ThinkPad Yoga 260
Hardware Maintenance Manual

Contents

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About this manual

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

ThinkPad Yoga® 260	Machine types (MT) 20FD, 20FE, 20FS, 20FT, 20GS, and 20GT

Use this manual along with the advanced diagnostic tests to troubleshoot problems.

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

Chapter 1. Safety information

This chapter presents following safety information that you need to be familiar with before you service a ThinkPad notebook computer.
- "General safety" on page 1
- "Electrical safety" on page 1
- "Safety inspection guide" on page 2
- "Handling devices that are sensitive to electrostatic discharge" on page 3
- "Grounding requirements" on page 4
- "Safety notices (multilingual translations)" on page 4

General safety

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

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

Electrical safety

Observe the following rules when working on electrical equipment.

Important: Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine, and to lock the wall box in the off position.
- If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.

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

    Attention: An electrical shock can occur only when there is a complete circuit. By observing the above rule, you may prevent a current from passing through your body.
  - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

  Observe the special safety precautions when you work with very high voltages; Instructions for these precautions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.
- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, ungrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts *with the power on* when they are removed from their normal operating places in a machine:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators
  - Parts similar to those listed above

  This practice ensures correct grounding of the units.
- If an electrical accident occurs:
  - Use caution; do not become a victim yourself.
  - Switch off power.
  - Send another person to get medical aid.

Safety inspection guide

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

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

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

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

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power off the computer. Disconnect the power cord.
3. Check the power cord for:
   a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
   b. The power cord should be the authorized type specified for your computer.

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

Handling devices that are sensitive to electrostatic discharge

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

Notes:

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

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

   Note: The use of a grounding system to guard against ESD damage is desirable but not necessary.
   – Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.

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

Grounding requirements

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

Safety notices (multilingual translations)

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

DANGER

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

DANGER

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

DANGER

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

DANGER

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

DANGER

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

DANGER

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

DANGER

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

DANGER

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

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

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.

Use the following strategy to prevent unnecessary expense for replacing and servicing FRUs:

- If you are instructed to replace a FRU but the replacement does not correct the problem, reinstall the original FRU before you continue.
- Some computers have both a processor board and a system board. If you are instructed to replace either the processor board or the system board, and replacing one of them does not correct the problem, reinstall that board, and then replace the other one.
- If an adapter or a device consists of more than one FRU, any of the FRUs may be the cause of the error. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change. Replace only the FRU that changed the symptoms.

Strategy for replacing a hard disk drive or a solid-state drive

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

Attention:

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

- Ensure that you partition the mSATA solid-state drive after installing it on the computer you are servicing. Otherwise, the mSATA solid-state drive will not function correctly.

Important notice for replacing a system board

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

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

How to use error message

Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, begin the diagnosis with the first error code. Whatever causes the first error code may also cause false error codes. If no error code is displayed, see whether the error symptom is listed in the Symptom-to-FRU Index for the computer you are servicing.

Strategy for replacing FRUs for CTO, special bid 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. Type the Machine Type and Serial Number in the corresponding fields.
2. Click **Submit**.x

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. Follow the instructions on the screen to select a product.
2. Click the **Product & Parts** tab.
3. Select **System Service Parts** to view a general FRU list.x

Chapter 3. General checkout

This chapter introduces following information:
- "What to do first" on page 23
- "Checkout guide" on page 24
  - "Lenovo Solution Center" on page 24
  - "Quick test programs" on page 24
  - "UEFI diagnostic program" on page 25
  - "Bootable diagnostic programs" on page 25
- "Power system checkout" on page 26

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

Important notes:
- **Only certified trained personnel should service the computer.**
- **Before replacing any FRU, read the entire page on removing and replacing FRUs.**
- **When you replace FRUs, it is recommended use new nylon-coated screws.**
- **Be extremely careful during such write operations as copying, saving, or formatting.** The sequence of the drives in the computer that you are servicing might have been altered. If you select an incorrect drive, data or programs might be overwritten.
- **Replace a FRU only with another FRU of the correct model.** When you replace a FRU, ensure that the model of the machine and the FRU part number are correct
- **A FRU should not be replaced because of a single, unreproducible failure.** Single failures can occur for a variety of reasons that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. Consider replacing a FRU only when a problem recurs. If you suspect that a FRU is defective, clear the error log and run the test again. If the error does not recur, do not replace the FRU.
- **Be careful not to replace a nondefective FRU..**

What to do first

When you return a FRU, you must include the following information in the parts exchange form or parts return form that you attach to it:

1. Name and phone number of service technician
2. Date of service
3. Date on which the machine failed
4. Date of purchase
5. Failure symptoms, error codes appearing on the display, and beep symptoms
6. Procedure index and page number in which the failing FRU was detected
7. Failing FRU name and part number
8. Machine type, model number, and serial number
9. Customer's name and address

Note: During the warranty period, the customer may be responsible for repair costs if the computer damage was caused by misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance by the customer.Following is a list of some common items that are not covered under warranty and some symptoms that might indicate that the system was subjected to stress beyond normal use.

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

The following are not covered under warranty:
- LCD panel cracked from the application of excessive force or from being dropped
- Scratched (cosmetic) parts
- Distortion, deformation, or discoloration of the cosmetic parts
- Plastic parts, latches, pins, or connectors that have been cracked or broken by excessive force
- Damage caused by liquid spilled into the system
- Damage caused by the improper insertion of a PC card or the installation of an incompatible card
- Improper disc insertion or use of an optical drive
- Fuses blown by attachment of a nonsupported device
- Forgotten computer password (making the computer unusable)
- Sticky keys caused by spilling a liquid onto the keyboard
- Use of an incorrect ac power adapter on the computer

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

Checkout guide

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

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

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

Lenovo Solution Center

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

To run the Lenovo Solution Center program, go to Control Panel and click **System and Security ➔ Lenovo - System Health and Diagnostics**, and then follow the instructions on the screen.

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

Quick test programs

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

- **Lenovo Hard Drive Quick Test**

- **Lenovo Memory Quick Test**

- **Lenovo Wireless Quick Test**

- **Lenovo PCI Express Quick Test**
- **Lenovo RAID Quick Test**
- **Lenovo Motherboard Bus Quick Test**

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

1. Go to the C:\SWTOOLS\ldiag directory.
2. Double-click the lsc_lite.exe file.
3. When the **User Account Control** window opens, if any, click **Yes**.
4. Select the device class to be tested.
5. Select the devices to be tested.
6. Select the test to be performed.
7. Follow the instructions on the screen to start the test. When a problem is detected, information messages are displayed. Refer to the messages to troubleshoot the problem.

UEFI diagnostic program

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

To run the UEFI diagnostic program, do the following:

1. Turn on the computer. If the computer cannot be turned on, go to "Power system checkout" on page 26, and check the power sources. If an error code is displayed, go to "Symptom-to-FRU index" on page 34 for error code descriptions and troubleshooting hints.
2. When the logo screen is displayed, repeatedly press and release the F10 key. The main screen of the UEFI diagnostic program is displayed.
3. Follow the instructions on the screen to use the diagnostic program.

Bootable diagnostic programs

If the computer you are servicing is not installed with the UEFI diagnostic program, you can download a bootable diagnostic program from the Lenovo Support Web site. The bootable diagnostic program enables you to view system information and test some hardware devices in your computer, such as memory, storage devices, the LCD, and system board buses. To use the bootable diagnostic program, you can create a bootable diagnostic medium using a USB device or disc.

To create a bootable diagnostic medium, do the following:

1. Click **Lenovo Bootable Diagnostics**.
2. Follow the instructions on the Web site to create a bootable diagnostic medium on a USB device or disc.x

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

- If you have created the bootable diagnostic medium using a USB device, do the following:
  1. Attach the USB device to the computer.
  2. Turn on the computer. If the computer cannot be turned on, go to "Power system checkout" on page 26, and check the power sources. If an error code is displayed, go to "Symptom-to-FRU index" on page 34 for error code descriptions and troubleshooting hints.
  3. When the logo screen is displayed, repeatedly press and release the F12 key. When the Boot Menu window opens, release the F12 key.
  4. Use the arrow keys to select **USB HDD** and then press Enter. The diagnostic program launches.
  5. Follow the instructions on the screen to use the diagnostic program.
- If you have created the bootable diagnostic medium using a disc, do the following:
  1. Turn on the computer. If the computer cannot be turned on, go to "Power system checkout" on page 26, and check the power sources. If an error code is displayed, go to "Symptom-to-FRU index" on page 34 for error code descriptions and troubleshooting hints.
  2. Insert the disc into the optical drive.
  3. Restart the computer.
  4. When the logo screen is displayed, repeatedly press and release the F12 key. When the Boot Menu window opens, release the F12 key.
  5. Use the arrow keys to select **ATAPI CDx** (x: 0, 1, ...) and then press Enter. The diagnostic program launches.
  6. Follow the instructions on the screen to use the diagnostic program.

Power system checkout

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

If you suspect a power problem, see the appropriate one of the following power supply checkouts:
- "Checking the ac power adapter" on page 26
- "Checking the built-in battery and operational charging" on page 27
- "Checking the coin-cell battery" on page 27
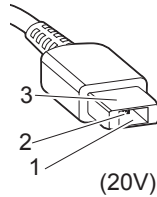
Checking the ac power adapter

You are here because the computer fails only when the ac power adapter is used.
- If the power problem occurs only when the docking station or the port replicator is used, replace the docking station or the port replicator.

- If the system-status indicator does not blink three times when an ac power source is connected, check the power cord of the ac power adapter for correct continuity and installation.
- If the computer does not charge during operation, go to "Checking the built-in battery and operational charging" on page 27.

To check the ac power adapter, do the following:
1. Unplug the ac power adapter cable from the computer.
2. Measure the output voltage at the plug of the ac power adapter cable. See the following illustration:

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

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

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

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

Checking the built-in battery and operational charging

This computer 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:
1. Discharge the battery until the remained battery power is less than 50%.
2. Connect the computer to ac power to charge the battery. If the battery status icon in the Windows notification area indicates that the battery is not charging, remove the battery and let it return to room temperature.
3. Reinstall the battery. If the battery is still not charging, replace the battery.
4. Check the battery status icon again. If the same error still exists, replace the system board.

Checking the coin-cell battery

To check the coin-cell battery, do the following:
1. Disable the built-in battery. See "Disabling the built-in battery" on page 56.
2. Remove the coin-cell battery. See "1070 Coin-cell battery" on page 62.
3. Measure the voltage of the coin-cell battery. See the following illustration.

Red (+)
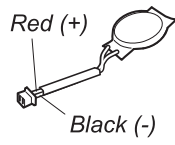
Black (-)

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

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

Chapter 4. Related service information

This chapter presents following information:
- "Restoring the factory contents by using the product Recovery Disc Set" on page 29
- "Recovery overview for the Windows 10 operating system" on page 30
- "Passwords" on page 31
- "Power management" on page 33
- "Symptom-to-FRU index" on page 34

Restoring the factory contents by using the product Recovery Disc Set

When the main storage device is replaced because of a failure, no product recovery program is on the new drive. In this case, the customer must use the Recovery Disc Set to recover the computer. Order the Recovery Disc Set and the drive at the same time so that the customer can restore the computer to the factory default settings by using the Recovery Disc Set after the new drive is installed.

Depending on the model, the number of recovery discs included in the Recovery Disc Set differs. To restore the factory contents by using the product Recovery Disc Set, do the following:

Notes:

- During the recovery process, all data on the drive will be deleted. If possible, copy any important data or personal files that you want to keep onto removable media or a network drive before you start the recovery process.
- The recovery process takes one to two hours to complete. The length of time depends on the method you use. If you use product Recovery Disc Set, the recovery process takes about two hours.

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

   Note: Not all Recovery Disc Sets come with a Supplemental Recovery Disc. If there is a Supplemental Recovery Disc, it will be clearly marked as such.

8. When all of the data has been copied from the last disc in the set and has been processed, remove the external CD/DVD drive and restart the computer. Follow the instructions on the screen to finish the recovery.

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

9. When the recovery process completes, the Welcome to Microsoft Windows screen is displayed. Follow the instructions on the screen to complete the Windows setup.

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

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

Recovery overview for the Windows 10 operating system

The Windows recovery programs enable you to reset your computer 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 31.

Resetting your computer

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

To reset your computer, 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 click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs, and then click **Settings** ➙ **Update & security** ➙ **Recovery**.

2. In the **Reset this PC** section, click **Get started**.

3. Follow the instructions on the screen to reset your computer.

Using advanced startup options

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

To use 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 click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs, and then click **Settings** ➙ **Update & security** ➙ **Recovery**.

2. In the **Advanced startup** section, click **Restart now** ➙ **Troubleshoot** ➙ **Advanced options**.

3. Select a desired startup option, then follow the instructions on the screen.

Recovering your operating system if Windows 10 fails to start

The Windows recovery environment on your computer 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 computer 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 computer 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 click **Create a recovery drive**.
3. Click **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 computer, use the recovery USB drive to recover your computer.

To use a recovery USB drive, do the following:

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

1. Connect the recovery USB drive to the computer.
2. Turn on or restart the computer. Before the Windows operating system starts, repeatedly press the F12 key. The Boot Menu window opens.
3. Select the recovery USB drive as the boot device.
4. Select a preferred keyboard layout.
5. Click **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

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

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

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

Power-on password

A power-on password protects the system from being powered on by an unauthorized person. The password must be entered before an operating system can be started. For instructions on how to remove the power-on password, see "How to remove the power-on password" on page 32.

Hard disk password

There are two kinds of hard disk passwords:
• User hard disk password - for the user
• Master hard disk password - for the system administrator, who can use it to get access to the hard disk even if the user has changed the user hard disk password

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

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

For how to remove the hard disk password, see "How to remove the hard disk password" on page 33.

Supervisor password

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

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

How to remove the power-on password

To remove a power-on password, do the following:

If no supervisor password has been set, do the following to remove the power-on password:
1. Turn off the computer.
2. Remove the battery. For instructions on how to remove the battery, see "1120 Battery" on page 68.
3. Remove the coin-cell battery. For instructions on how to remove the coin-cell battery, see "1070 Coin-cell battery" on page 62. Wait for a few seconds.
4. Reinstall the coin-cell battery.
5. Reinstall the battery. Turn on the computer and wait until the POST ends. After the POST ends, the password prompt does not appear. The power-on password has been removed.

If a supervisor password has been set and is known to the service technician, do the following to remove the power-on password:
1. Turn on the computer.
2. When the logo screen comes up, immediately press F1.
3. Type the supervisor password to enter the ThinkPad Setup program.
4. Select **Security**.
5. Select **Password**.
6. Select **Power-On Password**.
7. Type the current supervisor password in the **Enter Current Password** field. Then leave the **Enter New Password** field blank, and press Enter twice.
8. In the Changes have been saved window, press Enter.
9. Press F10 to save changes and exit the ThinkPad Setup program.

How to remove the hard disk password

Attention: If **User only** mode is selected and the user hard disk password has been forgotten and cannot be made available to the service technician, neither Lenovo nor Lenovo-authorized service technicians provide any services to reset the user hard disk passwords or to recover data from the hard disk drive. To put the system back to operational status, the only Lenovo and Lenovo-authorized service solution would be to replace the hard disk drive or solid-state drive with a scheduled fee.

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

1. Turn on the computer.
2. When the logo screen comes up, immediately press F1 to enter the ThinkPad Setup program.
3. Select **Security**.
4. Select **Password**.
5. Select **Hard-disk *x* password**, where *x* is the letter of the hard disk drive. A pop-up window opens.
6. Select **Master hard disk password**.
7. Type the current master hard disk password in the **Enter Current Password** field. Then leave the **Enter New Password** field blank, and press Enter twice.
8. Press F10.
9. Press F10 to save changes and exit the ThinkPad Setup program. The user hard disk password and the master hard disk password have been removed.

Power management

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

Screen blank mode (for the Windows 7 operating system only)

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

To put the computer into screen blank mode, do the following:

1. Right-click the battery gauge in the task bar.
2. Select **Power off display (keep current power plan)**.

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

Sleep mode

When the computer enters sleep mode, the following events occur in addition to what occurs in screen blank mode:
- The LCD is powered off.
- The hard disk drive or solid-state drive is powered off.
- The microprocessor stops.

To put your computer into sleep mode, do the following:

- **For Windows 7**: Open the Start menu, then click the arrow next to the **Shut down** button. Click **Sleep** from the menu displayed.
- **For Windows 10:** Open the Start menu, click ⏻ **Power**, and then click **Sleep**.

