Chapter 8. Removing and replacing a FRU

External CRU statement to customers:
Some problems with your product can be resolved with a replacement part you can install yourself, called a "Customer Replaceable Unit" or "CRU." Some CRUs are designated as Self-service CRUs and others are designated as Optional-service CRUs. *Installation of Self-service CRUs is your responsibility; you may request that Lenovo installs an Optional-service CRU according to the warranty service for your product.* Where you are installing the CRU, Lenovo will ship the CRU to you. CRU information and replacement instructions are shipped with your product and are available from Lenovo at any time upon request. You may find a list of CRUs in the publications that ship with your product or at http://www.lenovo.com/CRUs. You may be required to return the defective part that is replaced by the CRU. When return is required: (1) return instructions, a prepaid shipping label, and a container will be included with the replacement CRU; and (2) you may be charged for the replacement CRU if Lenovo does not receive the defective part within thirty (30) days of your receipt of the replacement CRU. See your Lenovo Limited Warranty documentation for full details.

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

1. Do not try to service any computer unless you have been trained and certified. An untrained person runs the risk of damaging parts.
2. Before replacing any FRU, review Chapter 7 "FRU replacement notices" on page 57.
3. Begin by removing any FRUs that have to be removed before replacing the failing FRU. Any such FRUs are listed at the top of each FRU replacement page. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing a FRU, as given in the drawings by the numbers in square callouts.
5. When turning a screw to replace a FRU, turn it in the direction as given by the arrow in the drawing.
6. When removing a FRU, move it in the direction as given by the arrow in the drawing.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement. For information about connecting and arranging internal cables, see Chapter 9 "Locations" on page 99.
8. When replacing a FRU, use the correct screws as shown in the procedures.

⚠ DANGER

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

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

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

## Before servicing ThinkPad X220 and X220i models

Removing the SIM card:

Some models of the ThinkPad X220 and X220i you are servicing might have the SIM card that the customer has been installed.

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

To remove the SIM card, you need to remove the battery pack first. (See "1010 Battery pack" on page 62.)

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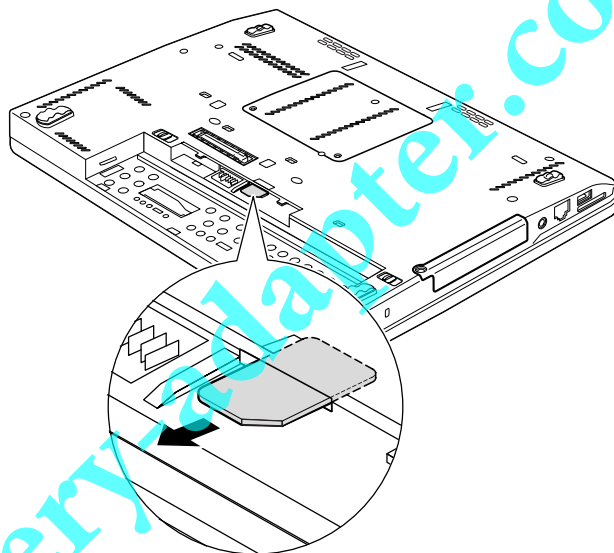
Notice on disconnecting a cable from a flip-lock ZIF connector:

Some cables used in ThinkPad X220 and X220i models are connected to flip-lock ZIF connectors.

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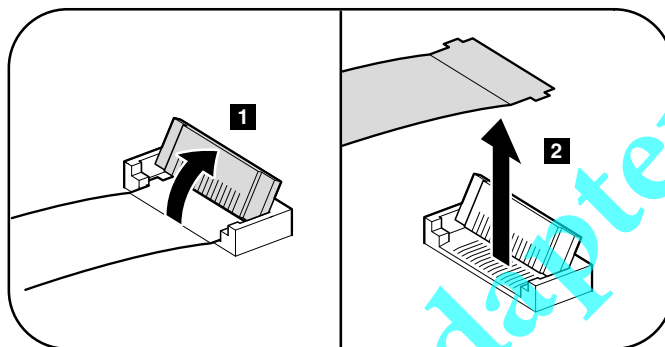
1010 Battery pack

 Important notice for replacing a battery pack:

The Lenovo ThinkVantage Toolbox and Lenovo Solution Center (in Windows 7) have an automatic battery diagnostic that determines if the battery pack is defective. A battery pack FRU should not be replaced unless this diagnostic shows that the battery is defective.

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

If Lenovo ThinkVantage Toolbox or Lenovo Solution Center is not installed in the computer, the customer should download this program before a non-physically damaged battery pack is replaced. Note that the replacement of a physically damaged battery pack is not covered by the warranty.
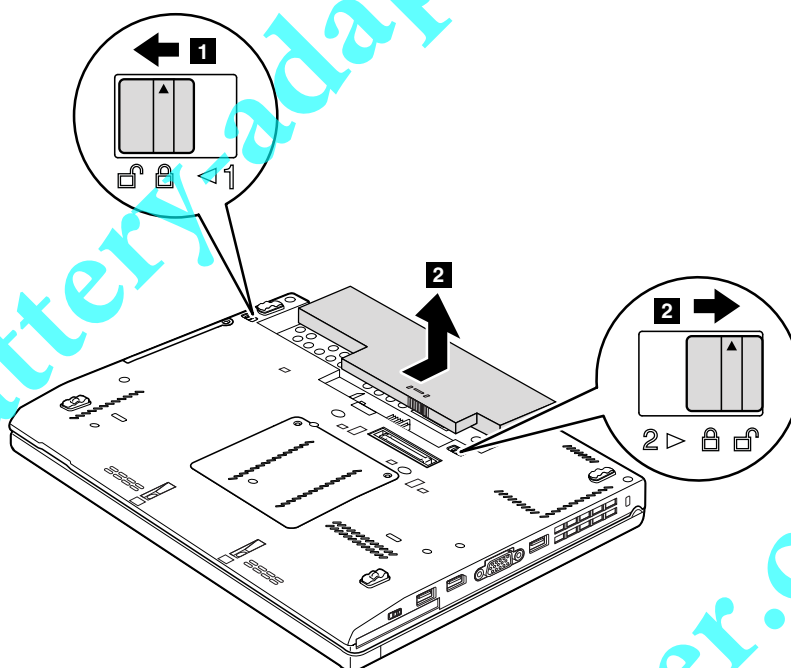
Removal steps of battery pack

⚠️ **DANGER**

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

Slide the left battery latch to the unlocked position **1**, and then hold the right battery latch in the unlocked position until you remove the battery **2**.

When installing:

Install the battery pack along the slide rails of the slot. Make sure that the left battery release lever is in the locked position.

1020 Hard disk drive (HDD) and solid state drive (SSD)

For access, remove this FRU:
• "1010 Battery pack" on page 62

Attention:

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

• Before removing the drive, have the user make a backup copy of all the information on it if possible.
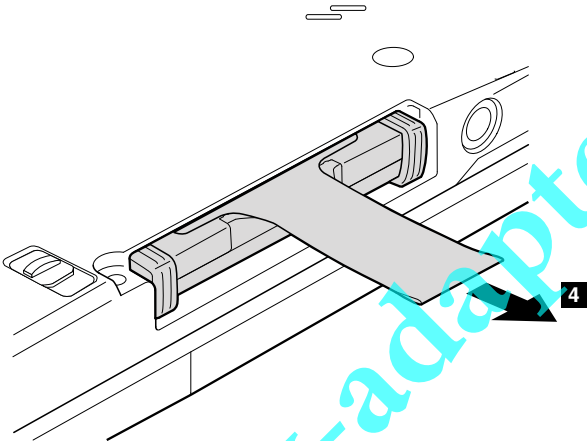
Chapter 8. Removing and replacing a FRU **63**

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

Removal steps of hard disk drive and solid state drive
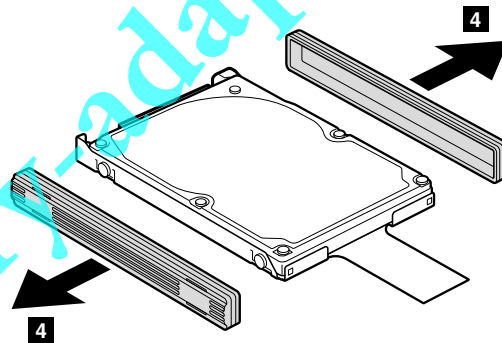
Note: Loosen the screw **1**.
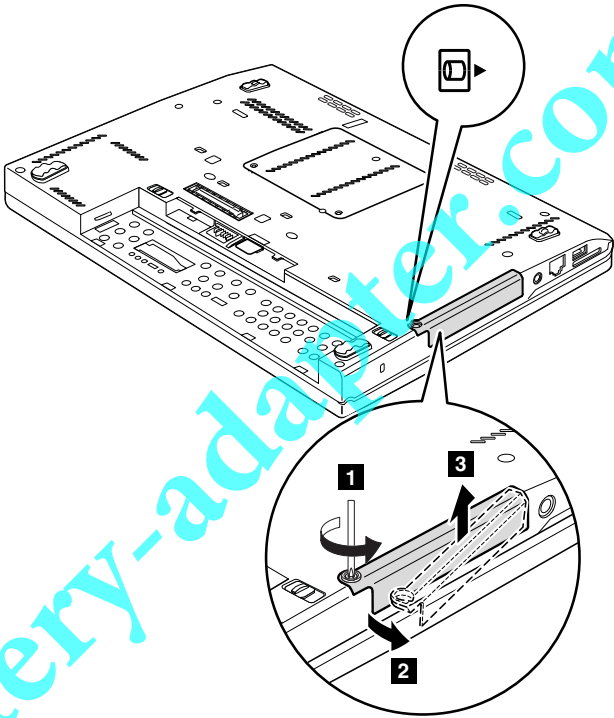
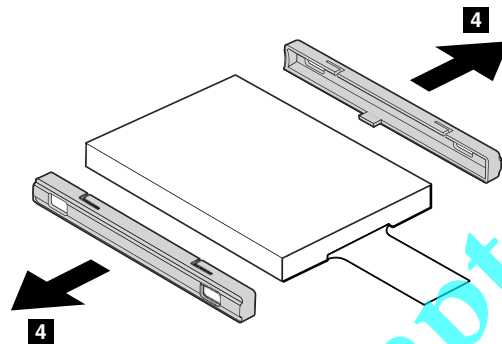| Step	Screw (quantity)	Color	Torque
1	M3 × 3 mm, wafer-head, nylon-coated (1)	Black	0.392 Nm (4 kgf-cm)
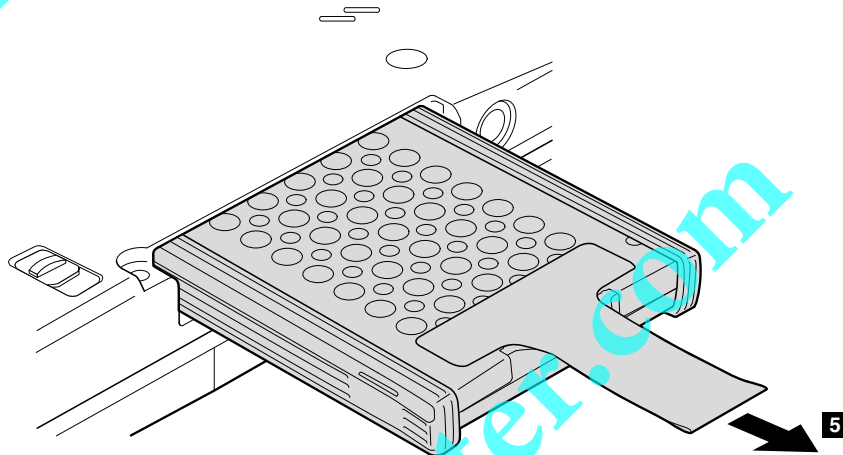
HDD and HDD rubber rails:

SSD and SSD spacers:

When installing:

Rubber rails on the hard disk drive or spacers on the solid state drive must be attached to the replacement drive. Otherwise the drive cannot be installed properly.

