is set, users must enter the supervisor password to open the ThinkPad Tablet Setup program.

Attention: If the customer forgets the supervisor password, there is no service procedure to reset the password. The system board must be replaced for a scheduled fee.

Hard disk password

There are two kinds of hard disk passwords:

- User hard disk password - for the user
- Master hard disk password - for the system administrator

Attention: If the customer forgets the user hard disk password, he or she can use the supervisor hard disk password to access the solid-state drive. If the customer forgets the master hard disk password, there is no service procedure to reset the password. The solid-state drive must be replaced for a scheduled fee.

If the user forgets the user hard disk password, but can provide the master hard disk password, do the following to remove the user hard disk password:

1. Restart the tablet. When the logo screen is displayed, tap **To interrupt normal startup, press Enter or tap here** on the screen.
2. Tap **F1** on the screen to start the ThinkPad Tablet Setup program.
3. Tap **Security** → **Password** to display the **Password** menu items.
4. Tap **Enter** next to the **Hard disk x Password** item. A Setup Notice message is displayed.
5. Tap either **User HDP** or **Master HDP**. The Hard Disk x Password window opens.
6. Type the master hard disk password in the **Enter Current Password** field, and leave the other fields blank, then tap **OK**. A Setup Notice message is displayed.
7. Tap **Continue**. The hard disk password is removed.
8. Tap **Home** → **Restart** → **Exit Saving Changes**. A confirmation message is displayed.
9. Tap **Yes** to restart the tablet.

Symptom-to-FRU index

This section contains following information:

- “Error codes” on page 36
- “Intermittent problems” on page 37
- “Undetermined problems” on page 37

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 tablet. Do not replace a nondefective FRU.

This index can also help you determine, during regular servicing, what FRUs are likely 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 37.

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

Error codes

Table 2. Error codes

Symptom or error	FRU or action, in sequence
0177 Bad SVP data, stop POST task—The checksum of the supervisor password in the EEPROM is not correct.	Replace the system board.
0183 Bad CRC of Security Settings in EFI Variable. Enter ThinkPad Tablet Setup.	Checksum of the Security settings in the EFI Variable is not correct. Enter ThinkPad Tablet Setup to check Security settings, and restart the system. If you still have a problem, have the tablet serviced.
0187 EAIA data access error.	The access to EEPROM is failed. Have the tablet serviced.
0188 Invalid RFID Serialization Information Area.	The EEPROM checksum is not correct (block # 0 and 1). The system board should be replaced, and the box serial number should be reinstalled. Have the tablet serviced.
0189 Invalid RFID configuration information area.	The EEPROM checksum is not correct (block # 4 and 5). The system board should be replaced, and the UUID should be reinstalled. Have the tablet serviced.
0190 Critical low-battery error.	The tablet turned off, because the battery is low. Connect the ac power adapter to the tablet and charge the battery.
0191 System Security—Invalid Remote Change requested.	<ol style="list-style-type: none"> 1. Run the ThinkPad Tablet Setup program. 2. Replace the system board.
0199 System Security - Security password retry count exceeded.	This message is displayed if you enter a wrong supervisor password more than three times. Confirm the supervisor password and try again. To clear the error, enter the ThinkPad Tablet Setup.
0270 Real Time Clock Error.	System Real Time Clock is not functional. Have the tablet serviced.
0271 Check Date and Time settings.	Neither the date nor the time is set in the tablet. Set the date and time, using the ThinkPad Setup program.
1802 Unauthorized network card is plugged in—Turn off and remove the network card.	The wireless network card is not supported on this tablet. Remove it.
1820 More than one external fingerprint reader is attached. Power off and remove all but the reader that you set up within your main operating system.	Power off and remove all but the reader that you set up within your main operating system.
2101 Detection error on SSD (M.2)	The M.2 SSD device is not working. Have the M.2 SSD device serviced.
2111 Read error on SSD (M.2)	The M.2 SSD device is not working. Have the M.2 SSD device serviced.
2200 Machine Type and Serial Number are invalid.	Machine Type and Serial Number are invalid. Have the tablet serviced.
2201 Machine UUID is invalid.	Machine UUID is invalid. Have the tablet serviced.

Table 2. Error codes (continued)

Symptom or error	FRU or action, in sequence
<p>Message: Thermal sensing error</p>	<p>The thermal sensor has problem. Shut down the tablet immediately and have the tablet serviced.</p>
<p>Message: Error: The System UEFI Variable Storage is nearly full. Note: This error indicates that the operating system or applications cannot create, modify, or delete data in the non-volatile system UEFI variable storage due to insufficient storage space after POST.</p> <p>The non-volatile system UEFI variable storage is used by the UEFI BIOS and by the operating system or applications. This error occurs when the operating system or applications store large amounts of data in the variable storage. All data needed for POST, such as BIOS setup settings, chipset or platform configuration data, are stored in a separate UEFI variable storage.</p>	<p>Enter ThinkPad Tablet Setup after the error message is displayed. A dialog asks the user for confirmation to clean up the storage. If the user selects “Yes”, all data that were created by the operating system or applications are deleted except global variables defined by the Unified Extensible Firmware Interface Specification. If the user selects “No”, all data is kept, but the operating system or applications will not be able to create, modify, or delete data in the storage.</p> <p>If this error happens at a service center, Lenovo authorized service personnel will clean up the non-volatile system UEFI variable storage using the above solution.</p>

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 tablet.

Verify that the power supply being used at the time of the failure is operating correctly. See “Power system checkout” on page 26.

1. Turn off the tablet.
2. Visually check each FRU for damage. Replace any damaged FRU.
3. Remove or disconnect all of the following devices:
 - a. Non-ThinkPad devices
 - b. Devices attached to the docking station or the port replicator
 - c. Printer, mouse, and other external devices
 - d. Battery
 - e. External diskette drive or optical drive
 - f. PC cards
4. Turn on the tablet.
5. Determine whether the problem has been solved.
6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
7. If the problem remains, replace the following FRUs one at a time (do not replace a non-defective FRU):
 - a. System board

b. LCD assembly

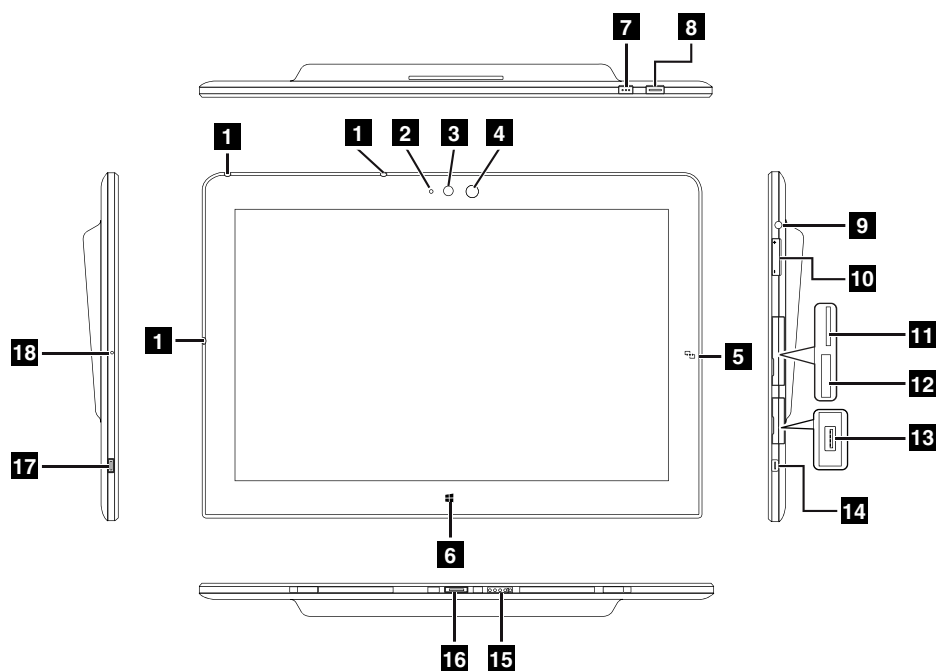
Chapter 5. Locations

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

Locating tablet controls, connectors, and indicators

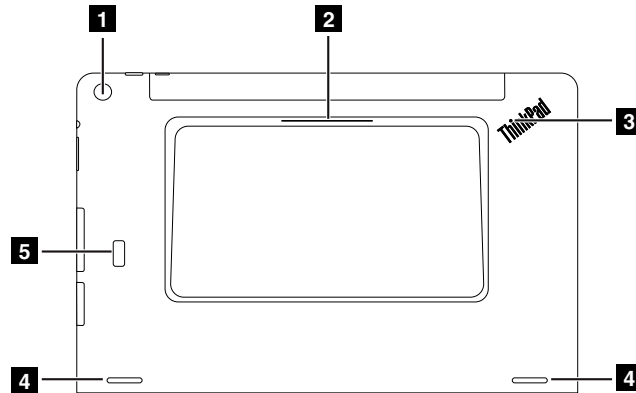
Front view and side view

Note: The tablet might look slightly different from the following illustration.



- | | |
|--|----------------------------------|
| 1 Microphones | 2 Camera-status indicator |
| 3 Front-facing camera | 4 Ambient light sensor |
| 5 NFC touchpoint (on some models) | 6 Windows button |
| 7 Screen-rotation-lock button | 8 Power button |
| 9 Audio connector | 10 Volume-control buttons |
| 11 Micro-SIM-card slot (on some models) | 12 Micro-SD-card slot |
| 13 USB 3.0 connector | 14 Micro HDMI™ connector |
| 15 Keyboard connector | 16 Dock connector |
| 17 Power connector | 18 Emergency-reset hole |

Rear view



- 1** Rear-facing camera
- 2** Smart card slot (on some models)
- 3** System-status indicator
- 4** Speakers
- 5** Fingerprint reader (on some models)

Locating FRUs and CRUs

This topic introduces the following service parts:

- “Major FRUs” on page 41
- “Miscellaneous kits and other parts” on page 42

Notes:

