

# **Alienware m15 R2**

## **Service Manual**

Regulatory Model: P87F  
Regulatory Type: P87F001

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A L I E N W A R E™ 

## Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

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# Safety instructions

Use the following safety guidelines to protect your computer from potential damage and to ensure your personal safety. Unless otherwise noted, each procedure included in this document assumes that you have read the safety information that shipped with your computer.



-  **NOTE:** Before working inside your computer, read the safety information that shipped with your computer. For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).
-  **NOTE:** Disconnect all power sources before opening the computer cover or panels. After you finish working inside the computer, replace all covers, panels, and screws before connecting to the electrical outlet.
-  **CAUTION:** To avoid damaging the computer, ensure that the work surface is flat and clean.
-  **CAUTION:** Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.
-  **CAUTION:** You should only perform troubleshooting and repairs as authorized or directed by the Dell technical assistance team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. See the safety instructions that shipped with the product or at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).
-  **CAUTION:** Before touching anything inside your computer, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate static electricity, which could harm internal components.
-  **CAUTION:** When you disconnect a cable, pull on its connector or on its pull tab, not on the cable itself. Some cables have connectors with locking tabs or thumb-screws that you must disengage before disconnecting the cable. When disconnecting cables, keep them evenly aligned to avoid bending any connector pins. When connecting cables, ensure that the ports and connectors are correctly oriented and aligned.
-  **CAUTION:** Press and eject any installed card from the media-card reader.
-  **NOTE:** The color of your computer and certain components may appear differently than shown in this document.

## Before working inside your computer

-  **NOTE:** The images in this document may differ from your computer depending on the configuration you ordered.

### Before you begin

#### Steps

1. Save and close all open files and exit all open applications.
2. Shut down your computer. Click **Start** >  **Power** > **Shut down**.
  -  **NOTE:** If you are using a different operating system, see the documentation of your operating system for shut-down instructions.
3. Disconnect your computer and all attached devices from their electrical outlets.
4. Disconnect all attached network devices and peripherals, such as keyboard, mouse, and monitor from your computer.
5. Remove any media card and optical disc from your computer, if applicable.

## Electrostatic discharge—ESD protection

ESD is a major concern when you handle electronic components, especially sensitive components such as expansion cards, processors, memory DIMMs, and system boards. Very slight charges can damage circuits in ways that may not be obvious, such as intermittent problems or a shortened product life span. As the industry pushes for lower power requirements and increased density, ESD protection is an increasing concern.

Due to the increased density of semiconductors used in recent Dell products, the sensitivity to static damage is now higher than in previous Dell products. For this reason, some previously approved methods of handling parts are no longer applicable.

Two recognized types of ESD damage are catastrophic and intermittent failures.

- **Catastrophic** – Catastrophic failures represent approximately 20 percent of ESD-related failures. The damage causes an immediate and complete loss of device functionality. An example of catastrophic failure is a memory DIMM that has received a static shock and immediately generates a "No POST/No Video" symptom with a beep code emitted for missing or nonfunctional memory.
- **Intermittent** – Intermittent failures represent approximately 80 percent of ESD-related failures. The high rate of intermittent failures means that most of the time when damage occurs, it is not immediately recognizable. The DIMM receives a static shock, but the tracing is merely weakened and does not immediately produce outward symptoms related to the damage. The weakened trace may take weeks or months to melt, and in the meantime may cause degradation of memory integrity, intermittent memory errors, etc.

The more difficult type of damage to recognize and troubleshoot is the intermittent (also called latent or "walking wounded") failure.

Perform the following steps to prevent ESD damage:

- Use a wired ESD wrist strap that is properly grounded. The use of wireless anti-static straps is no longer allowed; they do not provide adequate protection. Touching the chassis before handling parts does not ensure adequate ESD protection on parts with increased sensitivity to ESD damage.
- Handle all static-sensitive components in a static-safe area. If possible, use anti-static floor pads and workbench pads.
- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the anti-static packing material until you are ready to install the component. Before unwrapping the anti-static packaging, ensure that you discharge static electricity from your body.
- Before transporting a static-sensitive component, place it in an anti-static container or packaging.

## ESD field service kit

The unmonitored Field Service kit is the most commonly used service kit. Each Field Service kit includes three main components: anti-static mat, wrist strap, and bonding wire.

### Components of an ESD field service kit

The components of an ESD field service kit are:

- **Anti-Static Mat** – The anti-static mat is dissipative and parts can be placed on it during service procedures. When using an anti-static mat, your wrist strap should be snug and the bonding wire should be connected to the mat and to any bare metal on the system being worked on. Once deployed properly, service parts can be removed from the ESD bag and placed directly on the mat. ESD-sensitive items are safe in your hand, on the ESD mat, in the system, or inside a bag.
- **Wrist Strap and Bonding Wire** – The wrist strap and bonding wire can be either directly connected between your wrist and bare metal on the hardware if the ESD mat is not required, or connected to the anti-static mat to protect hardware that is temporarily placed on the mat. The physical connection of the wrist strap and bonding wire between your skin, the ESD mat, and the hardware is known as bonding. Use only Field Service kits with a wrist strap, mat, and bonding wire. Never use wireless wrist straps. Always be aware that the internal wires of a wrist strap are prone to damage from normal wear and tear, and must be checked regularly with a wrist strap tester in order to avoid accidental ESD hardware damage. It is recommended to test the wrist strap and bonding wire at least once per week.
- **ESD Wrist Strap Tester** – The wires inside of an ESD strap are prone to damage over time. When using an unmonitored kit, it is a best practice to regularly test the strap prior to each service call, and at a minimum, test once per week. A wrist strap tester is the best method for doing this test. If you do not have your own wrist strap tester, check with your regional office to find out if they have one. To perform the test, plug the wrist-strap's bonding-wire into the tester while it is strapped to your wrist and push the button to test. A green LED is lit if the test is successful; a red LED is lit and an alarm sounds if the test fails.
- **Insulator Elements** – It is critical to keep ESD sensitive devices, such as plastic heat sink casings, away from internal parts that are insulators and often highly charged.
- **Working Environment** – Before deploying the ESD Field Service kit, assess the situation at the customer location. For example, deploying the kit for a server environment is different than for a desktop or portable environment. Servers are typically installed in a rack within a data center; desktops or portables are typically placed on office desks or cubicles. Always look for a large open flat work area that is free of clutter and large enough to deploy the ESD kit with additional space to accommodate the type of system that is being repaired. The workspace should also be free of insulators that can cause an ESD event. On the work area, insulators such as Styrofoam and other plastics should always be moved at least 12 inches or 30 centimeters away from sensitive parts before physically handling any hardware components.
- **ESD Packaging** – All ESD-sensitive devices must be shipped and received in static-safe packaging. Metal, static-shielded bags are preferred. However, you should always return the damaged part using the same ESD bag and packaging that the new part arrived in. The ESD bag should be folded over and taped shut and all the same foam packing material should be used in the original box that the new part arrived in. ESD-sensitive devices should be removed from packaging only at an ESD-protected

work surface, and parts should never be placed on top of the ESD bag because only the inside of the bag is shielded. Always place parts in your hand, on the ESD mat, in the system, or inside an anti-static bag.

- **Transporting Sensitive Components** – When transporting ESD sensitive components such as replacement parts or parts to be returned to Dell, it is critical to place these parts in anti-static bags for safe transport.

## ESD protection summary


It is recommended that all field service technicians use the traditional wired ESD grounding wrist strap and protective anti-static mat at all times when servicing Dell products. In addition, it is critical that technicians keep sensitive parts separate from all insulator parts while performing service and that they use anti-static bags for transporting sensitive components.

## Transporting sensitive components

When transporting ESD sensitive components such as replacement parts or parts to be returned to Dell, it is critical to place these parts in anti-static bags for safe transport.

## Lifting equipment

Adhere to the following guidelines when lifting heavy weight equipment:

 **CAUTION: Do not lift greater than 50 pounds. Always obtain additional resources or use a mechanical lifting device.**

1. Get a firm balanced footing. Keep your feet apart for a stable base, and point your toes out.
2. Tighten stomach muscles. Abdominal muscles support your spine when you lift, offsetting the force of the load.
3. Lift with your legs, not your back.
4. Keep the load close. The closer it is to your spine, the less force it exerts on your back.
5. Keep your back upright, whether lifting or setting down the load. Do not add the weight of your body to the load. Avoid twisting your body and back.
6. Follow the same techniques in reverse to set the load down.

## After working inside your computer

### About this task

 **CAUTION: Leaving stray or loose screws inside your computer may severely damage your computer.**

### Steps

1. Replace all screws and ensure that no stray screws remain inside your computer.
2. Connect any external devices, peripherals, or cables you removed before working on your computer.
3. Replace any media cards, discs, or any other parts that you removed before working on your computer.
4. Connect your computer and all attached devices to their electrical outlets.
5. Turn on your computer.

# Removing and installing components

## Recommended tools

The procedures in this document may require the following tools:

- Philips screwdriver #1
- Flat-head screwdriver
- Plastic scribe












## Screw list

**NOTE:** When removing screws from a component, it is recommended to note the screw type, the quantity of screws, and then place them in a screw storage box. This is to ensure that the correct number of screws and correct screw type is restored when the component is replaced.














**NOTE:** Some computers have magnetic surfaces. Ensure that the screws are not left attached to such surface when replacing a component.

**NOTE:** Screw color may vary with the configuration ordered.

**Table 1. Screw list**

Component	Secured to	Screw type	Quantity	Screw image
Base cover	Palm-rest assembly	M2.5x5	2	
M.2 connector shield	System board	M2x4.5	1	
M.2 2230 solid-state drive	M.2 2230 mounting bracket	M2x3	1 per M.2 2230 solid-state drive	
M.2 2230 mounting bracket	Palm-rest assembly	M2x3	1 per M.2 2230 solid-state drive	
M.2 2280 solid-state drive	Palm-rest assembly	M2x3	1 per M.2 2280 solid-state drive	
Back cover	Palm-rest assembly	M2.5x5	2	
Wireless-card bracket	Left I/O-board	M2x3	1	
Display assembly	Palm-rest assembly	M2.5x5	6	
Battery	<ul style="list-style-type: none"><li>▪ Palm-rest assembly</li><li>▪ System board</li><li>▪ Left I/O-board</li><li>▪ Right I/O-board</li></ul>	M2x4.5	6	
Keyboard-backlight cable	Keyboard-controller board	M2x1.9	2	
Left I/O-board connector	<ul style="list-style-type: none"><li>▪ System board</li><li>▪ Left I/O-board</li></ul>	M2x3	2	

**Table 1. Screw list(continued)**

Component	Secured to	Screw type	Quantity	Screw image
Left I/O-board	Palm-rest assembly	M2x3	1	
Right I/O-board connector	<ul style="list-style-type: none"> <li>System board</li> <li>Right I/O-board</li> </ul>	M2x3	2	
Right I/O-board	Palm-rest assembly	M2x3	2	
Fans	Palm-rest assembly	M2.5x5	5	
System board	Palm-rest assembly	M2x3	4	
Fan and heat-sink assembly	System board	M2x3	6	
Solid-state drive support bracket	Palm-rest assembly	M2x1.9	2	
Touchpad	Palm-rest assembly	M2x1.9	4	
Solid-state drive support-bracket	Palm-rest assembly	M2x1.9	2	
Power-adapter port bracket	Palm-rest assembly	M2x3	2	
Power-button assembly	Palm-rest assembly	M2x1.9	3	
Keyboard bracket	<ul style="list-style-type: none"> <li>Palm-rest assembly</li> <li>Keyboard</li> </ul>	M1.2x2.1	9	
Keyboard	Palm-rest assembly	M1.2x1.6	33	

## Base cover

### Removing the base cover

#### Prerequisites

1. Follow the procedure in [Before working inside your computer.](#)

#### About this task

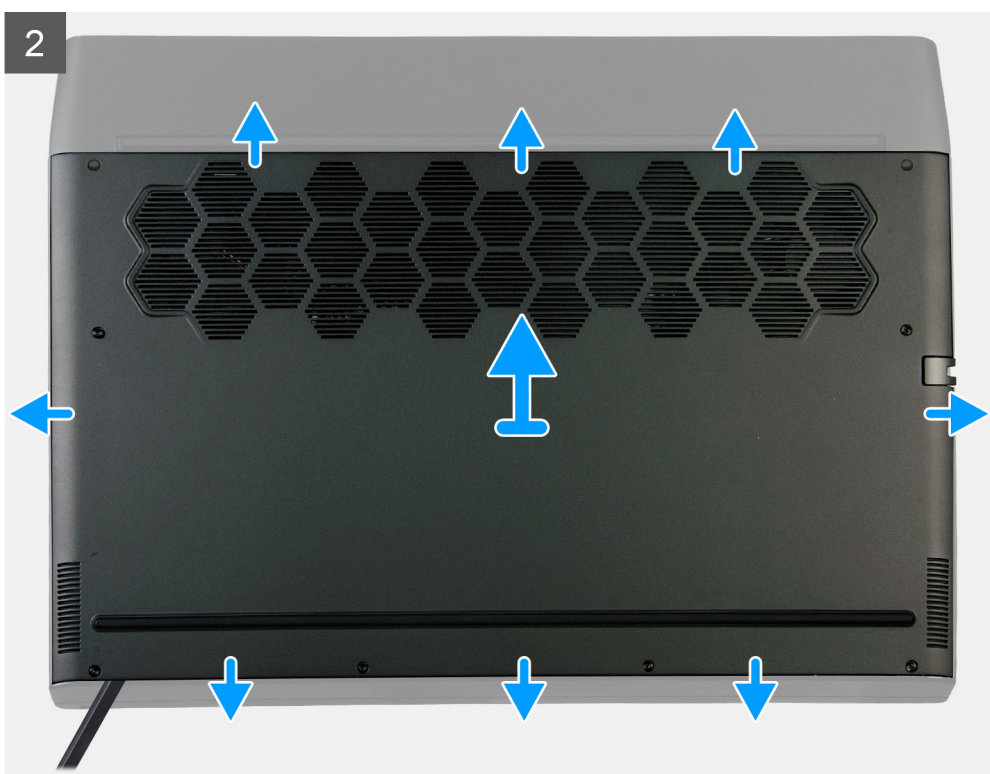
The following image indicates the location of the base cover and provides a visual representation of the removal procedure.