1030 DIMM

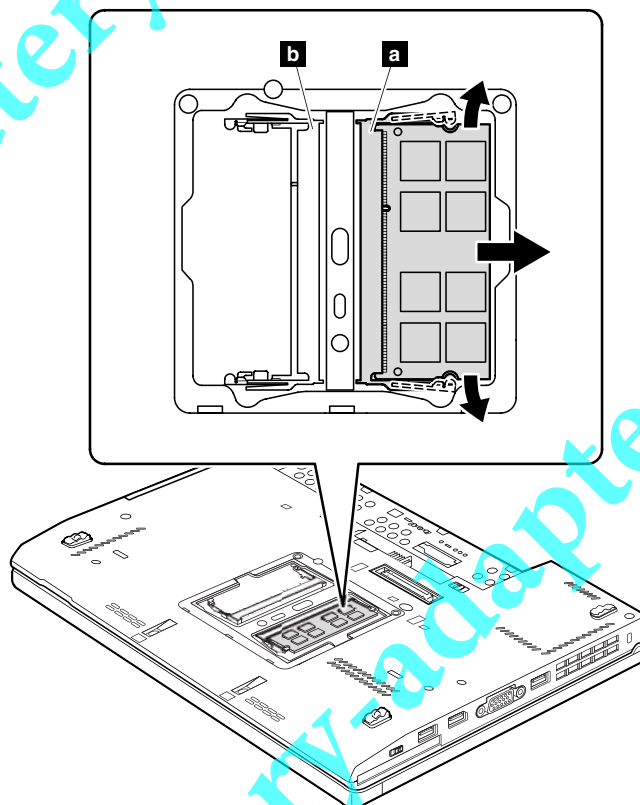For access, remove this FRU:
• "1010 Battery pack" on page 62

Removal steps of DIMM

Remove the DIMM slot cover as shown in the following figure.

Loosen the screws **1**.
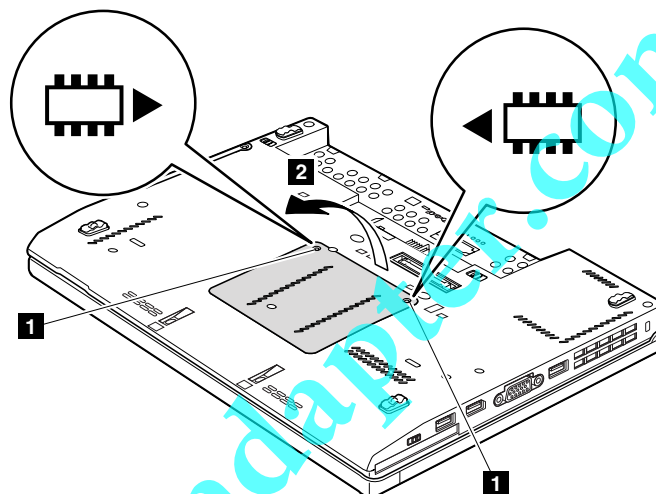
If only one DIMM is used on the computer you are servicing, the card must be installed in SLOT-0 **a**, but not in SLOT-1 **b**.
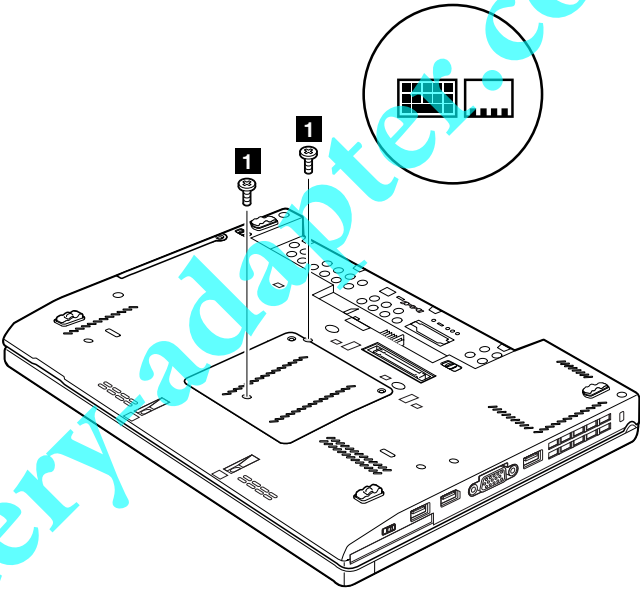
When installing:

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

1040 Keyboard

For access, remove this FRU:
• "1010 Battery pack" on page 62

Removal steps of keyboard

Step	Icon	Screw (quantity)	Color	Torque
1		M2 × 5 mm, wafer-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgf-cm)

Slightly press the keyboard and slide it a little bit forward in the direction shown by arrow **2** to detach the front edge of the keyboard from the frame. Then, lift up the keyboard in the direction shown by arrow **3**.
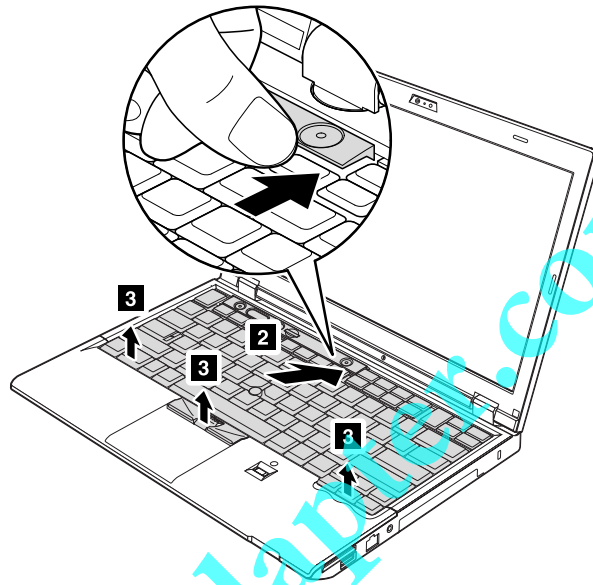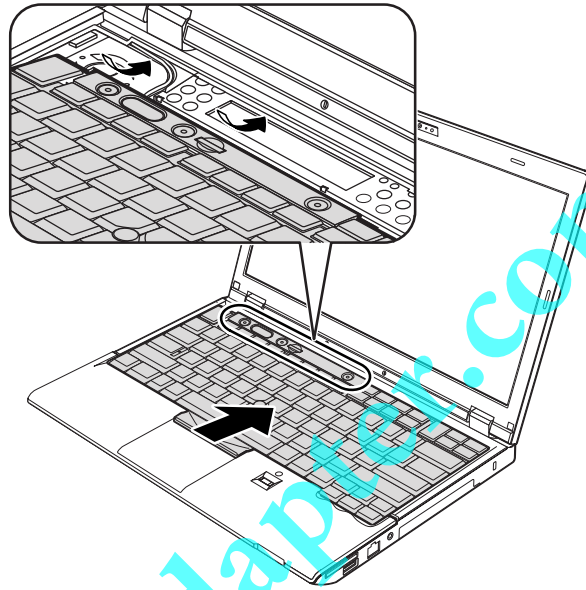
Lift the keyboard a little in the direction shown by arrow **5**, and then detach the connector **4**.
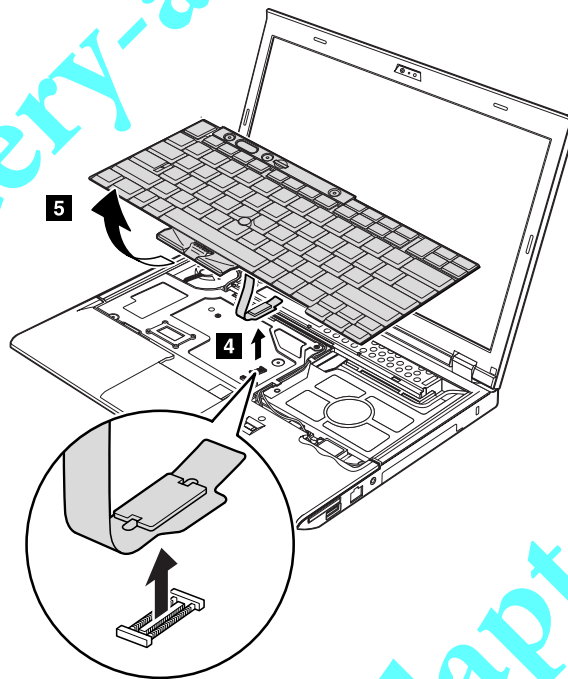
When installing:

1. Attach the keyboard connector firmly.
2. Make sure that the keyboard edge is under the frame as shown in the following figure. Then press the keys to latch the keyboard firmly in place.

3. Gently press the keys with your palms and slightly slide the keyboard toward you until it snaps into position.
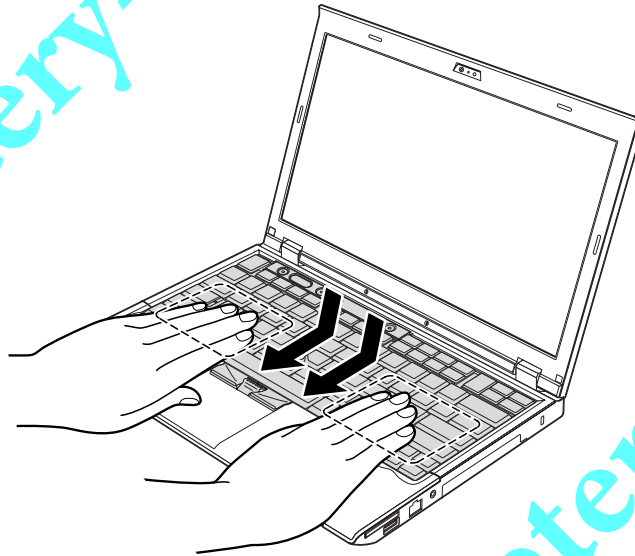
4. Secure the keyboard by tightening the screws from the bottom side of the computer.