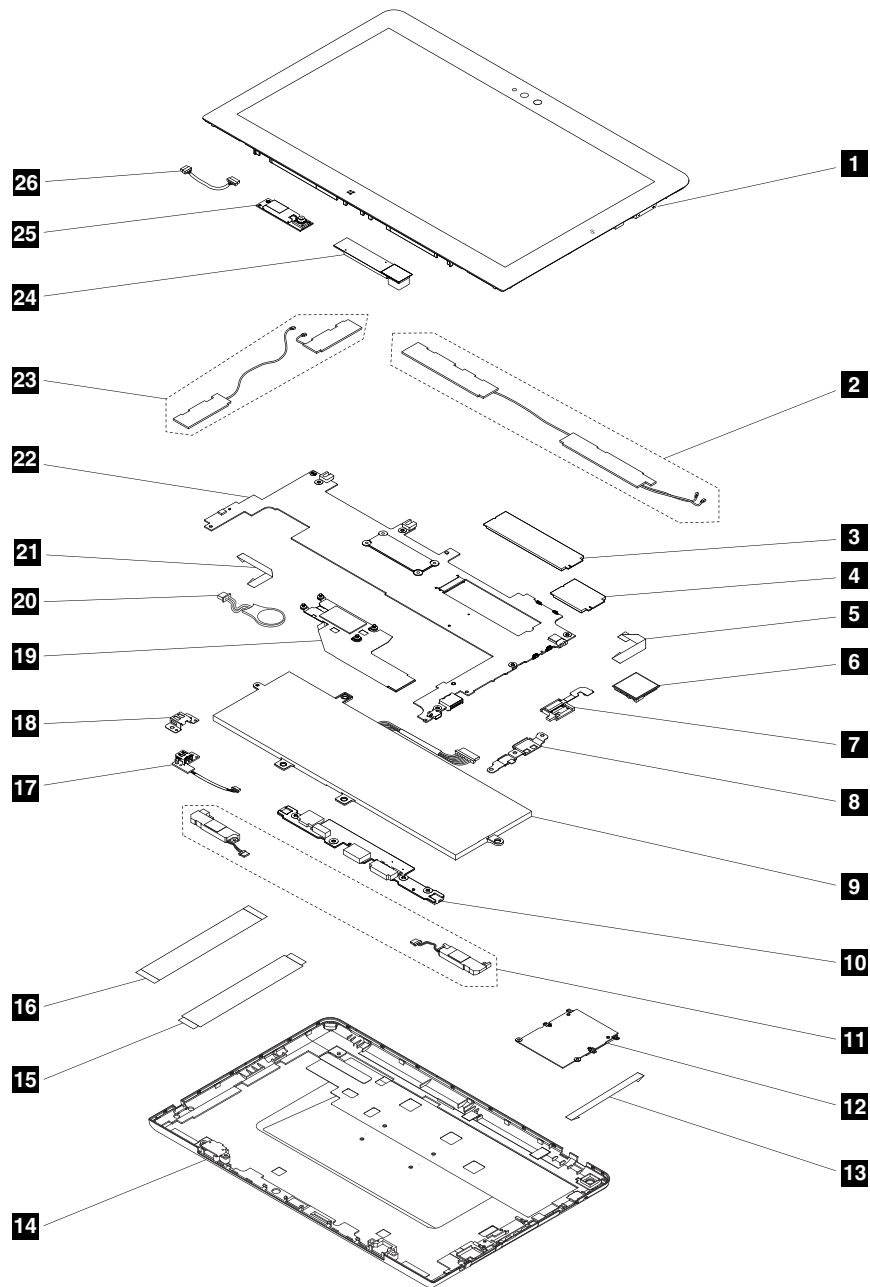
- Each FRU is available for all types or models, unless otherwise specified.
- **CRU statement for customers:**

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

ThinkPad tablets contain the following types of CRUs:

Self-service CRUs: Examples of these types of CRUs include the ac power adapter and power cord.

Major FRUs



No.	FRU	Self-service CRU	Optional-service CRU
1	LCD module	No	No
2	Wireless-WAN antenna assembly	No	No
3	M.2 solid-state drive	No	No
4	Wireless WAN card	No	No
5	NFC-card cable	No	No
6	NFC card	No	No
7	Fingerprint-reader module	No	No
8	USB-connector bracket	No	No

No.	FRU	Self-service CRU	Optional-service CRU
9	Built-in battery	No	No
10	I/O card	No	No
11	Speakers	No	No
12	Smart-card reader	No	No
13	Smart-card-reader cable	No	No
14	Back cover assembly	No	No
15	LCD cable	No	No
16	I/O-card cable	No	No
17	dc-in cable	No	No
18	dc-in-cable bracket	No	No
19	Thermal module	No	No
20	Coin-cell battery	No	No
21	Digitizer cable	No	No
22	System board	No	No
23	Wireless-LAN antenna assembly	No	No
24	Rear-facing camera module	No	No
25	Front-facing camera module	No	No
26	Front-facing-camera-module cable	No	No

Miscellaneous kits and other parts

Table 3. Miscellaneous kits

FRU descriptions	Self-service CRU	Optional-service CRU
Screw kit	No	No
Magnet kit	No	No
Sponges	No	No
Mylars	No	No
Rubbers	No	No
Buttons	No	No
Brackets	No	No
Logo badge	No	No

Table 4. Other parts

Descriptions	Self-service CRU	Optional-service CRU
ac power adapter	Yes	No
Power cord	Yes	No
ThinkPad Helix Quickshot Cover (on some models)	Yes	No
ThinkPad USB 3.0 Ethernet Adapter (on some models)	Yes	No
Lenovo Micro HDMI To VGA Adapter (on some models)	Yes	No
ThinkPad Helix Ultrabook™ Keyboard (on some models)	Yes	No

Table 4. Other parts (continued)

Descriptions	Self-service CRU	Optional-service CRU
ThinkPad Helix Ultrabook Pro Keyboard (on some models)	Yes	No
Tablet Digitizer Pen (on some models)	Yes	No
ThinkPad Active Pen (on some models)	Yes	No

Looking up FRU information

For detailed FRU information, including part numbers, descriptions, and substitution part numbers, go to <http://www.lenovo.com/serviceparts-lookup>.

Chapter 6. FRU replacement notices

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

CRU statement for customers:

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

Screw notices

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

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

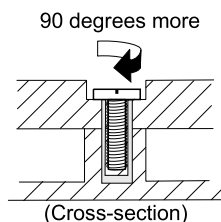
Do the following when you service this machine:

- Keep the screw kit in your tool bag. For the part number of the screw kit, go to <http://www.lenovo.com/serviceparts-lookup>.
- It is recommended to use new screws.
- It is recommended to use each screw only once.

Tighten screws as follows:

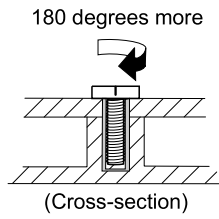
- **Plastic to plastic**

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



- **Logic card to plastic**

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



Notes:

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

Retaining serial numbers

Instructions for retaining serial numbers, MTM, UUID, or asset ID can be found from the Lenovo Support Web site at:

<http://www.lenovo.com/support>

Chapter 7. Removing or replacing a FRU

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

CRU statement for customers:

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

General guidelines

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

1. Do not try to service any tablet unless you have been trained and certified. An untrained person runs the risk of damaging parts.
2. Before replacing any FRU, review Chapter 6 “FRU replacement notices” on page 45.
3. Begin by removing any FRUs that have to be removed before replacing the failing FRU. Any such FRUs are listed at the beginning of in each FRU replacement section. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing a FRU, as given in the drawings by the numbers in square callouts.
5. When turning a screw, turn it in the direction as given by the arrow in the drawing.
6. When removing a FRU, remove it in the direction as given by the arrow in the drawing.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement.
8. When replacing a FRU, use the correct screws as shown in the replacement procedures.



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

Attention: After replacing a FRU, do not turn on the tablet until you have made sure that all screws, springs, and other small parts are in place and none are loose inside the tablet. Verify this by shaking the tablet 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(ESD). Before touching it, establish personal grounding by touching a ground point with one hand or by using an ESD strap.

Before servicing the tablet

Before you service this tablet, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.

Disabling the built-in battery

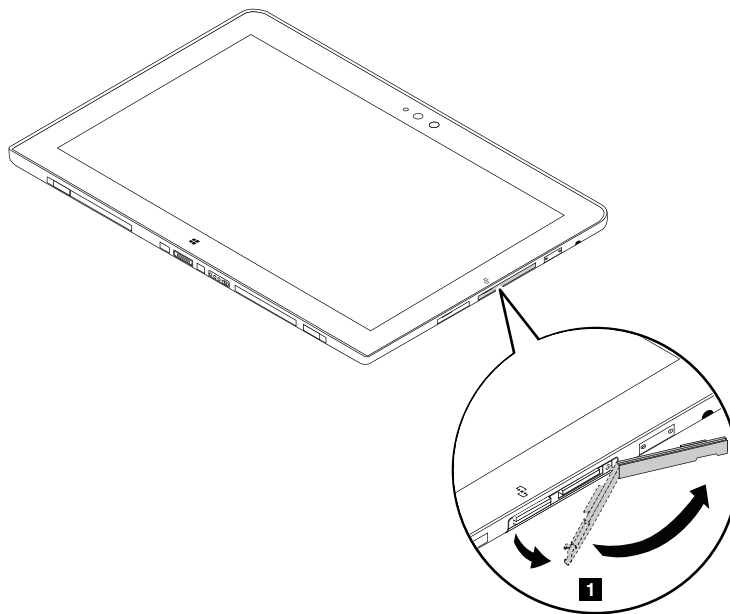
To disable the built-in battery, do the following:

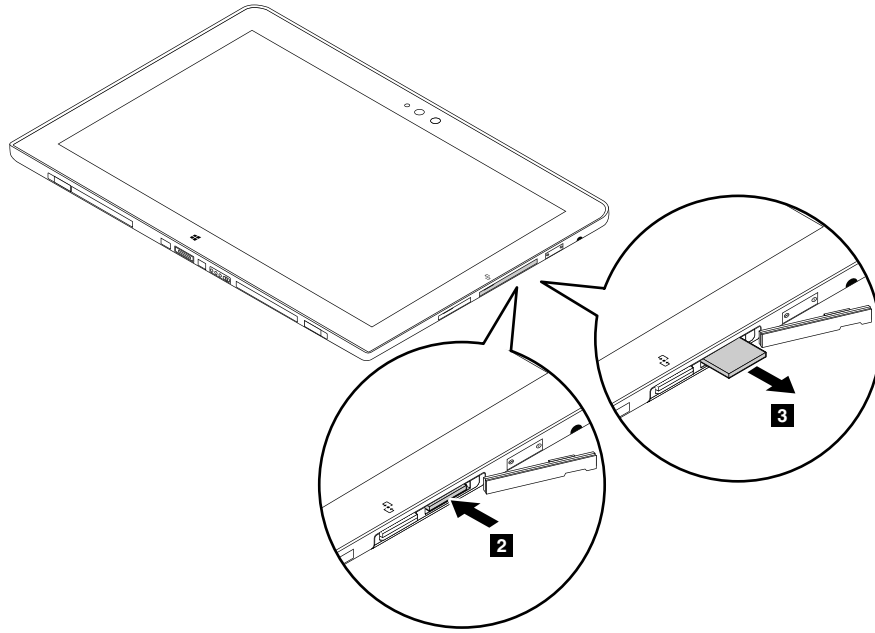
1. Remove the ac power adapter and the external devices.
2. Restart the tablet. When the logo screen is displayed, tap **To interrupt normal startup, press Enter or tap here** on the screen.
3. Tap **F1** on the screen to start the ThinkPad Tablet Setup program.
4. Tap **Config** → **Power** to display the **Power** menu items.
5. Tap **Enter** next to the **Disable Built-in Battery** item.
6. A confirmation message is displayed. Tap **Yes** to disable the built-in battery and to turn off the tablet.

Removing the SIM card, SD card, and smart card

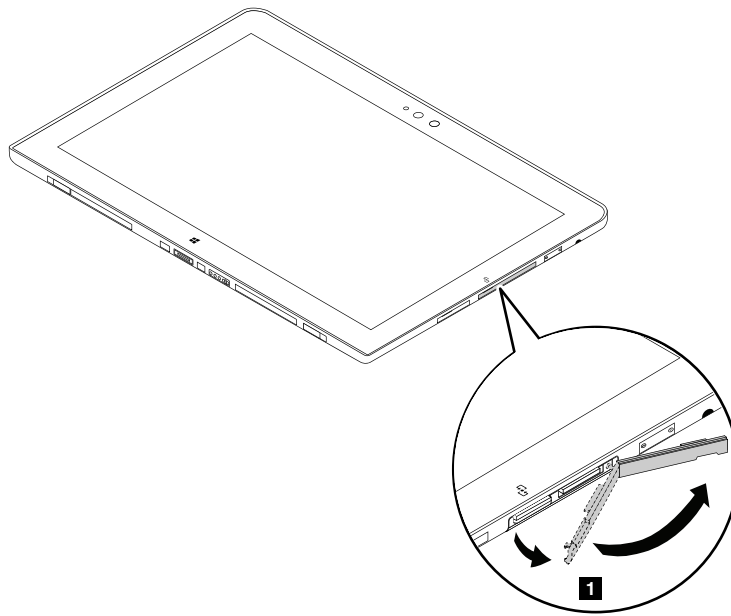
If the tablet has a SIM card, an SD card, or a smart card installed, remove them before you service the tablet.