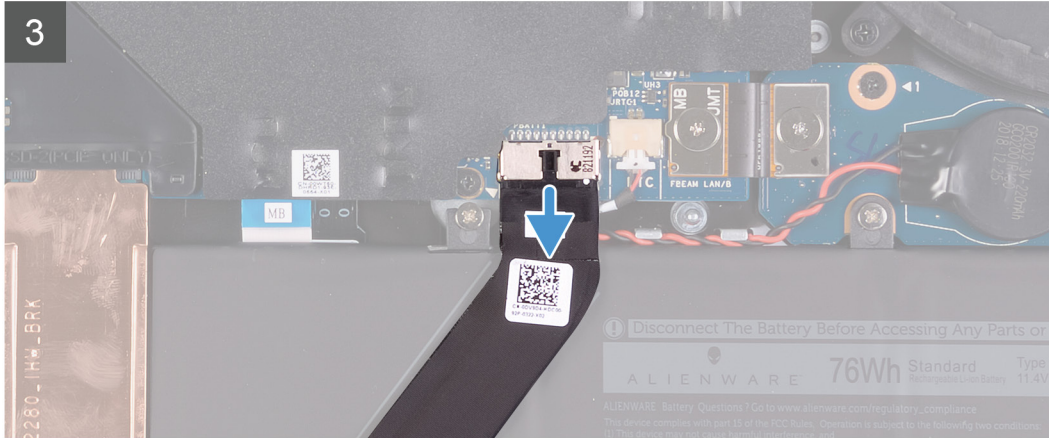
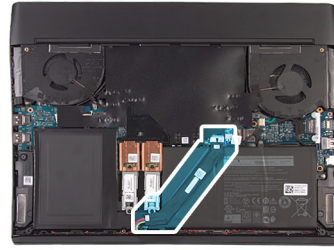


2x  
M2.5x5



6x





### Steps

1. Remove the two screws (M2.5x5) that secure the base cover to the palm-rest assembly.
2. Loosen the six captive screws.
3. Using a plastic scribe, pry the base cover from the bottom-left corner and continue to work on the sides to open the base cover.
4. Lift the base cover off the palm-rest assembly.
5. Disconnect the battery from the system board.
6. Press and hold the power button for 5 seconds to ground the computer and drain the flea power.

### Installing the base cover

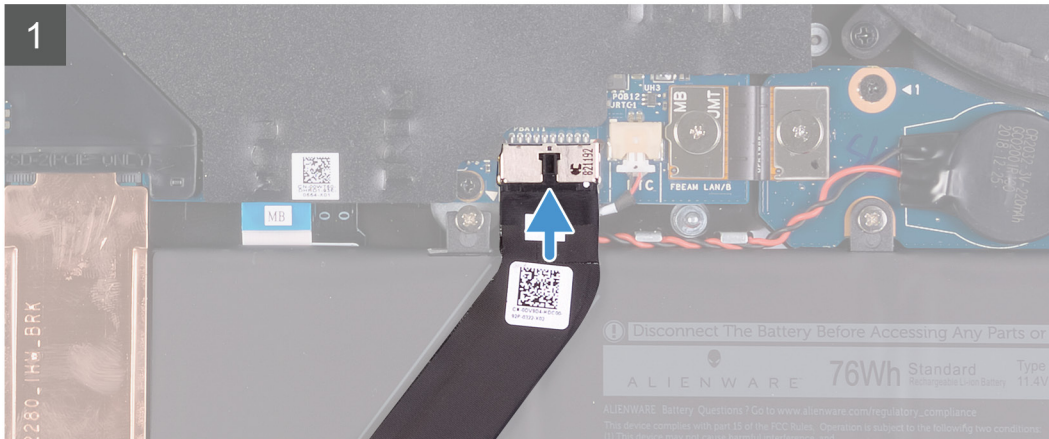
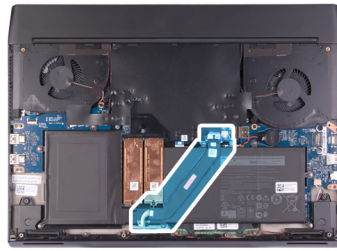
#### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

#### About this task

The following image indicates the location of the base cover and provides a visual representation of the installation procedure.

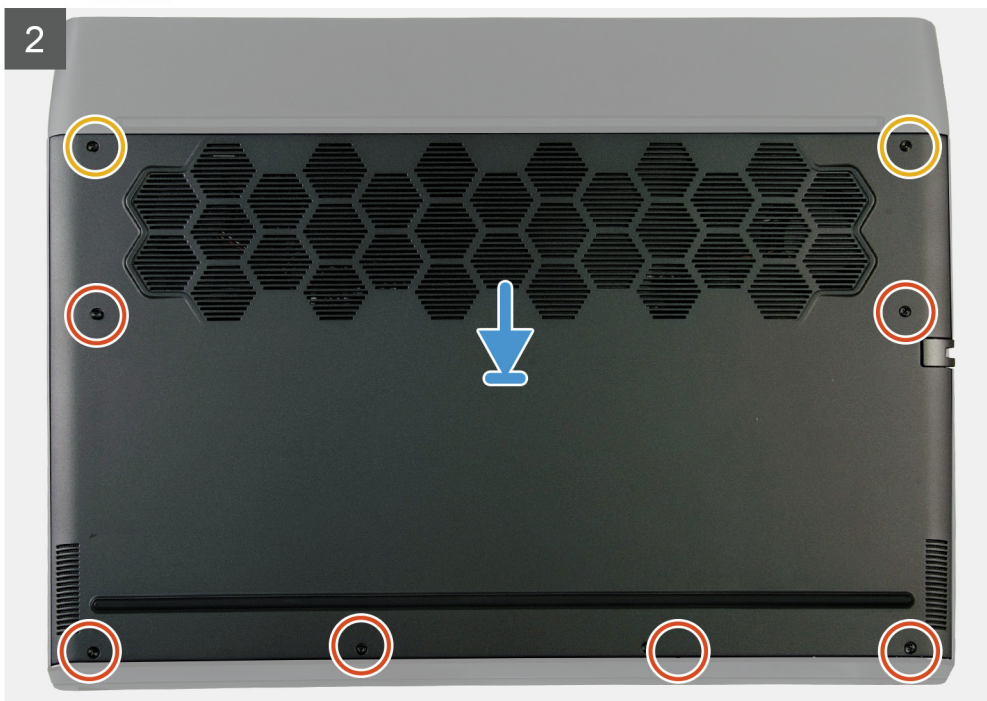




**2x**  
M2.5x5



**6x**



## Steps

1. Connect the battery cable to the system board.
2. Slide the notches on the top of the base cover under the rear I/O-cover and snap the base cover into place on the palm-rest assembly.



3. Tighten the six captive screws on the base cover.
4. Replace the two screws (M2.5x5) that secure the base cover to the palm-rest assembly.

#### Next steps

1. Follow the procedure in [After working inside your computer](#).

## M.2 solid-state drive

### Removing the M.2 2230 solid-state drive

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

#### About this task

**NOTE:** This procedure applies only to computers shipped with a M.2 2230 solid-state drive installed.

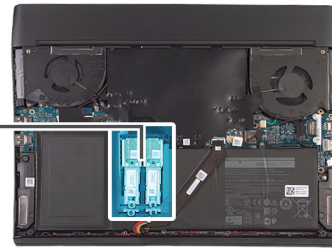
**NOTE:** Depending on the configuration ordered your computer may have up to two M.2 cards installed. Supported card configurations per M.2 card slot:

- M.2 2230 solid-state drive + 2230 mounting bracket
- M.2 2280 solid-state drive

The following image indicates the location of the M.2 2230 solid-state drive and provides a visual representation of the removal procedure.



2x  
M2x3



## Steps

1. Remove the screw (M2x3) that secures the M.2 thermal shield to the mounting bracket.
2. Remove the M.2 2230 thermal shield from the M.2 2230 solid-state drive.
3. Lift and remove the M.2 2230 solid-state drive from the M.2 card slot on the system board.
4. Remove the screw (M2x3) that secures the M.2 2230 mounting bracket to the palm-rest assembly.
5. Remove the M.2 2230 mounting bracket from the palm-rest assembly.

## Installing the M.2 2230 solid-state drive

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

- ① **NOTE:** This procedure applies if you are installing a M.2 2230 solid-state drive.
- ① **NOTE:** Depending on the configuration ordered your computer may have up to two M.2 cards installed. Supported card configurations per M.2 card slot:

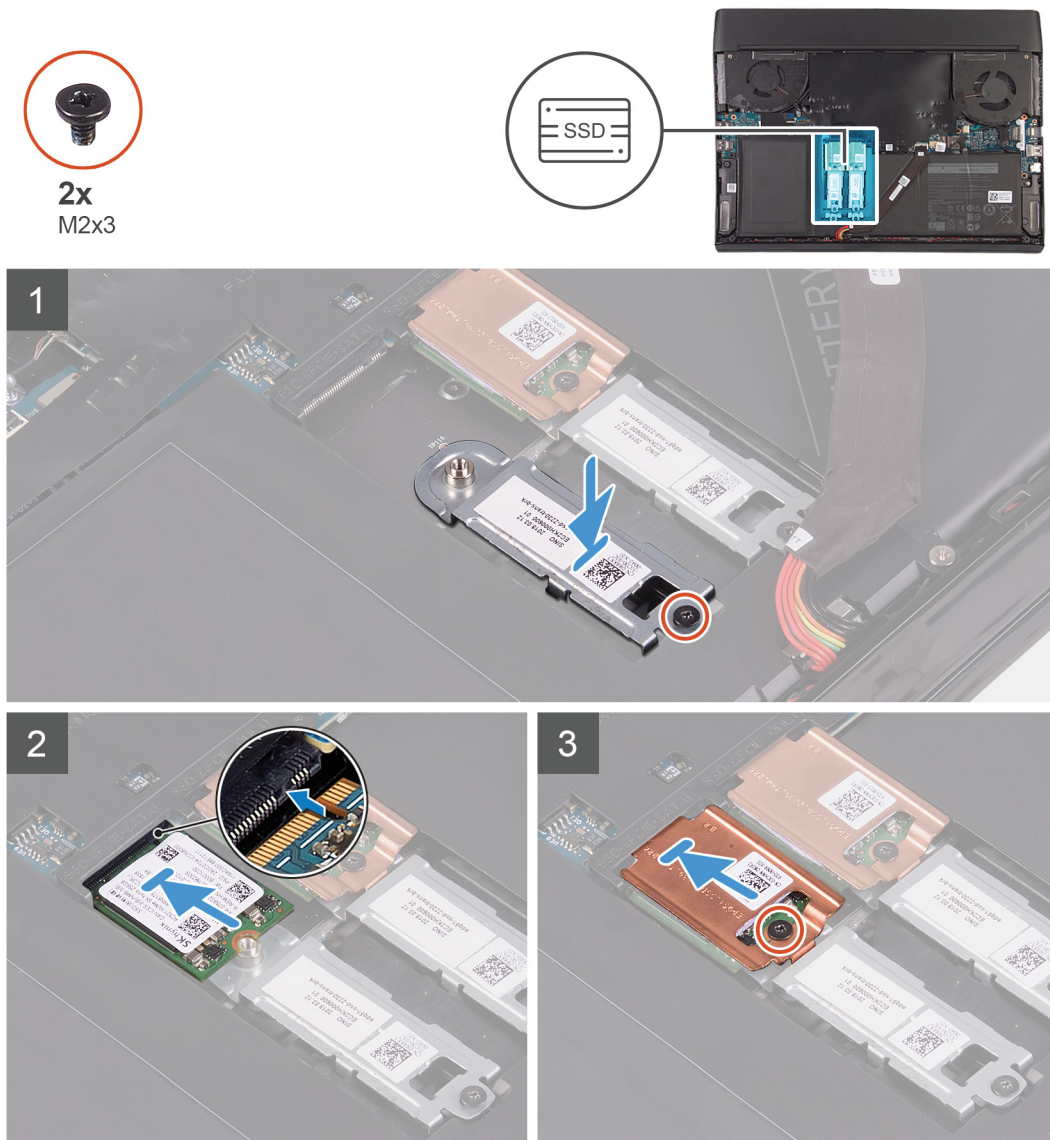
- M.2 2230 solid-state drive + 2230 mounting bracket
- M.2 2280 solid-state drive

**NOTE:** For PCIe, NVMe solid-state drives a thermal shield is required for optimal heat dissipation and is installed in the computer when these configurations are ordered. If these configurations are installed After Point-of-Sale (APOS), that is, after you purchase the computer; contact Dell support to purchase a thermal shield.

**NOTE:** Before replacing the M.2 card take note that there are two M.2 card slots present on your computer, for:

- the left card slot PCIe, NVMe and SATA AHCI cards are supported.
- the right card slot only PCIe, NVMe cards are supported.

The following image indicates the location of the M.2 2230 solid-state drive and provides a visual representation of the installation procedure.



## Steps

1. Place and align the M.2 2230 mounting bracket on the palm-rest assembly.
2. Replace the screw (M2x3) that secures the M.2 2230 mounting bracket to the palm-rest assembly.
3. Align the notch on the M.2 2230 solid-state drive with the tab on the M.2 card slot on the system board.
4. Slide the M.2 2230 solid-state drive into the M.2 card slot on the system board.
5. Place the M.2 thermal shield on the M.2 2230 solid-state drive.

6. Replace the screw (M2x3) that secures the M.2 2230 solid-state drive and thermal shield to the M.2 2230 mounting bracket.

#### Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).

## Removing the M.2 2280 solid-state drive

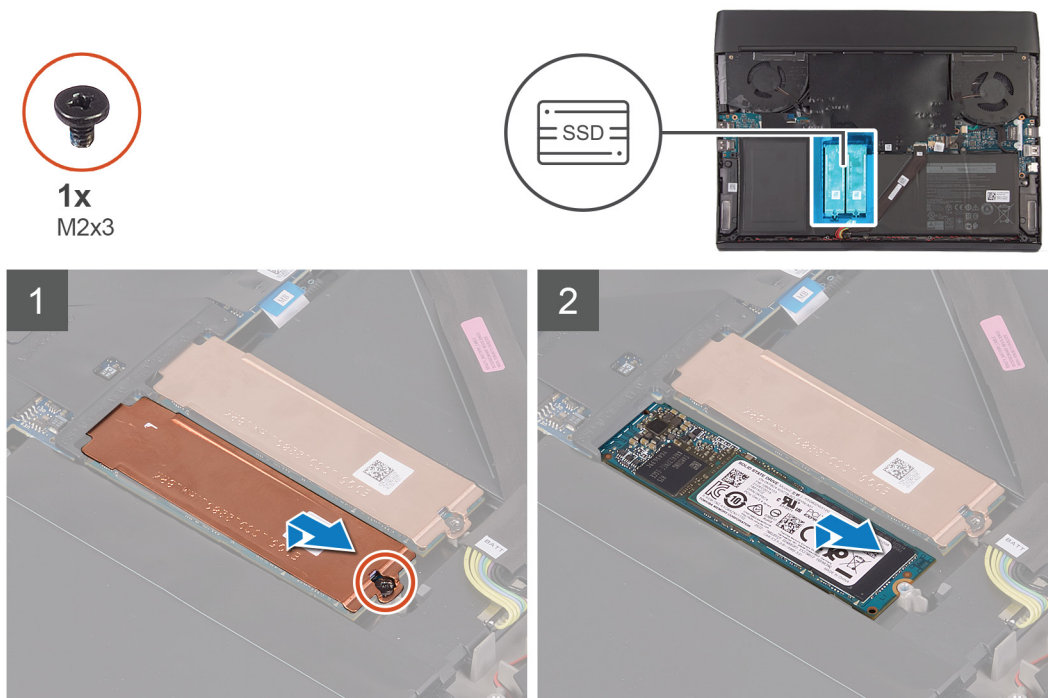
#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

#### About this task

- i** **NOTE:** This procedure applies only to computers shipped with a M.2 2280 solid-state drive installed.
- i** **NOTE:** Depending on the configuration ordered your computer may have up to two M.2 cards installed. Supported card configurations per M.2 card slot:
- M.2 2230 solid-state drive + 2230 mounting bracket
  - M.2 2280 solid-state drive

The following image indicates the location of the M.2 2280 solid-state drive and provides a visual representation of the removal procedure.