1050 Palm rest or palm rest with a fingerprint reader

For access, remove these FRUs in order:
• "1010 Battery pack" on page 62
• "1040 Keyboard" on page 67

Note: In models with a fingerprint reader, the sensor is attached to the palm rest FRU. If the fingerprint reader has any defects, you can replace it by the procedures given in this section, which are the same for a palm rest with or without a fingerprint reader.
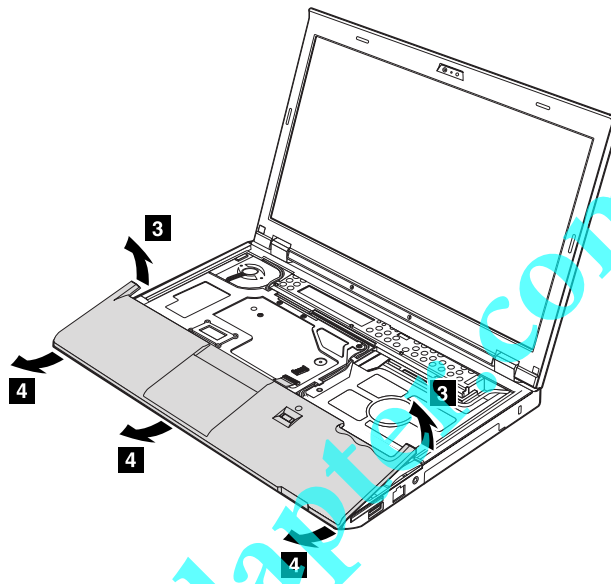
Removal steps of palm rest
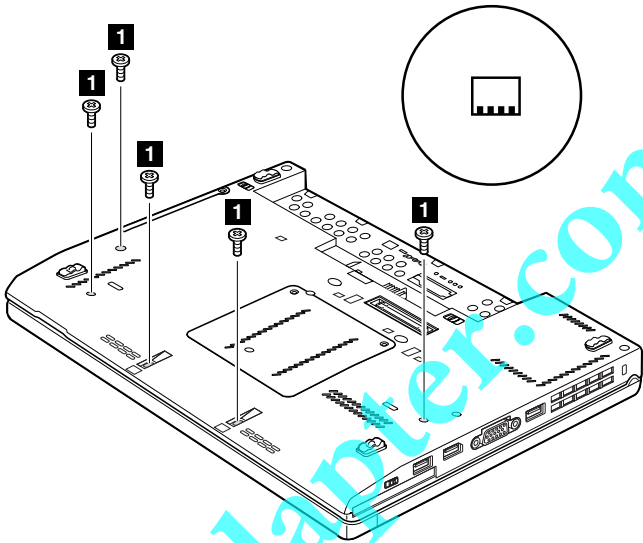
| Step	Icon	Screw (quantity)	Color	Torque
1	⸛	M2 × 5 mm, wafer-head, nylon-coated (5)	Black	0.181 Nm (1.85 kgf-cm)

Step 2 is only for models with a fingerprint reader. For models without a fingerprint reader, skip step 2.
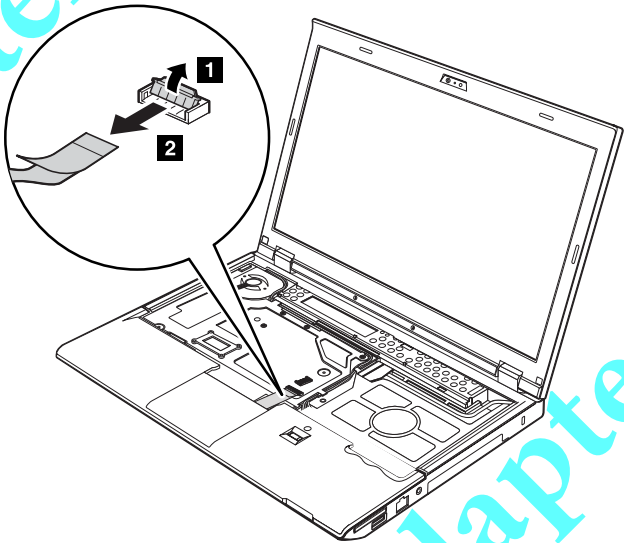
When installing:

1. In models with a fingerprint reader, attach the fingerprint reader connector firmly to the system board.
2. Press the left and right top edges of the palm rest to fit it into place **1**.
3. Push the front side of the palm rest until it clicks into place **2**.
4. Close the LCD cover and turn the computer over. Then fasten the five screws to secure the palm rest.
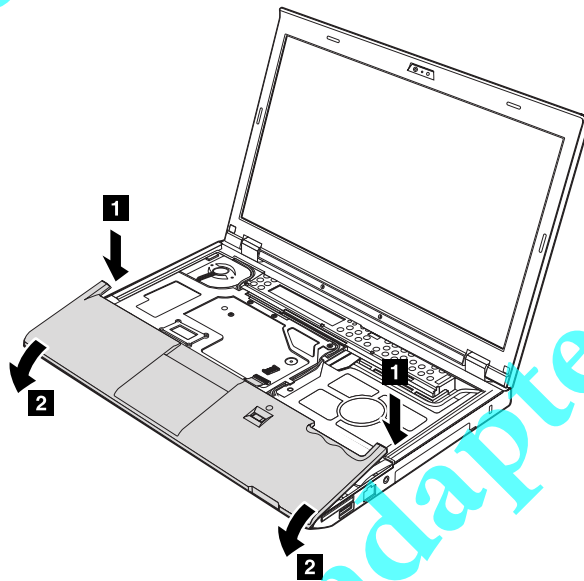
## 1060 PCI Express Mini Card for wireless LAN/WiMAX

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69

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

In step 1, unplug the jacks by using the removal tool antenna RF connector (P/N: 08K7159) or pick the connectors with your fingers and gently unplug them in the direction of the arrow.

Note: Some models might have three antenna cables.
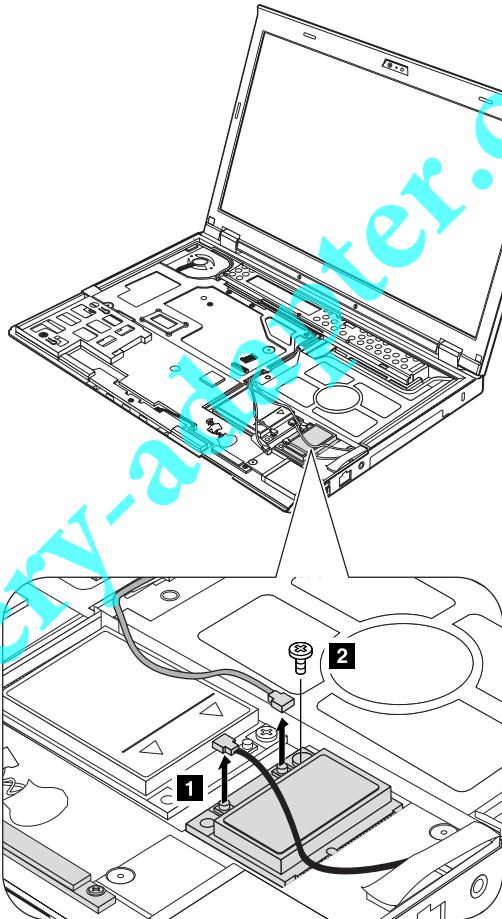
Step	Screw (quantity)	Color	Torque
2	M2 × 3 mm, wafer-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgf-cm)
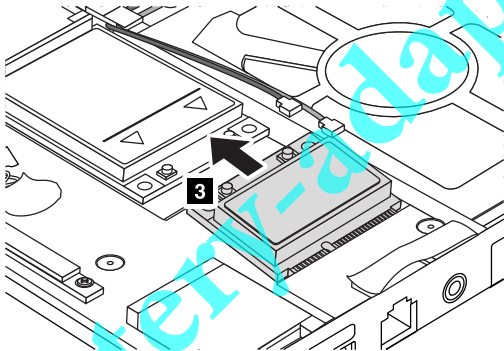
When installing:

- In models with a wireless LAN card that has two antenna connectors, plug the gray cable into the jack labeled **MAIN** or **M** on the card, and the black cable into the jack labeled **AUX** or **A**. If the computer you are servicing has three cables, put the white cable in the cable protection tube.
- In models with a wireless LAN card that has three antenna connector, plug the gray cable (MAIN) into the jack labeled **TR1**, the white cable (third) into the jack labeled **RO** or **TR3**, and the black cable (AUX) into the jack labeled **TR2** on the card.
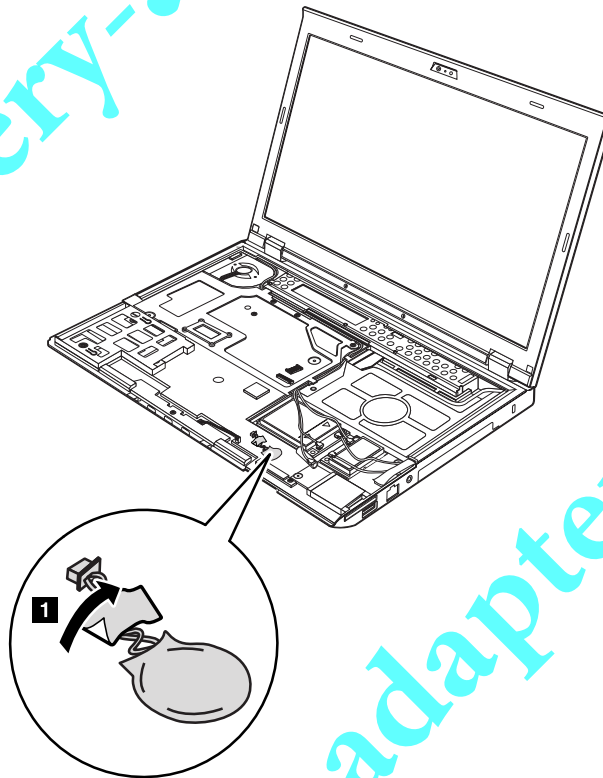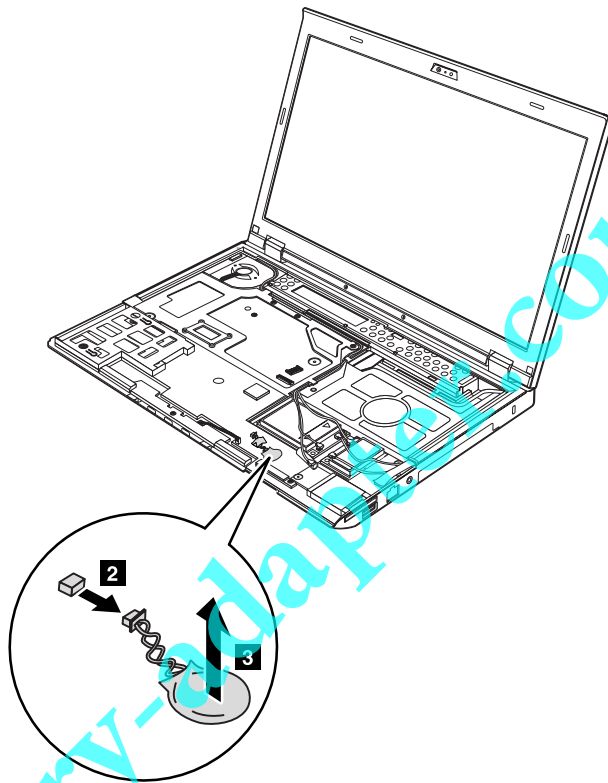
1070 Backup battery

⚠ DANGER

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

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69

Removal steps of backup battery

When installing:

Make sure that the battery connector is attached firmly.