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

• When the battery power is low

To cause the computer to return from sleep mode and resume operation, do one of the following:
• Press the Fn key.
• Press the power button.

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

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

• The time set on the resume timer elapses.

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

Hibernation mode

In hibernation mode, the following occurs:

• The system status, RAM, VRAM, and setup data are stored on the hard disk drive or solid-state drive.

• The system is powered off.

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

If you have defined one of the following actions as the event that causes the system to go into hibernation mode, perform that action.
• Closing the lid.
• Pressing the power button.

Also, the computer goes into hibernation mode automatically after a period of inactivity specified in power plan settings.

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

Symptom-to-FRU index

This section contains following information:

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

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

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

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

If no numeric code is displayed, check the narrative descriptions of symptoms. If the symptom is not described there, go to "Intermittent problems" on page 37.

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

Numeric error codes

Table 1. Numeric error codes

Symptom or error	FRU or action, in sequence
0177 Bad SVP data, stop POST task— 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 the ThinkPad Setup program. – The checksum of the Security settings in the EFI Variable is not correct.	1. **Run the ThinkPad Setup program. The settings will be corrected automatically. Then save the current settings by pressing F10.** 2. Replace the system board.
0187 EAIA data access error	**Replace the system board.**
0188 Invalid RFID Serialization Information Area.	**Replace the system board.**
0189 Invalid RFID Configuration Information Area.	**Replace the system board.**
0190 Critical low-battery error	1. **Charge the battery pack.** 2. Replace the battery pack.
0191 System Security—Invalid Remote Change requested.	1. **Run the ThinkPad Setup program, and then save current setting by pressing F10.** 2. Replace the system board.
0199 System Security— Security password retry count exceeded.	1. **Run the ThinkPad Setup program. The retry count will be reset. Then save the current settings by pressing F10.** 2. Replace the system board.
0251 System CMOS checksum bad - Default configuration used.	1. **Charge the coin-cell battery for more than 8 hours by connecting the ac adapter.** 2. Replace the coin-cell battery and run ThinkPad Setup to reset the time and date.
0271 Real-Time Clock Error. Check Date and Time settings.	1. **Run ThinkPad Setup to reset the time and date** 2. Replace the coin-cell battery and run ThinkPad Setup to reset the time and date.
1802 Unauthorized network card is plugged in—Power off and remove the network card.	1. **Remove network card.** 2. Replace the system board.
2000 ThinkVantage Active Protection sensor diagnostics failed.	**Have the computer serviced.**

Table 1. Numeric error codes (continued)

Symptom or error	FRU or action, in sequence
2100 Detection error on Storage Device (M.2)	1. **Reseat the storage device.** 2. Replace the storage device.
2101 Detection error on SSD (M.2)	1. **Reseat the solid-state drive.** 2. Replace the solid-state drive.
2110 Read error on Storage Device (M.2)	1. **Reseat the storage device.** 2. Replace the storage device.
2111 Read error on SSD (M.2)	1. **Reseat the solid-state drive.** 2. Replace the solid-state drive.
2200 Machine Type and Serial Number are invalid.	**Replace the system board.**
2201 Machine UUID is invalid	**Replace the system board.**

Error messages

Table 2. Error messages

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

Beep symptoms

Table 3. Beep symptoms

Symptom or error	FRU or action, in sequence
Four cycles of four short beeps	**Replace the system board.**
One short beep, pause, three short beeps, pause, three more short beeps, pause, and one short beep	1. **Replace the memory module**. 2. Replace the system board.
Five short beeps	**Replace the system board.**
One long and two short beeps	**Replace the system board.**
Five short beeps, pause, five short beeps, and pause	**Replace the system board.**

No-beep symptoms

Table 4. No-beep symptoms

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

LCD-related symptoms

Important: The TFT LCD for the notebook computer contains many thin-film transistors (TFTs). The presence of a small number of dots that are missing, discolored, or always lighted is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns.If the LCD you are servicing has two or less visible defective pixels, it should not be considered faulty. However, if the LCD has three or more visible defective pixels, it will be deemed as defective by Lenovo and it should be replaced.

Notes:

- This policy applies to all ThinkPad notebook computers purchased on 1 January, 2008 or later.

- Lenovo will not provide warranty replacement if the LCD is within specifications because we cannot guarantee that any replacement LCD will have zero pixel defects.

- One pixel consists of R, G, B sub-pixels.

Table 5. LCD-related symptoms

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

Intermittent problems

Intermittent system hang problems can be due to a variety of causes that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. FRU replacement should be considered only when a problem recurs.

When analyzing an intermittent problem, do the following:

1. Run the diagnostic test for the system board in loop mode **at least 10 times**.

2. If no error is detected, do not replace any FRUs.

3. If any error is detected, replace the FRU shown by the FRU code. Rerun the test to verify that no more errors exist.

Undetermined problems

If the diagnostic tests did not identify the adapter or device that has failed, if wrong devices are installed, or if the system simply is not operating, follow these procedures to isolate the failing FRU (do not isolate FRUs that have no defects).

Verify that all attached devices are supported by the computer.

Verify that the power supply being used at the time of the failure is operating correctly. See "Power system checkout" on page 26.
1. Turn off the computer.
2. Visually check each FRU for damage. Replace any damaged FRU.
3. Remove or disconnect all of the following devices:
   a. Non-ThinkPad devices
   b. Devices attached to the docking station or the port replicator
   c. Printer, mouse, and other external devices
   d. Battery
   e. Solid-state drive
   f. External diskette drive or optical drive
   g. PC cards
4. Turn on the computer.
5. Determine whether the problem has been solved.
6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
7. If the problem remains, replace the following FRUs one at a time (do not replace a nondefective FRU):
   a. System board
   b. LCD assembly

Chapter 5. Status indicators

This topic helps you locate and identify the various status indicators on your computer.

Note: Depending on the model, your computer might look different from the following illustration.
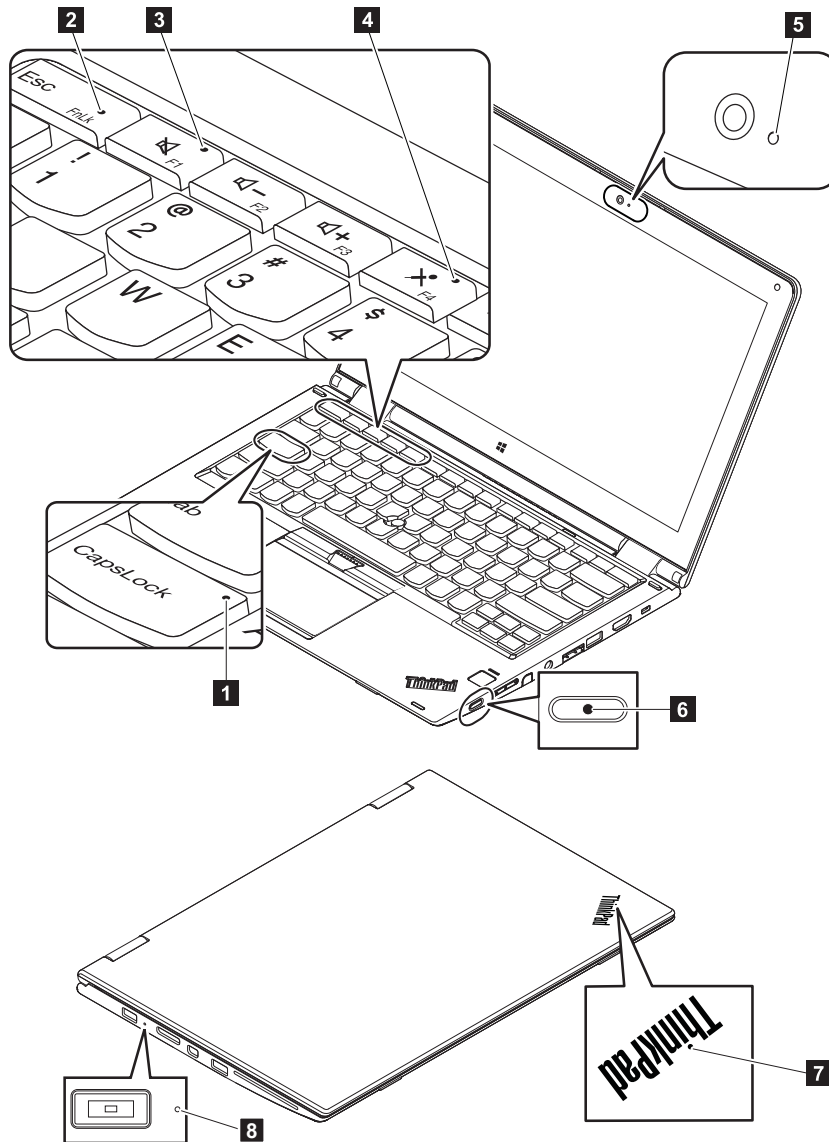
Table 6. Status indicators

Indicator	Meaning
1 CapsLock indicator	When the indicator is on, it indicates that Caps Lock mode is enabled. You can type all alphabetic characters (A-Z) in upper case directly.
2 Fn Lock indicator	• **Off**: The Fn Lock function is disabled. To initiate the special function printed as an icon on each key, press the function key directly. To input F1- F12, press the Fn key and the corresponding function key. • **On**: The Fn Lock function is enabled. To input F1- F12, press the function keys directly. To initiate the special function printed as an icon on each key, press the Fn key and the corresponding function key.
3 Speaker-mute indicator	**On**: The speakers are muted.
4 Microphone-mute indicator	**On**: The microphones are muted.
5 Camera-status indicator	**On**: The camera is in use.
6 7 System-status indicators	• **Blinking for three times**: The computer is initially connected to power. • **On**: The computer is on (in normal mode). • **Blinking fast**: The computer is entering sleep or hibernation mode. • **Blinking slowly**: The computer is in sleep mode. • **Off**: The computer is off or in hibernation mode.
8 ac power-status indicator	The ac power-status indicator shows the ac power charging status of the computer. • **Green**: Connected to ac power (charging 80%–100%) • **Amber**: Connected to ac power (charging 1%–80%) • **Off**: Not connected to ac power (no charging)

Chapter 6. Function keys

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

Table 7. Function keys

Function key and key combination	Description
[F1 mute icon]	Mutes or unmutes the speakers. If you mute the sound and turn off your computer, the sound will remain muted when you turn on your computer again. To turn on the sound, press the volume-down key [F2] or volume-up key [F3].
[F2 volume down icon]	Decreases the speaker volume.
[F3 volume up icon]	Increases the speaker volume.
[F4 microphone mute icon]	Mutes or unmutes the microphones.
[F5 darken icon]	Darkens the computer display.
[F6 brighten icon]	Brightens the computer display.
[F7 display output icon]	Switches the display output location between the computer display and an external monitor.
[F8 wireless icon]	Enables or disables the wireless features.
[F9 settings icon]	• For Windows 7: Opens **Control Panel**. • For Windows 10: Opens the Settings window.
[F10 search icon]	• For Windows 7: Opens **Windows Search**. • For Windows 10: Opens the Cortana® search box.
[F11 icon]	Views all the programs that you have opened.
[F12 icon]	• For Windows 7: Opens **Computer**. • For Windows 10: Views all the programs.
[Fn]+[Esc FnLk]	You can configure the Fn key and function keys in the Keyboard Properties window by doing the following: 1. Go to Control Panel. Change the view of Control Panel from Category to Large icons or Small icons. 2. Click **Keyboard**. In the Keyboard Properties window, click the **Fn and function keys** or **ThinkPad F1–F12 keys** tab. 3. Select the options of your preference. Press Fn+Esc to enable or disable the Fn Lock function. • **When the Fn Lock function is disabled**: The Fn Lock indicator is off. To initiate the special function printed as an icon on each key, press the function key directly. To input F1- F12, press the Fn key and the corresponding function key.

Table 7. Function keys (continued)

Function key and key combination	Description
	• **When the Fn Lock function is enabled**: The Fn Lock indicator is on. To input F1-F12, press the function keys directly. To initiate the special function printed as an icon on each key, press the Fn key and the corresponding function key.
Fn + [backlight key]	Controls the keyboard backlight. Press Fn+Spacebar to change the mode of the keyboard backlight. **Note:** If your computer is installed with the Lenovo Settings 3.0 program or later version, there are four modes for the keyboard backlight: **Off**, **Low**, **High**, and **Auto**. Otherwise, there are three modes for the keyboard backlight: **Off**, **Low**, and **High**.
Fn+B	Has the same function as the Break key on a conventional keyboard.
Fn+P	Has the same function as the Pause key on a conventional keyboard.
Fn+S	Has the same function as the SysRq key on a conventional keyboard.
Fn+K	Has the same function as the ScrLK key on a conventional keyboard.
Fn+4	Puts your computer into sleep mode. To return to normal operation, press the Fn key only.

Chapter 7. Locations

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

Locating computer controls, connectors, and indicators

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

Front view
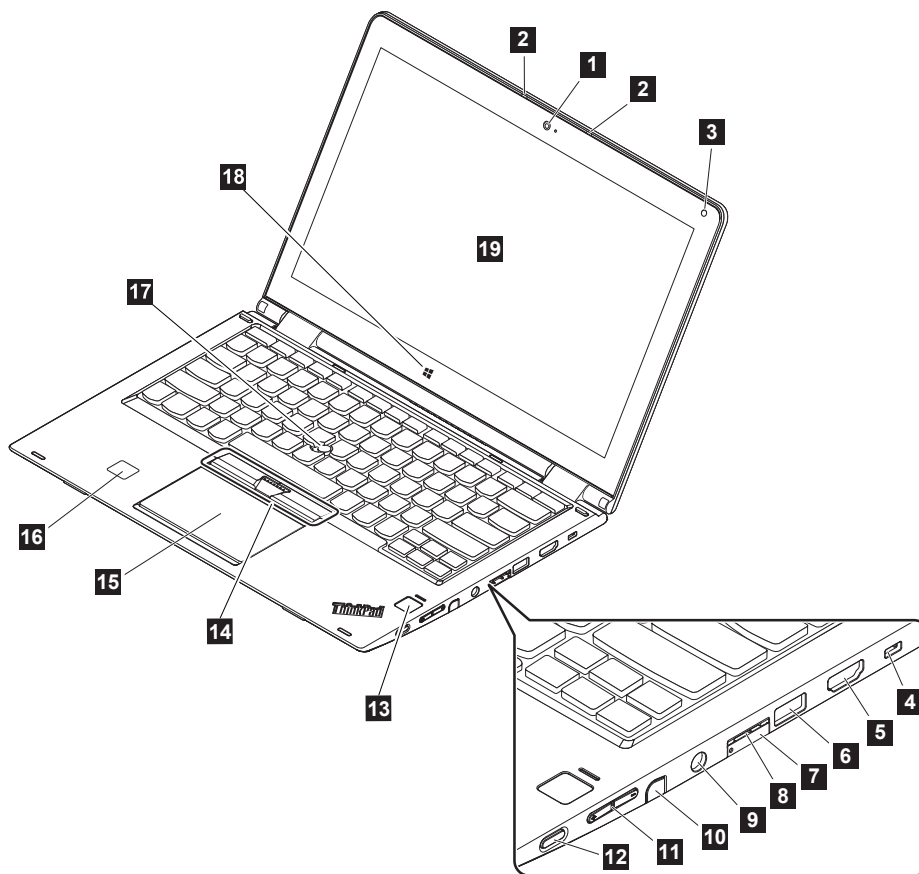
1 Camera (available on some models)

2 Microphones (available on some models)

3 Ambient light sensor

4 Security-lock slot

5 HDMI™ connector

6 USB 3.0 connector

7 Micro-SIM-card tray (available on some models)

8 MicroSD-card slot

9 Audio connector

10 ThinkPad Pen Pro (available on some models)

11 Volume-control buttons

12 Power button

13 Fingerprint reader (available on some models)

14 TrackPoint® buttons

15 Trackpad

16 NFC label (available on some models)

17 TrackPoint pointing stick

18 Windows® button

19 Multi-touch screen

Rear view
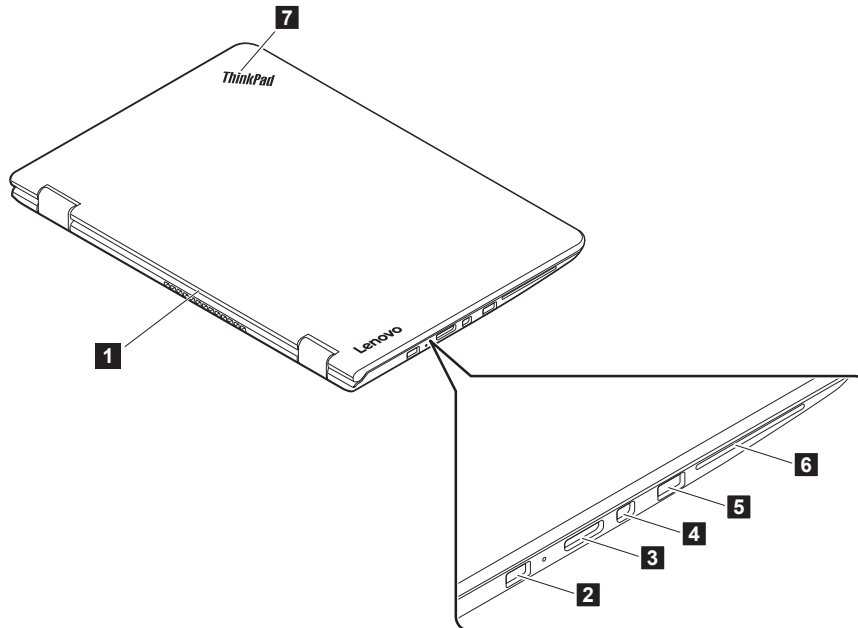
1 Fan louvers

2 Power connector

3 OneLink+ connector

4 Mini DisplayPort connector

5 Always On USB connector (USB 3.0 connector)

6 Smart card slot (available on some models)

7 System-status indicator[1]

[1]: The indicator in the ThinkPad logo on the lid shows the system status of the computer.