#### Steps

1. Remove the screw (M2x3) that secures the M.2 thermal shield to the palm-rest assembly.
2. Lift and remove the M.2 2280 thermal shield off the M.2 2280 solid-state drive.

**i** **NOTE:** A thermal shield is only present on PCIe M.2 cards.
3. Slide and remove the M.2 2280 solid-state drive from the M.2 card slot on the system board.



## Installing the M.2 2280 solid-state drive

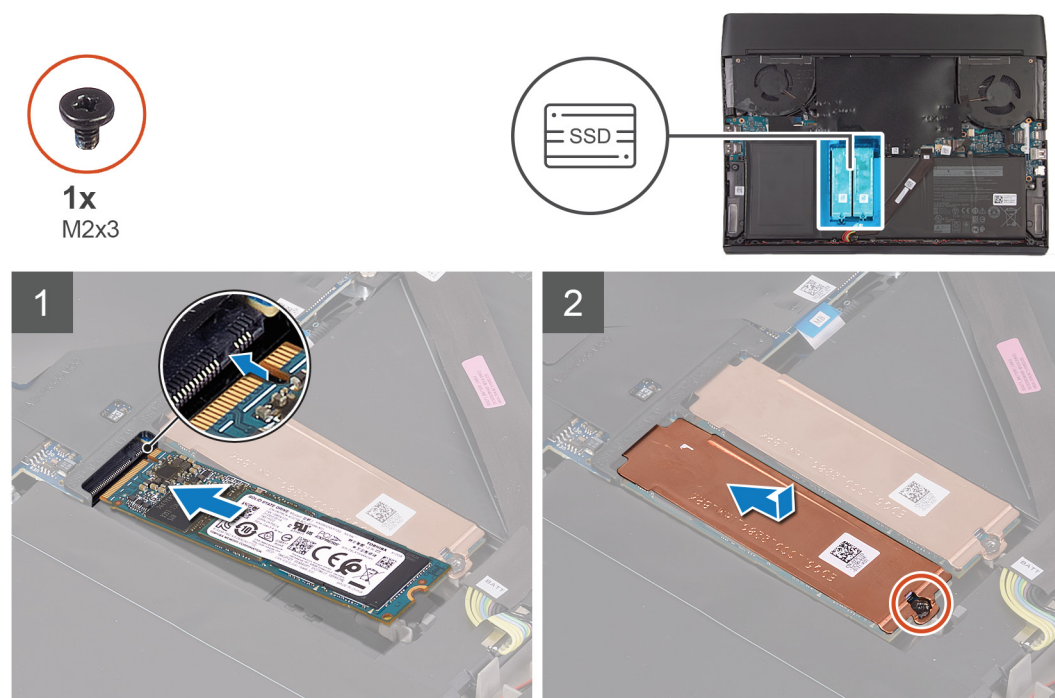
### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

- NOTE:** This procedure applies if you are installing a M.2 2280 solid-state drive.
- NOTE:** Depending on the configuration ordered your computer may have up to two M.2 cards installed. Supported card configurations per M.2 card slot:
  - M.2 2230 solid-state drive + 2230 mounting bracket
  - M.2 2280 solid-state drive
- NOTE:** For PCIe, NVMe solid-state drives a thermal shield is required for optimal heat dissipation and is installed in the computer when these configurations are ordered. If these configurations are installed After Point-of-Sale (APOS), that is, after you purchase the computer; contact Dell support to purchase a thermal shield.
- NOTE:** Before replacing the M.2 card take note that there are two M.2 card slots present on your computer, for:
  - the left card slot PCIe, NVMe and SATA AHCI cards are supported.
  - the right card slot only PCIe, NVMe cards are supported.

The following image indicates the location of the M.2 2280 solid-state drive and provides a visual representation of the installation procedure.



### Steps

1. Align the notch on the M.2 2280 solid-state drive with the tab on the M.2 card slot on the system board.
2. Slide the M.2 2280 solid-state drive into the M.2 card slot on the system board.
3. Slide and align the screw hole of the M.2 thermal shield with the screw hole on the palm-rest assembly.
  - NOTE:** This step is only applicable when installing a PCIe M.2 card.
4. Replace the screw (M2x3) that secures the M.2 2280 solid-state drive to the palm-rest assembly.

### Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).

## Rear-I/O cover

### Removing the rear I/O-cover

#### Prerequisites

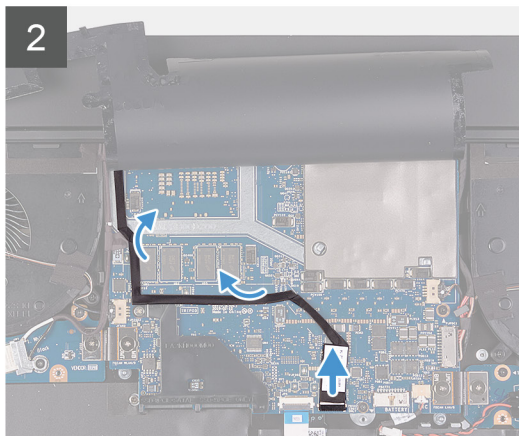
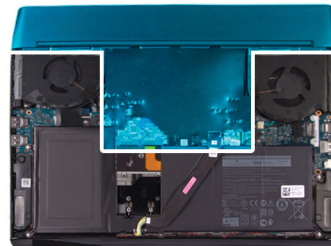
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

#### About this task

The following image indicates the location of the rear I/O-cover and provides a visual representation of the removal procedure.



**2x**  
M2.5x5





### Steps

1. Peel and lift the Mylar covering the system board.
  2. Disconnect and peel the Tron light cable from the system board and route the cable through the slot on the Mylar.
- NOTE:** To prevent damaging your computer ensure the Tron light cable has been disconnected from the system board before removing the rear I/O-cover.
3. Remove the two screws (M2.5x5) that secure the rear I/O-cover to the palm-rest assembly.
  4. Firmly grasp the sides of your computer with both hands and push the rubber feet on the rear I/O-cover outwards with your thumbs to release the rear I/O-cover from the palm-rest assembly.
  5. Lift the rear I/O-cover from the palm-rest assembly.

### Installing the rear I/O-cover

#### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

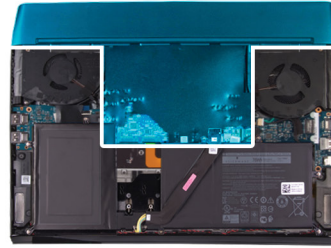
#### About this task

The following image indicates the location of the rear I/O-cover and provides a visual representation of the installation procedure.





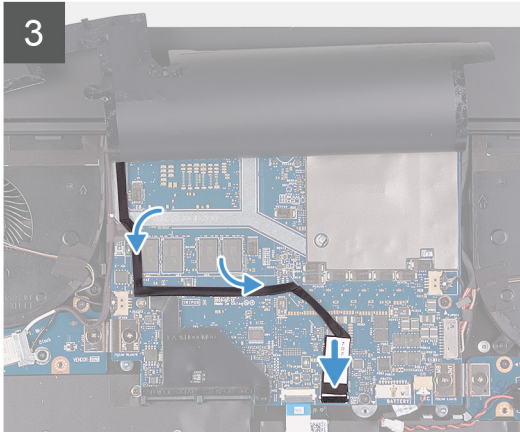
2x  
M2.5x5



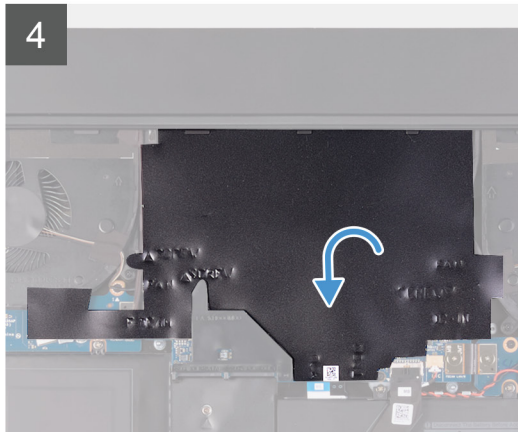
2



3



4



## Steps

1. Push the rear I/O-cover into the palm-rest assembly snapping it into place.

**i** **NOTE:** To avoid damaging your computer, ensure the Tron light cable is not pinched and that the Mylar is pasted on the system board before snapping the rear I/O-cover into place.

2. Replace the two screws (M2.5x5) that secure the rear I/O-cover to the palm-rest assembly.
3. Peel and lift the Mylar from the system board.
4. Route the Tron light cable through the slot on the Mylar.
5. Connect the Tron light cable to the system board.
6. Route and adhere the Tron light cable into place on the system board.
7. Adhere the Mylar into place onto the system board.

## Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).

# Display assembly

## Removing the display assembly

### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).



2. Remove the [base cover](#).
3. Remove the [rear I/O-cover](#).

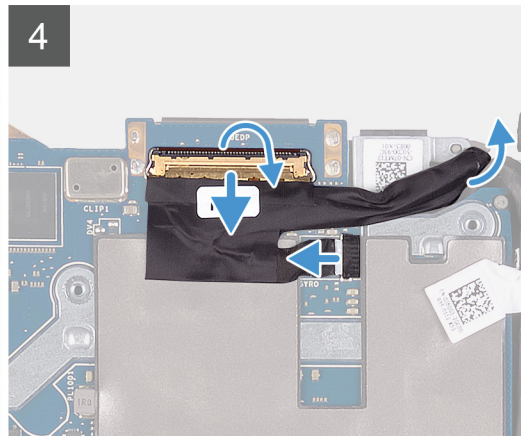
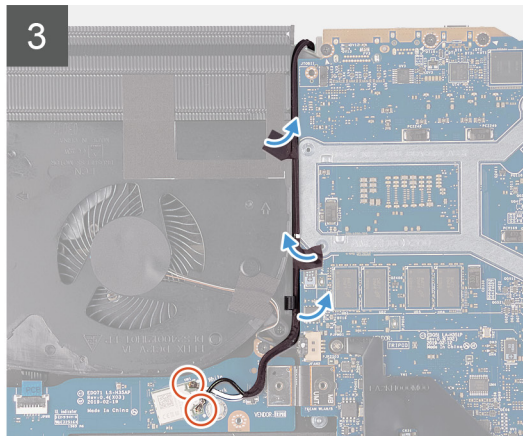
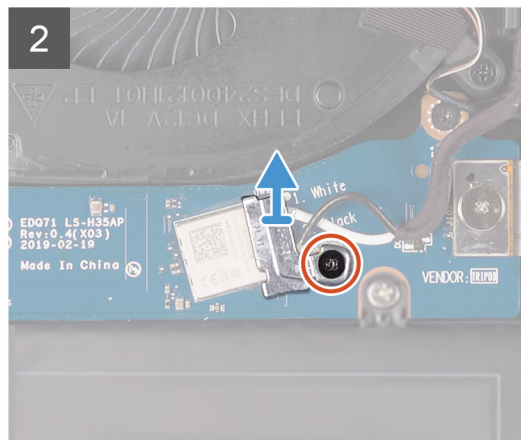
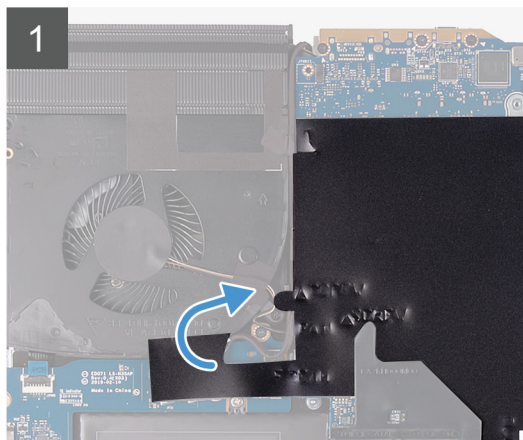
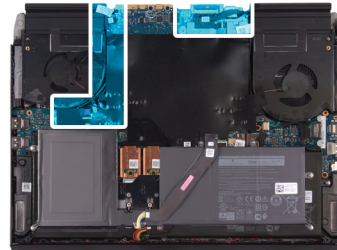
#### About this task

**i** **NOTE:** The display assembly is a Hinge-up Display (HUD) and cannot be further disassembled. If components within the display assembly need to be replaced, the entire display assembly is to be replaced.

The following image indicates the location of the display assembly and provides a visual representation of the removal procedure.



1x  
M2x3





**8x**  
M2.5x5

**5**



### Steps

1. Peel the Mylar covering the system board.
  2. Remove the screw (M2x3) that secures the wireless card bracket to the left I/O-board.
  3. Lift the wireless card bracket off the left I/O-board.
  4. Disconnect the antenna cables from the wireless card.
  5. Peel the tapes securing the antenna cables to system board and left fan.
  6. Remove the antenna cables from the routing guides on the left fan and system board.
  7. Lift the latch and disconnect the display cable from the connector on the system board.
  8. Disconnect the G-sensor cable from the connector on the system board.
  9. Disconnect the Tobii eye tracker cable from the connector on the system board.
- (i) NOTE: This step is only applicable to computers shipped with a Tobii eye tracker.**
10. Place the computer face up.
  11. Remove the following cables from the routing guides on the palm-rest assembly.
    - Display cable
    - G-sensor cable
    - Tobii eye tracker cable
    - Antenna cables
  12. Remove the six screws (M2.5x5) securing the display assembly to the palm-rest assembly.