1080 PCI Express Mini Card for wireless WAN
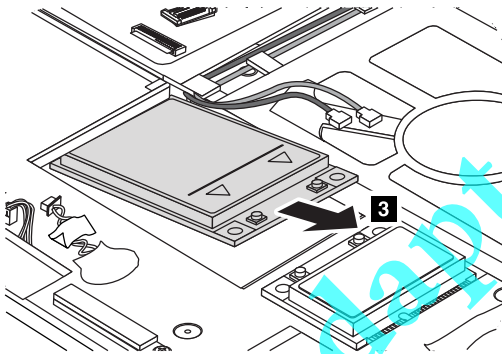
For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69

Removal steps of PCI Express Mini Card for wireless WAN

In step **1**, unplug the jacks by using the removal tool antenna RF connector (P/N: 08K7159) or pick the connectors with your fingers and gently unplug them in the direction of the arrow.
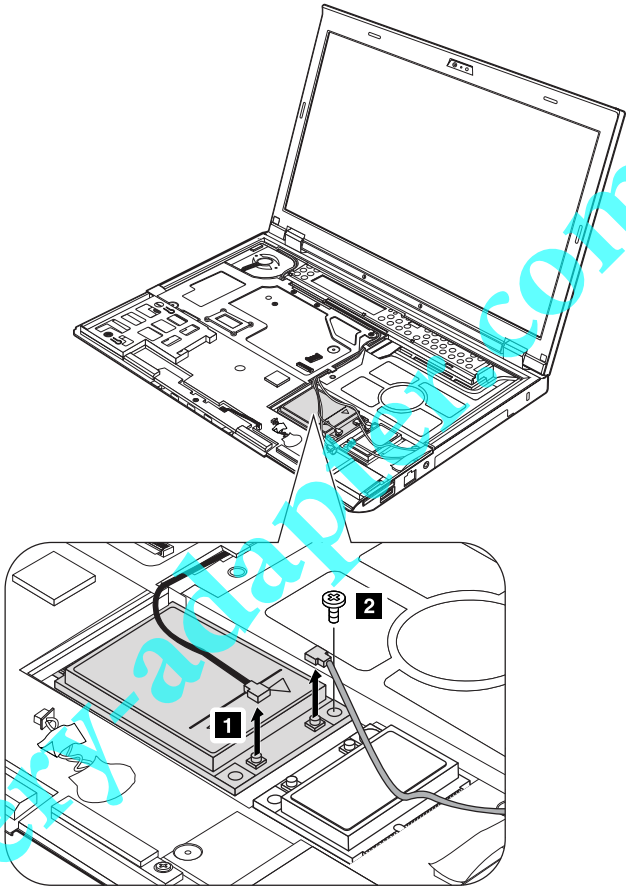
Step	Screw (quantity)	Color	Torque
2	M2 × 3 mm, wafer-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgf-cm)

When installing:

Plug the red cable into the jack labeled **MAIN** on the card, and the blue cable into the jack labeled **AUX**.
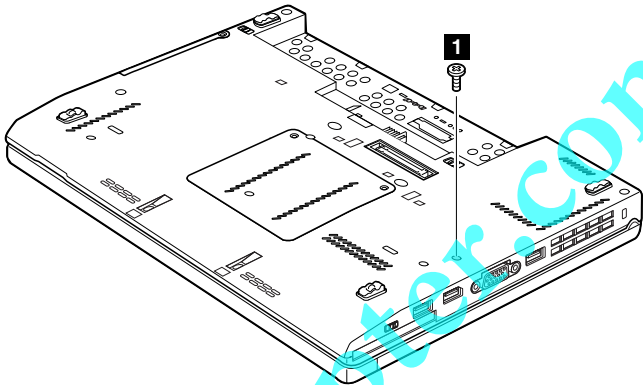
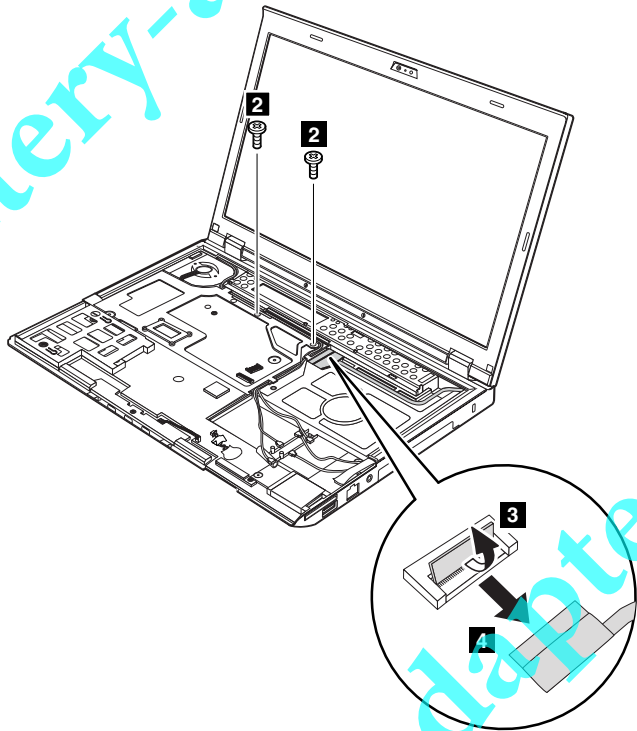## 1090 Keyboard bezel

For access, remove these FRUs in order:
• "1010 Battery pack" on page 62

- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69

Removal steps of keyboard bezel

Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, wafer-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgf-cm)

When installing:

Make sure that you attach the connector firmly.

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

In step **5**, detach the claws. Then remove the keyboard bezel in the direction shown by arrow **6**.

Attention: When you service the keyboard bezel, avoid any kind of rough handling.
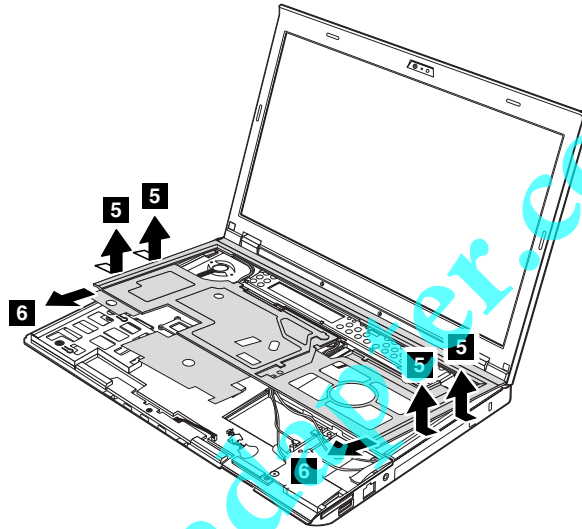
When installing:

Make sure that all the claws are attached firmly.

1100 LCD assembly

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69
- "1060 PCI Express Mini Card for wireless LAN/WiMAX" on page 71
- "1080 PCI Express Mini Card for wireless WAN" on page 74
- "1090 Keyboard bezel" on page 75
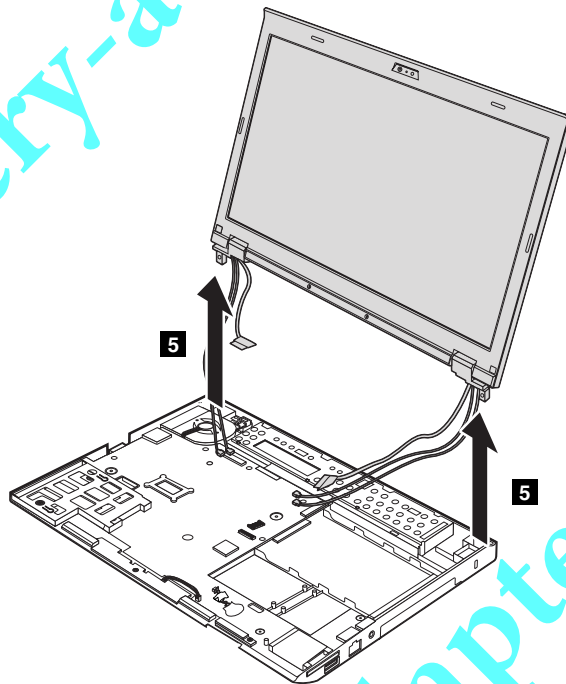
Removal steps of LCD assembly
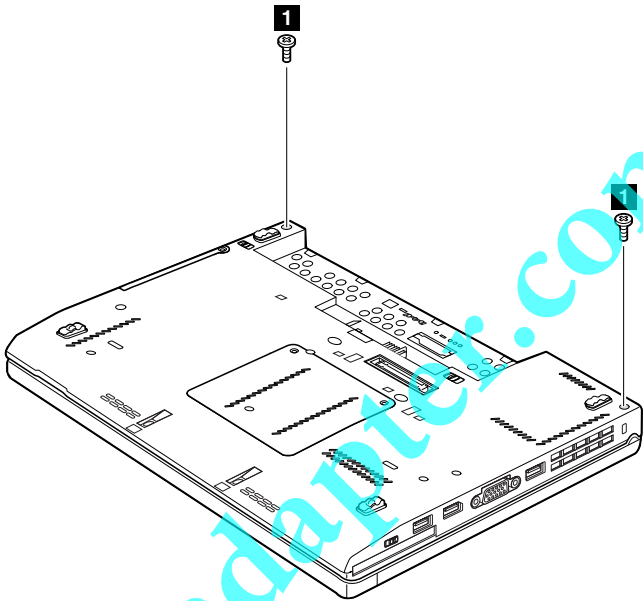
Step	Screw (quantity)	Color	Torque
1	M2 × 5 mm, wafer-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgf-cm)
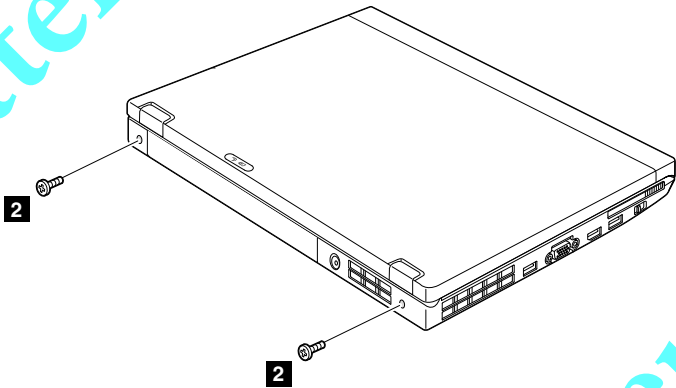
Step	Screw (quantity)	Color	Torque
2	M2 × 5 mm, wafer-head, nylon-coated (2)	Black	0.181 Nm (1.85 kgf-cm)

Before step 3, strip off the tapes securing the antenna cables, and release the cables from the cable guides of the frame.