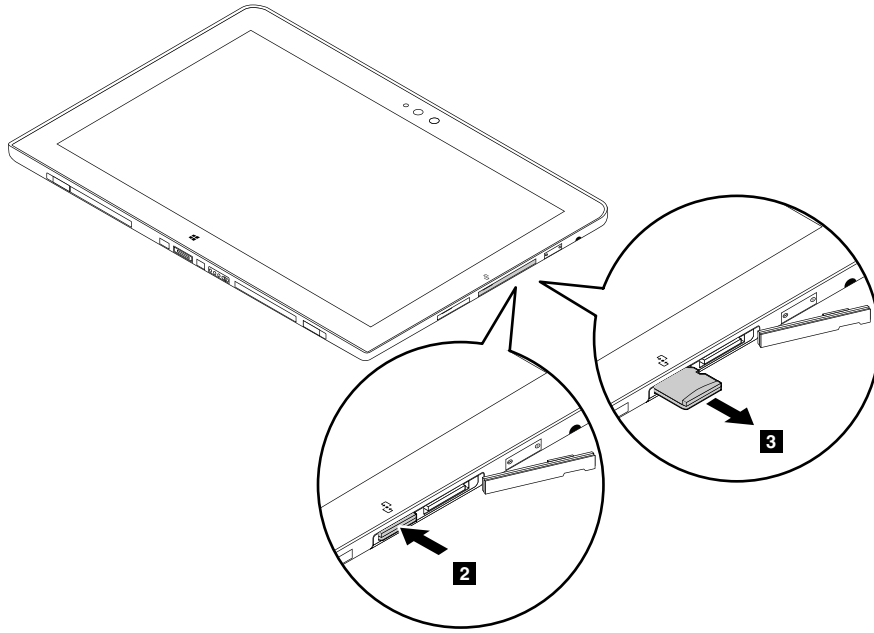
Removal steps of the SIM card



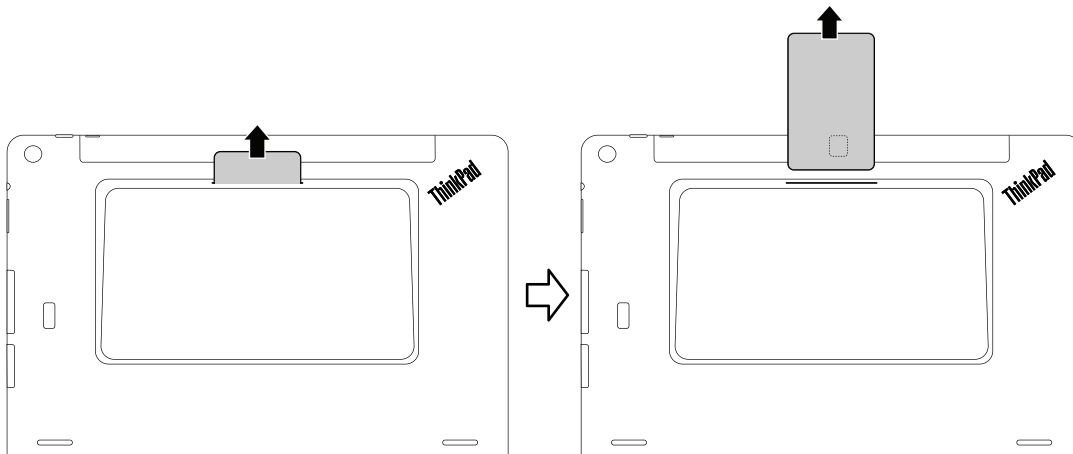


Removal steps of the SD card





Removal step of the smart card



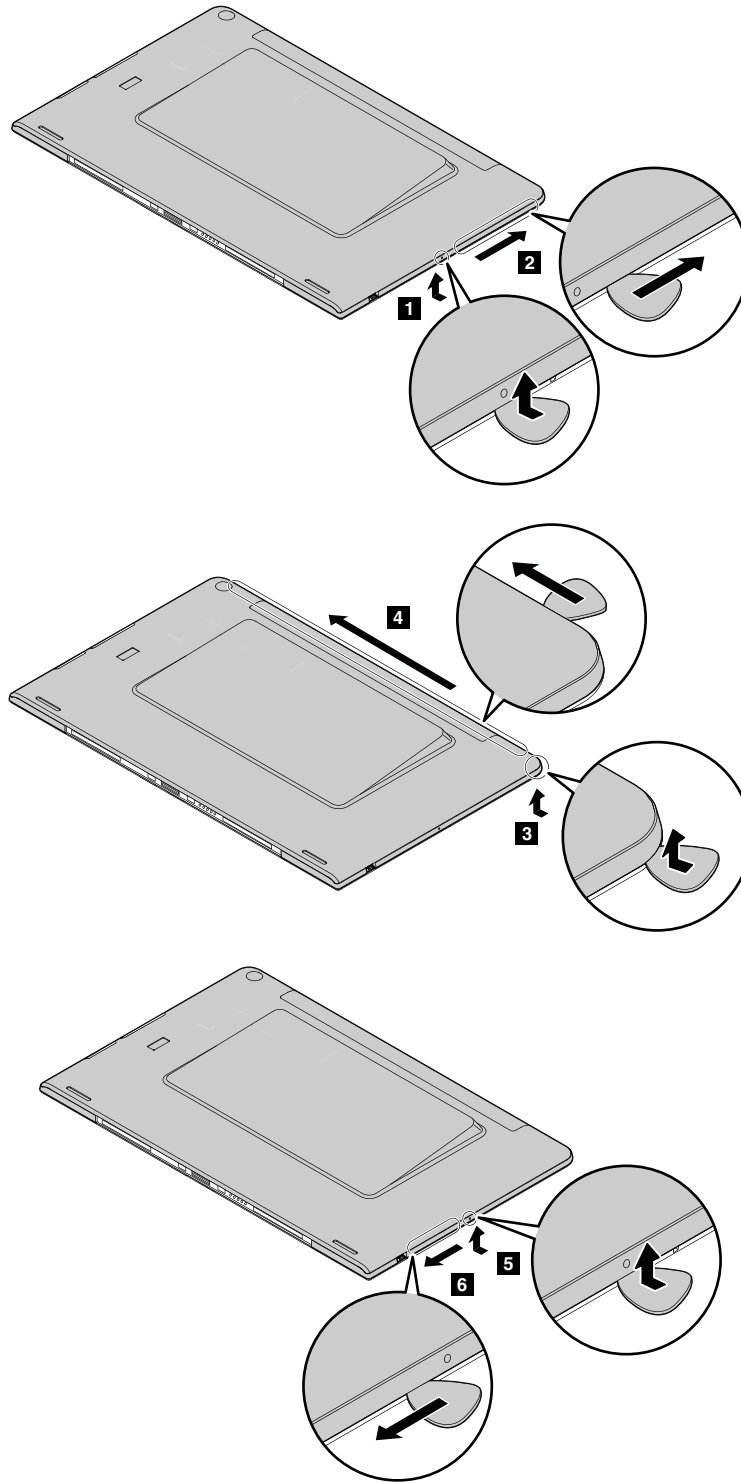
1010 Back cover assembly, smart-card reader, and smart-card-reader cable

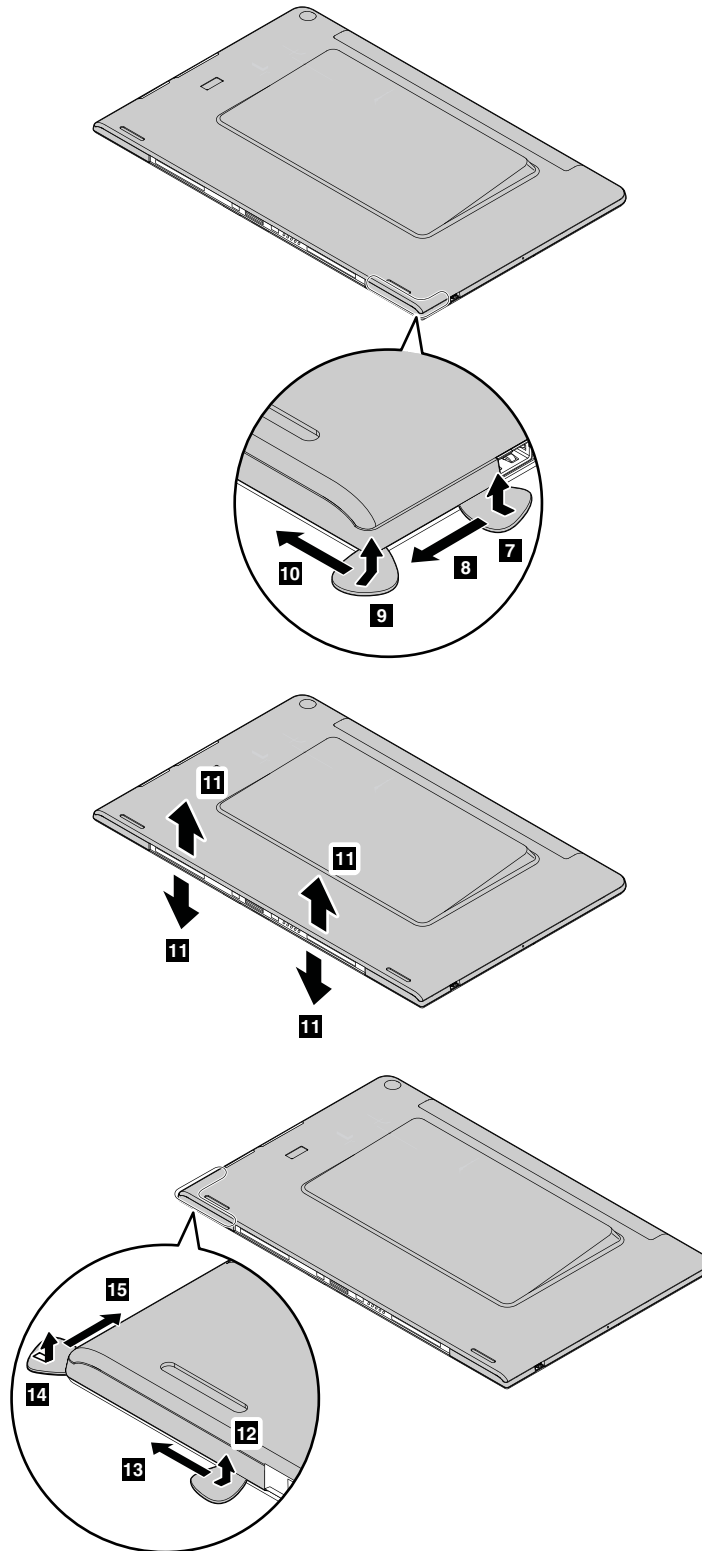
Before you replace the back cover assembly, smart-card reader, or smart-card-reader cable, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.

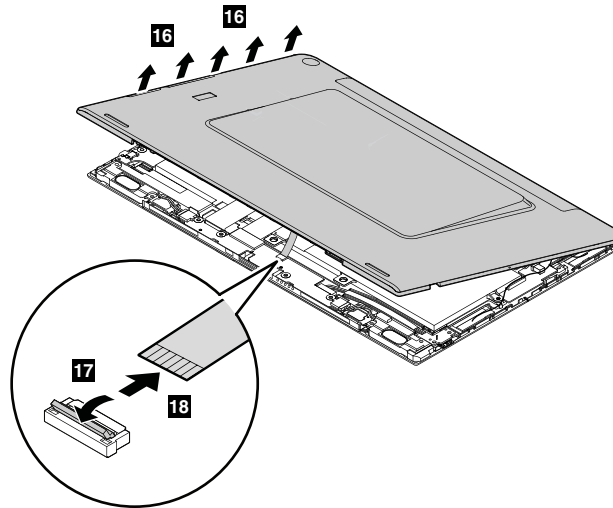
Removal steps of the back cover assembly

Note: The tablet you are servicing might look slightly different from the following illustrations.