13. Gently lift the display assembly from the palm-rest assembly.

## Installing the display assembly

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

**NOTE:** The display assembly is a Hinge-up Display (HUD) and cannot be further disassembled. If components within the display assembly need to be replaced, the entire display assembly is to be replaced.

The following image indicates the location of the display assembly and provides a visual representation of the installation procedure.



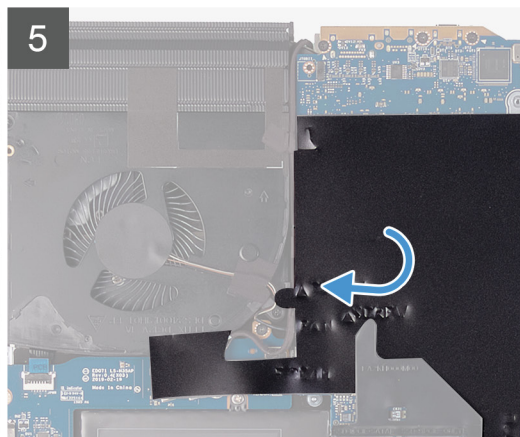
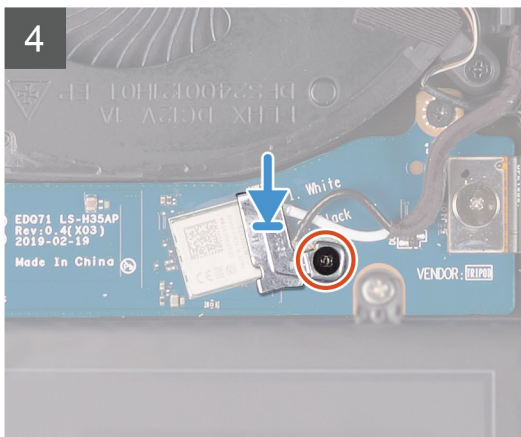
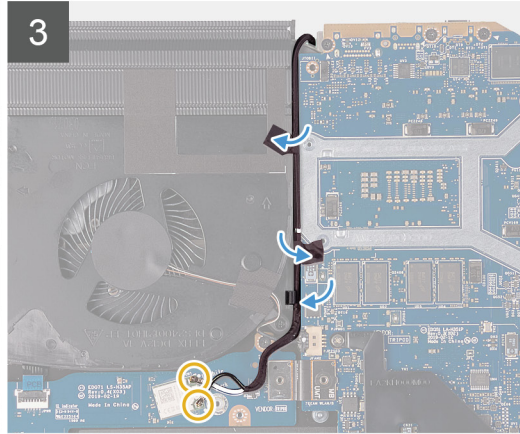
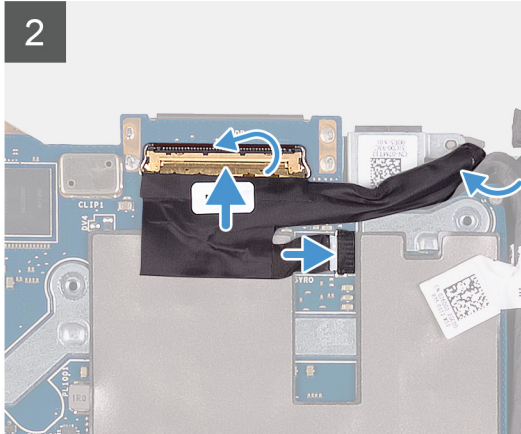
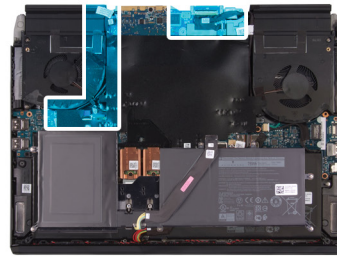
8x  
M2.5x5







1x  
M2x3



## Steps

1. Ensure that the palm-rest assembly is placed face up with the keyboard facing you.
2. Gently place the display assembly on the palm-rest assembly and align the screw holes on the display assembly to the screw holes on the palm-rest assembly.
3. Replace the six screws (M2.5x5) that secure the display assembly to the palm-rest assembly.
4. Route the following cables to the routing guides on the palm-rest assembly.
  - Display cable
  - G-sensor cable
  - Tobii eye tracker cable
  - Antenna cables
5. Place the computer face down.
6. Connect the Tobii eye tracker cable to the connector on the system board.
 

**i NOTE: This step is only applicable to computers shipped with a Tobii eye tracker.**
7. Connect the G-sensor cable to the connector on the system board.
8. Connect the display cable to the connector on the system board and close the latch.
9. Route the antenna cables to the routing guides on the left fan and system board.
10. Adhere the tapes that secure the antenna cables to system board and left fan.

11. Connect the antenna cables to the wireless card.

The following table provides the antenna-cable color scheme for the wireless card supported by your computer.

**Table 2. Antenna-cable color scheme**

Connectors on the wireless card	Antenna-cable color
Main (white triangle)	White
Auxiliary (black triangle)	Black

12. Place the wireless card bracket on the wireless card.  
13. Replace the screw (M2x3) that secures the wireless card bracket to the left I/O-board.  
14. Adhere the Mylar over the system board.

**Next steps**

- 1. Install the [rear I/O-cover](#).
- 2. Install the [base cover](#).
- 3. Follow the procedure in [After working inside your computer](#).

# Battery

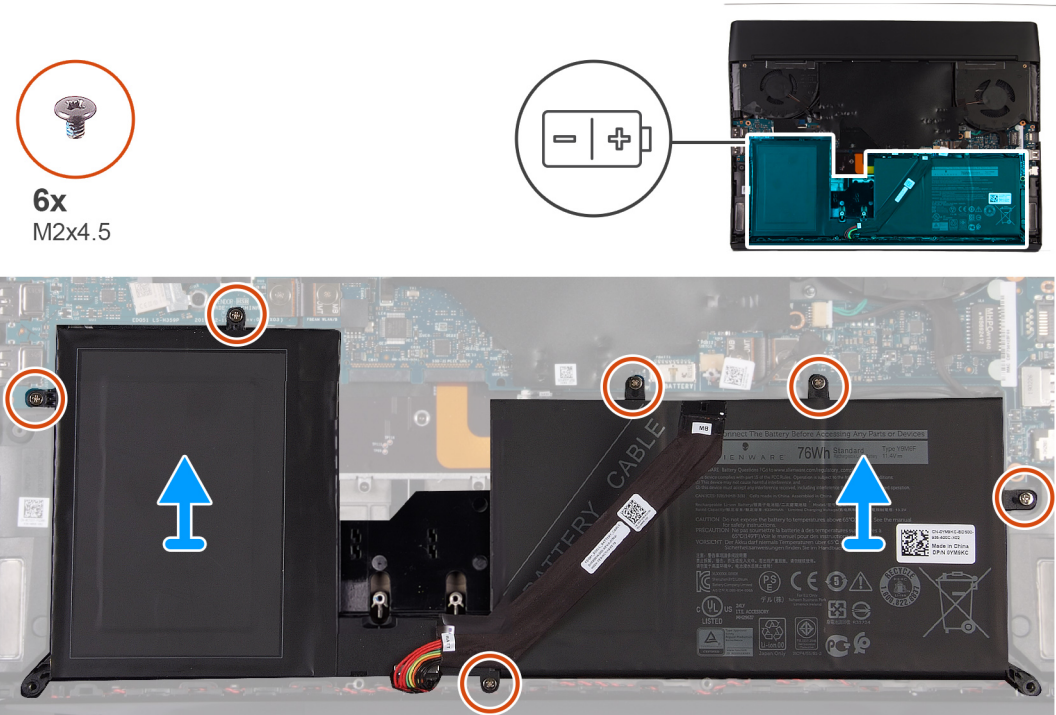
## Removing the battery

**Prerequisites**

- 1. Follow the procedure in [Before working inside your computer](#).
- 2. Remove the [base cover](#).
- 3. Remove the [2230 solid-state drive](#). (if applicable)
- 4. Remove the [2280 solid-state drive](#). (if applicable)

**About this task**

The following image indicates the location of the battery and provides a visual representation of the removal procedure.



## Steps

1. Ensure that the battery cable has been disconnected from the system board.
2. Remove the six screws (M2x4.5) that secure the battery to the palm-rest assembly.
3. Remove the battery from the palm-rest assembly.

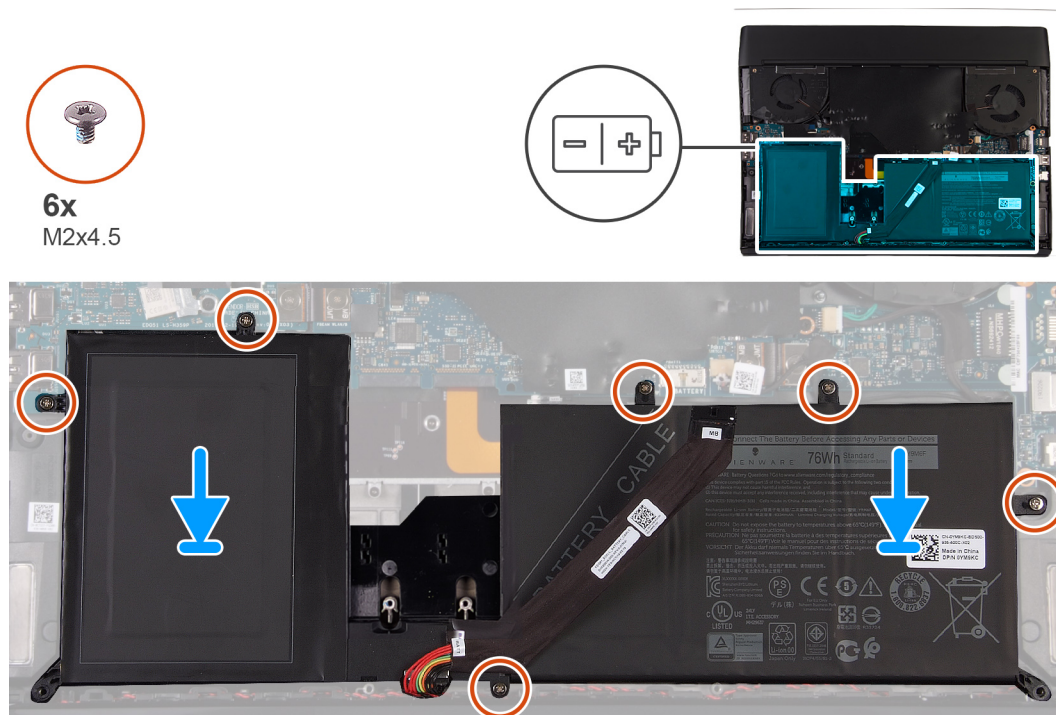
## Installing the battery

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of the battery and provides a visual representation of the installation procedure.



## Steps

1. Place the battery on the palm-rest assembly.
2. Replace the six screws (M2x4.5) that secure the battery to the palm-rest assembly.

### Next steps

1. Install the [2230 solid-state drive](#). (if applicable)
2. Install the [2280 solid-state drive](#). (if applicable)
3. Install the [battery](#).
4. Follow the procedure in [After working inside your computer](#).



# Coin-cell battery

## Removing the coin-cell battery

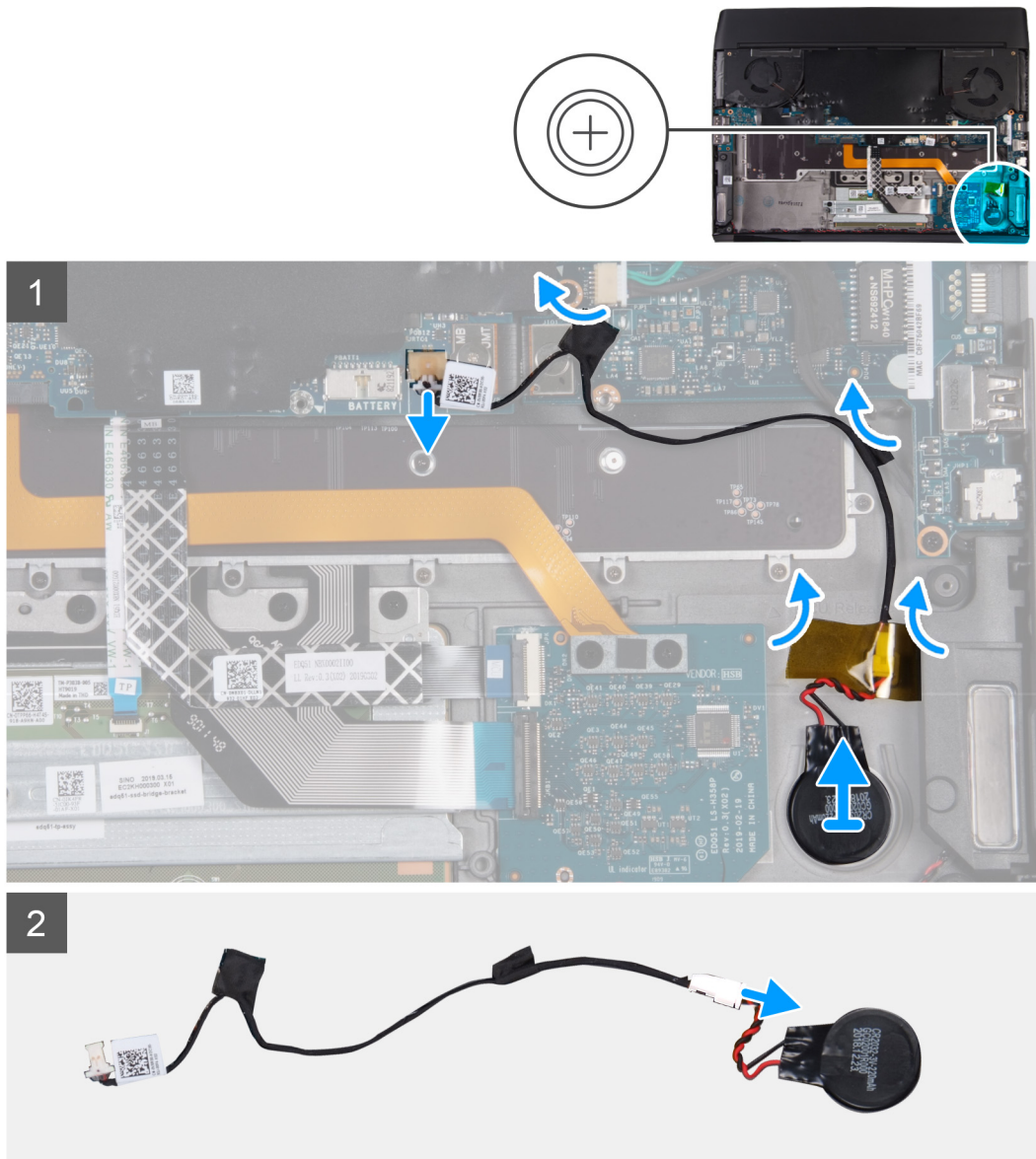
### Prerequisites

△ **CAUTION:** Removing the coin-cell battery resets the BIOS setup program's settings to default. It is recommended that you note the BIOS setup program's settings before removing the coin-cell battery.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [2230 solid-state drive](#). (if applicable)
4. Remove the [2280 solid-state drive](#). (if applicable)
5. Remove the [battery](#).