- **Blinking for three times**: The computer is initially connected to power.
- **On**: The computer is on (in normal mode).
- **Blinking fast**: The computer is entering sleep or hibernation mode.
- **Blinking slowly**: The computer is in sleep mode.
- **Off**: The computer is off or in hibernation mode.

Bottom view
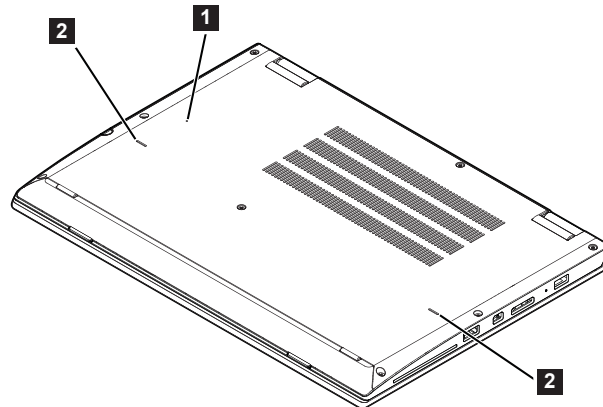
1 Emergency-reset hole   **2** Keyboard drainage holes

Locating FRUs and CRUs

This topic introduces the following service parts:
- "Major FRUs" on page 46
- "LCD FRUs" on page 48

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*. Click **Guides & Manuals** and then follow the on-screen instructions to find the manual for your product. You might be required to return the defective part that is replaced by the CRU. When return is required: (1) return instructions, a prepaid shipping label, and a container will be included with the replacement CRU; and (2) you might be charged for the replacement CRU if Lenovo does not receive the defective CRU within thirty (30) days of your receipt of the replacement CRU. See your Lenovo Limited Warranty documentation for full details.

  ThinkPad computers contain the following types of CRUs:
  - **Self-service CRUs:** These CRUs unplug or are held by no more than two screws. Examples of these types of CRUs include the ac power adapter and power cord. Other self-service CRUs depending on product design might include the memory module, wireless card, keyboard, and palm rest with fingerprint reader and trackpad.
  - **Optional-service CRUs:** These CRUs are isolated parts within the computer that are concealed by an access panel that is typically secured by more than two screws. Once the access panel is removed, the specific CRU is visible.x
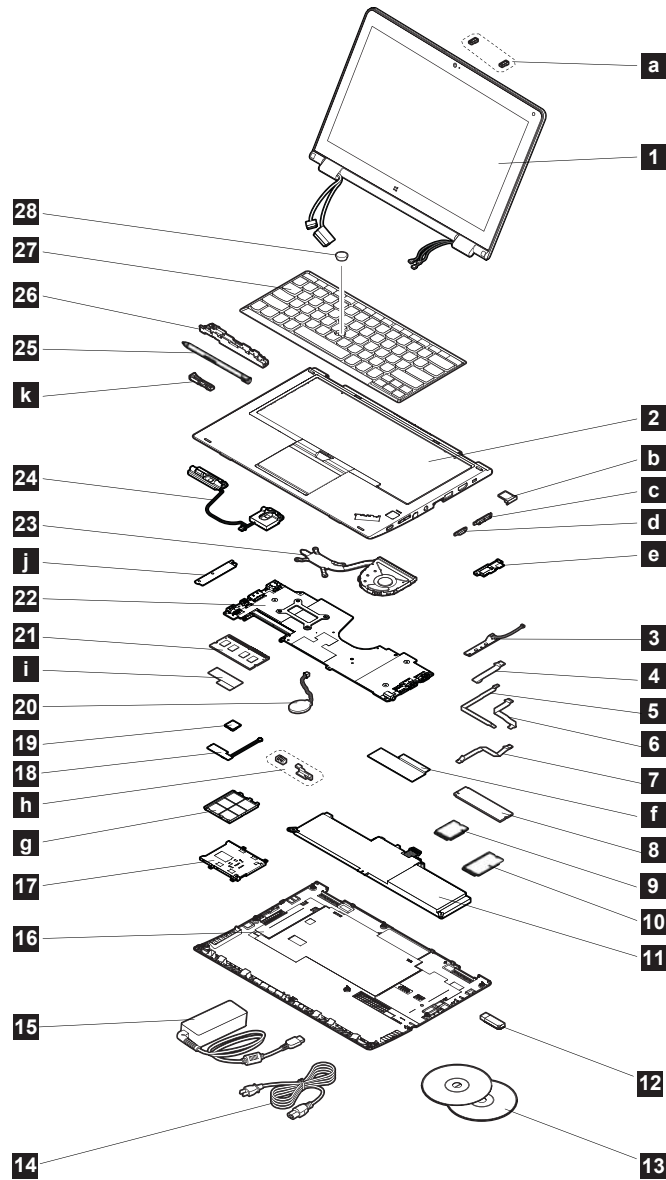
Major FRUs

Table 8. Major FRUs

No.	FRU descriptions	Self-service CRU	Optional-service CRU
1	LCD unit	No	No
2	Keyboard bezel assembly	No	No
3	Power card	No	No
4	Touchpad cable	No	No
5	Smart-card-reader cable *	No	No
6	NFC cable *	No	No
7	Fingerprint-reader cable	No	No
8	M.2 solid-state drive	Yes	No

Table 8. Major FRUs (continued)

No.	FRU descriptions	Self-service CRU	Optional-service CRU
9	Wireless-LAN card or WiGig module *	Yes	No
10	Wireless-WAN card *	Yes	No
11	Battery	No	No
12	Lenovo factory recovery USB key *	No	No
13	Lenovo recovery disc set *	No	No
14	Power cord	Yes	No
15	ac power adapter	Yes	No
16	Base cover assembly	Yes	No
17	Smart-card reader *	No	No
18	NFC antenna *	No	No
19	NFC module *	No	No
20	Coin-cell battery	Yes	No
21	Memory module	Yes	No
22	System board	No	No
23	Thermal fan assembly	No	No
24	Speaker assembly	No	No
25	ThinkPad Pen Pro *	Yes	No
26	Pen holder	No	No
27	Keyboard	No	No
28	TrackPoint cap	Yes	No
a - k	System miscellaneous parts (see "Miscellaneous parts and other FRUs" on page 49)		

* Available on some models

Note: The Lenovo factory recovery USB key 12 and the Lenovo recovery disc set 13 are used to restore the Microsoft Windows operating system.

LCD FRUs
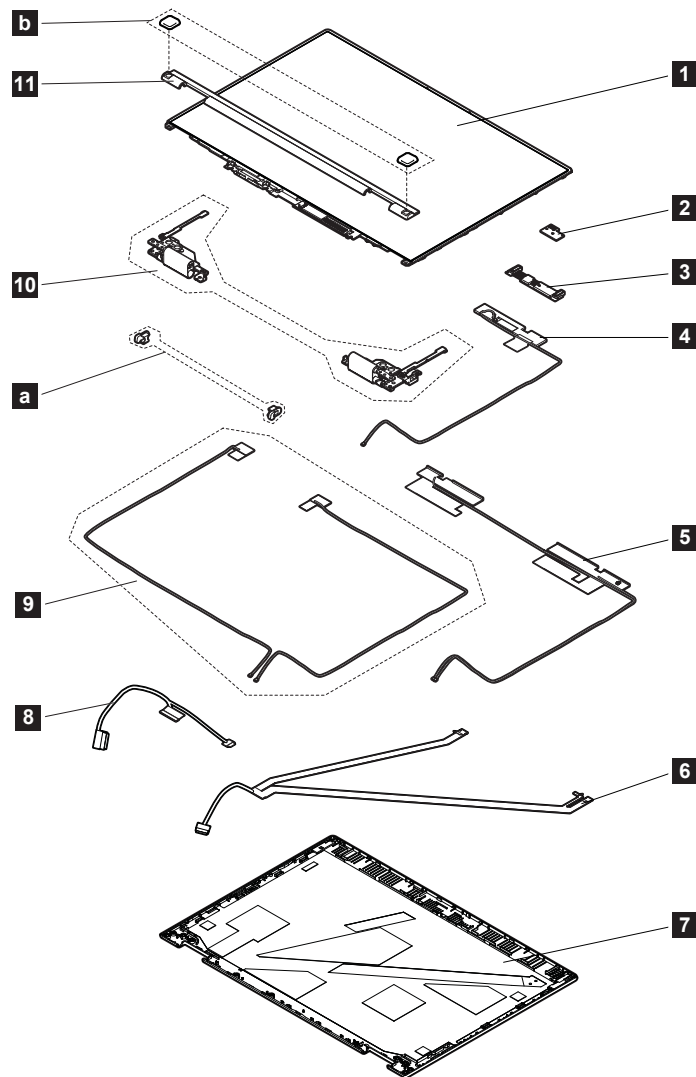
Table 9. LCD FRUs

No.	FRU descriptions	Self-service CRU	Optional-service CRU
1	LCD panel	No	No
2	Sensor card	No	No
3	Camera/microphone assembly *	No	No
4	WiGig antenna kit *	No	No
5	Wireless-WAN antenna kit *	No	No
6	Camera/microphone cable	No	No
7	LCD rear-cover assembly	No	No
8	LCD cable assembly	No	No
9	Wireless-LAN antenna kit	No	No
10	LCD hinges	No	No

No.	FRU descriptions	Self-service CRU	Optional-service CRU
11	Strip bezel assembly	No	No
a **b**	LCD miscellaneous parts (see "Miscellaneous parts and other FRUs" on page 49)		

* Available on some models

Miscellaneous parts and other FRUs

Table 10. Miscellaneous parts

FRU descriptions	Self-service CRU	Optional-service CRU
System miscellaneous parts: • **a** Microphone rubbers * • **b** Micro-SIM-card tray * • **c** Volume button • **d** Power button • **e** Fingerprint-reader bracket * • **f** Mylar for the M.2 solid-state drive • **g** Dummy door for the smart-card reader * • **h** Cable rubbers • **i** Insulation mylar for the memory module • **j** dc-in bracket • **k** Dummy cap for the ThinkPad Pen Pro *	No	No
LCD miscellaneous parts: • **a** Left hinge rubber clips and right hinge rubber clips • **b** Screw caps	No	No
Screw kit	No	No

* Available on some models

Chapter 8. FRU replacement notices

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

CRU statement for customers:
You can resolve some problems with your product with a replacement part you can install yourself, called a "Customer Replaceable Unit" or "CRU." Some CRUs are designated as self-service CRUs and others are designated as optional-service CRUs. *Installation of self-service CRUs is your responsibility. For optional-service CRUs, you can either install the CRU yourself or you can request that a Service Provider install the CRU according to the warranty service for your prod uct.* 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*. Click **Guides & Manuals** and then follow the on-screen instructions to find the manual for your product. You might be required to return the defective part that is replaced by the CRU. When return is required: (1) return instructions, a prepaid shipping label, and a container will be included with the replacement CRU; and (2) you might be charged for the replacement CRU if Lenovo does not receive the defective CRU within thirty (30) days of your receipt of the replacement CRU. See your Lenovo Limited Warranty documentation for full details.

Screw notices

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

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

Do the following when you service this machine:

- Keep the screw kit in your tool bag.
- It is recommended to use new screws.
- It is recommended to use each screw only once.x

Tighten screws as follows:

- **Plastic to plastic**
  Turn an additional 90 degrees after the screw head touches the surface of the plastic part.
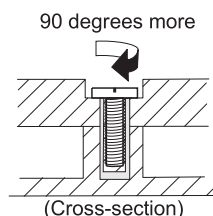
- **Logic card to plastic**
  Turn an additional 180 degrees after the screw head touches the surface of the logic card.

180 degrees more

(Cross-section)
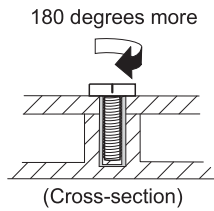
Notes:

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

Retaining serial numbers

This topic provides instructions on the following:
- "Restoring the serial number of the system unit" on page 52
- "Retaining the UUID" on page 53

Restoring the serial number of the system unit

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

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

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

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

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

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

After you replace the system board, do the following to restore the serial number of the system unit:

1. Connect the Maintenance Key to the computer.

2. When the logo screen is displayed, press Esc. The ThinkPad Config Information Update Utility interface is displayed.

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

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

Retaining the UUID

The Universally Unique Identifier (UUID) is a 128-bit number uniquely assigned to your computer at production and stored in the EEPROM of your system board.

The algorithm that generates the number is designed to provide unique IDs until the year A.D. 3400. No two computers in the world have the same number.

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

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

1. Connect a USB memory key to the computer.

   Note: Only an authorized Lenovo service technician can access the above Web site.
2. Restart the computer.
3. When the logo screen is displayed, press Esc. The ThinkPad Config Information Update Utility interface is displayed.
4. Type 2 under **Enter the action desired**, then press Enter. The Auto UUID generation utility interface is displayed.
5. Type y under **Change UUID. OK? [Y/N]**, then press Enter. A new UUID is created and written. If a valid UUID already exists, it is not overwritten.

Chapter 9. Removing or replacing a FRU

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

CRU statement for customers:

You can resolve some problems with your product with a replacement part you can install yourself, called a "Customer Replaceable Unit" or "CRU." Some CRUs are designated as self-service CRUs and others are designated as optional-service CRUs. *Installation of self-service CRUs is your responsibility. For optional-service CRUs, you can either install the CRU yourself or you can request that a Service Provider install the CRU according to the warranty service for your prod uct.* 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.*You might be required to return the defective CRU. When return is required:(1) return instructions, a prepaid shipping label, and a container will be included with the replacement CRU; and (2) you might be charged for the replacement CRU if Lenovo does not receive the defective part within thirty (30) days of your receipt of the replacement CRU. See your Lenovo Limited Warranty documentation for full details.

General guidelines

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

1. Do not try to service any computer unless you have been trained and certified. An untrained person runs the risk of damaging parts.
2. Before replacing any FRU, review Chapter 8 "FRU replacement notices" on page 51.
3. Begin by removing any FRUs that have to be removed before replacing the failing FRU. Any such FRUs are listed at the beginning of each FRU replacement section. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing a FRU, as given in the illustrations by the numbers in square callouts.
5. When turning a screw, turn it in the direction as given by the arrow in the illustration.
6. When removing a FRU, move it in the direction as given by the arrow in the illustration.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement.
8. When replacing a FRU, use the correct screws as shown in the replacement procedures.

⚠️**DANGER**

Before removing any FRU, turn off the computer, unplug all power cords from electrical outlets, disable the built-in battery, and then disconnect any interconnecting cables.

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

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

Before servicing the computer

Carefully read this topic before servicing the computer.

Disabling the built-in battery

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

1. Turn off your computer and disconnect the ac power adapter and all cables from the computer.
2. Turn on your computer. Press F1 to enter ThinkPad Setup when the logo screen is displayed.
3. Select **Config ➙ Power**. The **Power** submenu is displayed.
4. Select **Disable built-in battery** and press Enter.
5. Click **Yes** in the Setup Confirmation window. The built-in battery is disabled and the computer turns off. Wait for three to five minutes to let the computer cool.