When installing:

- Make sure that you attach the connectors firmly.
- Make sure that you route the cables correctly and you tape up the cables in the proper positions as shown in the following figure.
- When you route the cables, make sure that they are not subjected to any tension. Tension could cause the cables to be damaged by the cable guides, or a wire to be broken.
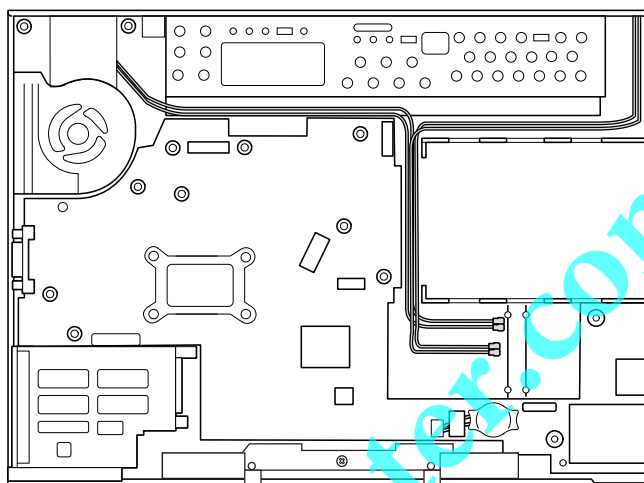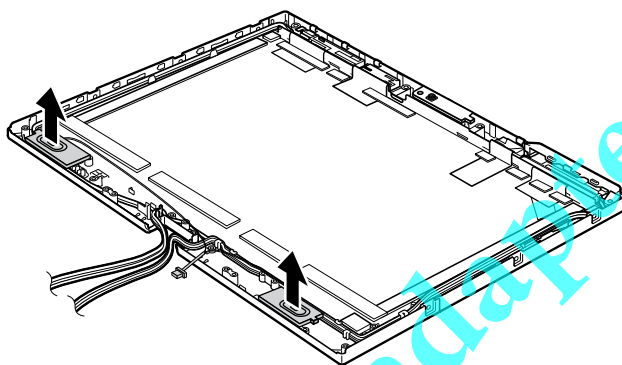
1110 Base cover assembly and speaker assembly

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "1020 Hard disk drive (HDD) and solid state drive (SSD)" on page 63
- "1030 DIMM" on page 65
- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69
- "1070 Backup battery" on page 73
- "1060 PCI Express Mini Card for wireless LAN/WiMAX" on page 71
- "1080 PCI Express Mini Card for wireless WAN" on page 74
- "1090 Keyboard bezel" on page 75
- "1100 LCD assembly" on page 77

Removal steps of speaker assembly

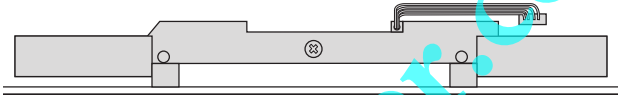Remove the speaker assembly from the base cover assembly.

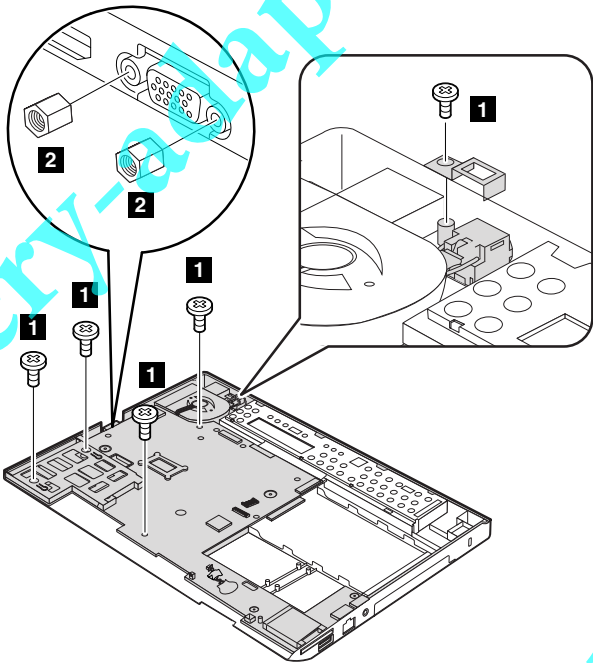| Step	Screw (quantity)	Color	Torque
2	M2 × 3mm, wafer-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgf-cm)
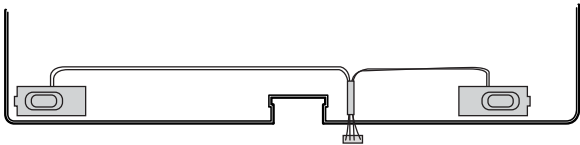
When installing:

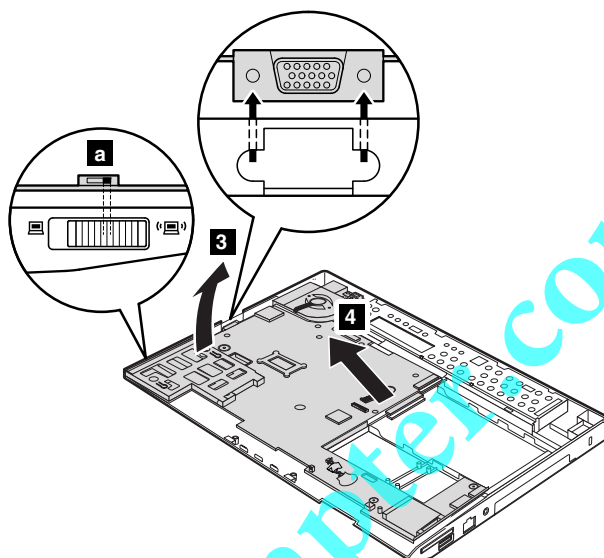Route the speaker cables along the cable guides as shown in the following figure.

Removal steps of base cover assembly

Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, wafer-head, nylon-coated (5)	Black	0.181 Nm (1.85 kgf-cm)
2	HEX nut washer&nylok #4R (2)	Silver	0.392 Nm (4 kgf-cm)

When installing:

Make sure that the wireless switch is adjusted as shown by callout **a**.

Applying labels to the base cover:

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

Note: If the Windows Certificate of Authentication label (COA) **1** is attached to a part that is replaced, return the old part with the label attached to the customer, or provide a letter to the customer stating what the label was originally on the system and what the label part number, serial number, and product key were.

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

|	
19	Homologation label
20	Product label

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

2	China telecom label or serial number label
3	Ethernet label or Onboard LAN MAV address label MAC address label
4	SIM label
5	Asset tag
6	IMEI label or China 3G label
7	Wireless card label (only for Brazil)
8	Modem AMOM label
9	MEDEM label (only for PRC model)
10	Bluetooth label
11	China WWAN label
12	Brazil WWAN label

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13	SIRIM label or POSTEL label
14	Non-encryption label (for non-TPM model) or Rating label (only for Indonesia)
15	AT Wireless LAN MAC address label
16	Vodafone label
17	FCC label
18	Serial number label
21	FCC-ID label for contactless smart card model
22	Israel label (67.8 mm x 27.9 mm)
23	Israel label (72.2 mm x 29.7 mm)
24	Israel label (76.2 mm x 31.8 mm)

For some models, you need to apply two FCC labels, **17** and **21**. Check the old base cover; if it has two FCC labels, apply both to the new base cover.

For the location of each label, refer to the following figure:
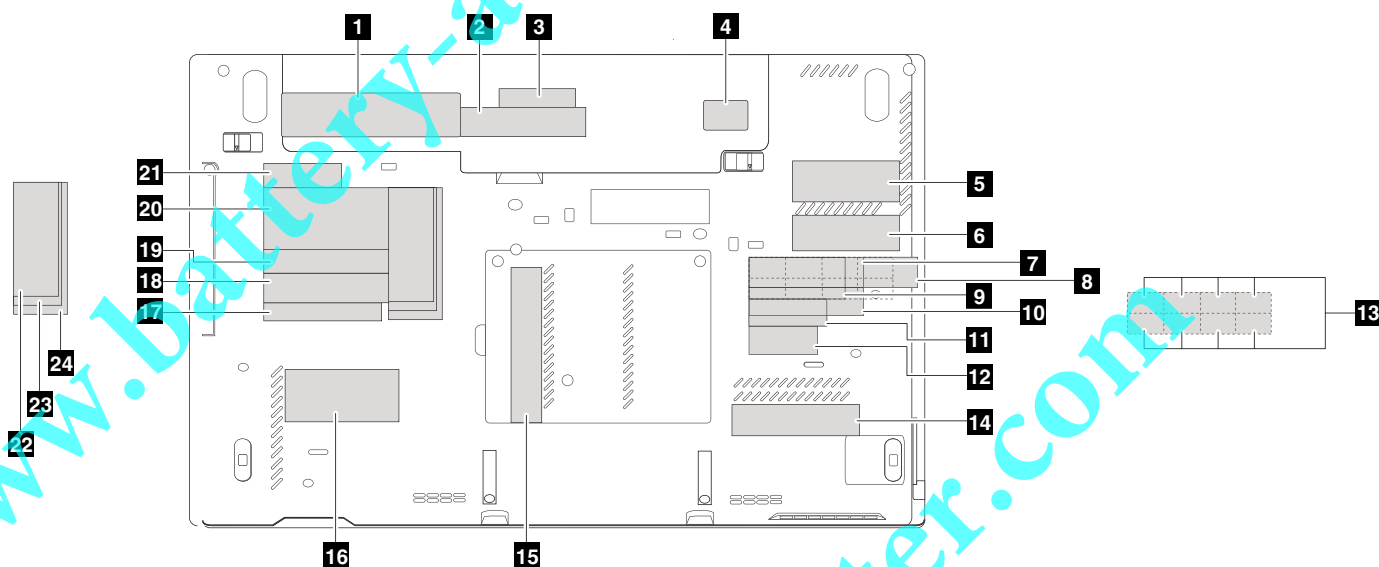
1120 Systemboard, DC-in connector, fan, and ExpressCard slot assembly

- To identify the system board originally installed in your computer, go to PEW at the following web site:
  http://www.lenovo.com/support/site.wss/document.do?Indocid=LOOK-WARNTY
  Select Warranty Lookup. Input the machine type and the serial number. Use the system board listed on PEW.