### About this task

The following image indicates the location of the coin-cell battery and provides a visual representation of the removal procedure.



## Steps

1. Disconnect the coin-cell battery cable from the connector on the system board.
2. Peel the tapes securing the coin-cell battery cable to the right I/O-board and palm-rest assembly.
3. Peel and lift the coin-cell battery off the palm-rest assembly along with its cable.
4. Disconnect the coin-cell battery from the coin-cell battery cable.

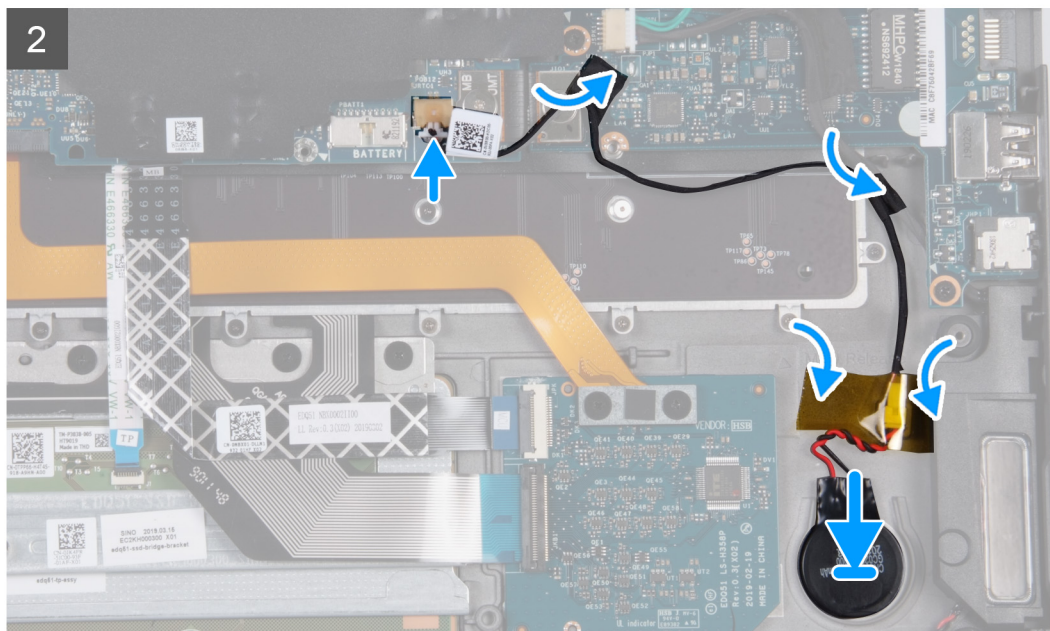
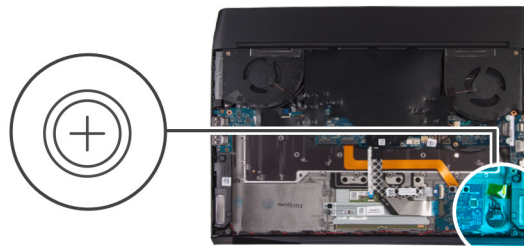
## Installing the coin-cell battery

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of the coin-cell battery and provides a visual representation of the installation procedure.



## Steps

1. Connect the coin-cell battery to the coin-cell battery cable.
2. Adhere the coin-cell battery into its slot on the palm-rest assembly.



3. Adhere the tapes securing the coin-cell battery cable to the right I/O-board and palm-rest assembly.
4. Connect the coin-cell battery cable to the connector on the system board.

#### Next steps

1. Install the [battery](#).
2. Install the [2230 solid-state drive](#). (if applicable)
3. Install the [2280 solid-state drive](#). (if applicable)
4. Install the [base cover](#).
5. Follow the procedure in [After working inside your computer](#).

## Keyboard-controller board

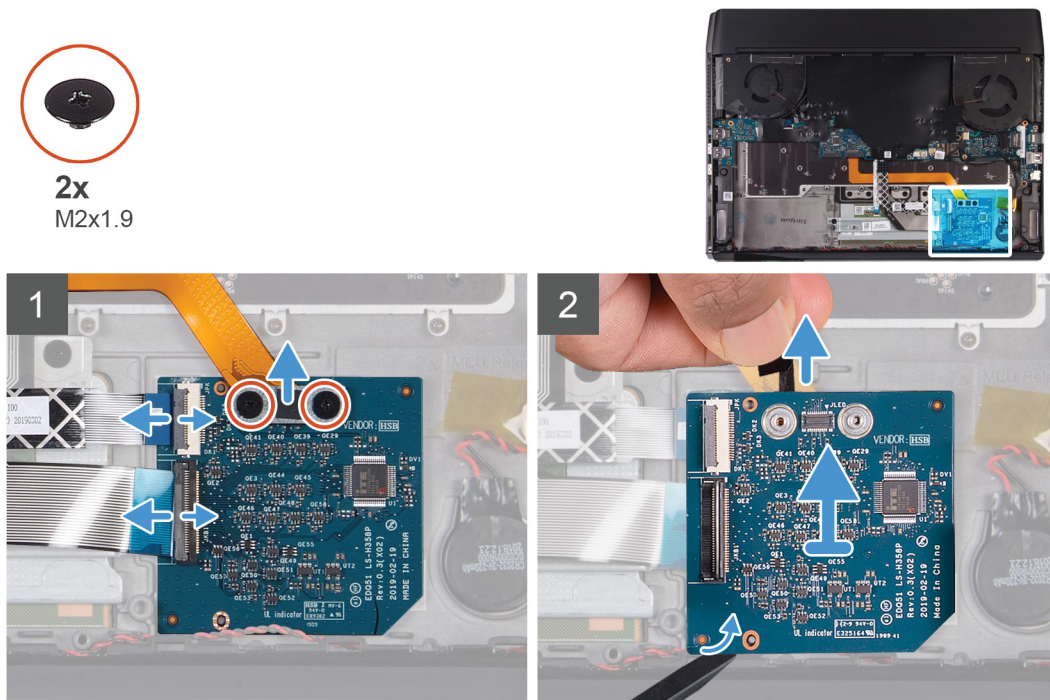
### Removing the keyboard-controller board

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [2230 solid-state drive](#). (If applicable)
4. Remove the [2280 solid-state drive](#). (If applicable)
5. Remove the [battery](#).

#### About this task

The following image indicates the location of the keyboard-controller board and provides a visual representation of the removal procedure.



#### Steps

1. Remove the two screws (M2x1.9) that secure the keyboard-backlight cable to the keyboard-controller board.
2. Disconnect the keyboard-backlight cable from the keyboard-controller board.
3. Open the latch and disconnect the keyboard-controller board cable from the keyboard-controller board.
4. Open the latch and disconnect the keyboard cable from the keyboard-controller board.
5. Pull on the securing tab to release the keyboard-controls board from the palm-rest assembly.

6. Using the plastic tab, pry and remove the keyboard-controller board from the palm-rest assembly.

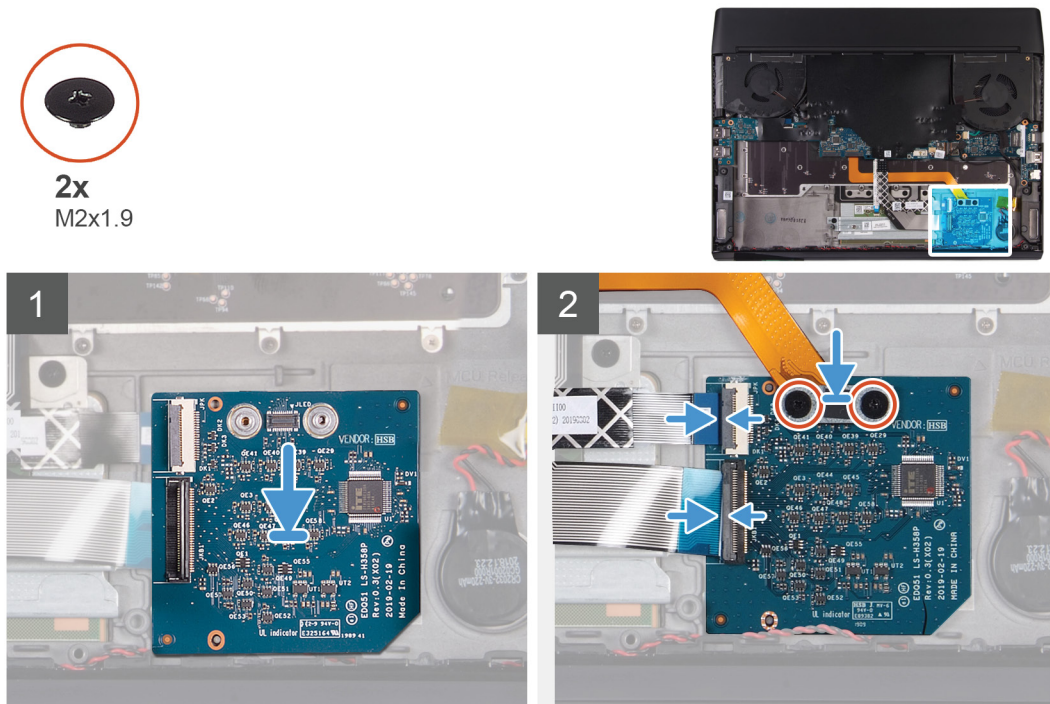
## Installing the keyboard-controller board

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of the keyboard-controller board and provides a visual representation of the installation procedure.



### Steps

1. Using the alignment posts, adhere the keyboard-controller board into place on the palm-rest assembly.
2. Connect the keyboard-controller board-cable to the keyboard-controller board and close the connector latch.
3. Connect the keyboard cable to the keyboard-controller board and close the connector latch.
4. Connect the keyboard-backlight cable to the keyboard-controller board.
5. Replace the two screws (M2x1.9) that secure the keyboard-backlight cable to the keyboard-controller board.

### Next steps

1. Install the [battery](#).
2. Install the [2230 solid-state drive](#), (if applicable)
3. Install the [2280 solid-state drive](#), (if applicable)
4. Install the [base cover](#).
5. Follow the procedure in [After working inside your computer](#).

# Left I/O-board

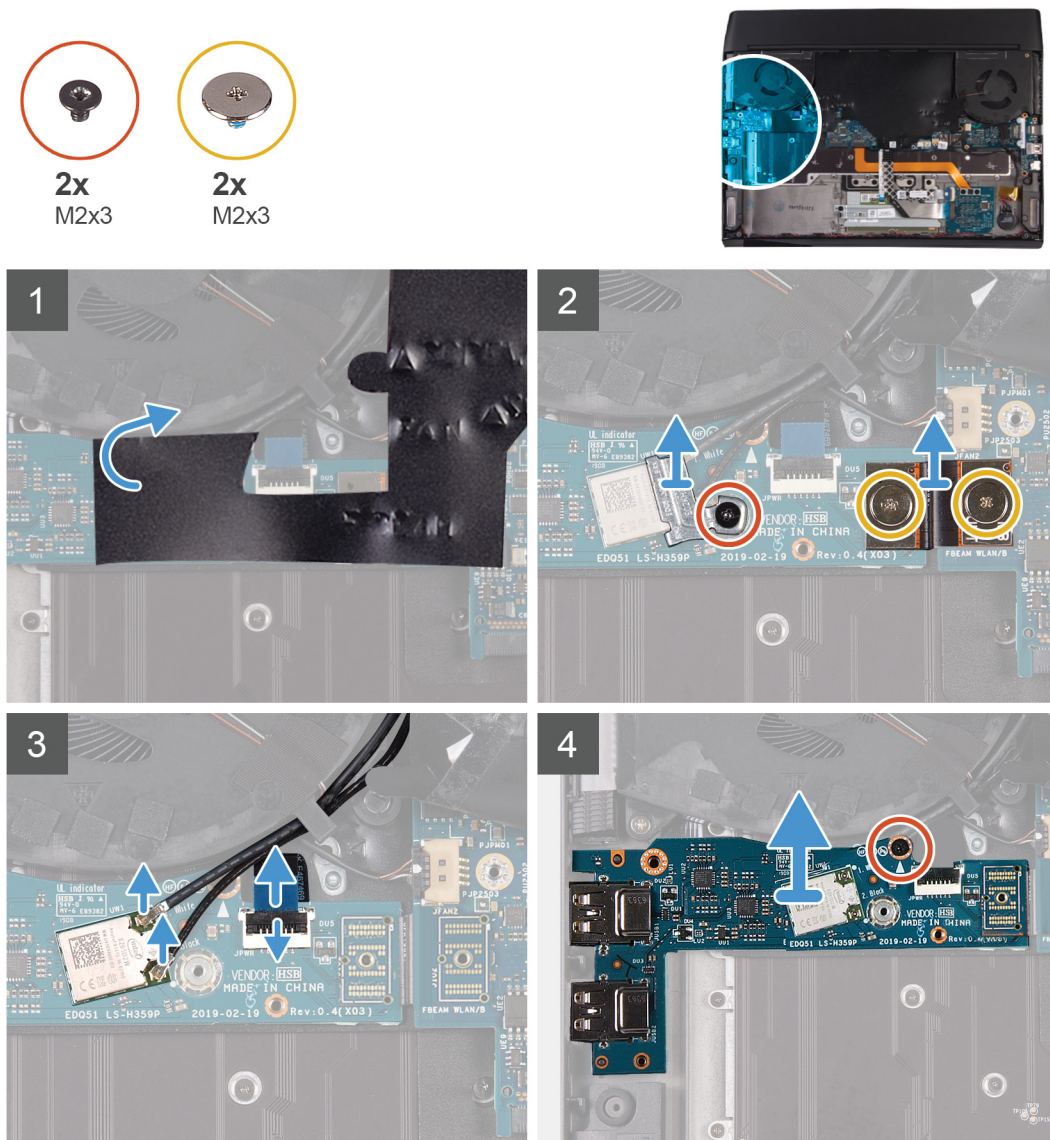
## Removing the left I/O-board

### Prerequisites

1. Follow the procedure in [Before working inside your computer.](#)
2. Remove the [base cover.](#)
3. Remove the [2230 solid-state drive.](#) (if applicable)
4. Remove the [2280 solid-state drive.](#) (if applicable)
5. Remove the [battery.](#)

### About this task

The following image indicates the location of the left I/O-board and provides a visual representation of the removal procedure.