1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro

Removal steps of the ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro

Remove the ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro as shown in the following illustration.
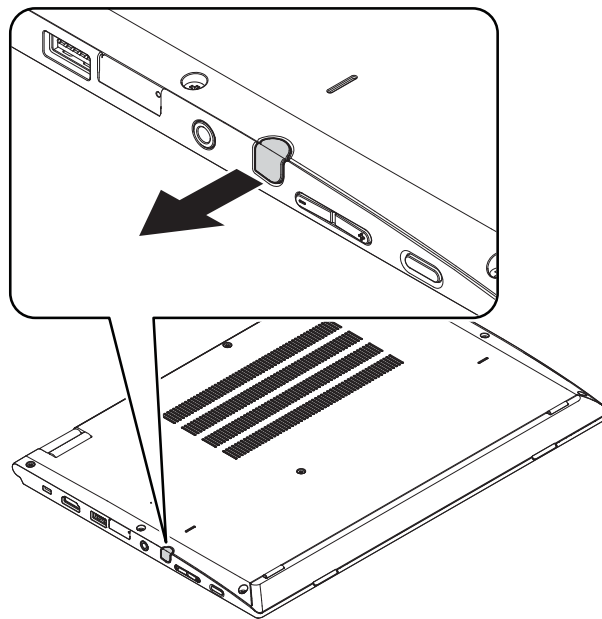
Note: Ensure that you reinstall the ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro after finishing the servicing.

1020 Micro-SIM-card tray (available on some models)

Removal steps of the micro-SIM-card tray
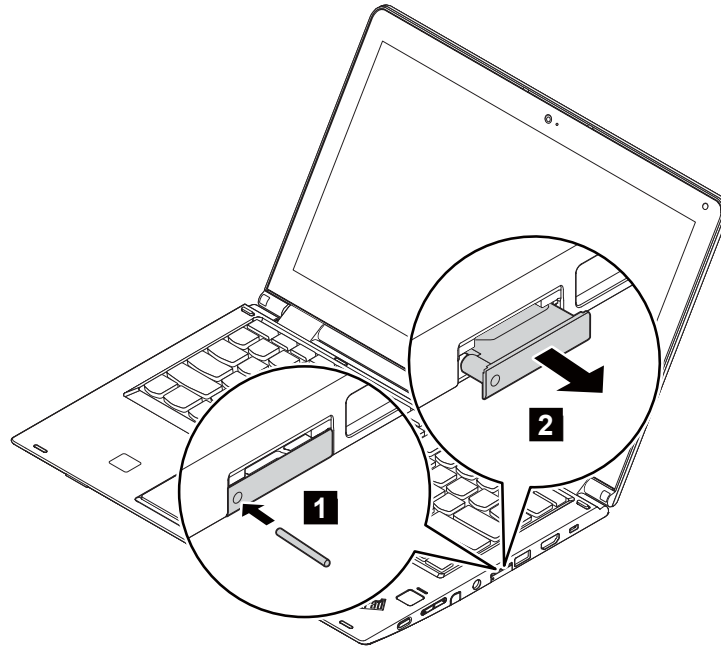
1030 Base cover assembly

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57

Removal steps of the base cover assembly

Loosen the screws **1** and remove the base cover assembly **2**.
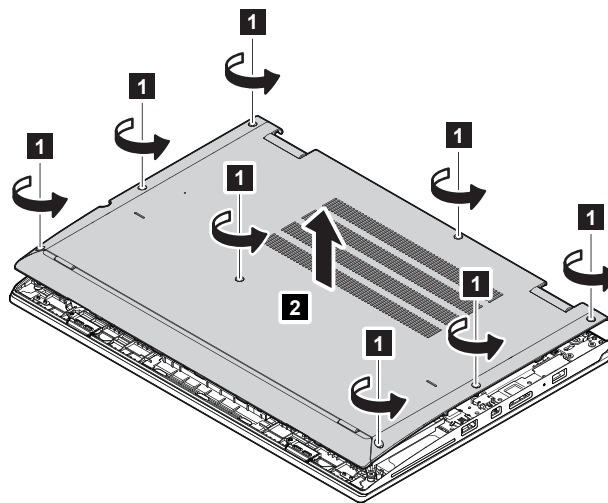
Applying labels to the base cover assembly

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

The following illustration shows the location of each label for Windows 7 and Windows 10 based computer models.
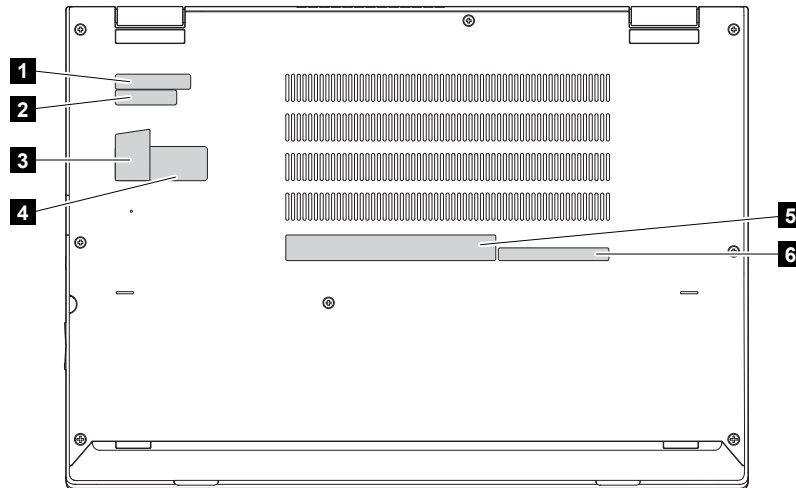
1 Serial number label

3 Genuine Microsoft label (for Windows 10)

5 GEO label

2 Wireless IMEI label

4 Certificate of Authentication (COA) label (for Windows 7)

**6** FCC ID label

1040 dc-in bracket

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

Removal steps of the dc-in bracket
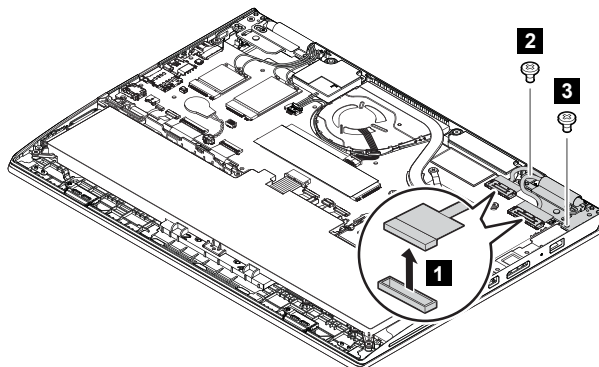
Step	Screw (quantity)	Color	Torque
2	M2.5 × 3.5 mm, flat-head, nylon-coated (1)	Black	0.294 Nm (3.0 kgf-cm)
3	M2.5 × 4 mm, flat-head, nylon-coated (1)	Silver	0.294 Nm (3.0 kgf-cm)
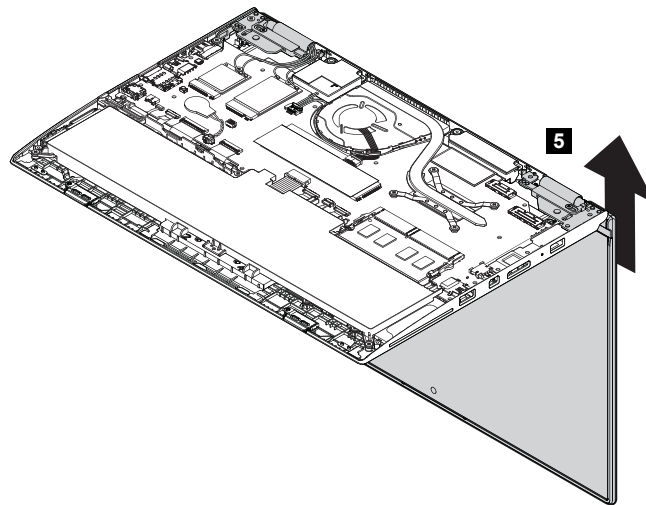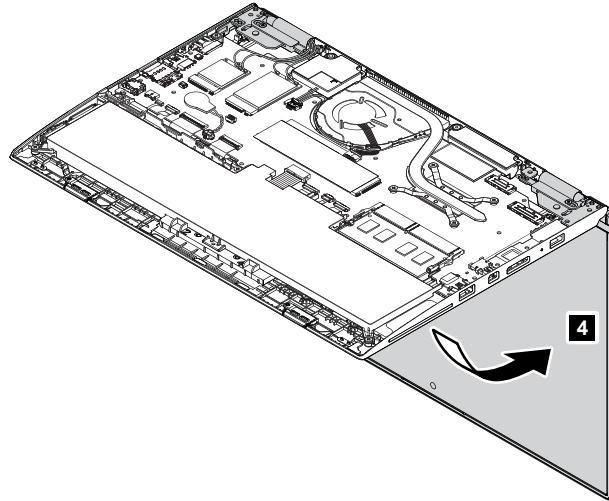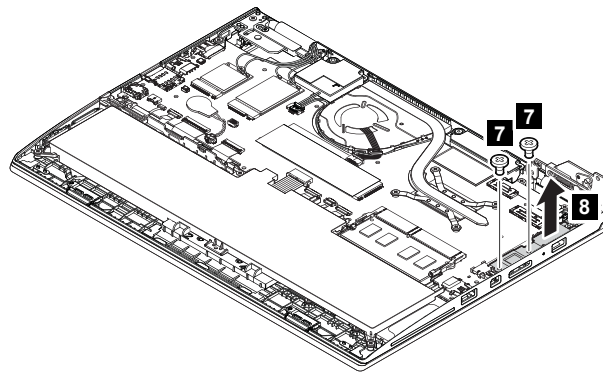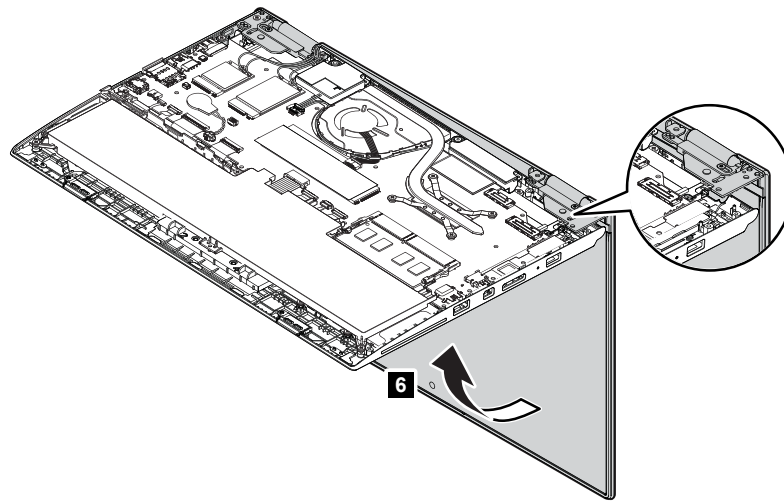
Step	Screw (quantity)	Color	Torque
7	M2 × 4.5 mm, flat-head, nylon-coated (2)	Silver	0.181 Nm (1.85 kgf-cm)

1050 Memory module

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

Removal steps of the memory module
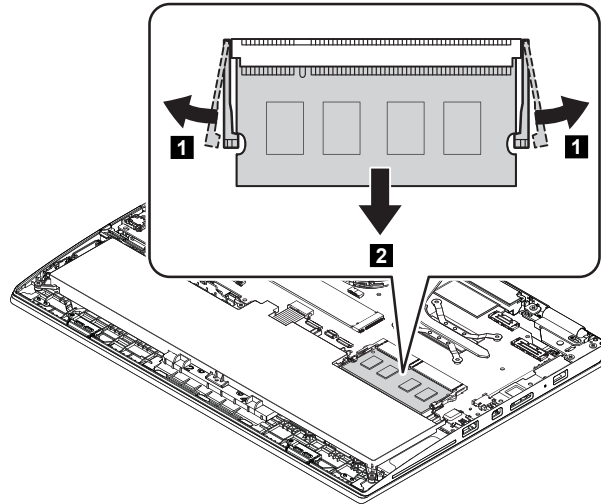
When installing:
Insert the notched end of the memory module into the memory slot. Press the memory module in firmly, and pivot it downward until it snaps into place. Ensure that the memory module is firmly installed in the slot and does not move easily.
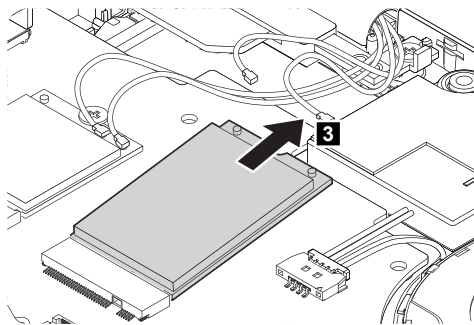
1060 M.2 solid-state drive

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

Removal steps of the M.2 solid-state drive

Attention:

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

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

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

- Ensure that you partition the M.2 solid-state drive after installing it on the computer you are servicing. Otherwise, the M.2 solid-state drive will not function correctly.
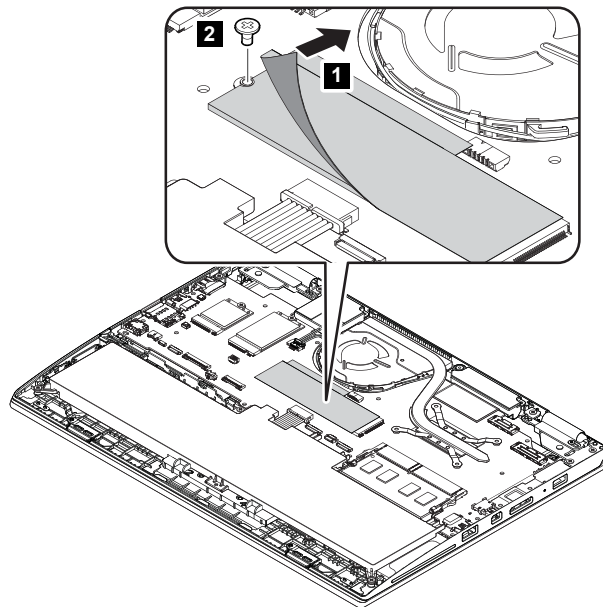
Step	Screw (quantity)	Color	Torque
2	M2 × 2.5 mm, flat-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgf-cm)
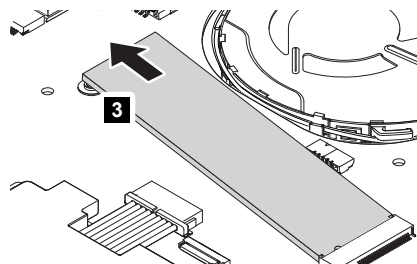
1070 Coin-cell battery

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

⚠️ **DANGER**

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

Removal steps of the coin-cell battery
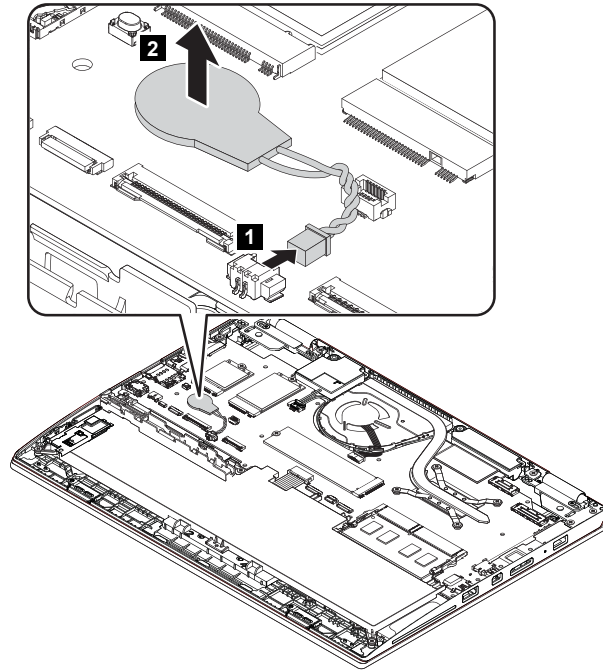
When installing:

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

1080 Wireless-LAN card or WiGig module

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

Removal steps of the wireless-LAN card
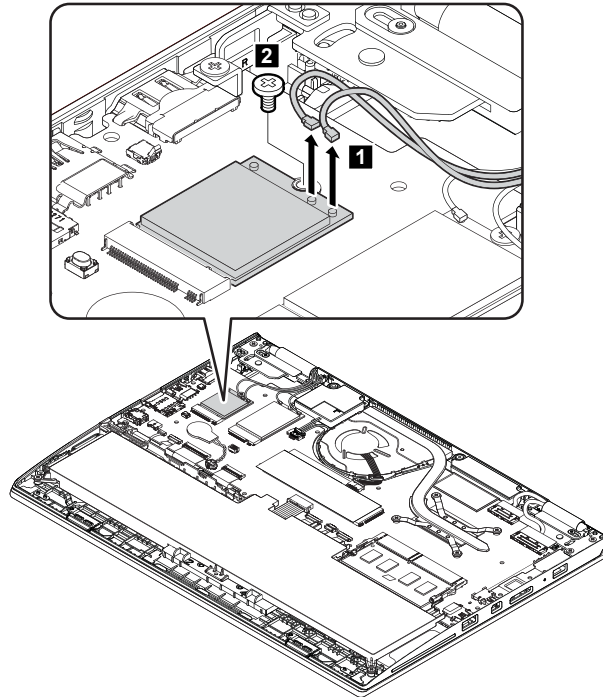
Step	Screw (quantity)	Color	Torque
2	M2 × 2.5 mm, flat-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgf-cm)
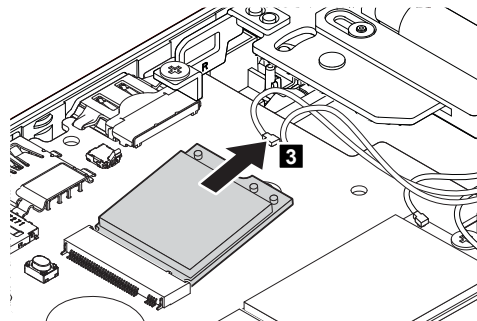
When installing:

Attention: When you route the cables, ensure that they are not subject to any tension. Tension could cause the cables to be damaged by the cable guides, or a wire to be broken.