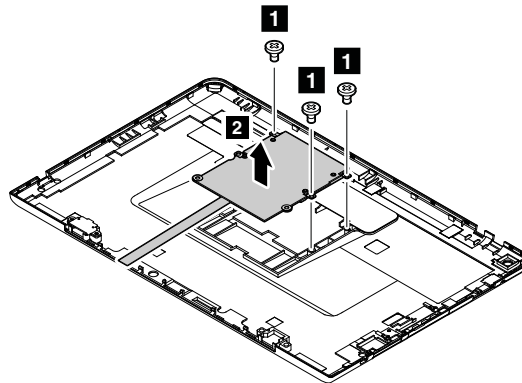
If the tablet you are servicing does not have the smart-card-reader cable, skip step **17** and step **18**.



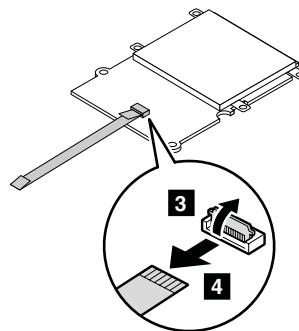
Note: Do not close the connector flip before connecting the cable. When connecting the cable, ensure that the connector is attached firmly.

Removal steps of the smart-card reader and smart-card-reader cable

The smart-card reader and smart-card-reader cable are only available on some models.



Step	Screw (quantity)	Color	Torque
1	M2 × 3.5 mm, flat-head, nylon-coated (3)	Silver	0.196 Nm (2 kgf-cm)



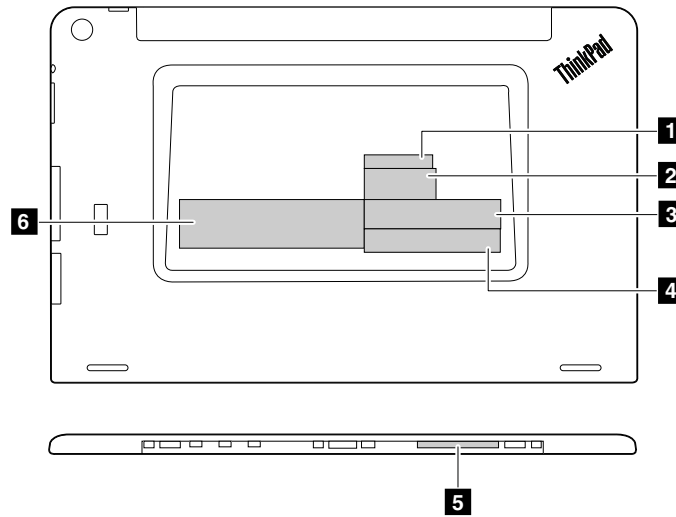
Note: Do not close the connector flip before connecting the cable. When connecting the cable, ensure that the connector is attached firmly.

Applying labels to the back cover assembly:

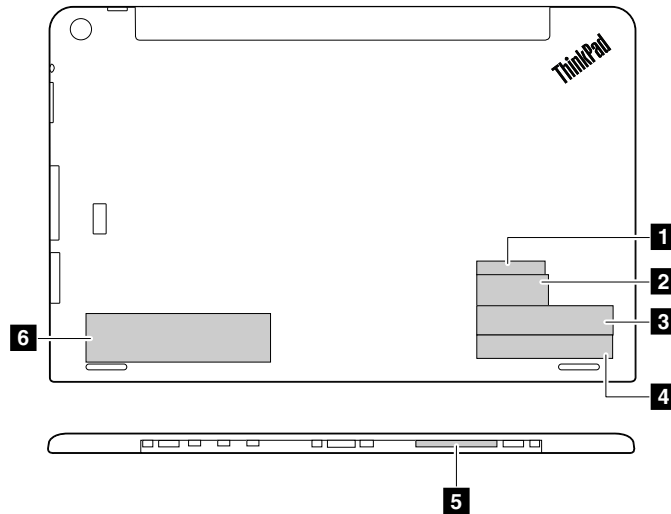
The new back cover assembly is shipped with a kit containing labels of several kinds. Apply those labels when you replace the back cover assembly. For the labels that are not shipped with the new back cover assembly, peel them off from the old back cover assembly, and then adhere them to the new one.

The following illustration shows the location of each label.

For models with the smart-card reader:



For models without the smart-card reader:



1 China Model label

3 GEO label

5 Factory ID label

2 Wireless WAN label (IMEI label)

4 FCC ID label

6 Country label

1020 Built-in battery

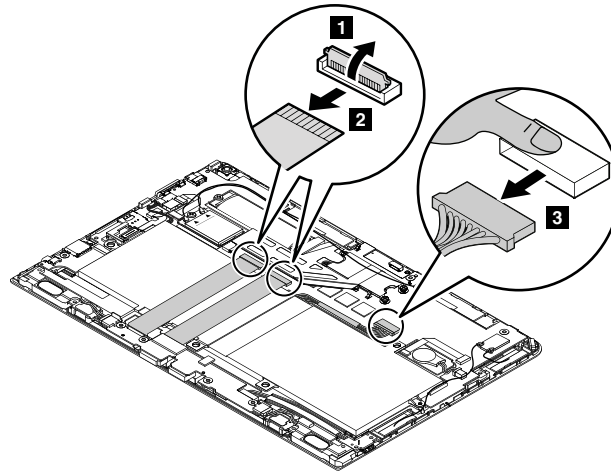
Before you replace the built-in battery, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.

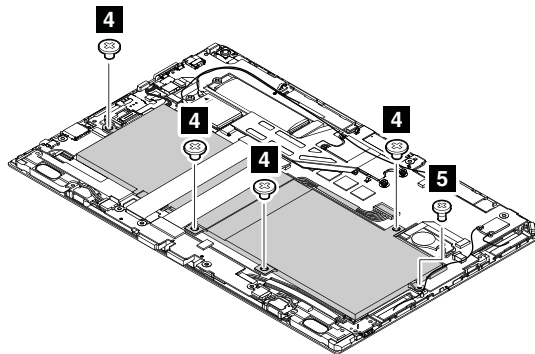
Removal steps of the built-in battery



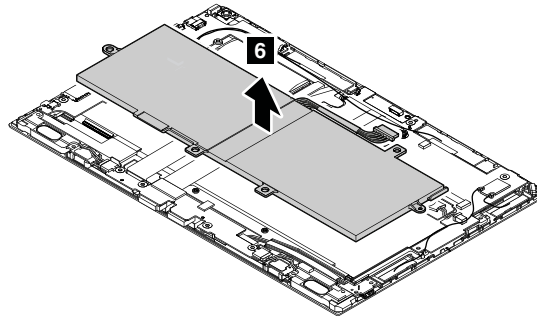
Use only the authorized battery specified for your tablet. Any other battery could ignite or explode.



Note: Do not close the connector flips before connecting the cables. When connecting the cables, ensure that the connectors are attached firmly.



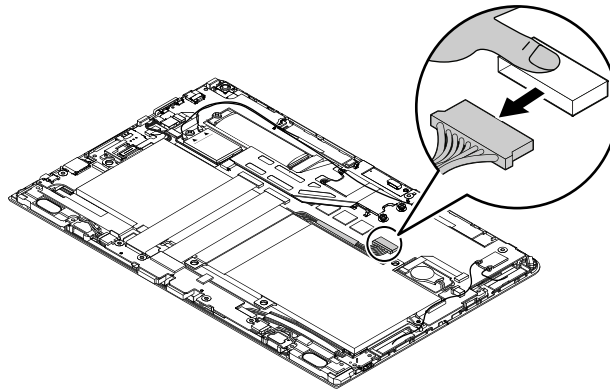
Step	Screw (quantity)	Color	Torque
4	M2 × 2 mm, flat-head, nylon-coated (4)	Black	0.196 Nm (2 kgf-cm)
5	M2 × 4.5 mm, flat-head, nylon-coated (1)	Black	0.196 Nm (2 kgf-cm)



1030 Wireless WAN card

Before you replace the wireless WAN card, do the following:

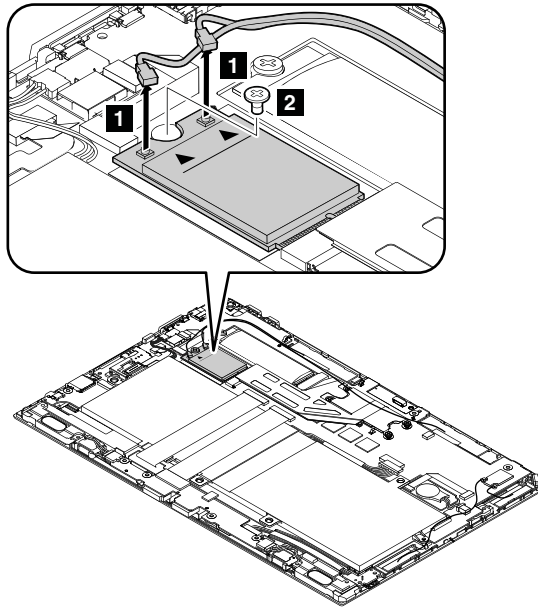
1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



Removal steps of the wireless WAN card

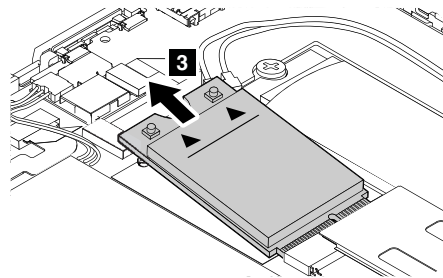
The wireless WAN card is only available on some models.

Use the antenna-RF-connector removal tool to disconnect the cables or use your fingers to pick up the cables slightly.



When installing: Plug the red cable into the main connector, and the blue cable into the auxiliary connector on the card. Ensure that the connectors are attached firmly.

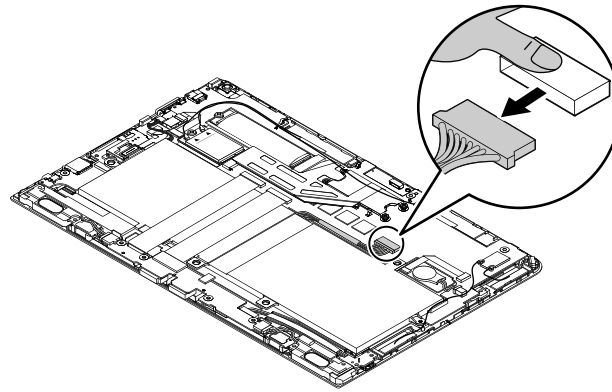
Step	Screw (quantity)	Color	Torque
2	M2 × 2 mm, flat-head, nylon-coated (1)	Silver	0.196 Nm (2 kgf-cm)



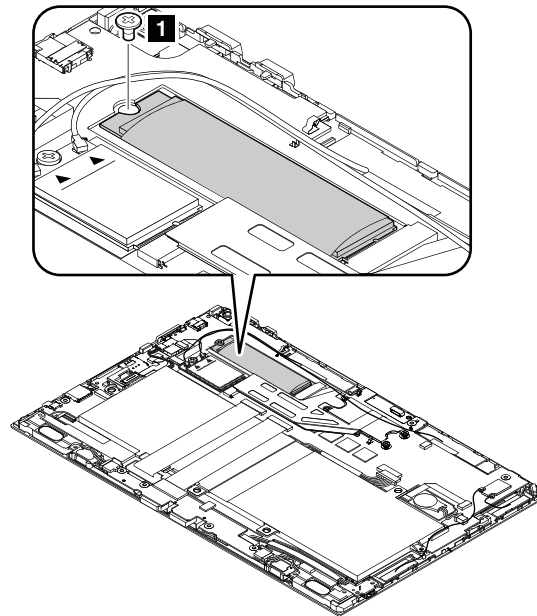
1040 M.2 solid-state drive and solid-state-drive mylar