### Steps

1. Peel the Mylar covering the system board.
2. Remove the screw (M2x3) that secures the wireless-card bracket to the left I/O-board.
3. Lift the wireless-card bracket off the left I/O-board.



4. Remove the two screws (M2x3) that secure the left I/O-board cable connecting the left I/O-board and the system board.
5. Lift the left I/O-board cable from the left I/O-board and the system board.
6. Disconnect the antenna cables from the wireless card.
7. Lift the latch and disconnect the power-button assembly-cable from the left I/O-board.
8. Remove the screw (M2x3) that secures the left I/O-board to the palm-rest assembly.
9. Lift the left I/O-board off the palm-rest assembly.

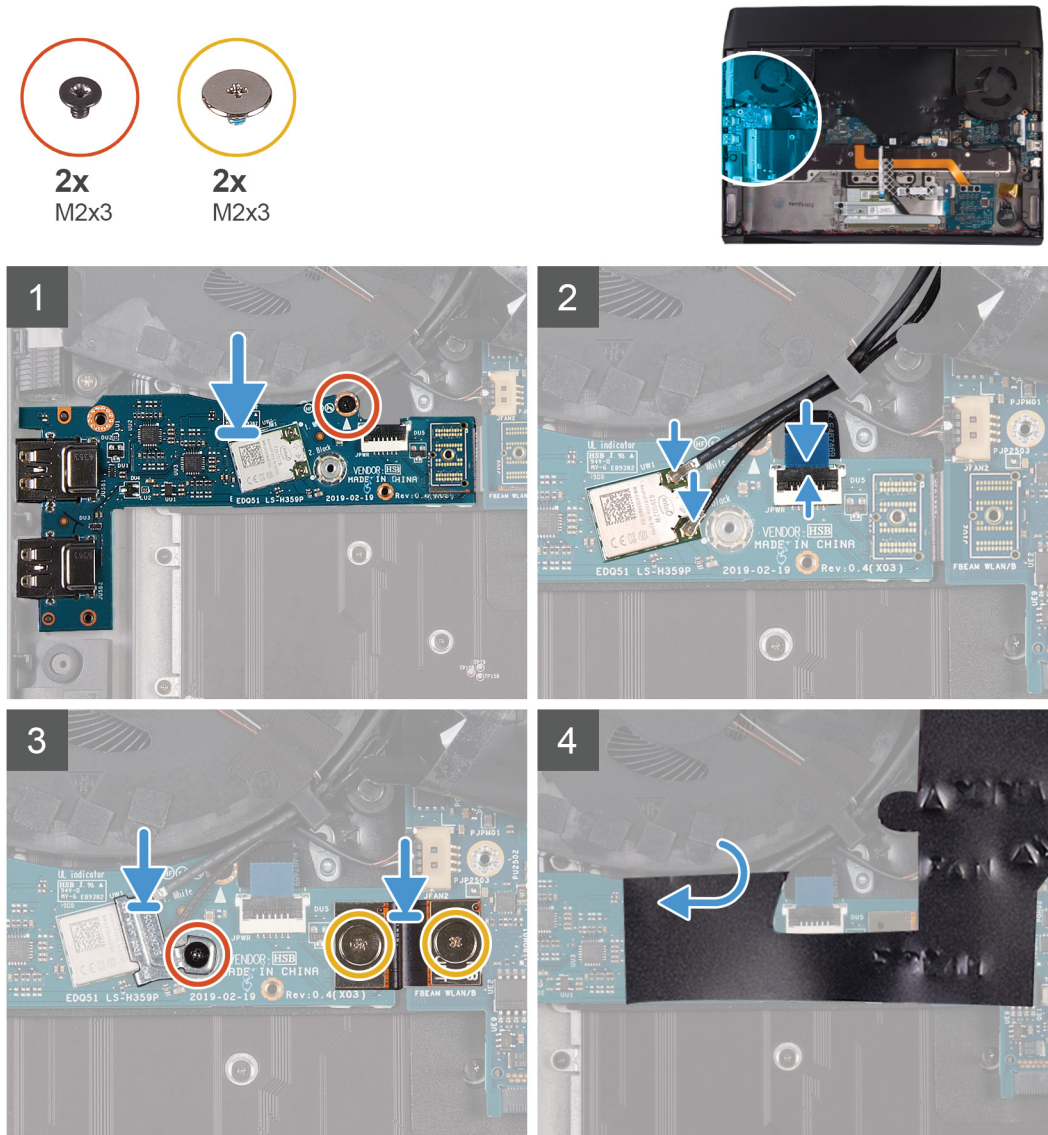
## Installing the left I/O-board

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of the left I/O-board and provides a visual representation of the installation procedure.



### Steps

1. Using the alignment post, place the left I/O-board on the palm-rest assembly.
2. Replace the screw (M2x3) that secures the left I/O-board to the palm-rest assembly.

3. Connect the power-button assembly-cable to the left I/O-board and close the latch.
4. Connect the antenna cables to the wireless card.

The following table provides the antenna-cable color scheme for the wireless card supported by your computer.

**Table 3. Antenna-cable color scheme**

Connectors on the wireless card	Antenna-cable color
Main (white triangle)	White
Auxiliary (black triangle)	Black

5. Using the alignment pins, connect the left I/O-board cable on the left I/O-board and the system board.
 

**NOTE:** The I/O-board cable is polarity sensitive. To prevent damage to your computer ensure that the MB UMT end of the cable is connected to the system board.
6. Replace the two screws (M2x3) that secure the left I/O-board cable to the left I/O-board and the system board.
7. Place the wireless-card bracket on the wireless card .
8. Replace the screw (M2x3) that secures the wireless-card bracket to the left I/O-board.
9. Adhere the Mylar over the system board and left I/O-board.

#### Next steps

1. Install the [battery](#).
2. Install the [2230 solid-state drive](#). (if applicable)
3. Install the [2280 solid-state drive](#). (if applicable)
4. Install the [base cover](#).
5. Follow the procedure in [After working inside your computer](#).

## Right I/O-board

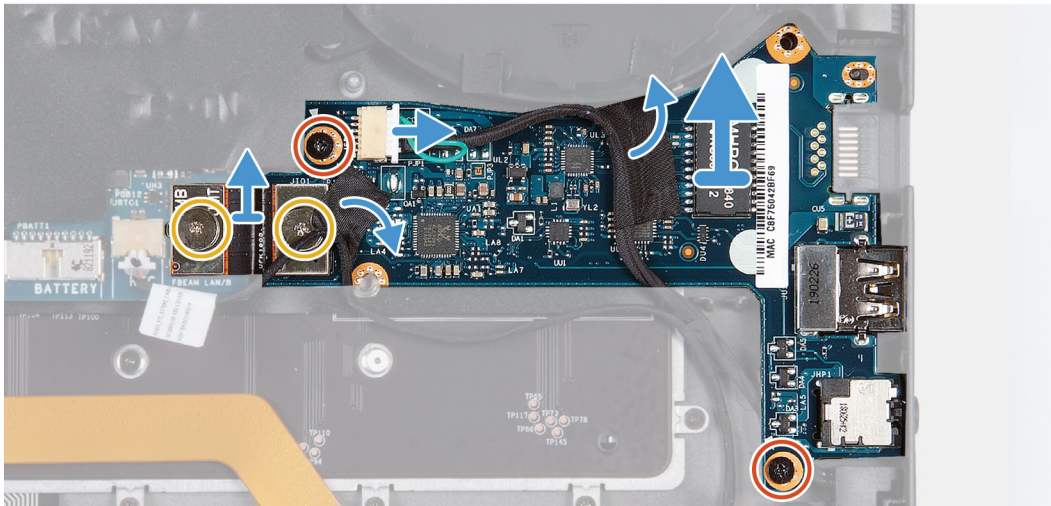
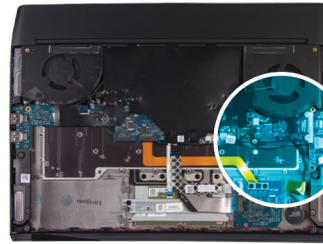
### Removing the right I/O-board

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [2230 solid-state drive](#). (if applicable)
4. Remove the [2280 solid-state drive](#). (if applicable)
5. Remove the [battery](#).

#### About this task

The following image indicates the location of the right I/O-board and provides a visual representation of the removal procedure.



## Steps

1. Remove the two screws (M2x3) that secure the right I/O-board cable connecting the right I/O-board and the system board.
2. Lift the right I/O-board cable off the right I/O-board and system board.
3. Disconnect the speaker cable from the right I/O-board.
4. Peel the tape securing the coin-cell battery cable to the right I/O-board.
5. Remove the two screws (M2x3) that secure the right I/O-board to the palm-rest assembly.
6. Lift the right I/O-board off the palm-rest assembly.

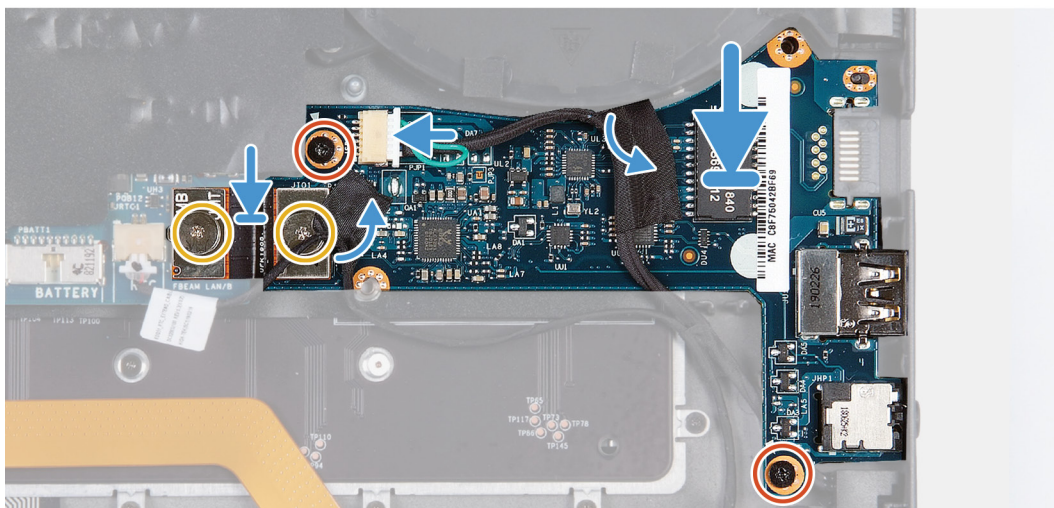
## Installing the right I/O-board

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of the right I/O-board and provides a visual representation of the installation procedure.



## Steps

1. Using the alignment posts, place the right I/O-board in place on the palm-rest assembly.
  2. Replace the two screws (M2x3) that secure the right I/O-board to the palm-rest assembly.
  3. Connect the speaker cable to the connector on the right I/O-board.
  4. Using the alignment pins, connect the right I/O-board cable on the right I/O-board and the system board.
- NOTE:** The I/O-board cable is polarity sensitive. To prevent damage to your computer ensure that the MB UMT end of the cable is connected to the system board.
5. Replace the two screws (M2x3) that secure the right I/O-board cable to the right I/O-board and system board.
  6. Adhere the tape securing the coin-cell battery cable to the right I/O-board.

## Next steps

1. Install the [battery](#).
2. Install the [2230 solid-state drive](#). (if applicable)
3. Install the [2280 solid-state drive](#). (if applicable)
4. Install the [base cover](#).
5. Follow the procedure in [After working inside your computer](#).

# Speakers

## Removing the speakers

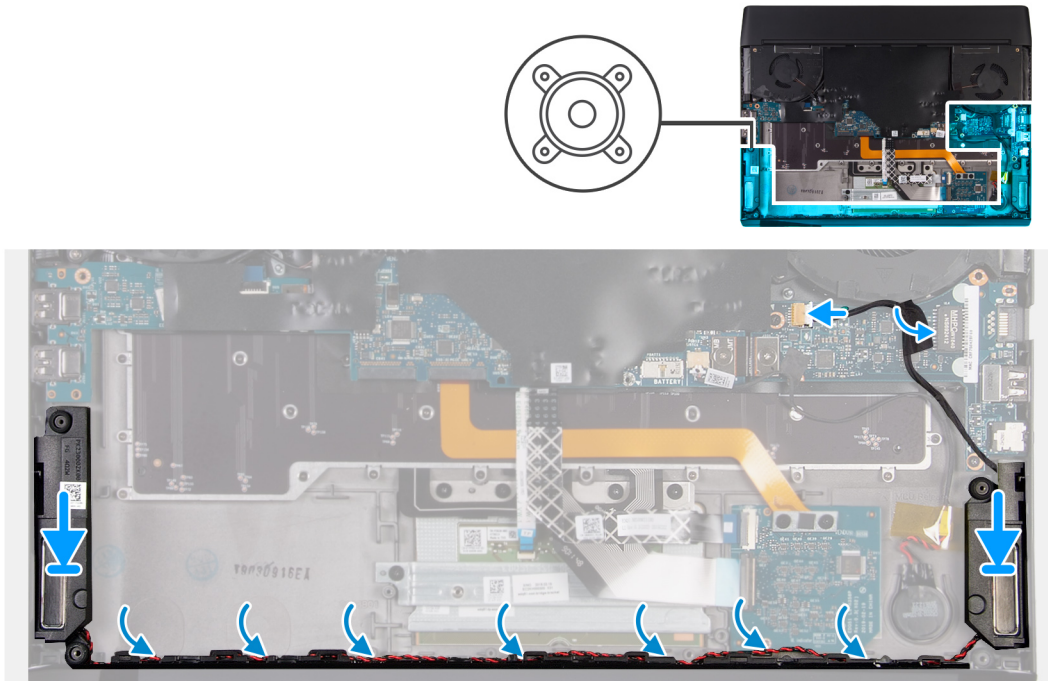
### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [2230 solid-state drive](#). (if applicable)
4. Remove the [2280 solid-state drive](#). (if applicable)
5. Remove the [battery](#).



### About this task

The following image indicates the location of the speakers and provides a visual representation of the removal procedure.



### Steps

1. Disconnect the speaker cable from the right I/O-board.
2. Lift the right speaker off the palm-rest assembly.
3. Remove the speaker cables from the routing guides on the palm-rest assembly.
4. Lift the left speaker off the palm-rest assembly.