1. Plug the gray cable into the connector labeled **MAIN** on the card, and plug the black cable into the connector labeled **AUX** on the card.
2. When you route the cables, ensure that there is a gap between the wireless-LAN cables and the hinge, and do not pull the wireless-LAN cables from the hinge.

Removal steps of the WiGig module
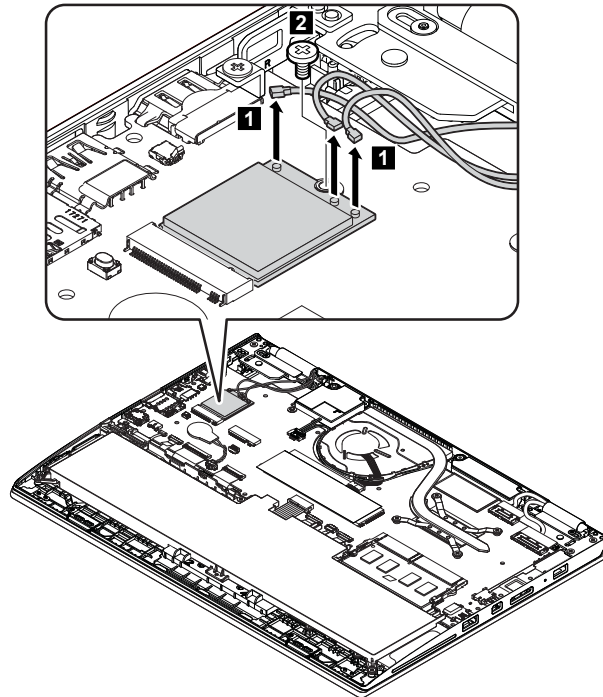
Step	Screw (quantity)	Color	Torque
2	M2 × 2.5 mm, flat-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgf-cm)
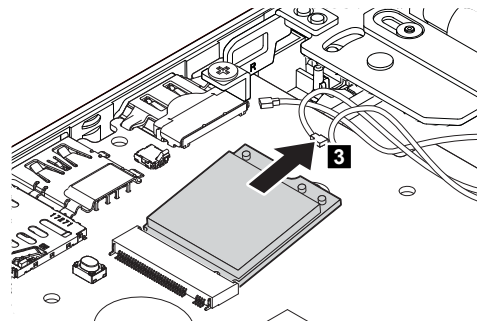
When installing:

Attention: When you route the cables, ensure that they are not subject to any tension. Tension could cause the cables to be damaged by the cable guides, or a wire to be broken.

1. Plug the white cable into the connector labeled **IFCON** on the module, plug the gray cable into the connector labeled **MAIN** on the module; and plug the black cable into the connector labeled **AUX** on the module.

2. When you route the cables, ensure that there is a gap between the WiGig-module cables and the hinge, and do not pull the WiGig-module cables from the hinge.

1090 Wireless-WAN card (available on some models)

For access, remove these FRUs in order:

- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

Removal steps of the wireless-WAN card
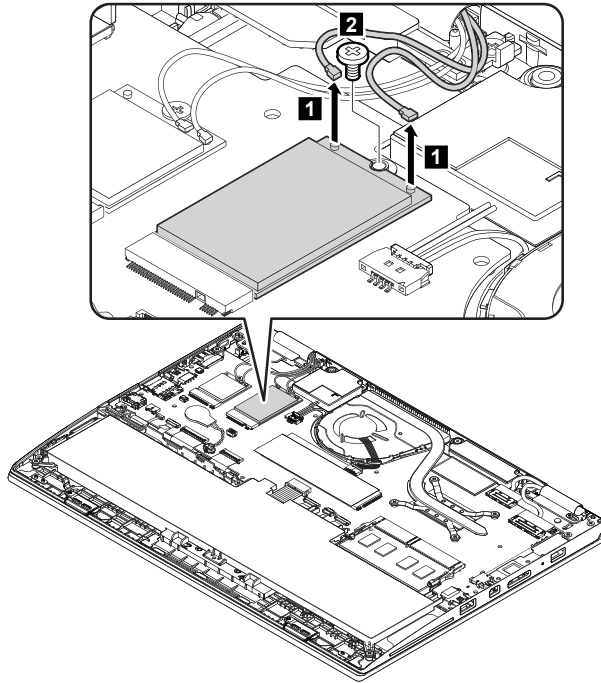
Step	Screw (quantity)	Color	Torque
2	M2 × 2.5 mm, flat-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgf-cm)

When installing:
Plug the orange cable into the connector labeled **MAIN** on the card, and plug the blue cable into the connector labeled **AUX** on the card.

1100 Thermal fan assembly

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

Removal steps of the thermal fan assembly

1. Detach the connector **1**, loosen the speaker cable **2**, and then loosen the screws **3** in ascending alphabetical order (**a** to **d**) as shown.
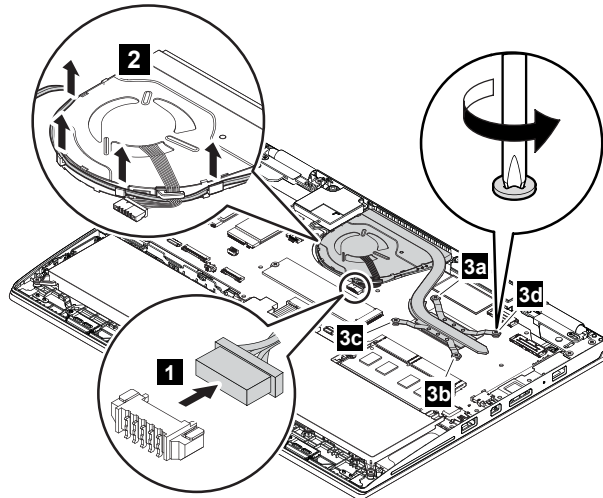
2. Remove the thermal fan assembly **4**.
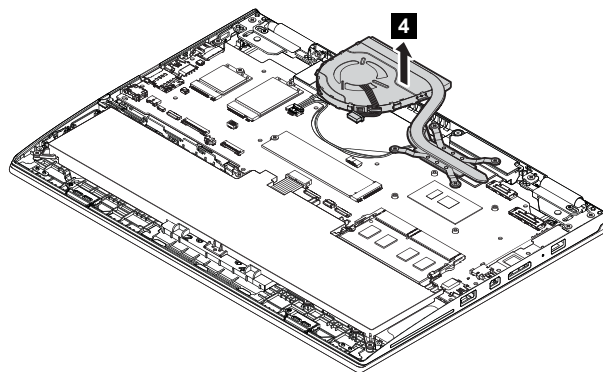
When installing:

- Always wear fingerstalls when handling the thermal fan assembly. Do not touch or hold any part of the thermal fan assembly with bare fingers.

- Before you attach the thermal fan assembly to the computer, apply thermal grease, at an amount of 0.2 grams, on the part marked **a** as shown in the following illustrations. Either too much or too less application of grease can cause a thermal problem due to imperfect contact with a component.
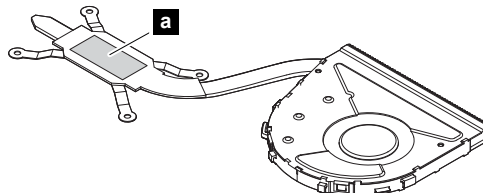
- Do not touch the thermal grease.
- Do not press, touch, or rotate the fan impeller.
- Do not touch the fan inlet hole.

- Do not twist or pull the cable of the thermal fan assembly.
- Do not apply pressure on the top and base covers of the thermal fan assembly.
- Do not press the heat pipe. Hold both sides of the heat pipe when you take the thermal fan assembly.
- Do not shake or drop the thermal fan assembly.
- Ensure that the fan connector is attached firmly.
- Replace the thermal fan assembly if you observe the following:

  – The cover of the thermal fan assembly is deformed or damaged.

  – There is abnormal noise during rotation.

1110 Speaker assembly

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57
- "1100 Thermal fan assembly" on page 66
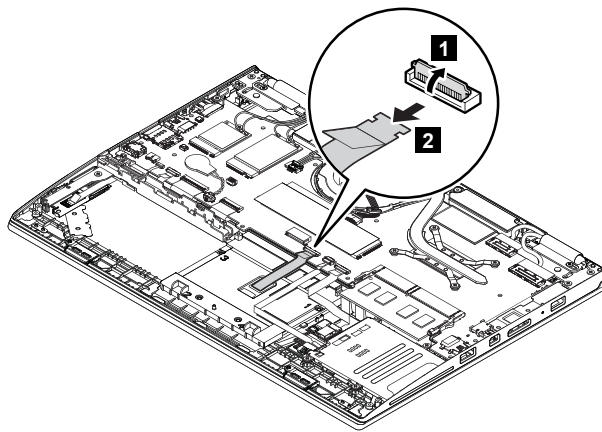
Removal steps of the speaker assembly
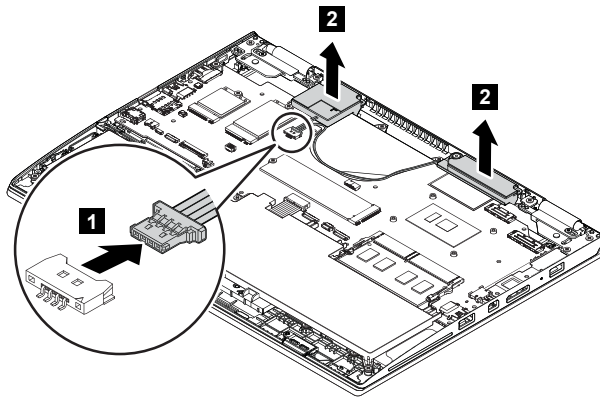
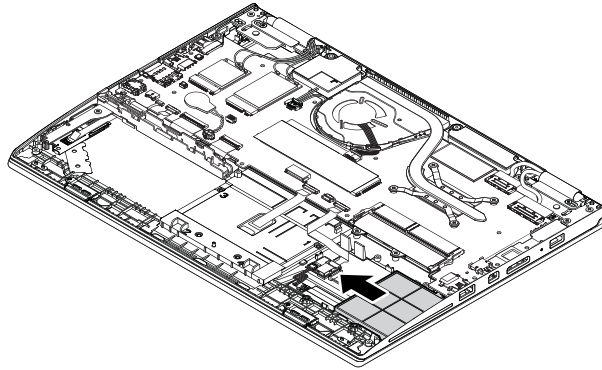# 1120 Battery
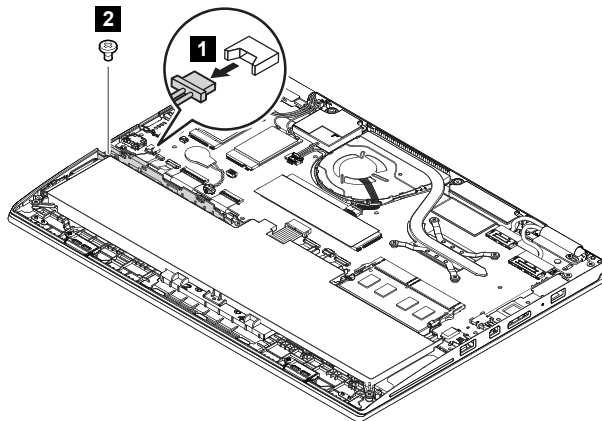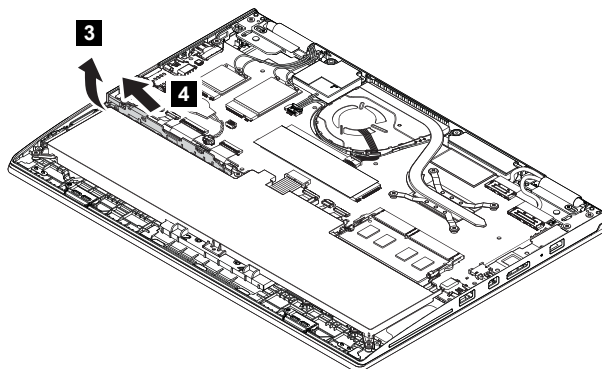
For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

Important notices for replacing a battery

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

The Lenovo Solution Center program provides an automatic battery diagnostic test that determines if the battery is defective. A battery FRU should not be replaced unless this diagnostic test shows that the battery is defective. The only exception to this is if the battery is physically damaged or a customer is reporting a possible safety issue.