Before you replace the M.2 solid-state drive or solid-state-drive mylar, do the following:

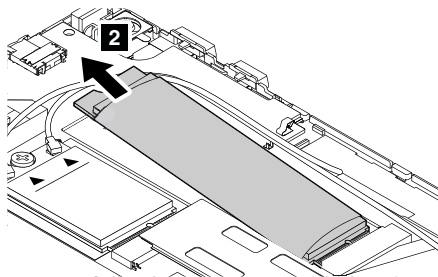
1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



Removal steps of the M.2 solid-state drive and solid-state-drive mylar



Step	Screw (quantity)	Color	Torque
1	M2 × 2 mm, flat-head, nylon-coated (1)	Silver	0.196 Nm (2 kgf-cm)

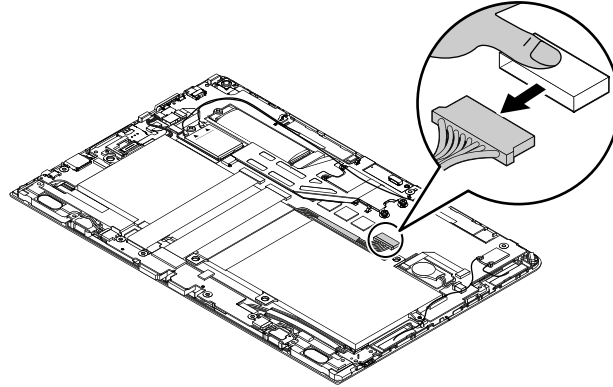


1050 Fingerprint-reader module

Before you replace the fingerprint-reader module, do the following:

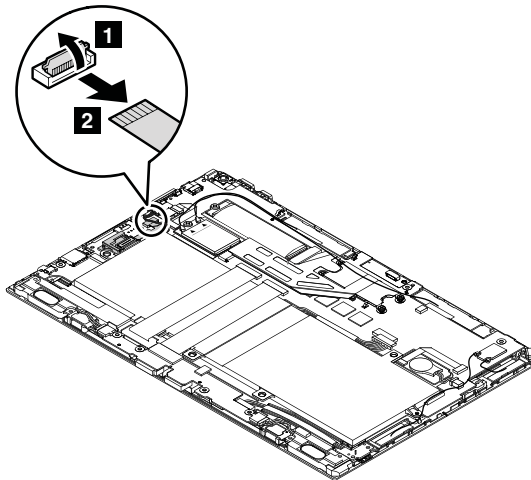
1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.

2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.

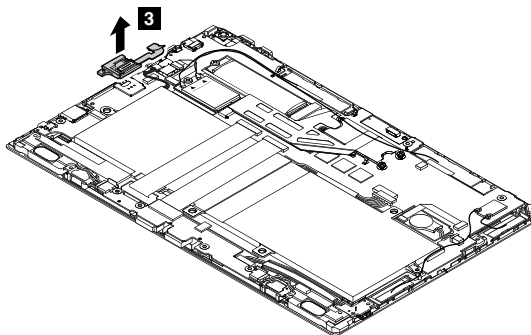


Removal steps of the fingerprint-reader module

The fingerprint-reader module is only available on some models.



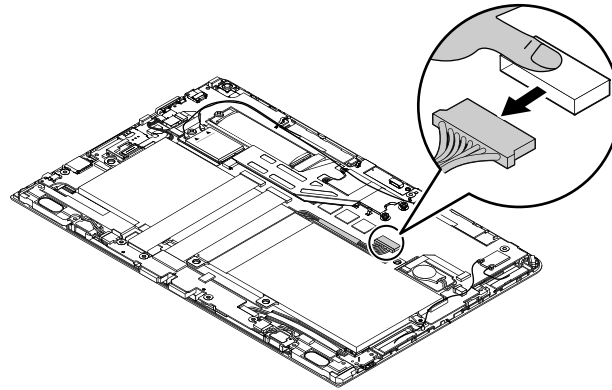
Note: Do not close the connector flip before connecting the cable. When connecting the cable, ensure that the connector is attached firmly.



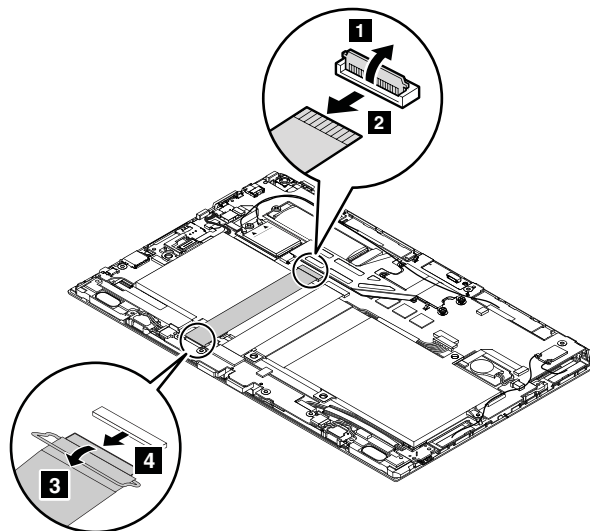
1060 LCD cable

Before you replace the LCD cable, do the following:

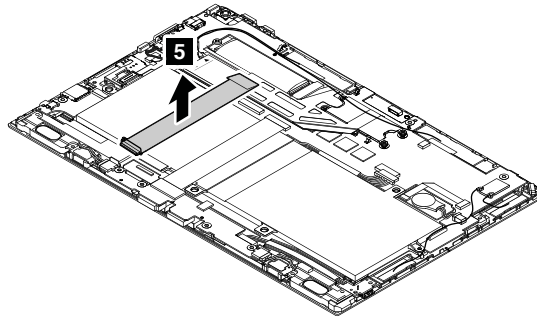
1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



Removal steps of the LCD cable



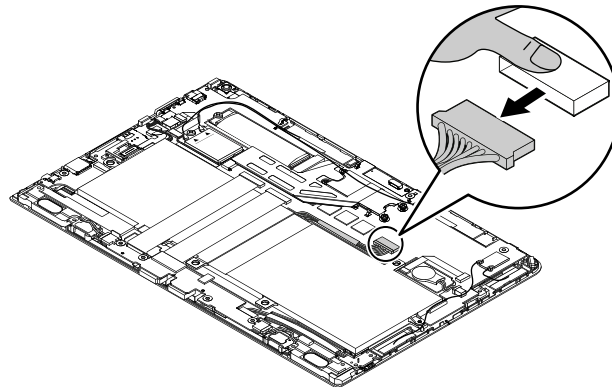
Note: Do not close the connector flips before connecting the cable. When connecting the cable, ensure that the connectors are attached firmly.



1070 Digitizer cable

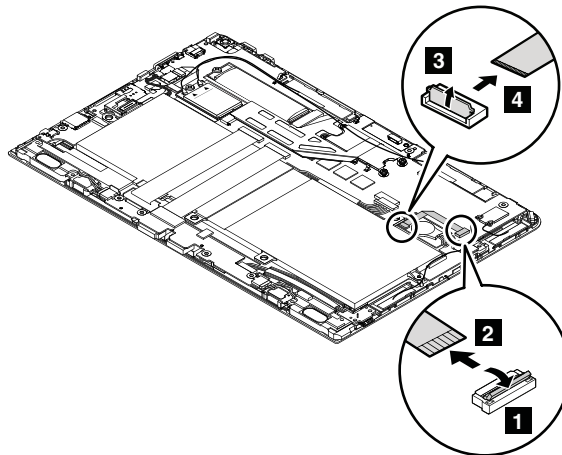
Before you replace the digitizer cable, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



Removal steps of the digitizer cable

The digitizer cable is only available on some models.

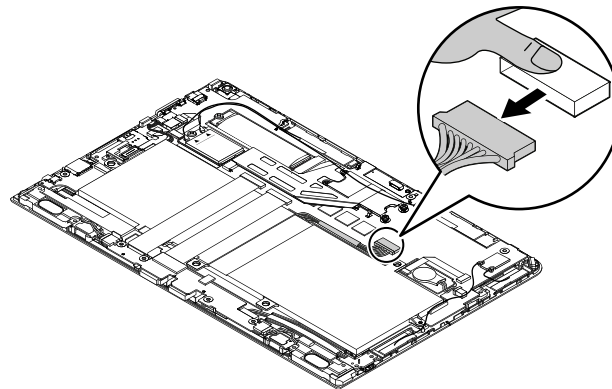


Note: Do not close the connector flips before connecting the cable. When connecting the cable, ensure that the connectors are attached firmly.

1080 Coin-cell battery

Before you replace the coin-cell battery, do the following:

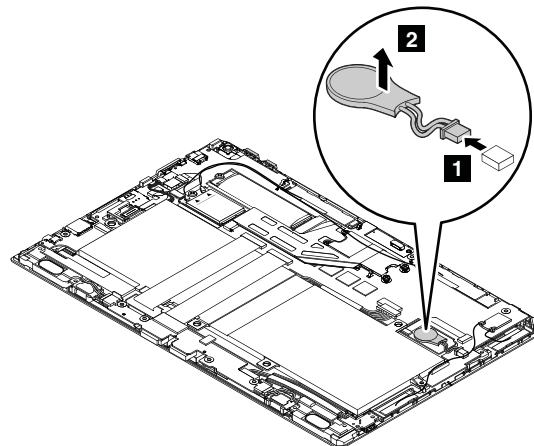
1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



Removal steps of the coin-cell battery



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

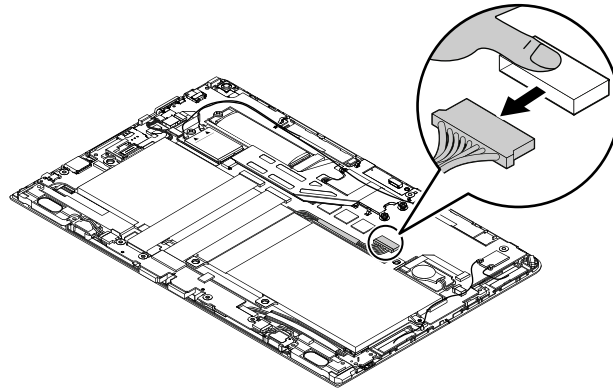


When installing: Ensure that the connector is attached firmly. After you install the coin-cell battery, reset the system date and time in the ThinkPad Tablet Setup program.

1090 NFC card and NFC-card cable

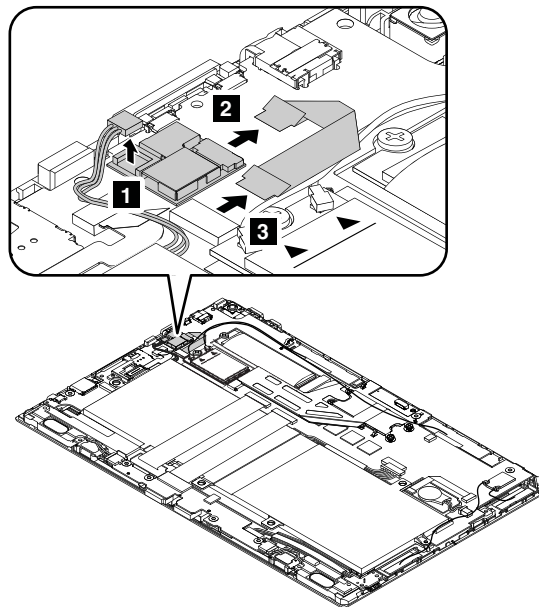
Before you replace the NFC card or NFC-card cable, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.