## Installing the speakers

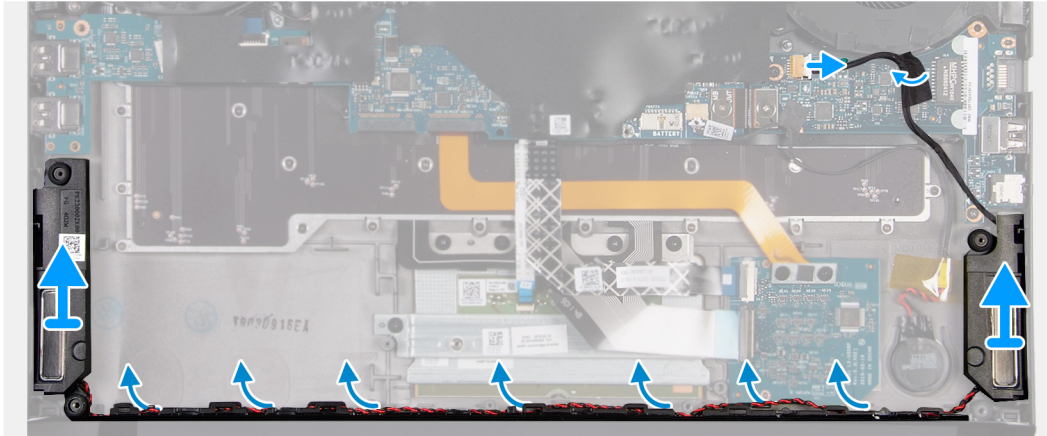
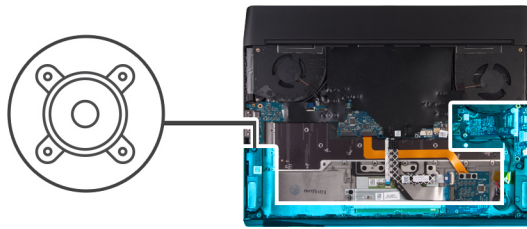
### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of the speakers and provides a visual representation of the installation procedure.





### Steps

1. Using the alignment posts, place the left speaker on the palm-rest assembly.  
 ⓘ **NOTE: Ensure that the alignment posts are threaded through the rubber grommets on the speaker.**
2. Route the speaker cable through the routing guides on the palm-rest assembly.
3. Using the alignment posts, place the right speaker on the palm-rest assembly.  
 ⓘ **NOTE: Ensure that the alignment posts are threaded through the rubber grommets on the speaker.**
4. Connect the speaker cable to the right I/O-board.

### Next steps

1. Install the [battery](#).
2. Install the [2230 solid-state drive](#). (if applicable)
3. Install the [2280 solid-state drive](#). (if applicable)
4. Install the [base cover](#).
5. Follow the procedure in [After working inside your computer](#).

## System board

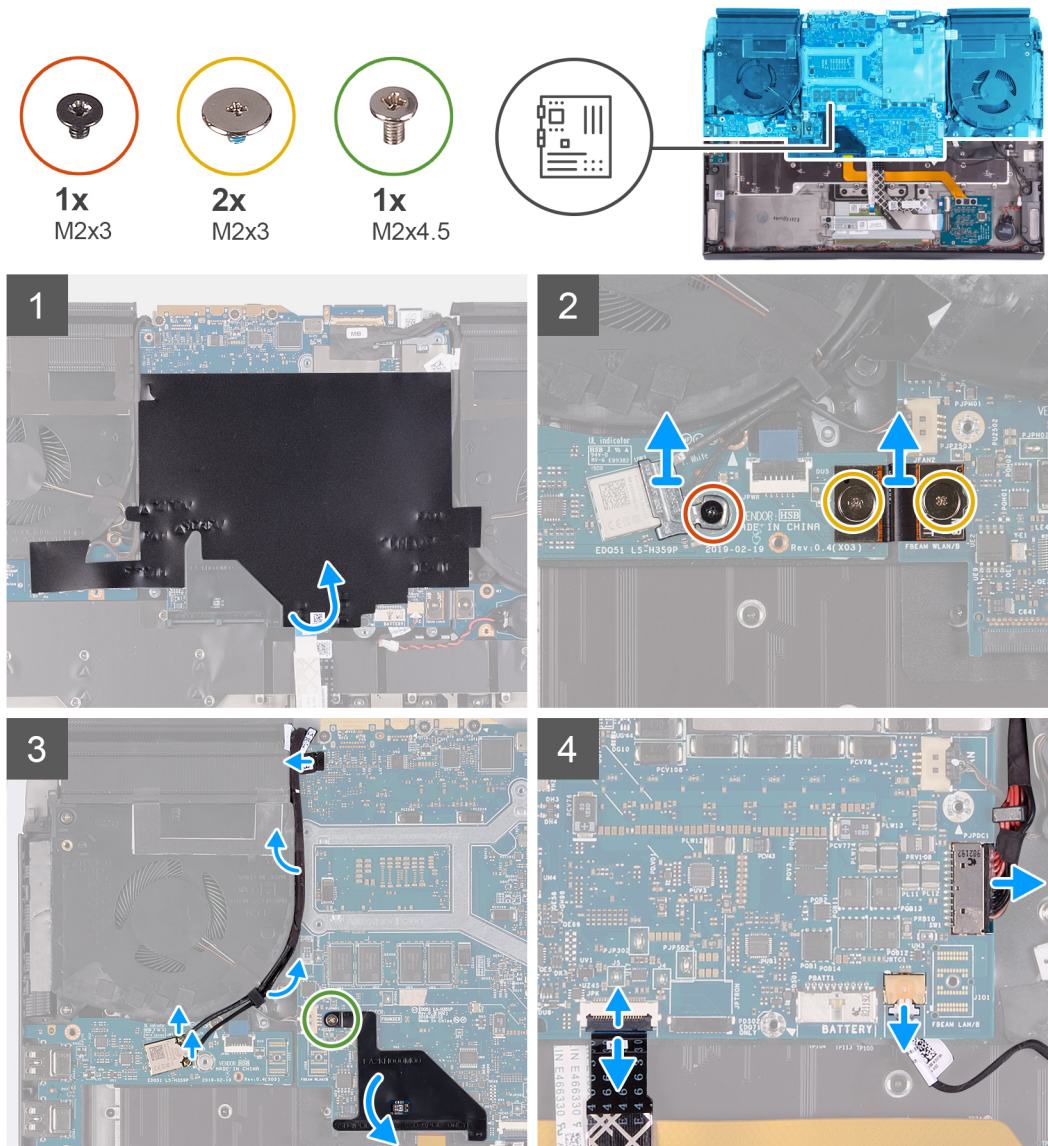
### Removing the system board

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [2230 solid-state drive](#). (if applicable)
4. Remove the [2280 solid-state drive](#). (if applicable)
5. Remove the [rear I/O-cover](#).
6. Remove the [battery](#).
7. Remove the [right I/O-board](#).

## About this task

The following image indicates the location of the system board and provides a visual representation of the removal procedure.

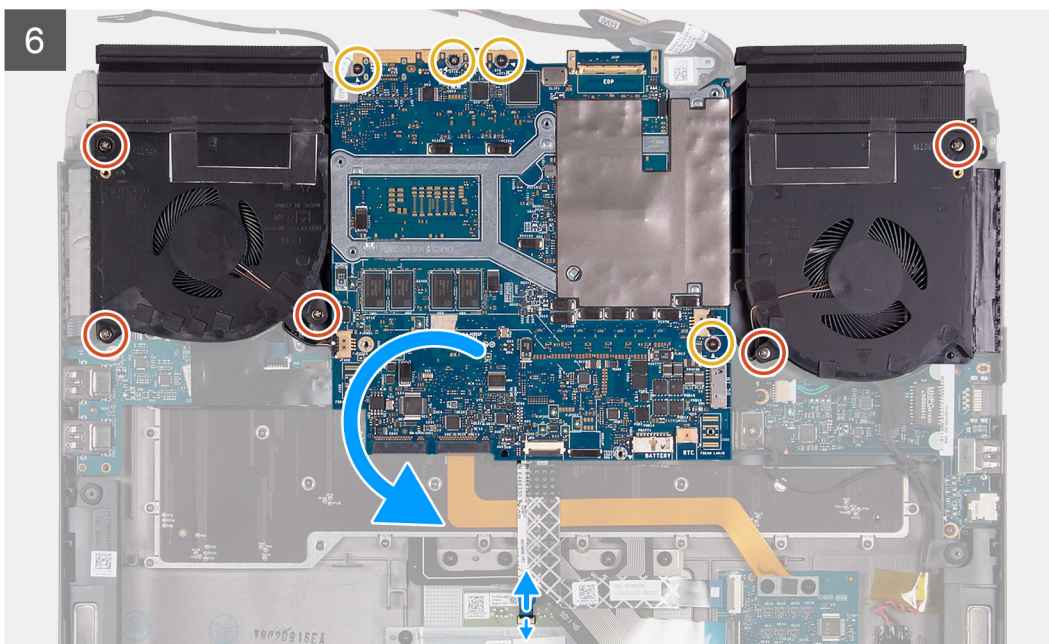
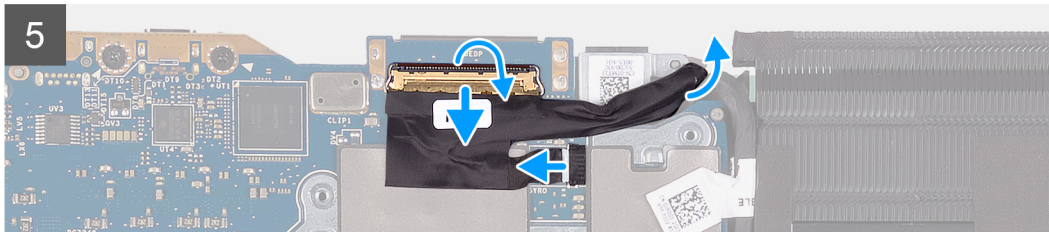




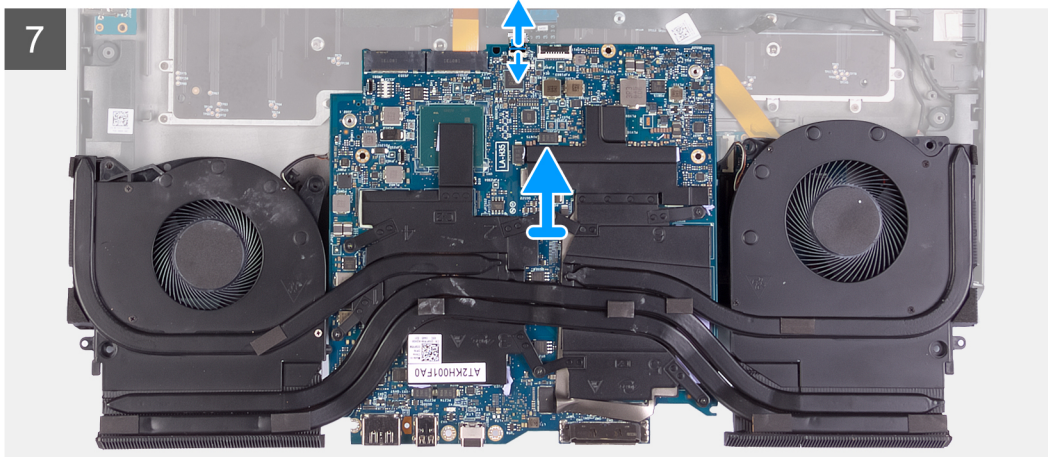
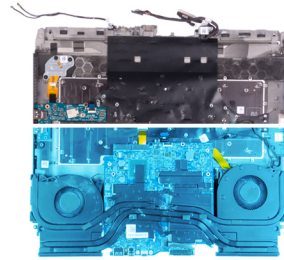
**5x**  
M2.5x5



**4x**  
M2x3







## Steps

1. Peel the Mylar covering the system board.
2. Remove the screw (M2x3) that secures the wireless card bracket to the left I/O-board.
3. Lift the wireless-card bracket off the left I/O-board.
4. Disconnect the antenna cables from the wireless card.
5. Remove the two screws (M2x3) that secure the left I/O-board cable to the left I/O-board and the system board.
6. Lift the left I/O-board cable off the left I/O-board and the system board.
7. Peel the tapes securing the antenna cables to system board and left fan.
8. Remove the screw (M2x4.5) that secures the M.2 connector shield to the system board.
9. Remove the M.2 connector shield from the system board.
10. Disconnect the power-adapter port cable from the system board.
11. Disconnect the coin-cell battery cable from the system board.
12. Lift the latch and disconnect the keyboard-controller board-cable from the system board.
13. Lift the latch and disconnect the display cable from the connector on the system board.
14. Disconnect the G-sensor cable from the connector on the system board.
15. Disconnect the Tobii eye tracker cable from the connector on the system board.

**NOTE:** This step is only applicable to computers shipped with a Tobii eye tracker.

16. Lift the latch and disconnect the touchpad cable from the touchpad.
17. Remove the five (M2.5x5) screws that secure the fans to the palm-rest assembly.
18. Remove the four (M2x3) screws that secure the system board to the palm-rest assembly.
19. Lift the system board from the palm-rest assembly and turn the system board over.
20. Lift the latch and disconnect the touchpad cable from the system board.
21. Remove the [fan and heat-sink assembly](#).

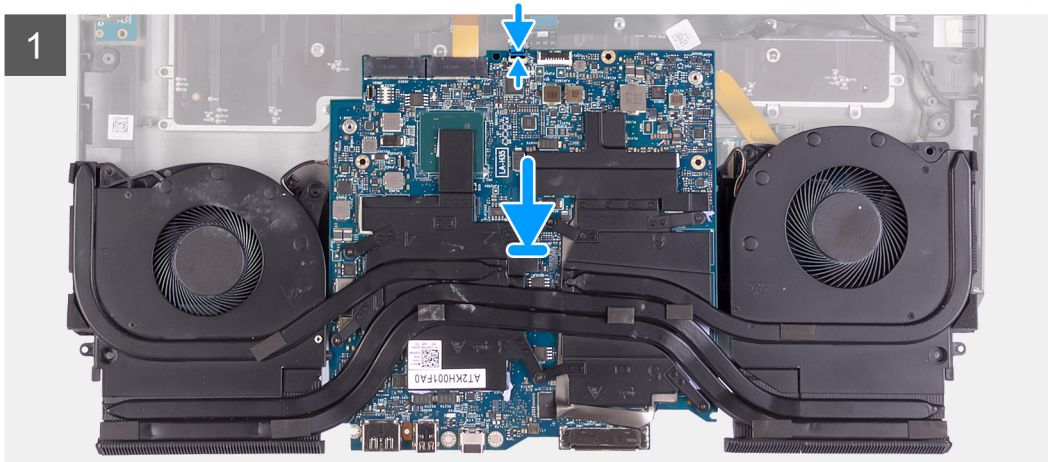
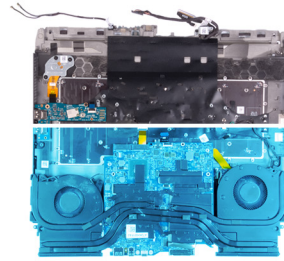
## Installing the system board

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of the system board and provides a visual representation of the removal procedure.