Important notices for handling the system board:

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

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

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

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

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

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

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

   1. Place the computer on a horizontal surface.
   2. Run **Diagnostics ➙ ThinkPad Devices ➙ HDD Active Protection Test**.

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

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "1020 Hard disk drive (HDD) and solid state drive (SSD)" on page 63
- "1030 DIMM" on page 65
- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69
- "1060 PCI Express Mini Card for wireless LAN/WiMAX" on page 71
- "1070 Backup battery" on page 73
- "1080 PCI Express Mini Card for wireless WAN" on page 74
- "1090 Keyboard bezel" on page 75
- "1100 LCD assembly" on page 77
- "1110 Base cover assembly and speaker assembly" on page 80

Removal steps of system board, DC-in connector, fan, and ExpressCard slot assembly

The following components soldered on the system board are extremely sensitive. When you service the system board, avoid any kind of rough handling.
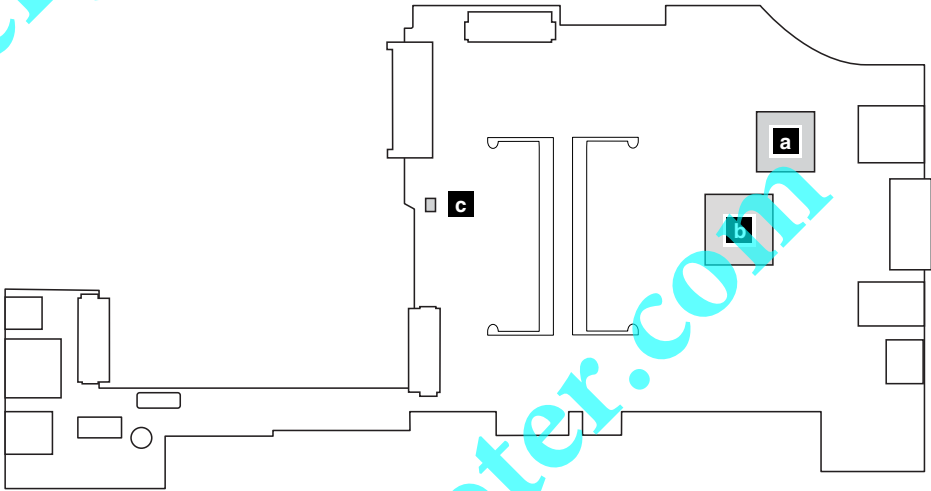
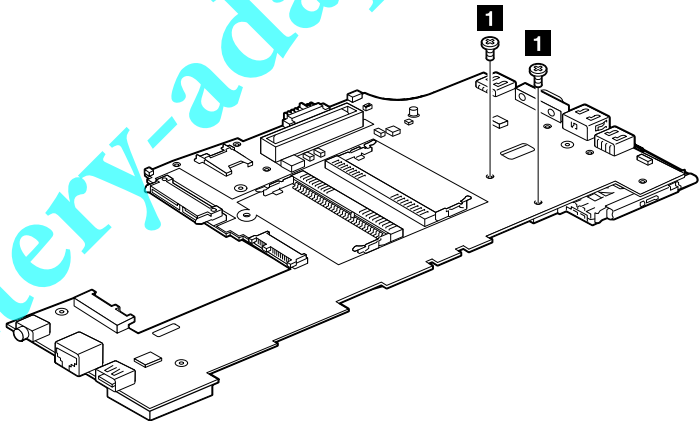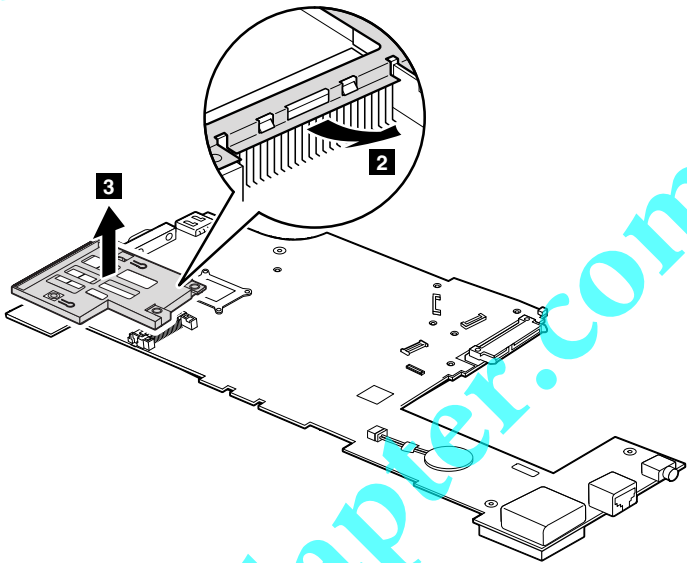| a | Platform Controller Hub (PCH) |
| b | CPU |
| c | Accelerometer chip for the HDD Active Protection System |

Note: The ExpressCard slot assembly is attached to the system board.

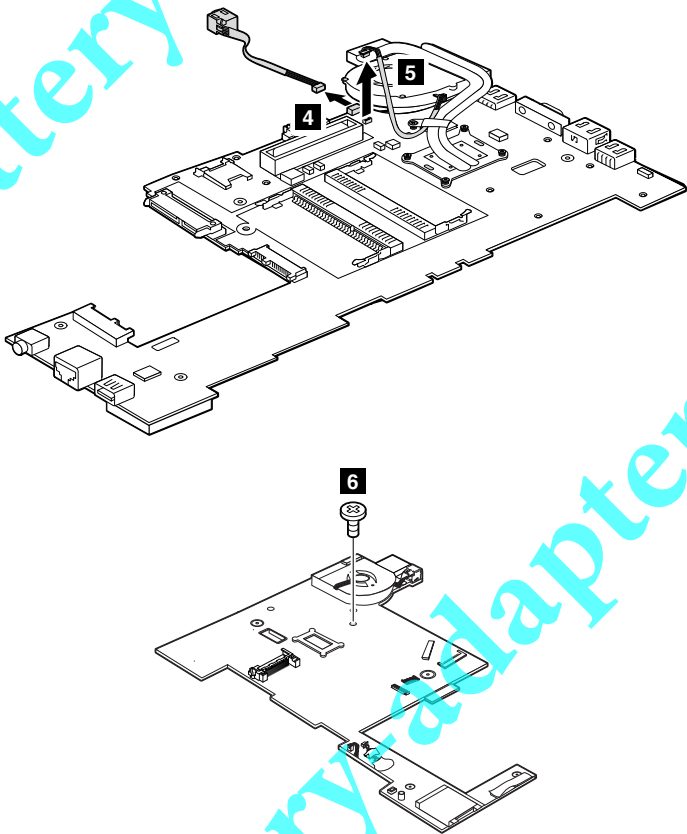| Step	Screw (quantity)	Color	Torque
1	M2 × 3.5 mm, flat-head, nylon-coated (2)	Silver	0.181 Nm (1.85 kgf-cm)

Turn the system board over, and then remove the ExpressCard slot assembly from the system board.
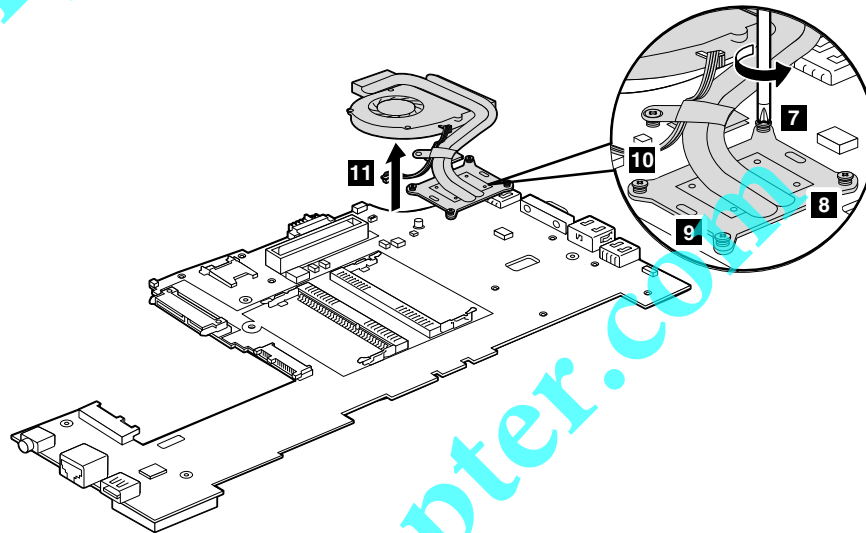
Turn the system board over, and then disconnect the DC-in connector and the fan connector from the system board.

Note: The DC-in connector and the fan assembly are attached to the underside of the system board.

Step	Screw (quantity)	Color	Torque
6	M2 × 3.5 mm, wafer-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgf-cm)

When installing:

- Make sure that the DC-in connector and the fan connector are attached to the system board firmly.

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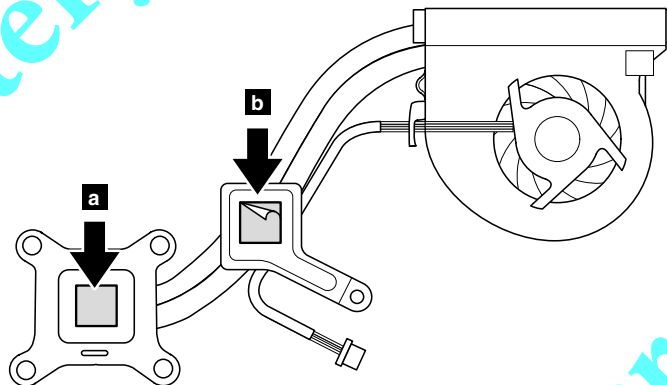

1130 mSATA solid state drive

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69

Attention:

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

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

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

Removal steps of mSATA solid state drive
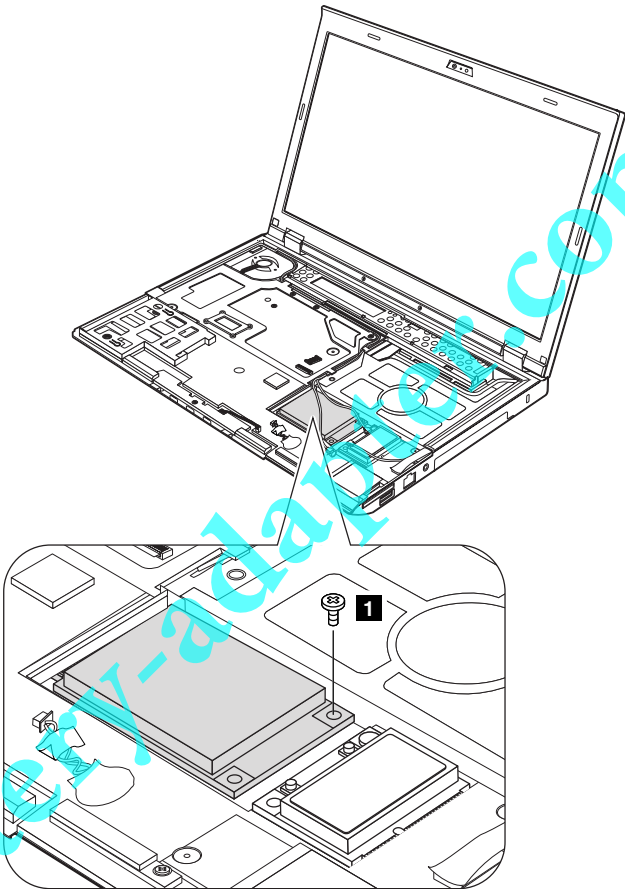
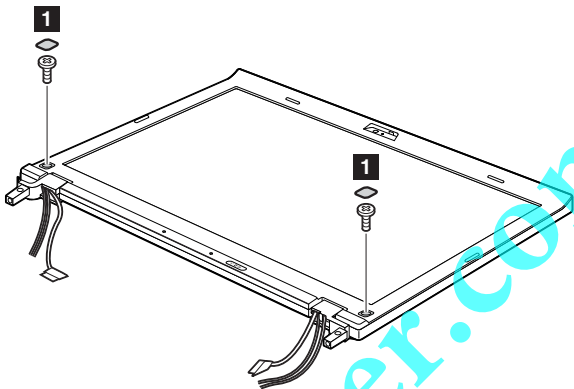| Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, flat-head, nylon-coated (1)	Black	0.181 Nm (1.85 kgf-cm)
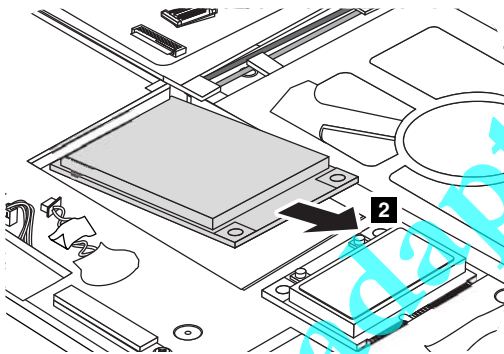
2010 LCD front bezel

For access, remove this FRU:
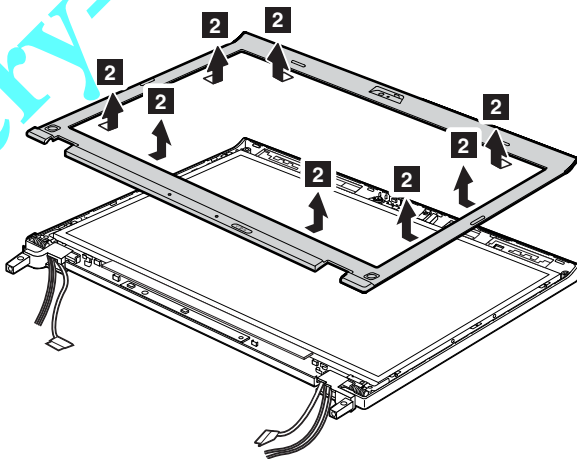- "1010 Battery pack" on page 62

Removal steps of LCD front bezel

Step	Screw cap	Screw (quantity)	Color	Torque
1	☐	M2.5 × 4 mm, wafer-head, nylon-coated (2)	Black	0.392 Nm (4 kgf-cm)

In step **2**, detach the claws. Then remove the LCD front bezel.
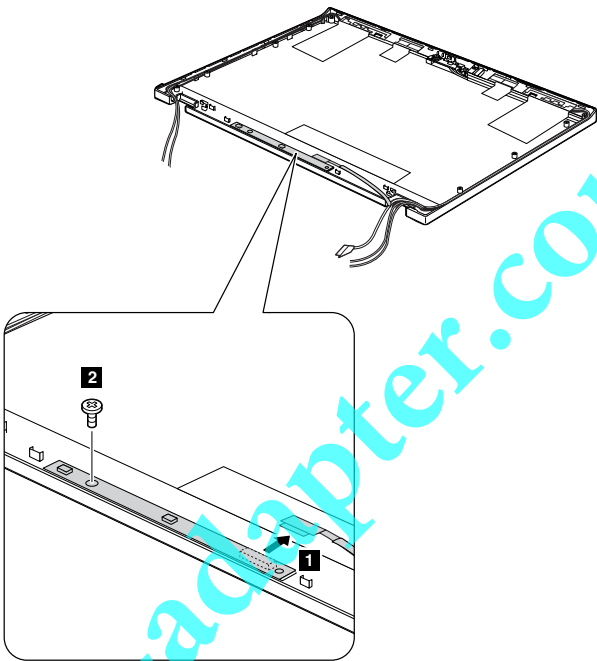

When installing:

Make sure that all the claws are attached firmly.
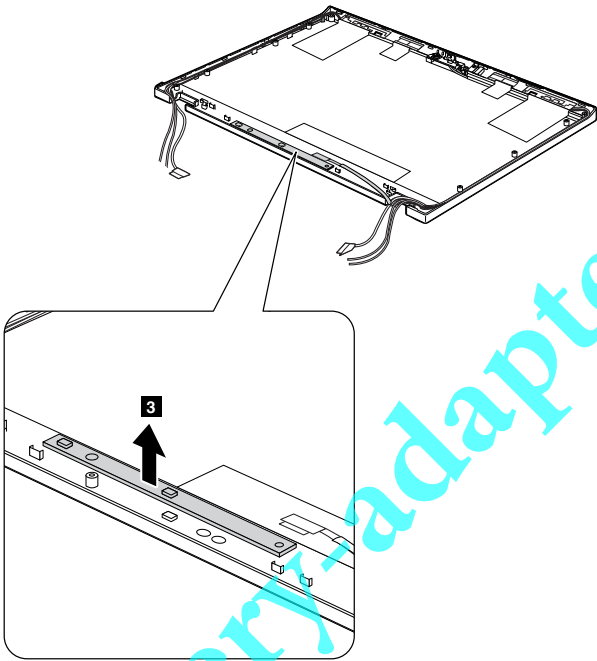
2020 LED board

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "2010 LCD front bezel" on page 88
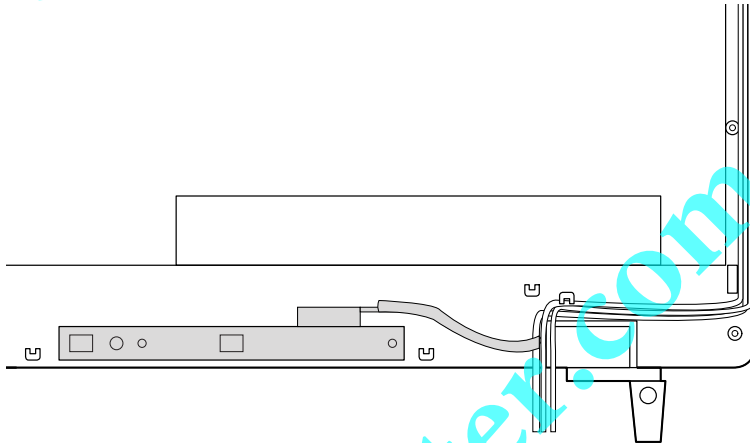
Removal steps of LED board

Step	Screw (quantity)	Color	Torque
2	M2 × 3.5 mm, wafer-head, nylon-coated (1)	Silver	0.181 Nm (1.85 kgf-cm)

When installing: Make sure that connector **1** is attached firmly.

Cabling: When replacing the inverter card or the LED board, route the connector cable as in the following figure.
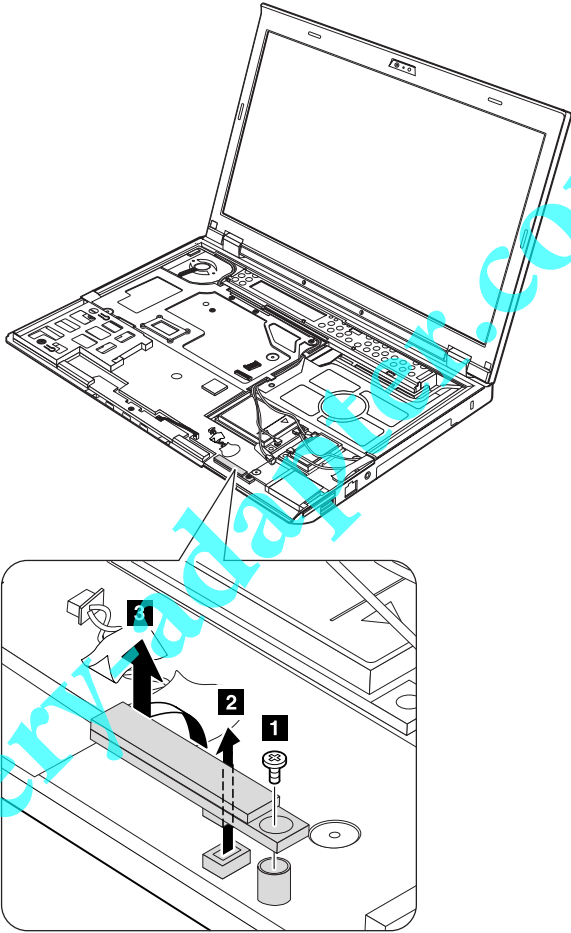
2030 Bluetooth daughter card (BDC-2.1)

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "2010 LCD front bezel" on page 88

Removal steps of Bluetooth daughter card

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

When installing:
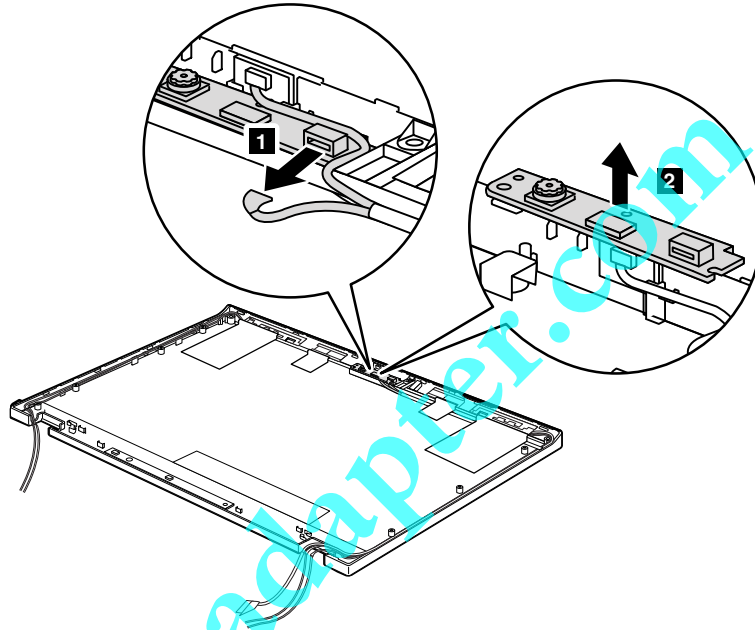
Make sure that the connector is attached firmly.