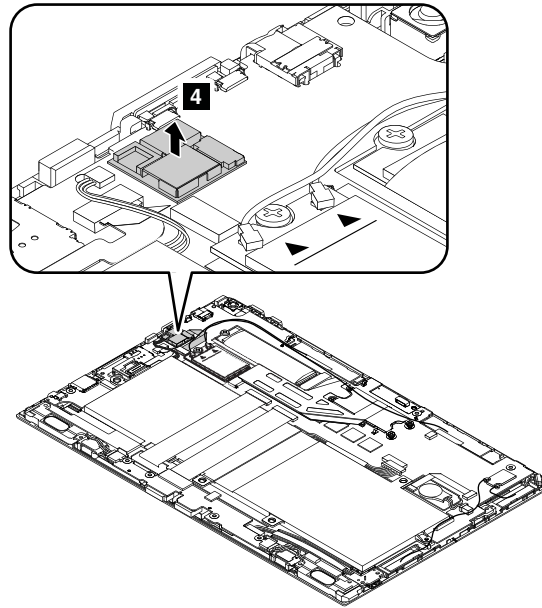


Removal steps of the NFC card and NFC-card cable

The NFC card and NFC-card cable are only available on some models.



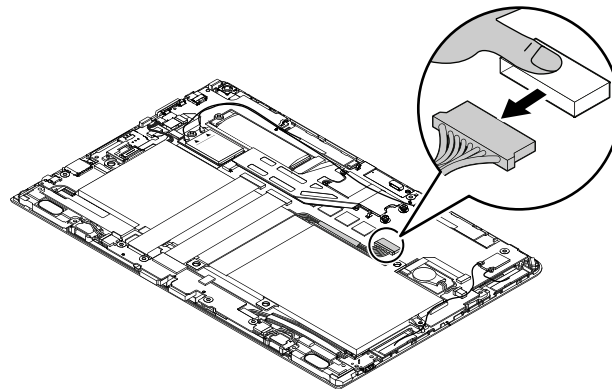
Note: Do not close the connector flips before connecting the cables. When connecting the cables, ensure that the connectors are attached firmly.



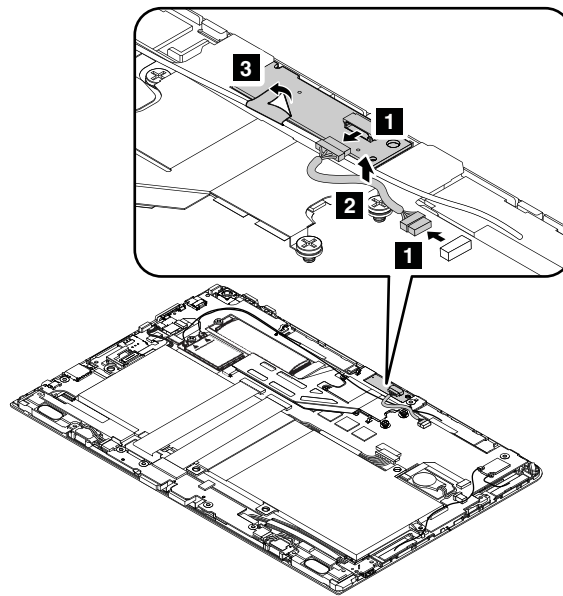
1110 Front-facing camera module and front-facing-camera-module cable

Before you replace the front-facing camera module or front-facing-camera-module cable, do the following:

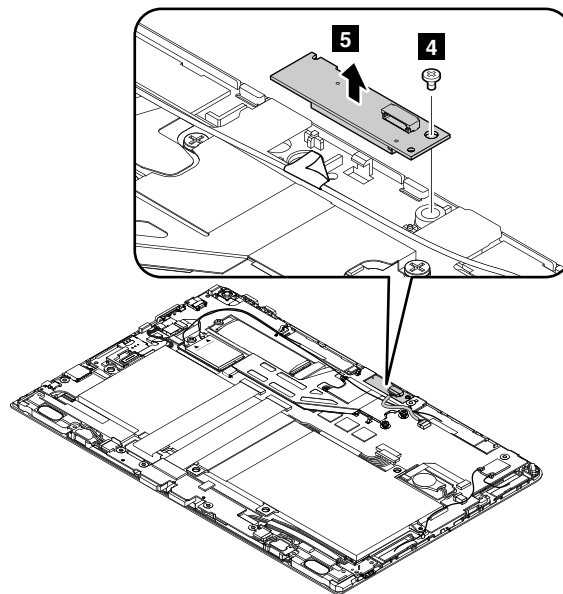
1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



Removal steps of the front-facing camera module and front-facing-camera-module cable



When installing: Ensure that the connectors are attached firmly.



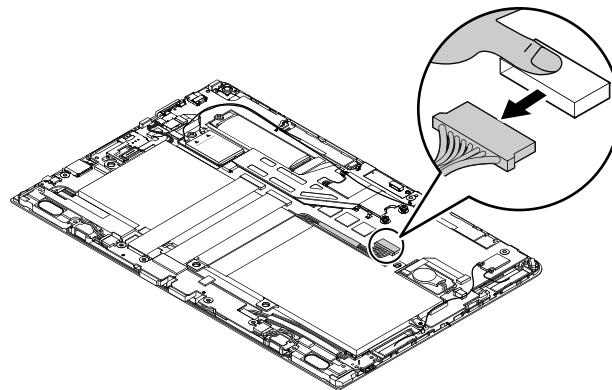
Step	Screw (quantity)	Color	Torque
4	M2 × 3.5 mm, flat-head, nylon-coated (1)	Silver	0.196 Nm (2 kgf-cm)

1120 dc-in cable and dc-in-cable bracket

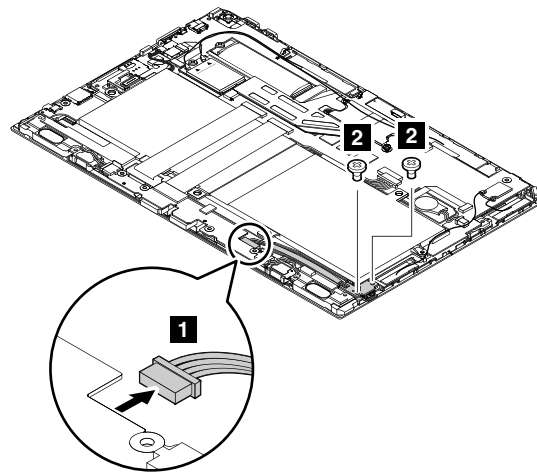
Before you replace the dc-in cable and dc-in-cable bracket, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.

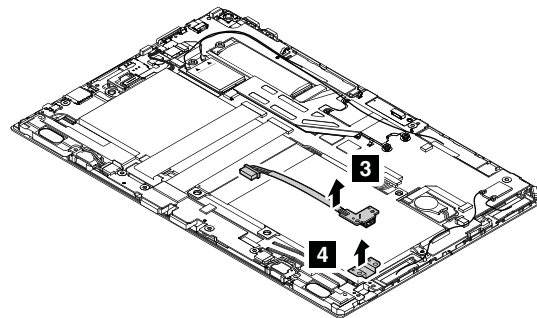
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



Removal steps of the dc-in cable and dc-in-cable bracket



When installing: Ensure that the connector is attached firmly.

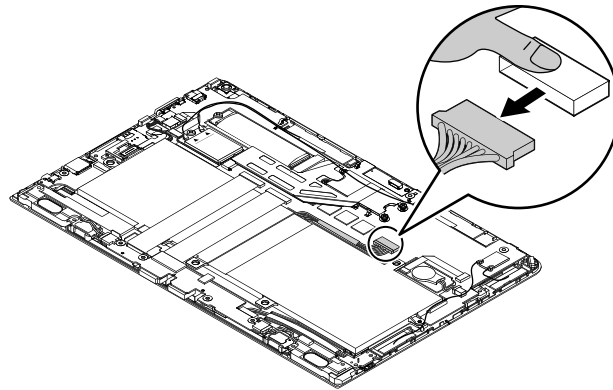


1130 Thermal module

Before you replace the thermal module, do the following:

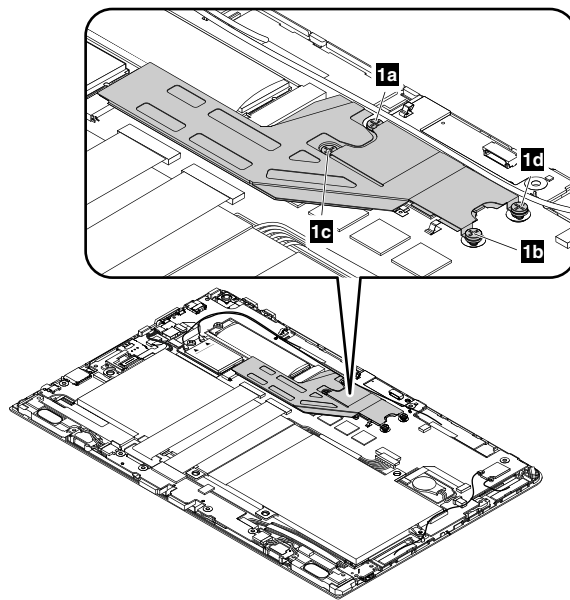
1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.

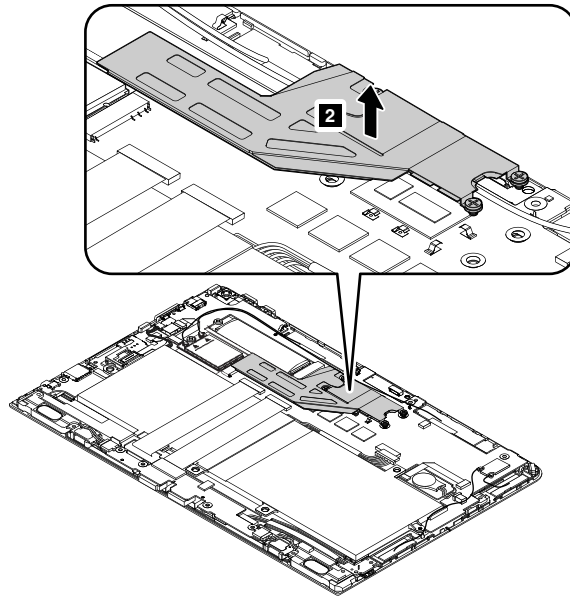
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



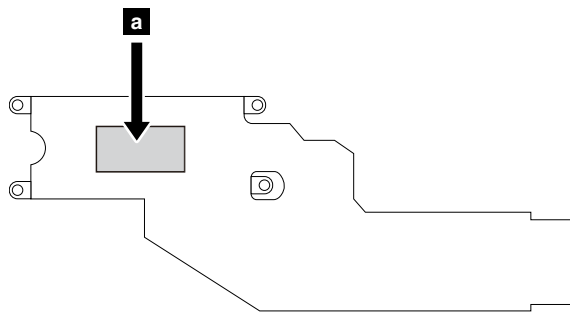
Removal steps of the thermal module

Loosen the screws **1** in ascending alphabetical order as shown in the following illustration.





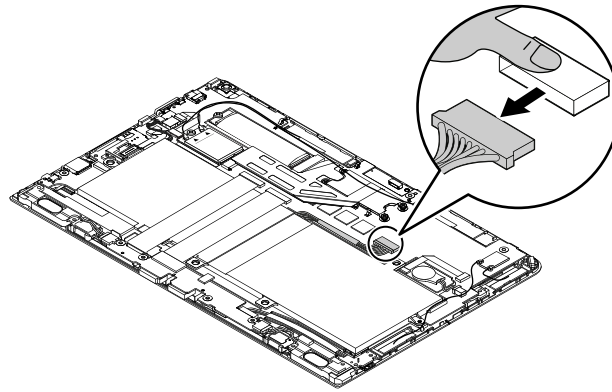
When installing: Before you install the thermal module, apply 0.2-gram thermal grease on part **a** as shown in the following illustration. Either too much or too less application of grease can cause a thermal problem due to imperfect contact with a component.