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

Removal steps of the battery

⚠️**DANGER**

Use only the authorized battery specified for your computer. Any other battery could ignite or explode.
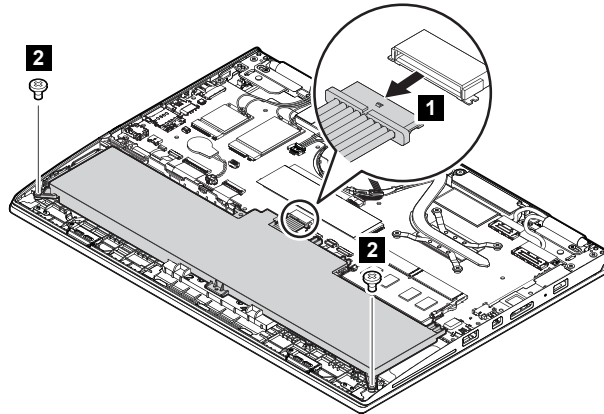
Step	Screw (quantity)	Color	Torque
2	M2 × 3 mm, flat-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgf-cm)
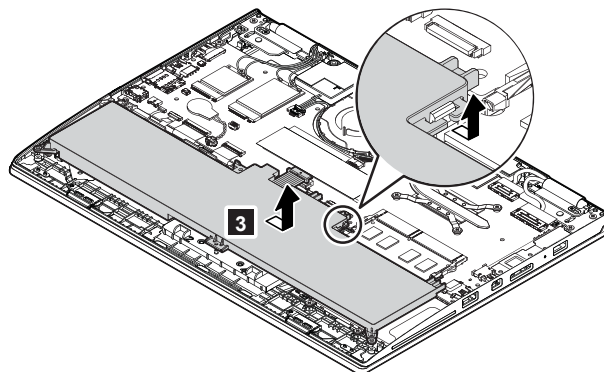
1130 Smart-card-reader cable, NFC cable, and touchpad cable
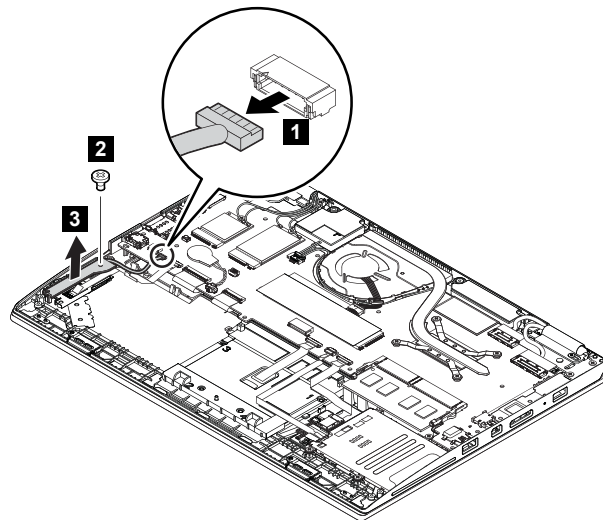
For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57
- "1120 Battery" on page 68

Removal steps of the smart-card-reader cable (available on some models)
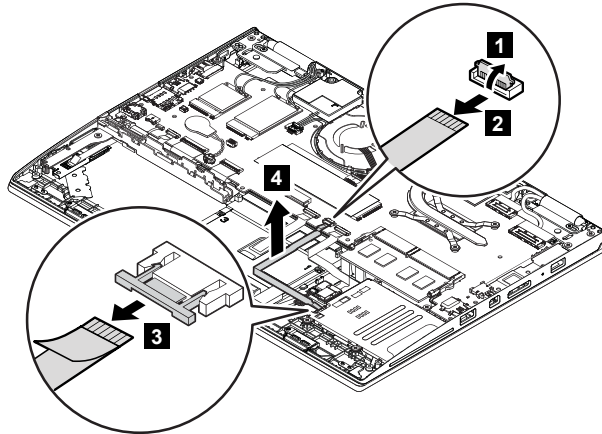
Removal steps of the NFC cable (available on some models)
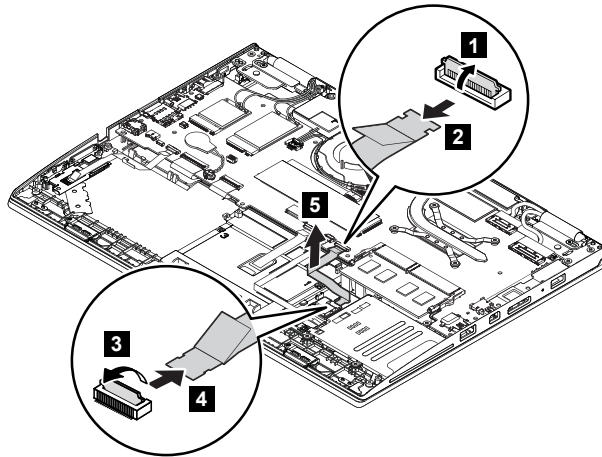
Removal steps of the touchpad cable
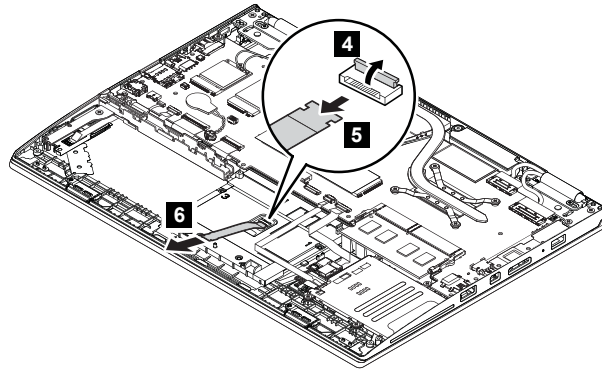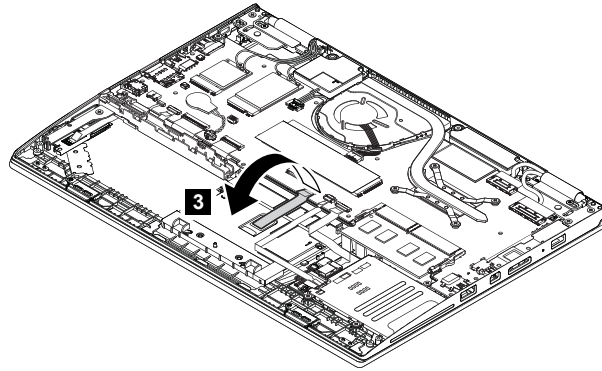
1140 Smart-card reader or dummy door for the smart-card reader

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57
- "1120 Battery" on page 68

Removal steps of the smart-card reader
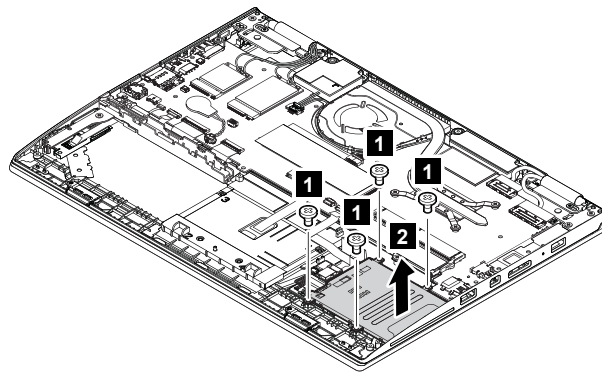
Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, flat-head, nylon-coated (4)	Black	0.181 Nm (1.85 kgf-cm)

Removal steps of the dummy door for the smart-card reader

1150 Pen holder

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

Removal steps of the pen holder

Step	Screw (quantity)	Color	Torque
2	M2 × 2 mm, flat-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgf-cm)

1160 Power card

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57
- "1120 Battery" on page 68
- "1150 Pen holder" on page 72

Removal steps of the power card

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

When installing:
Ensure that the power card is attached firmly.

1170 Power button and volume button

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57
- "1120 Battery" on page 68
- "1160 Power card" on page 73

Removal steps of the power button and volume button
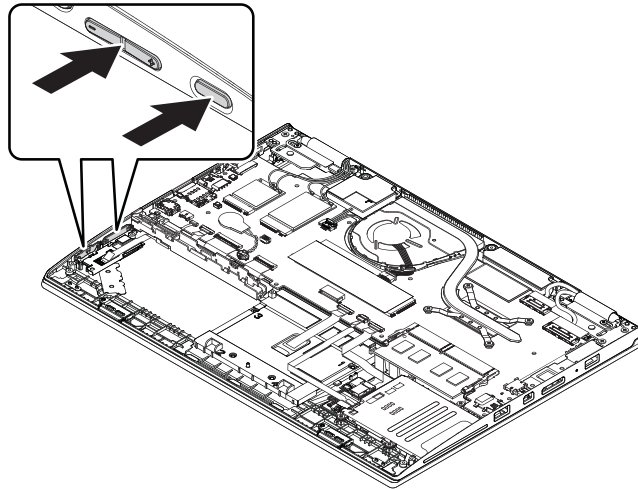
1180 Fingerprint-reader cable and fingerprint-reader bracket (available on some models)

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57
- "1120 Battery" on page 68
- "1150 Pen holder" on page 72
- "1160 Power card" on page 73

Removal steps of the fingerprint-reader cable and fingerprint-reader bracket
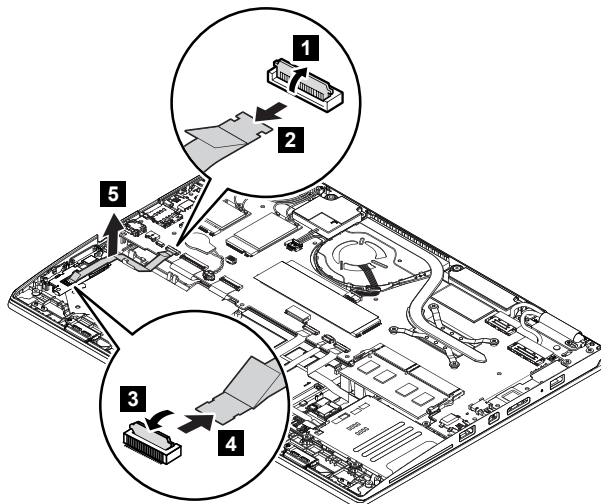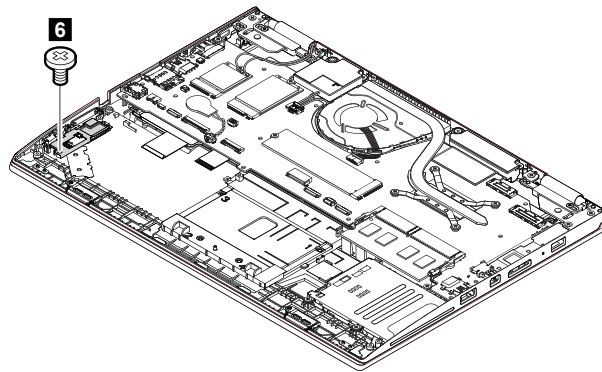
Step	Screw (quantity)	Color	Torque
6	M2 × 2.5 mm, flat-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgf-cm)
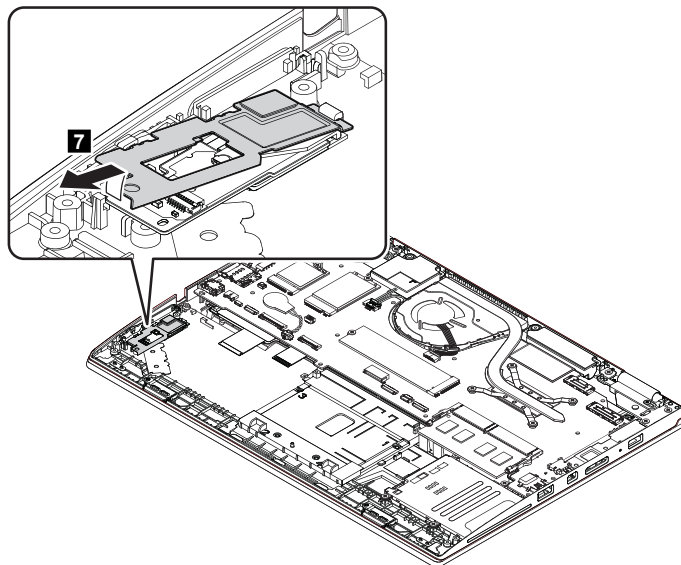
When installing:
Ensure that the fingerprint-reader cable and fingerprint-reader bracket are attached firmly.

1190 System board

Important notices for handling the system board

When handling the system board, read the following:

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

  Note: Dropping a system board from a height of as little as 0.15 m (6 inches) so that it falls flat on a hard bench can subject the accelerometer to as much as 6000 G's of shock.

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

- Avoid rough handling of any kind.

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

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

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57
- "1040 dc-in bracket" on page 58
- "1050 Memory module" on page 60
- "1060 M.2 solid-state drive" on page 61
- "1070 Coin-cell battery" on page 62
- "1080 Wireless-LAN card or WiGig module" on page 63
- "1090 Wireless-WAN card (available on some models)" on page 65
- "1100 Thermal fan assembly" on page 66
- "1120 Battery" on page 68

Attention: The microprocessor **a**, which is soldered on the system board, is extremely sensitive. When you service the system board, avoid any kind of rough handling.
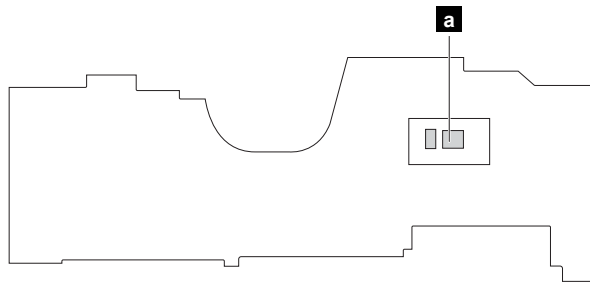
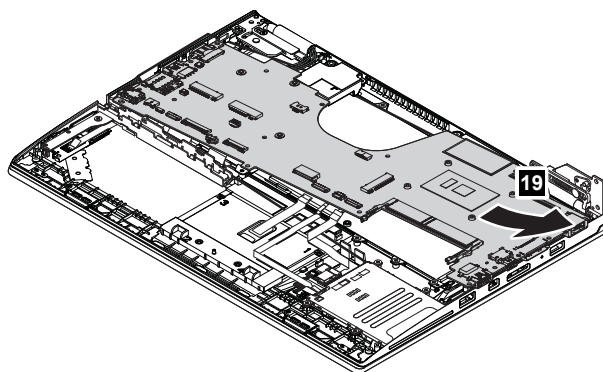**Removal steps of the system board**

1. Detach the connectors.
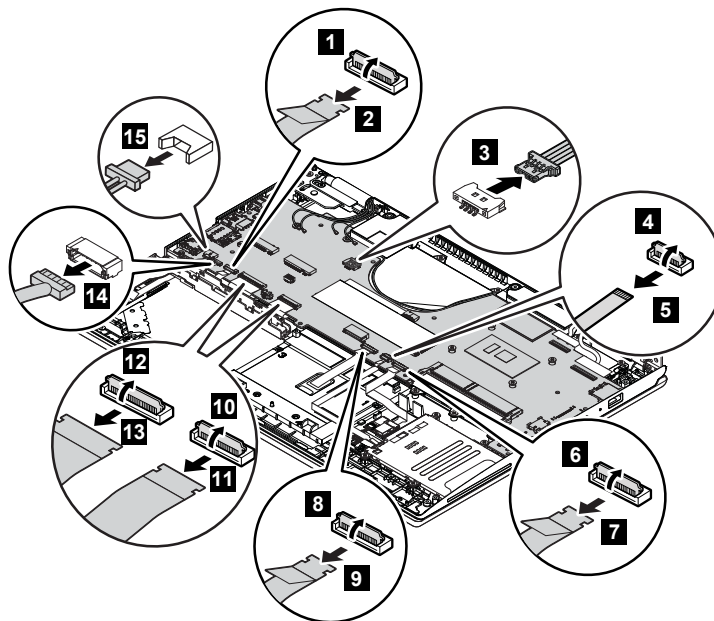
2. Remove the screws.
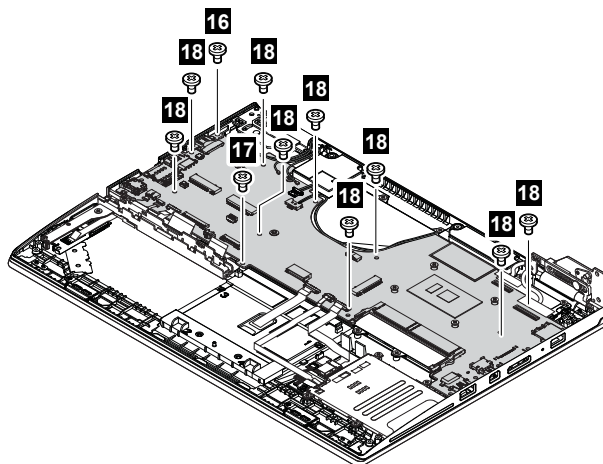
Step	Screw (quantity)	Color	Torque
16	M2.5 × 4 mm, flat-head, nylon-coated (1)	Silver	0.294 Nm (3.0 kgf-cm)
17	M2 × 4.5 mm, flat-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgf-cm)
18	M2 × 3 mm, flat-head, nylon-coated (9)	Black	0.181 Nm (1.85 kgf-cm)

3. Remove system board in the direction **19** as shown.

When installing: Ensure that all the connectors are attached firmly to the system board.

After the replacement finishes, calibrate the accelerometer using the sensor calibration tool. To download the sensor calibration tool and the instruction, do the following:

Note: Service account and password are required for downloading the sensor calibration tool and the instruction.

1. Locate the sensor calibration tool and select the corresponding file name to download the sensor calibration tool or the instruction.