2040 Integrated camera

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "2010 LCD front bezel" on page 88

Removal steps of Integrated camera
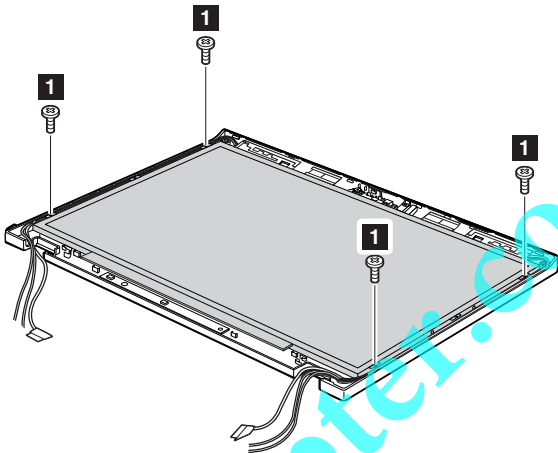

When installing:

Make sure that the connector is attached firmly.

2050 LCD panel and LCD cable
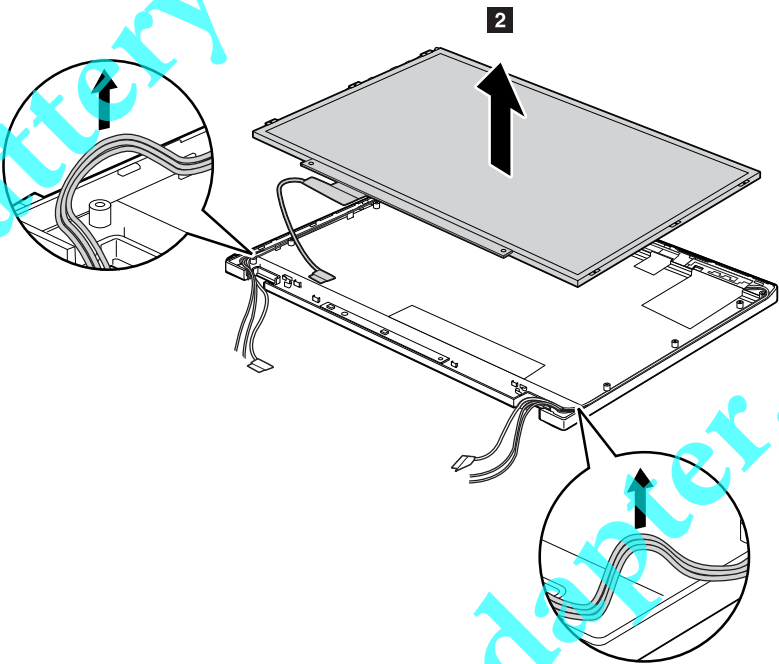
For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69
- "1060 PCI Express Mini Card for wireless LAN/WiMAX" on page 71
- "1080 PCI Express Mini Card for wireless WAN" on page 74
- "1090 Keyboard bezel" on page 75
- "1100 LCD assembly" on page 77
- "2010 LCD front bezel" on page 88
- "2020 LED board" on page 89
- "2030 Bluetooth daughter card (BDC-2.1)" on page 91
- "2040 Integrated camera" on page 92

Removal steps of LCD panel, LCD brackets, and LCD cable

| Step	Screw (quantity)	Color	Torque
1	M2 × 3.5 mm, wafer-head, nylon-coated (4)	Silver	0.181 Nm (1.85 kgf-cm)

In step **2**, release the antenna cables from the cable guides, and then remove the LCD panel.

When installing:

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

Turn the LCD panel over, and then remove the LCD cable from the LCD panel.
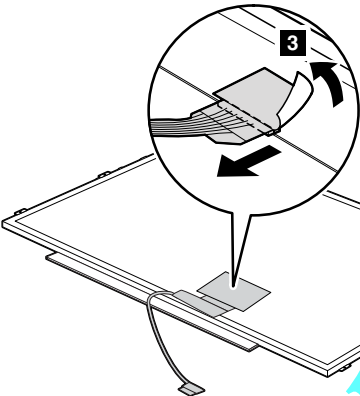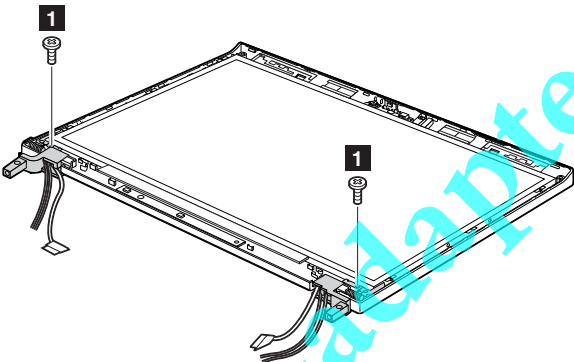
When installing:

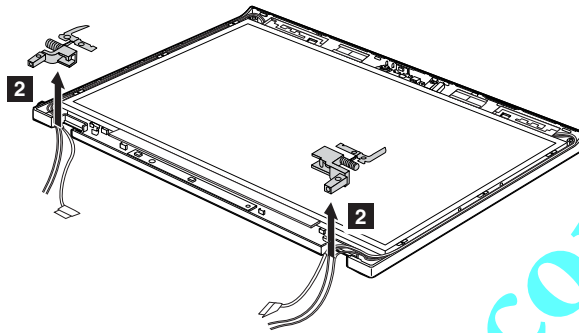Make sure that the LCD cable connector is attached firmly.

2060 Hinges

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69
- "1060 PCI Express Mini Card for wireless LAN/WiMAX" on page 71
- "1080 PCI Express Mini Card for wireless WAN" on page 74
- "1090 Keyboard bezel" on page 75
- "1100 LCD assembly" on page 77
- "2010 LCD front bezel" on page 88
- "2020 LED board" on page 89
- "2030 Bluetooth daughter card (BDC-2.1)" on page 91
- "2040 Integrated camera" on page 92
- "2050 LCD panel and LCD cable" on page 93

Removal steps of hinges

| Step	Screw (quantity)	Color	Torque
1	M2 x 3.5 mm, wafer-head, nylon-coated (2)	Black	0.392 Nm (4 kgf-cm)

2070 LCD rear cover and wireless antenna cables

For access, remove these FRUs in order:
- "1010 Battery pack" on page 62
- "1040 Keyboard" on page 67
- "1050 Palm rest or palm rest with a fingerprint reader" on page 69
- "1060 PCI Express Mini Card for wireless LAN/WiMAX" on page 71
- "1080 PCI Express Mini Card for wireless WAN" on page 74
- "1090 Keyboard bezel" on page 75
- "1100 LCD assembly" on page 77
- "2010 LCD front bezel" on page 88
- "2020 LED board" on page 89
- "2030 Bluetooth daughter card (BDC-2.1)" on page 91
- "2040 Integrated camera" on page 92
- "2050 LCD panel and LCD cable" on page 93
- "2060 Hinges" on page 95

Removal steps of LCD rear cover and wireless antenna cables
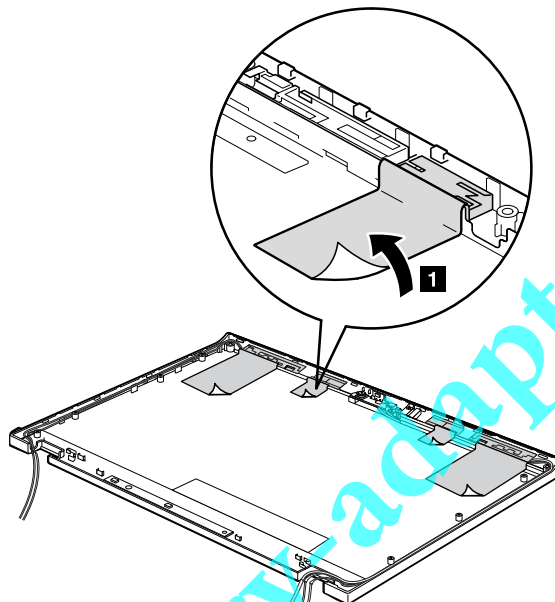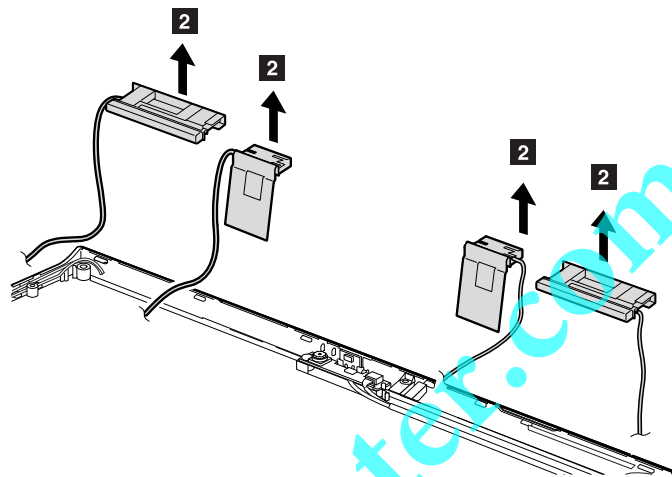
In step **2**, release the antenna cables from the cable guides of the rear cover.
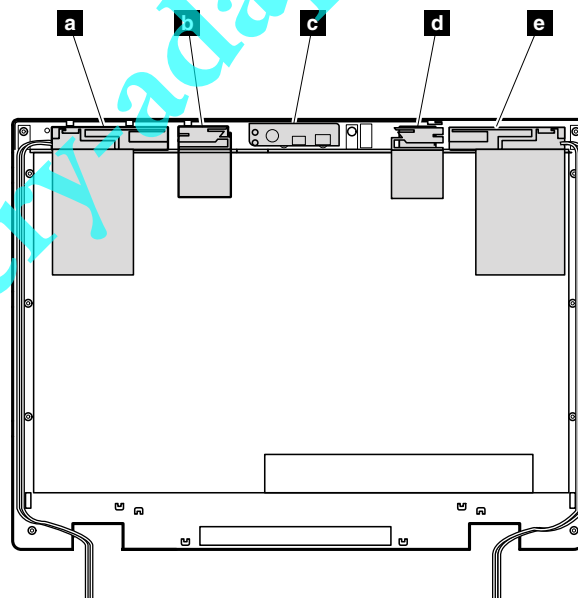
Note: Wireless antennas are secured with double-faced adhesive tapes.

When installing:

When you attach the antenna cables, place the antenna assembly as shown in the above figure.

a	Wireless WAN antenna, AUX (blue)
b	Wireless LAN antenna, AUX (black)
c	Wireless LAN antenna, 3rd (white)
d	Wireless LAN antenna, MAIN (gray)
e	Wireless WAN antenna, MAIN (red)

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