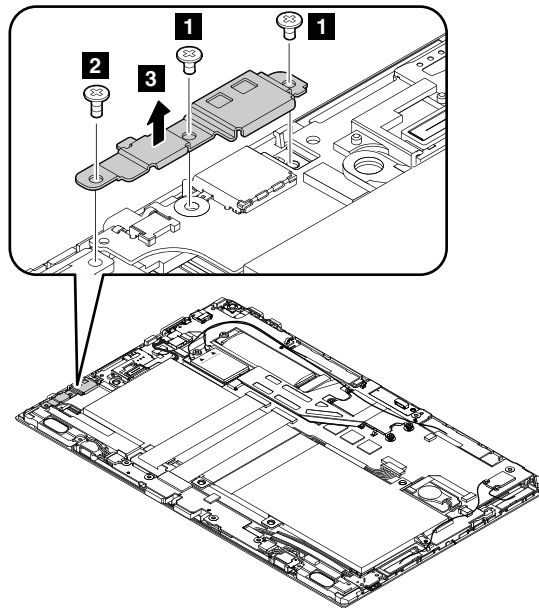
1140 USB-connector bracket

Before you replace the USB-connector bracket, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



Removal steps of the USB-connector bracket

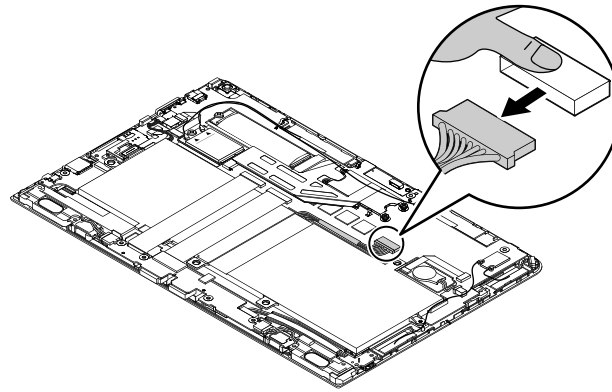


Step	Screw (quantity)	Color	Torque
1	M2 × 3.5 mm, flat-head, nylon-coated (2)	Silver	0.196 Nm (2 kgf-cm)
2	M2 × 4.5 mm, flat-head, nylon-coated (1)	Black	0.196 Nm (2 kgf-cm)

1150 Speakers

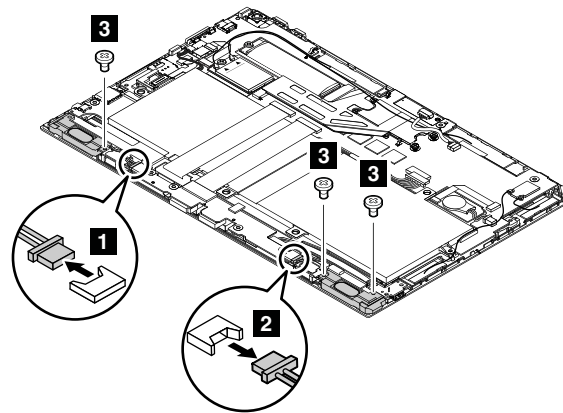
Before you replace the speakers, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



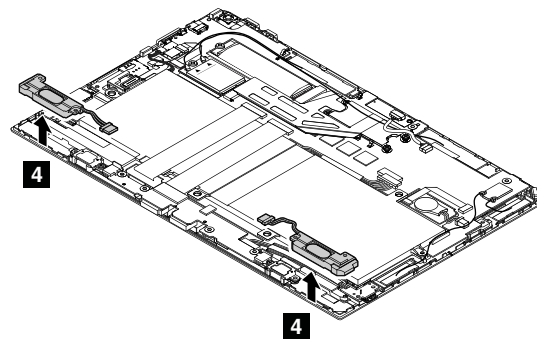
5. Remove the USB-contractor bracket. See “1140 USB-contractor bracket” on page 68

Removal steps of the speakers



When installing: Ensure that the connectors are attached firmly.

Step	Screw (quantity)	Color	Torque
3	M2 × 4.5 mm, flat-head, nylon-coated (3)	Black	0.196 Nm (2 kgf-cm)



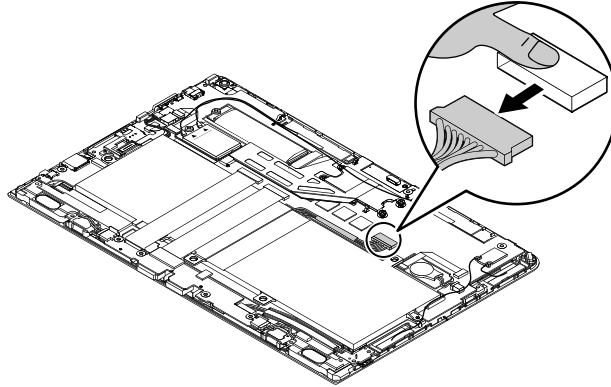
1160 I/O card and I/O-card cable

The I/O card integrates the connectors of the speakers, dock, and keyboard.

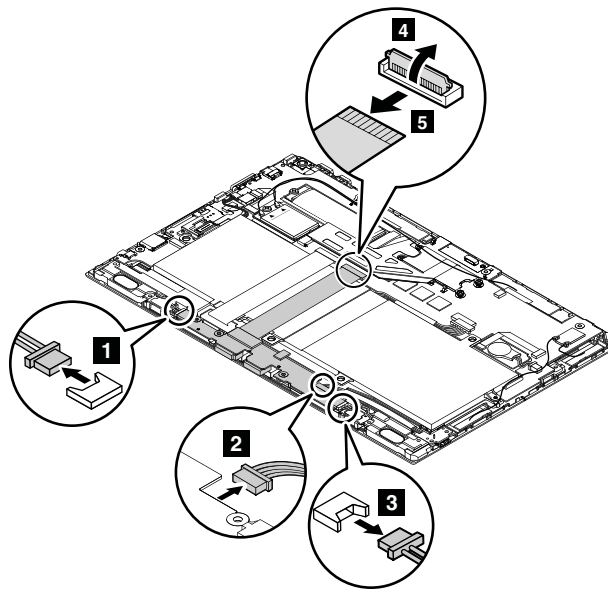
Before you replace the I/O card or I/O-card cable, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.

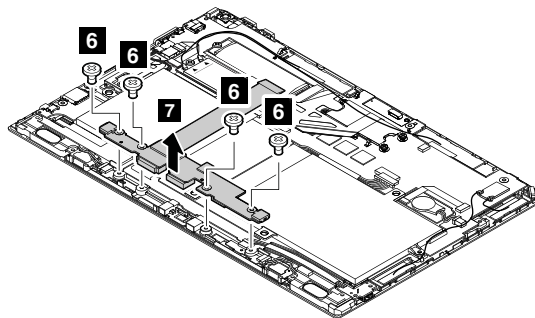
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the back cover assembly. See “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50.
4. Disconnect the cable of the built-in battery.



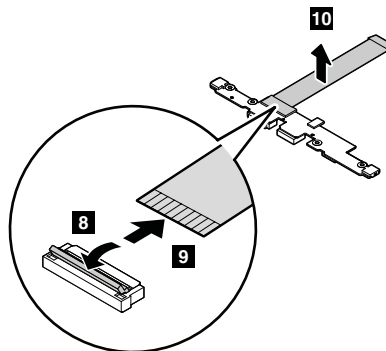
Removal steps of the I/O card and I/O-card cable



When installing: Ensure that the connectors are attached firmly.



Step	Screw (quantity)	Color	Torque
6	M2 × 4.5 mm, flat-head, nylon-coated (4)	Black	0.196 Nm (2 kgf-cm)



Note: Do not close the connector flip before connecting the cable. When connecting the cable, ensure that the connector is attached firmly.

1170 System board

Before you replace the system board, do the following:

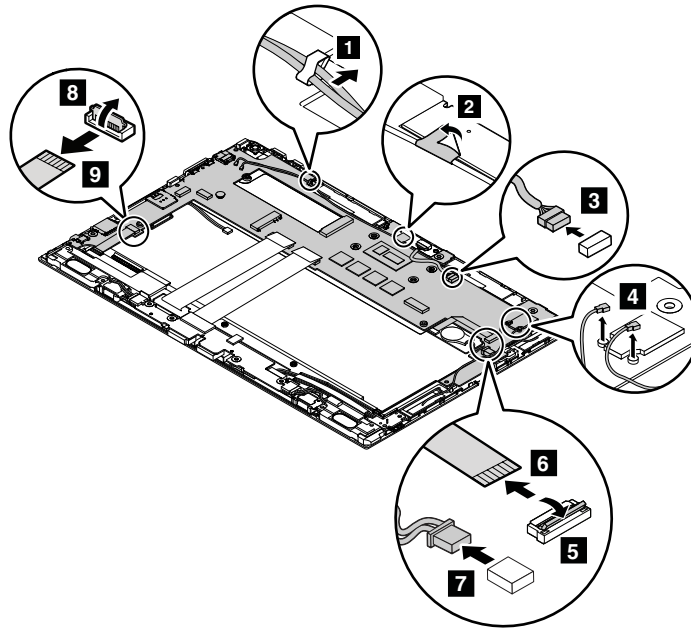
1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the following FRUs:
 - “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50
 - “1020 Built-in battery” on page 54
 - “1030 Wireless WAN card” on page 56
 - “1040 M.2 solid-state drive and solid-state-drive mylar” on page 57
 - “1050 Fingerprint-reader module” on page 58
 - “1090 NFC card and NFC-card cable” on page 63
 - “1130 Thermal module” on page 66
 - “1140 USB-connector bracket” on page 68

Removal steps of the system board

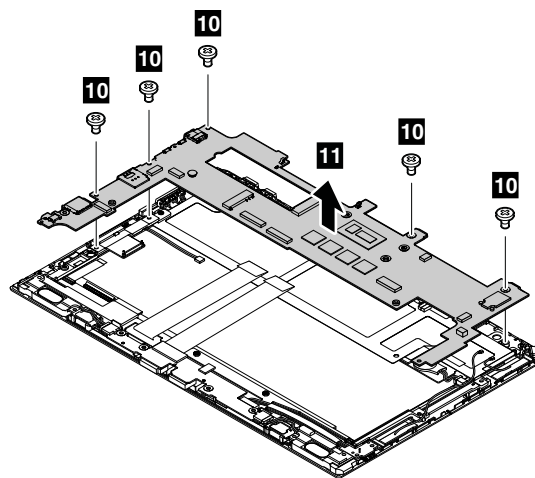
CAUTION:

When handling the system board, read the following:

- The system board has an accelerometer, which can be broken when several thousands of G-forces are applied.
- Be careful not to drop the system board on a bench top that has a hard surface, such as metal, wood, or composite.
- Avoid rough handling of any kind.
- At every point in the process, be sure not to drop or stack the system board.
- If you put a system board down, be sure to put it only on a padded surface such as an ESD mat or a corrugated conductive material.



Note: Do not close the connector flips before connecting the cables. When connecting the cables, ensure that the connectors are attached firmly.



Step	Screw (quantity)	Color	Torque
10	M2 × 3.5 mm, flat-head, nylon-coated (5)	Silver	0.196 Nm (2 kgf-cm)

If the system board is replaced with a new one, after installing all other parts, initialize the settings on the new system board.