1200 Keyboard assembly

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57
- "1040 dc-in bracket" on page 58
- "1050 Memory module" on page 60
- "1060 M.2 solid-state drive" on page 61
- "1070 Coin-cell battery" on page 62
- "1080 Wireless-LAN card or WiGig module" on page 63
- "1090 Wireless-WAN card (available on some models)" on page 65
- "1100 Thermal fan assembly" on page 66
- "1110 Speaker assembly" on page 68
- "1120 Battery" on page 68
- "1190 System board" on page 75

Removal steps of the keyboard assembly

1. Remove the screws **1**, and then remove the keyboard brackets **2**.
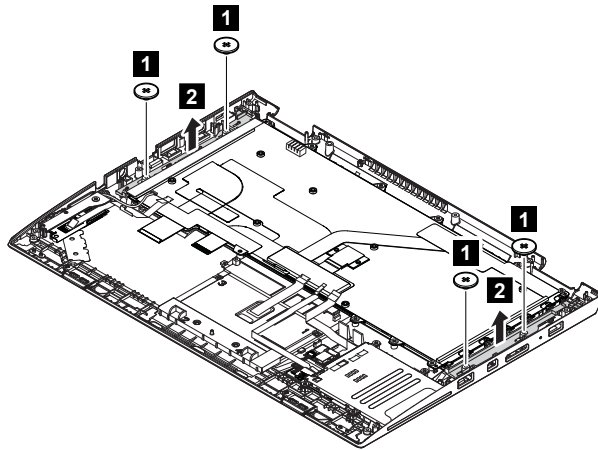
Step	Screw (quantity)	Color	Torque
1	M2 × 2 mm, flat-head, nylon-coated (4)	Black	0.181 Nm (1.85 kgf-cm)

2. Remove the screws **3** in ascending alphabetical order (**a** to **i**) as shown. Then lift the keyboard assembly and remove it **4**.
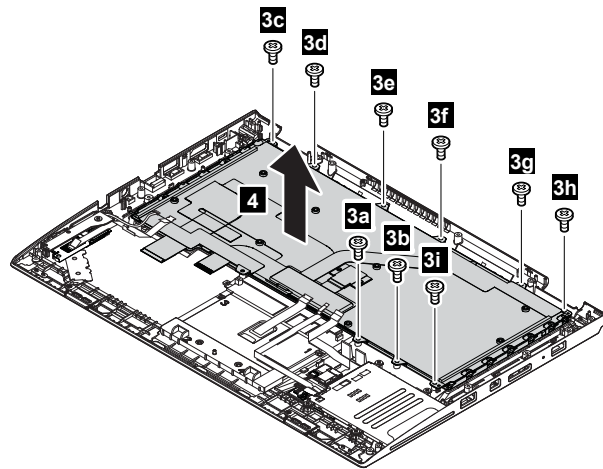
Step	Screw (quantity)	Color	Torque
3	M2 × 2.5 mm, flat-head, nylon-coated (9)	Silver	0.181 Nm (1.85 kgf-cm)

1210 LCD unit

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

Removal steps of the LCD unit

1. Detach the connectors.
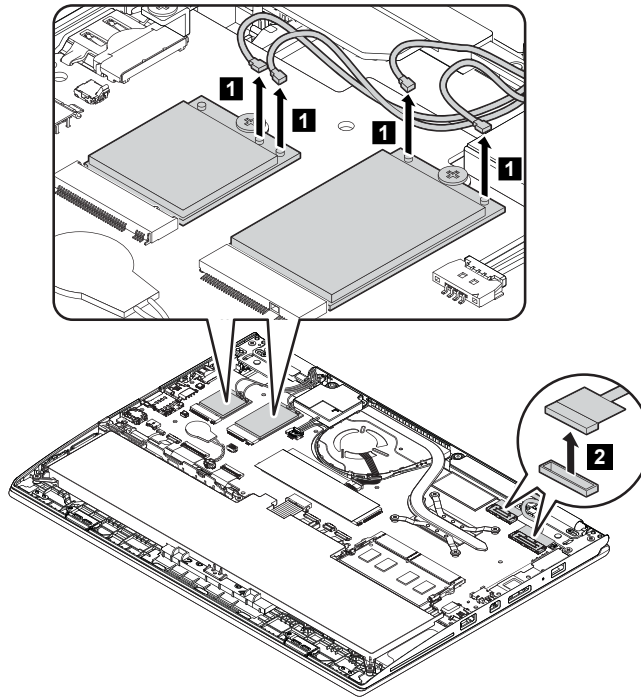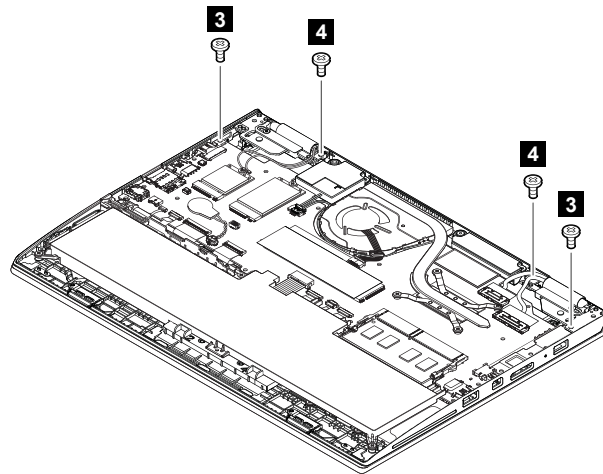
2. Remove the screws.

Step	Screw (quantity)	Color	Torque
3	M2.5 × 4 mm, flat-head, nylon-coated (2)	Silver	0.294 Nm (3.0 kgf-cm)
4	M2.5 × 3.5 mm, flat-head, nylon-coated (2)	Black	0.294 Nm (3.0 kgf-cm)

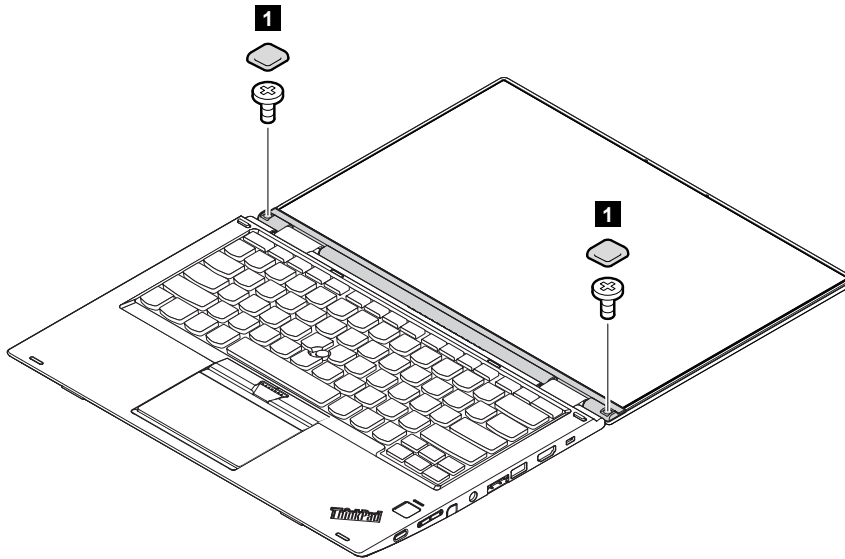3. Pivot the LCD unit as shown **6**.
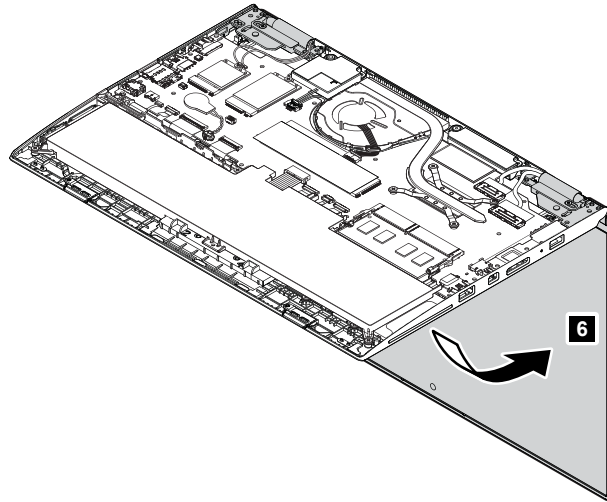
4. Remove the LCD unit **7**.
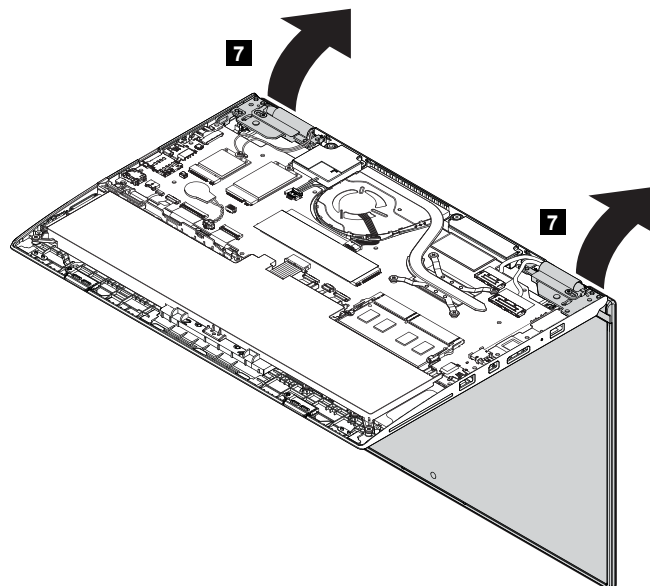
**When installing:** Ensure that you attach the connectors firmly.

Attention: When you route the cables, ensure that they are not subject to any tension. Tension could cause the cables to be damaged by the cable guides, or a wire to be broken.

2010 Strip bezel assembly

Removal steps of the strip bezel assembly

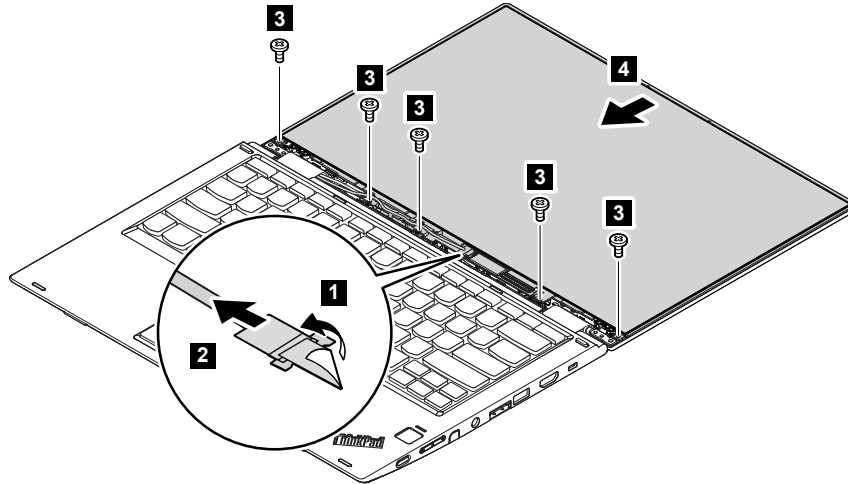| Step	Screw Cap	Screw (quantity)	Color	Torque
1	⬭	M2.5 x 4 mm, flat-head, nylon-coated (2)	Silver	0.294 Nm (3.0 kgf-cm)
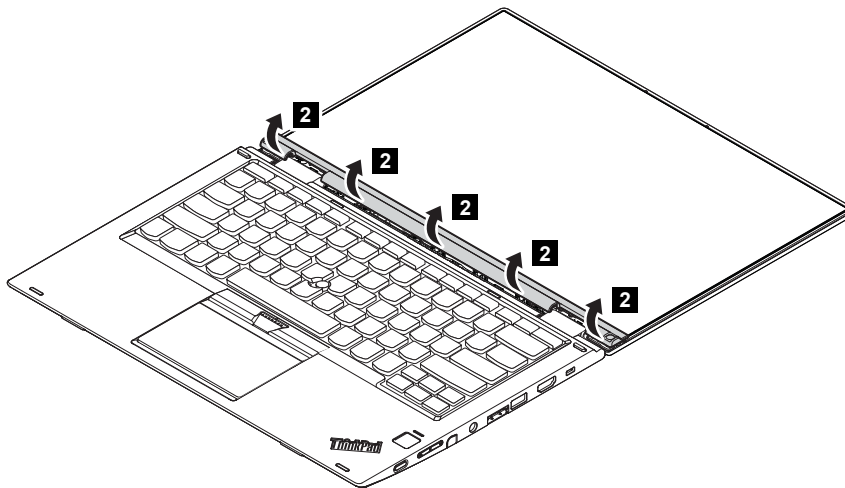
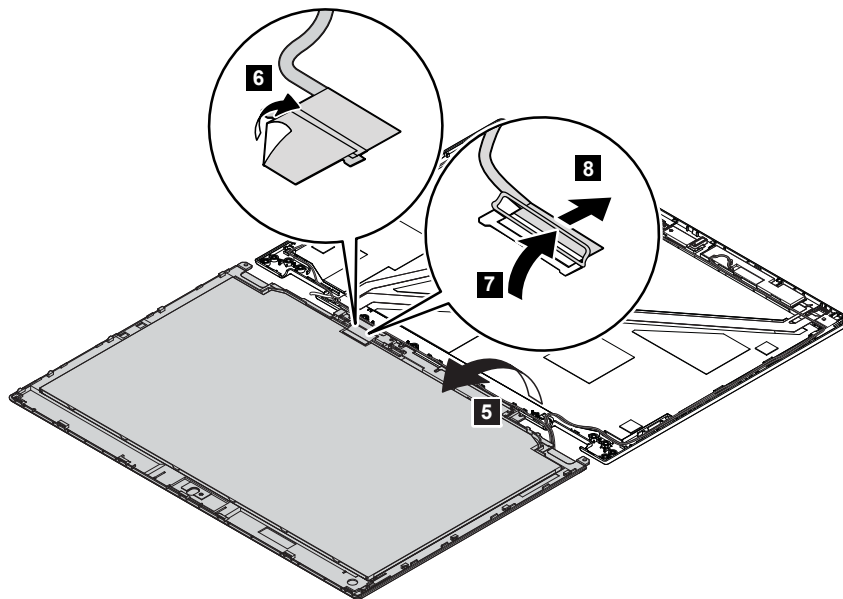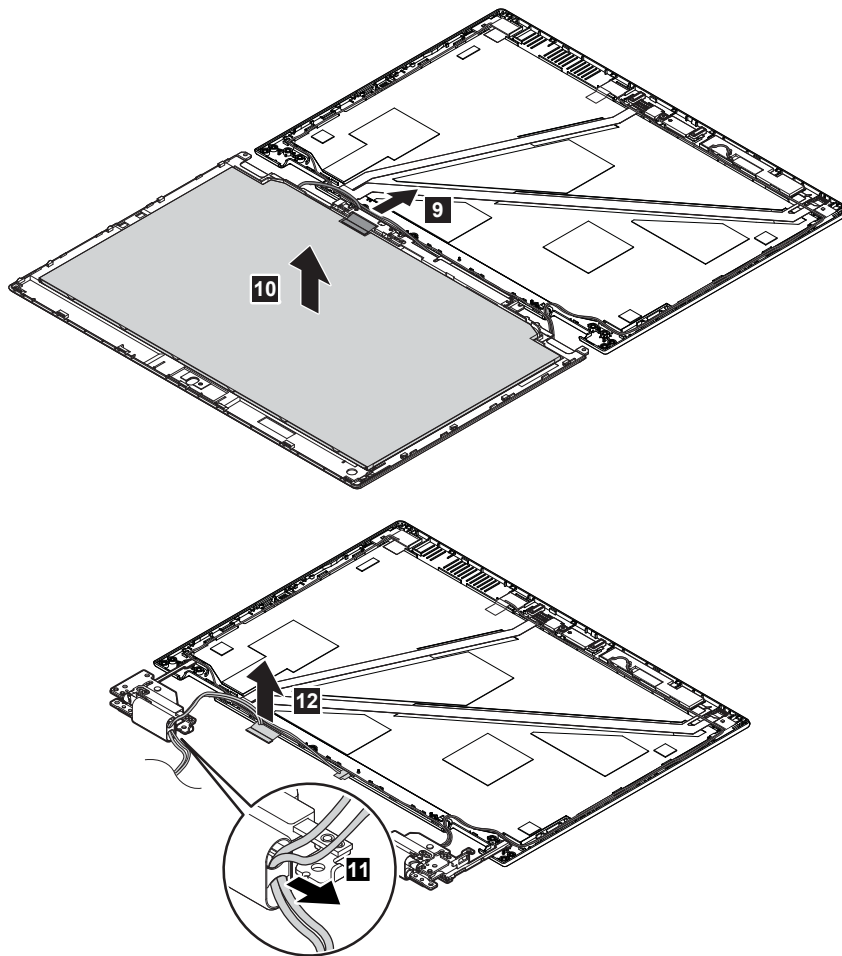# 2020 LCD panel and LCD cable assembly

For access, remove this FRU:
• "2010 Strip bezel assembly" on page 82

Removal steps of the LCD panel and LCD cable assembly

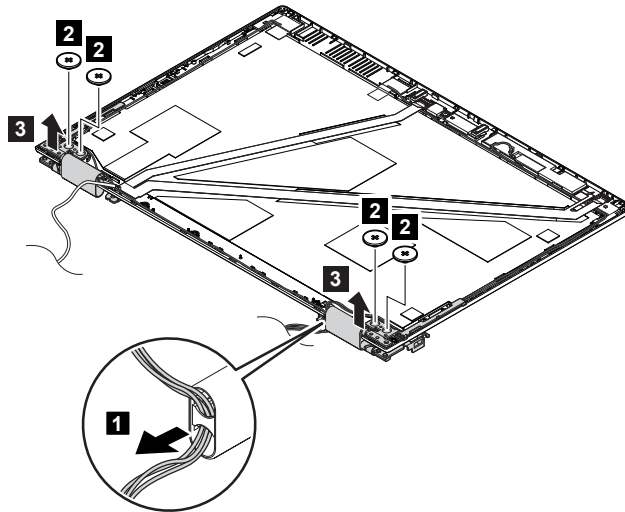| Step	Screw (quantity)	Color	Torque
3	M2 × 2.5 mm, wafer-head, nylon-coated (5)	Silver	0.181 Nm (1.85 kgf-cm)

2030 LCD hinges

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57
- "1210 LCD unit" on page 79
- "2020 LCD panel and LCD cable assembly" on page 82
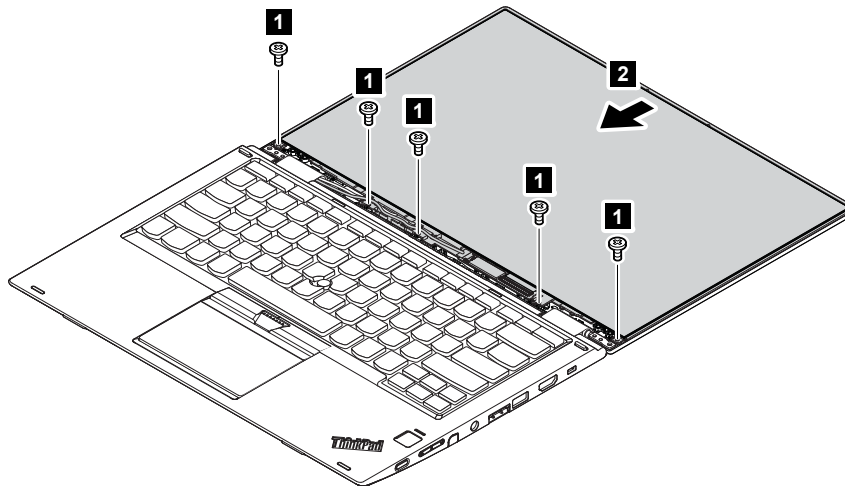
Removal steps of the LCD hinges

Step	Screw (quantity)	Color	Torque
2	M2.5 × 2 mm, flat-head, nylon-coated (4)	Black	0.294 Nm (3.0 kgf-cm)

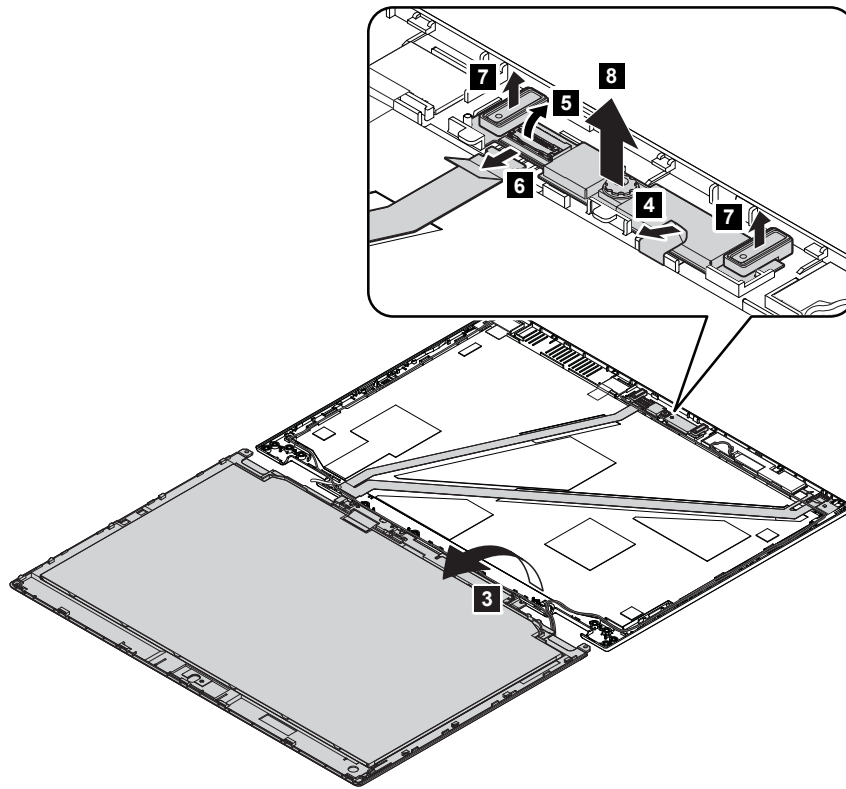## 2040 Camera/microphone assembly (available on some models)

For access, remove this FRU:
- "2010 Strip bezel assembly" on page 82

Removal steps of the camera and microphone assembly

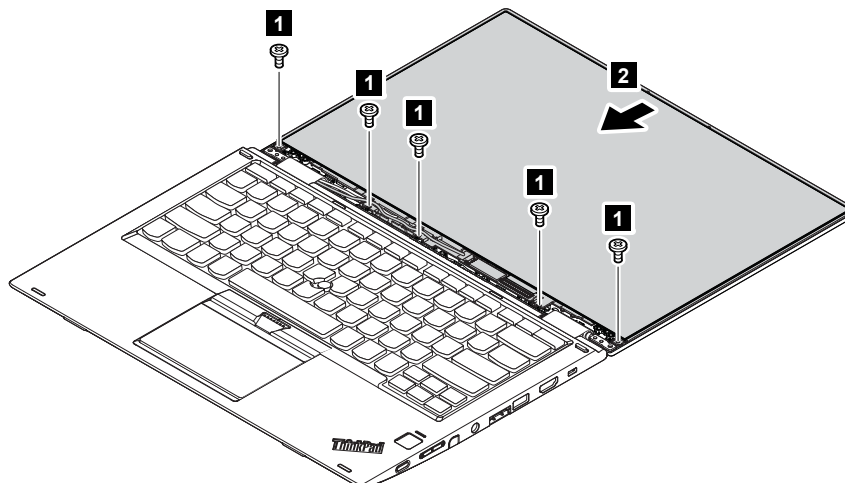| Step	Screw (quantity)	Color	Torque
1	M2 × 2.5 mm, flat-head, nylon-coated (5)	Silver	0.181 Nm (1.85 kgf-cm)

When installing: Ensure that the connector is attached firmly.
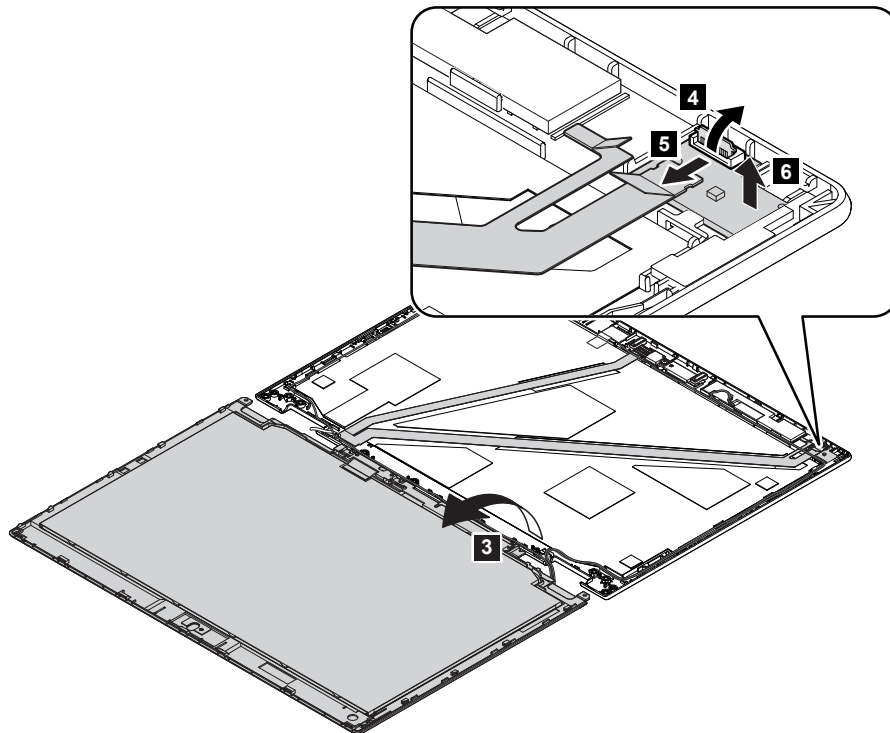
2050 Sensor card

For access, remove this FRU:
- "2010 Strip bezel assembly" on page 82

Removal steps of the sensor card

| Step	Screw (quantity)	Color	Torque
1	M2 × 2.5 mm, flat-head, nylon-coated (5)	Silver	0.181 Nm (1.85 kgf-cm)

2060 Wireless-LAN, wireless-WAN, or WiGig antenna kit

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57
- "1210 LCD unit" on page 79
- "2010 Strip bezel assembly" on page 82
- "2020 LCD panel and LCD cable assembly" on page 82

Removal steps of the wireless-LAN antenna kit
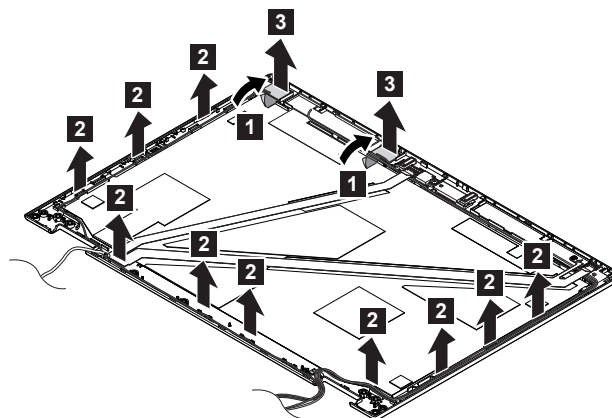
Removal steps of the wireless-WAN antenna kit (available on some models)
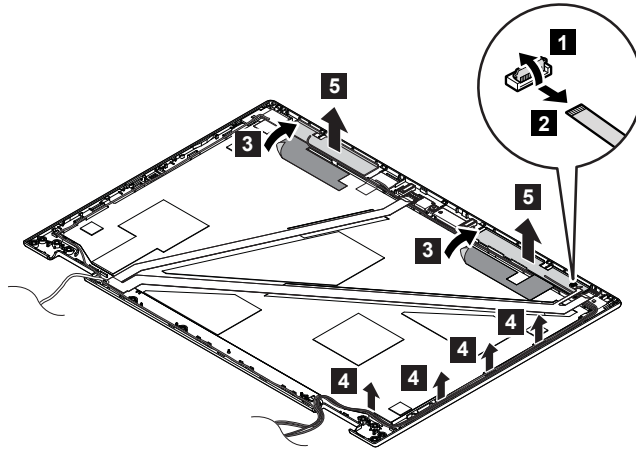
Removal steps of the WiGig antenna kit (available on some models)
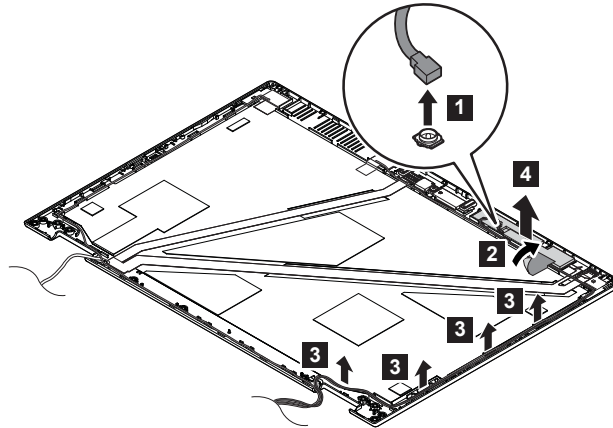
When installing:

When you install the antenna kit, route the cables as shown in the following illustrations.

Attention: When you route the cables, ensure that they are not subject to any tension. Tension could cause the cables to be damaged by the cable guides, or a wire to be broken.

For non-WiGig computer models:
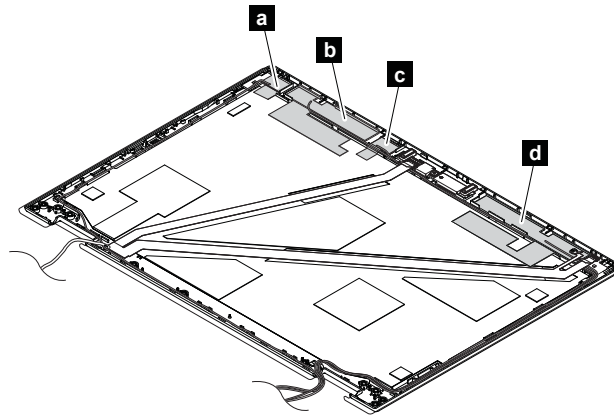
a Wireless-LAN auxiliary antenna (black) **b** Wireless-WAN auxiliary antenna (blue)
c Wireless-LAN main antenna (gray) **d** Wireless-WAN main antenna (orange)

For WiGig computer models:
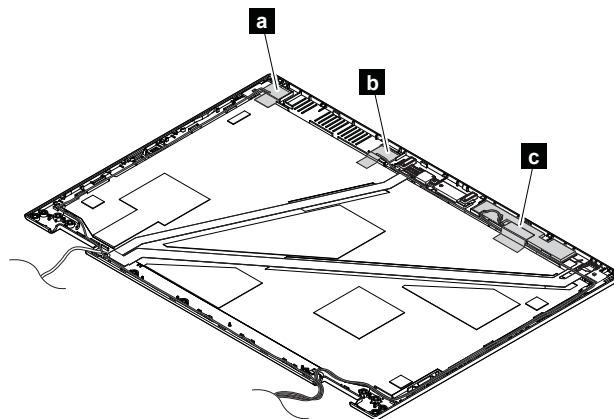
a Wireless-LAN auxiliary antenna (black) **b** Wireless-LAN main antenna (gray)
c WiGig antenna (white)

## 2070 Camera/microphone cable (available on some models)

For access, remove these FRUs in order:
- "1010 ThinkPad Pen Pro or dummy cap for the ThinkPad Pen Pro" on page 56
- "1020 Micro-SIM-card tray (available on some models)" on page 57
- "1030 Base cover assembly" on page 57

- "1210 LCD unit" on page 79
- "2010 Strip bezel assembly" on page 82
- "2020 LCD panel and LCD cable assembly" on page 82

Removal steps of the camera/microphone cable
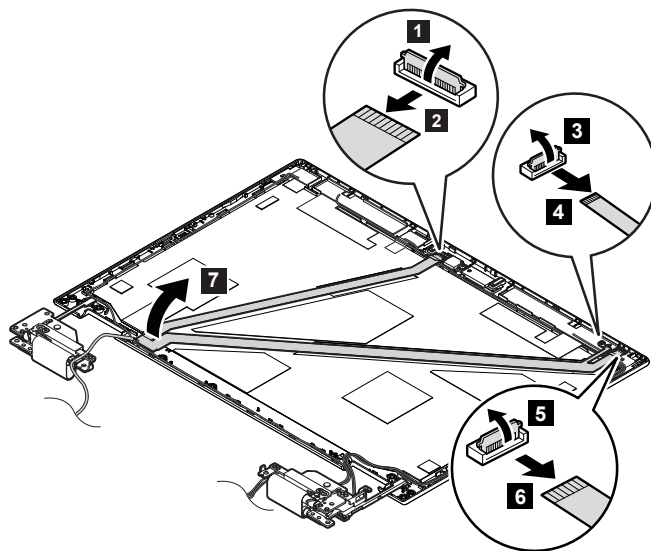
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Appendix B. Abbreviation table

The following table lists all abbreviations used in this manual.

Abbreviation	Term
BGA	Ball Grid Array
BIOS	Basic Input / Output System
CD	Compact Disc
CMOS	Complementary Metal Oxide Semiconductor
COA	Certificate of Authentication
CPU	Central Processing Unit
CRC	Cyclic redundancy check
CRT	Cathode ray tube
CRU	Customer Replaceable Unit
CTO	Configure To Order
DC	Direct current
DVD	Digital Video Disc
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

Abbreviation	Term
PCH	Platform Controller Hub
POST	Power-on self-test
RAM	Random Access Memory
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
VRAM	Video Random Access Memory