To initialize the settings on the new system board, do the following:

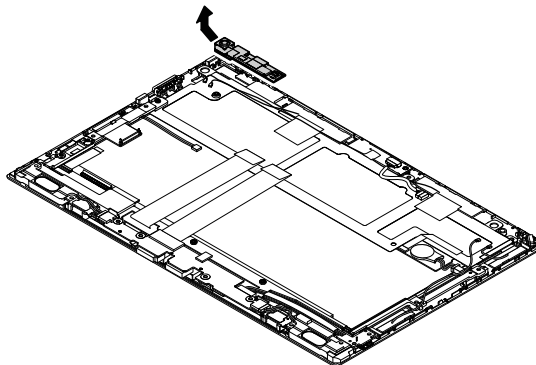
1. Restart the tablet. When the logo screen is displayed, tap **To interrupt normal startup, press Enter or tap here** on the screen.
2. Tap **F1** on the screen to start the ThinkPad Tablet Setup program.
3. Tap **Restart → Load Setup Defaults**.
4. A confirmation message is displayed. Tap **Yes** to load the default configuration.

1180 Rear-facing camera module

Before you replace the rear-facing camera module, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the following FRUs:
 - “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50
 - “1020 Built-in battery” on page 54
 - “1030 Wireless WAN card” on page 56
 - “1040 M.2 solid-state drive and solid-state-drive mylar” on page 57
 - “1050 Fingerprint-reader module” on page 58
 - “1090 NFC card and NFC-card cable” on page 63
 - “1130 Thermal module” on page 66
 - “1140 USB-connector bracket” on page 68
 - “1170 System board” on page 72

Removal step of the rear-facing camera module



When installing: Ensure that the connector is attached firmly.

1190 Wireless-WAN antenna assembly

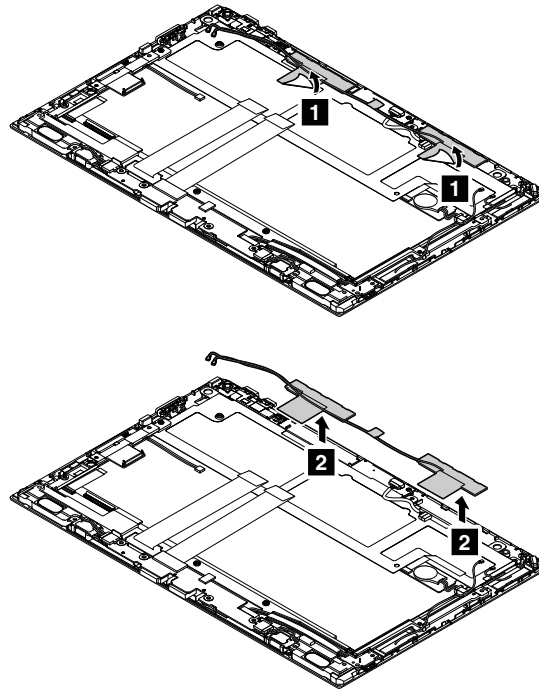
Before you replace the system board, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the following FRUs:
 - “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50
 - “1020 Built-in battery” on page 54
 - “1030 Wireless WAN card” on page 56
 - “1040 M.2 solid-state drive and solid-state-drive mylar” on page 57
 - “1050 Fingerprint-reader module” on page 58
 - “1090 NFC card and NFC-card cable” on page 63

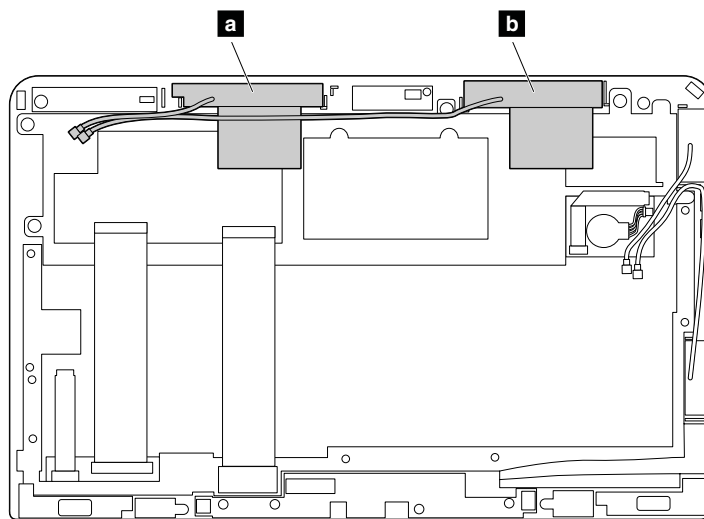
- “1130 Thermal module” on page 66
- “1140 USB-connector bracket” on page 68
- “1170 System board” on page 72

Removal steps of the wireless-WAN antenna assembly

The wireless-WAN antenna assembly is only available on some models.



Attention: When installing the antenna assembly, route the cables as shown in the following illustration. Ensure that the cables are not twisted or subject to any tension. Tension could cause the cables to be damaged by cable guides.



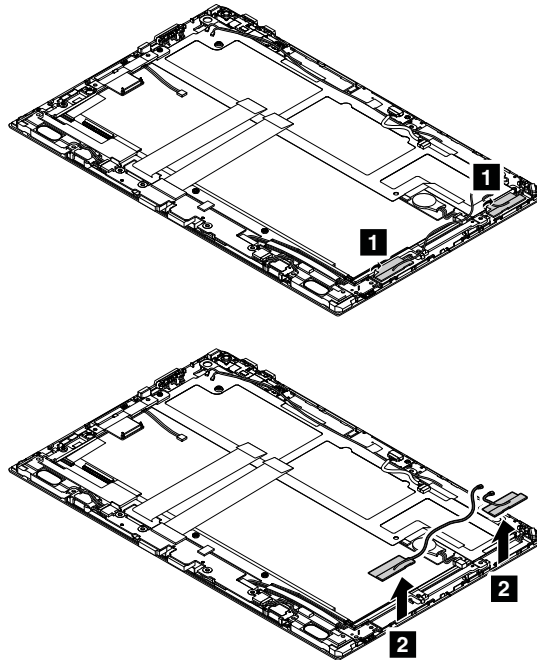
- a** Wireless-WAN antenna (Main)
- b** Wireless-WAN antenna (Auxiliary)

1200 Wireless-LAN antenna assembly

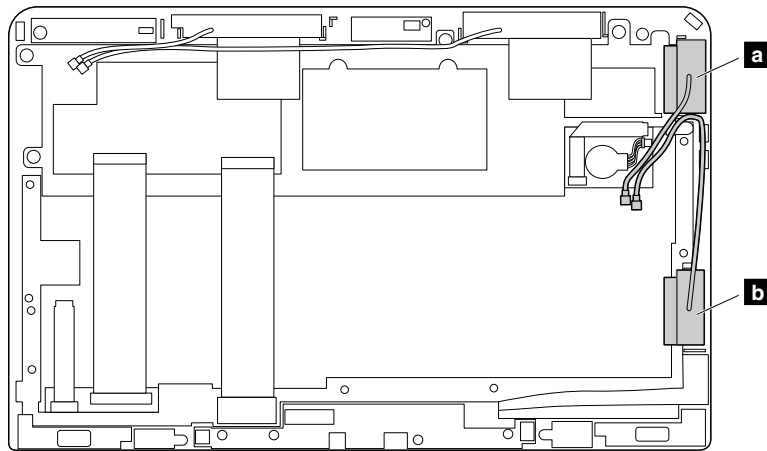
Before you replace the system board, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the following FRUs:
 - “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50
 - “1020 Built-in battery” on page 54
 - “1030 Wireless WAN card” on page 56
 - “1040 M.2 solid-state drive and solid-state-drive mylar” on page 57
 - “1050 Fingerprint-reader module” on page 58
 - “1090 NFC card and NFC-card cable” on page 63
 - “1130 Thermal module” on page 66
 - “1140 USB-connector bracket” on page 68
 - “1170 System board” on page 72

Removal steps of the wireless-LAN antenna assembly



Attention: When installing the antenna assembly, route the cables as shown in the following illustration. Ensure that the cables are not twisted or subject to any tension. Tension could cause the cables to be damaged by cable guides.



- a** Wireless-LAN antenna (Main)
- b** Wireless-LAN antenna (Auxiliary)

1210 LCD module

To replace the LCD module, do the following:

1. Disable the built-in battery. See “Disabling the built-in battery” on page 48.
2. Remove the SIM card, SD card, and smart card. See “Removing the SIM card, SD card, and smart card” on page 48.
3. Remove the following FRUs, then you will have the LCD module left.
 - “1010 Back cover assembly, smart-card reader, and smart-card-reader cable” on page 50
 - “1020 Built-in battery” on page 54
 - “1030 Wireless WAN card” on page 56
 - “1040 M.2 solid-state drive and solid-state-drive mylar” on page 57
 - “1050 Fingerprint-reader module” on page 58
 - “1060 LCD cable” on page 60
 - “1070 Digitizer cable” on page 61
 - “1080 Coin-cell battery” on page 62
 - “1090 NFC card and NFC-card cable” on page 63
 - “1110 Front-facing camera module and front-facing-camera-module cable” on page 64
 - “1120 dc-in cable and dc-in-cable bracket” on page 65
 - “1130 Thermal module” on page 66
 - “1140 USB-connector bracket” on page 68
 - “1150 Speakers” on page 69
 - “1160 I/O card and I/O-card cable” on page 70
 - “1170 System board” on page 72
 - “1180 Rear-facing camera module” on page 74
 - “1190 Wireless-WAN antenna assembly” on page 74
 - “1200 Wireless-LAN antenna assembly” on page 767

Appendix A. Notices

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

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

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

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

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

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

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

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

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

Electronic emission notices

For electronic emission information on Class B digital devices, refer to the corresponding information in the *User Guide*.



Trademarks

The following terms are trademarks of Lenovo in the United States, other countries or both:

Lenovo
ThinkPad

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

The terms HDMI is a trademark of HDMI Licensing LLC in the United States and other countries.

Ultrabook is a trademark of Intel Corporation in the U. S. and/or other countries.

Other company, product, or service names may be trademarks or service marks of others.

Appendix B. Abbreviation and acronym table

The following table lists all abbreviations and acronyms which might be used in this manual.

Abbreviation	Term
3G	third generation of mobile telecommunications technology
BGA	Ball Grid Array
BIOS	basic input/output system
CMOS	complementary metal-oxide semiconductor
COA	Certificate of Authentication
CRC	cyclic redundancy check
CRT	cathode ray tube
CRU	customer-replaceable unit
CTO	Configure To Order
EAIA	Enhanced Asset Information Area
ECA	Engineering Change Announcements
EEPROM	Electrically Erasable Programmable Read-Only Memory
EFI	Extensible Firmware Interface
EPO	emergency power-off
ESD	electrostatic discharge
EU	European Union
FCC	Federal Communications Commission
FRU	Field Replaceable Unit
GAV	General Announce Variant
GPU	graphics processing unit
HDD	hard disk drive
HDMI	high-definition multimedia interface
ICs	integrated circuits
ICCID	integrate circuit card identity
ISO	International Standardization Organization
LAN	local area network
LCD	liquid crystal display
MAC	media access control
MT	machine type
MTM	machine type and model
PC	personal computer
PCH	Platform Controller Hub
POST	power-on self-test
RAM	random-access memory

Abbreviation	Term
RF	radio frequency
RFID	radio-frequency identification
RI	ring indicator
RJ	registered jack
SATA	Serial Advanced Technology Attachment
SIM	subscriber identity module
SVP	supervisor password
TFTs	thin-film transistors
UEFI	Unified Extensible Firmware Interface
USB	Universal Serial Bus
UUID	universally unique identifier
VGA	video graphics array
VRAM	video random-access memory

ThinkPad®

Part Number: SP40G54974_03

Printed in China

(1P) P/N: SP40G54974_03