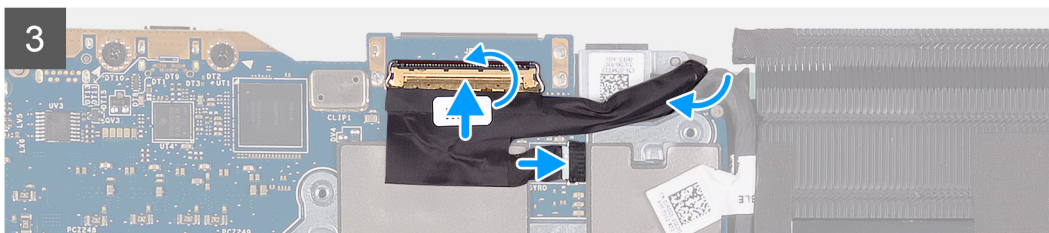
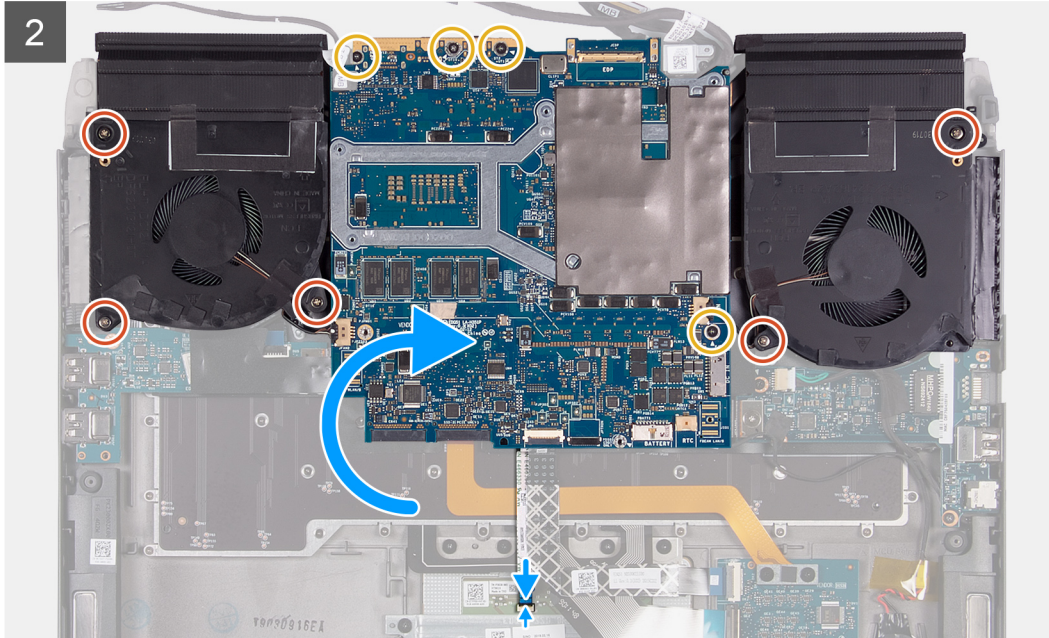


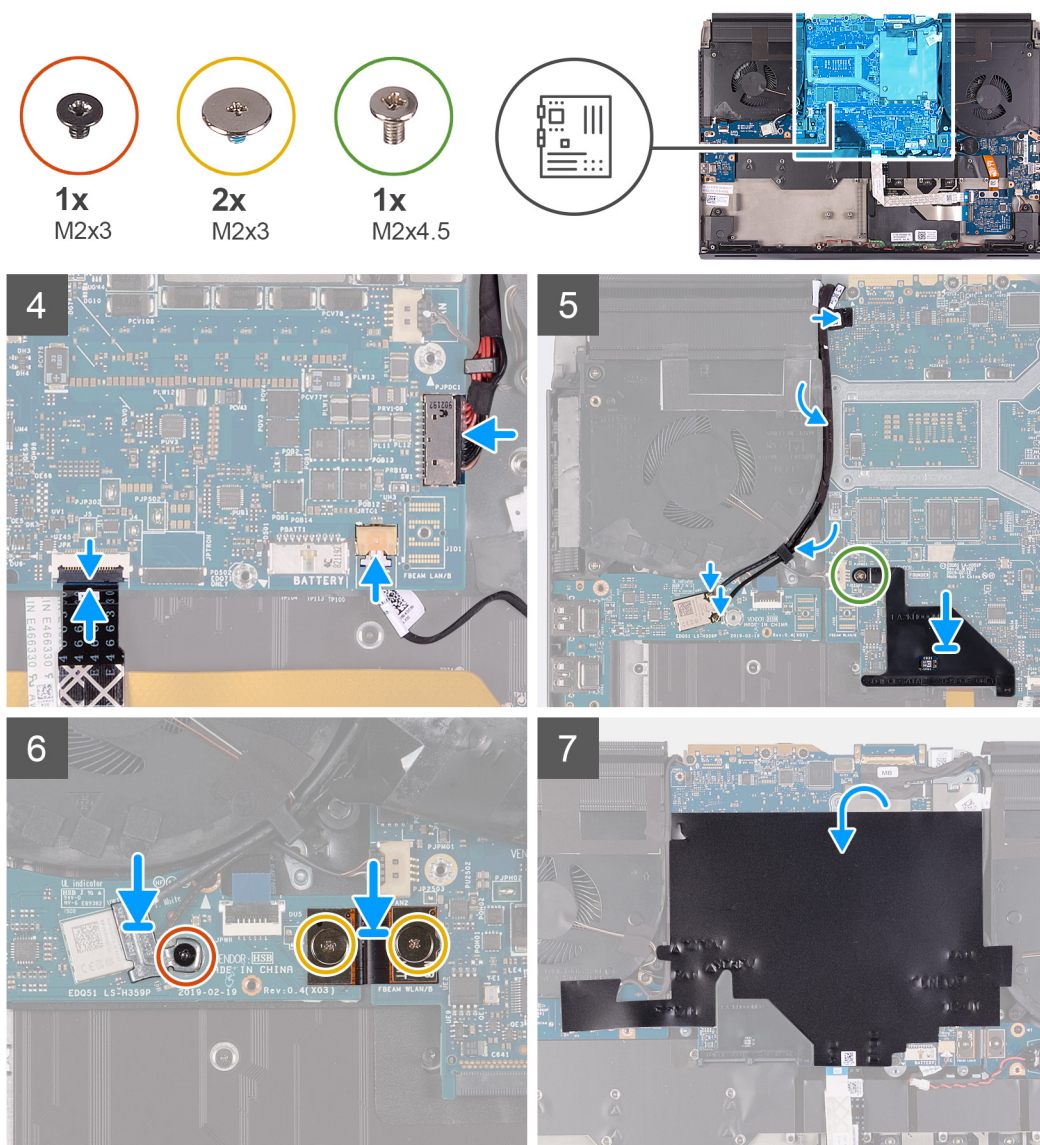


5x  
M2.5x5



4x  
M2x3





## Steps

1. Install the [fan and heat-sink assembly](#).
  2. Connect the touchpad cable to the system board and close the latch.
  3. Turn the system board over and place the system board on the palm-rest assembly.
  4. Replace the five (M2.5x5) screws that secure the fans to the palm-rest assembly.
  5. Replace the four (M2x3) screws that secure the system board to the palm-rest assembly.
  6. Connect the touchpad cable to the touchpad and close the latch.
  7. Connect the Tobii eye tracker cable to the connector on the system board.
- NOTE:** This step is only applicable to computers shipped with a Tobii eye tracker.
8. Connect the G-sensor cable to the connector on the system board.
  9. Connect the display cable to the connector on the system board and close the latch.
  10. Connect the keyboard-controller board-cable to the system board and close the latch.
  11. Connect the coin-cell battery cable to the system board.
  12. Connect the power-adapter port cable to the system board.
  13. Using the tab on the M.2 connector shield and the slot on the system board, align the screw hole of the M.2 connector shield with the screw hole on the system board.
  14. Replace the screw (M2x4.5) that secures the M.2 connector shield to the system board.
  15. Using the alignment pins, connect the left I/O-board cable to the left I/O-board and the system board.

**NOTE:** The I/O-board cable is polarity sensitive. To prevent damage to your computer ensure that the MB UMT end of the cable is connected to the system board.

16. Replace the two screws (M2x3) that secure the left I/O-board cable to the left I/O-board and the system board.
17. Route the antenna cables to the routing guides on the left fan and system board.
18. Adhere the tapes that secure the antenna cables to system board and left fan.
19. Connect the antenna cables to the wireless card.

The following table provides the antenna-cable color scheme for the wireless card supported by your computer.

**Table 4. Antenna-cable color scheme**

Connectors on the wireless card	Antenna-cable color
Main (white triangle)	White
Auxiliary (black triangle)	Black

20. Place the wireless card bracket on the wireless card.
21. Replace the screw (M2x3) that secures the wireless card bracket to the left I/O-board.
22. Adhere the Mylar over the system board.

#### Next steps

1. Install the [right I/O-board](#).
2. Install the [battery](#).
3. Install the [rear I/O-cover](#).
4. Install the [2230 solid-state drive](#). (if applicable)
5. Install the [2280 solid-state drive](#). (if applicable)
6. Install the [base cover](#).
7. Follow the procedure in [After working inside your computer](#).

## Fan and heat-sink assembly

### Removing the fan and heat-sink assembly

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [2230 solid-state drive](#). (if applicable)
4. Remove the [2280 solid-state drive](#). (if applicable)
5. Remove the [rear I/O-cover](#).
6. Remove the [battery](#).
7. Remove the [right I/O-board](#).
8. Remove the [system board](#).

#### About this task

**NOTE:** The heat sink may become hot during normal operation. Allow sufficient time for the heat sink to cool before you touch it.

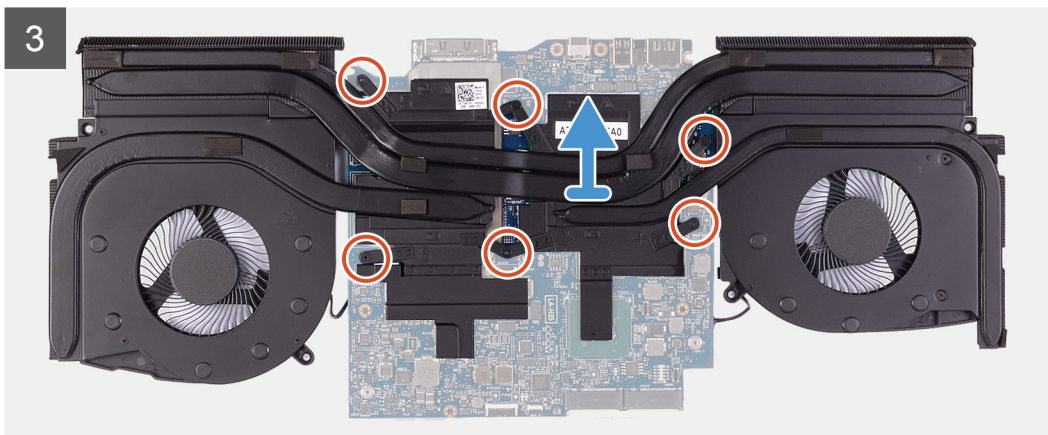
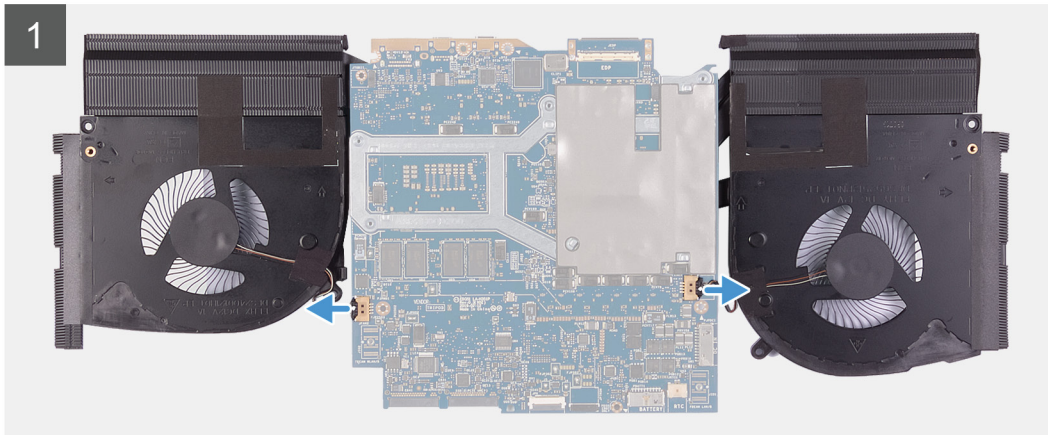
**CAUTION:** For maximum cooling of the processor, do not touch the heat transfer areas on the heat sink. The oils in your skin can reduce the heat transfer capability of the thermal grease.

The following image indicates the location of the fan and heat-sink assembly and provides a visual representation of the removal procedure.





**6x**  
M2x4



### Steps

1. Disconnect the left and right fan cables from the system board.
2. In the reverse sequential order (6>5>4>3>2>1) remove the six screws (M2x3) that secure the fan and heat-sink assembly to the system board.
3. Lift the fan and heat-sink assembly from the system board.





## Installing the fan and heat-sink assembly

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

**CAUTION:** If either the processor or the heat sink is replaced, use the thermal grease provided in the kit to ensure that thermal conductivity is achieved.

### About this task

The following image indicates the location of the fan and heat-sink assembly and provides a visual representation of the installation procedure.



**6x**  
M2x4



### Steps

1. Place the fan and heat-sink assembly on the system board.
2. In sequential order (1>2>3>4>5>6) replace the six screws (M2x3) that secure the fan and heat-sink assembly to the system board.
3. Connect the left and right fan cables to the system board.

## Next steps

1. Install the [system board](#).
2. Install the [right I/O-board](#).
3. Install the [battery](#).
4. Install the [rear I/O-cover](#).
5. Install the [2230 solid-state drive](#). (if applicable)
6. Install the [2280 solid-state drive](#). (if applicable)
7. Install the [base cover](#).
8. Follow the procedure in [After working inside your computer](#).

# Touchpad

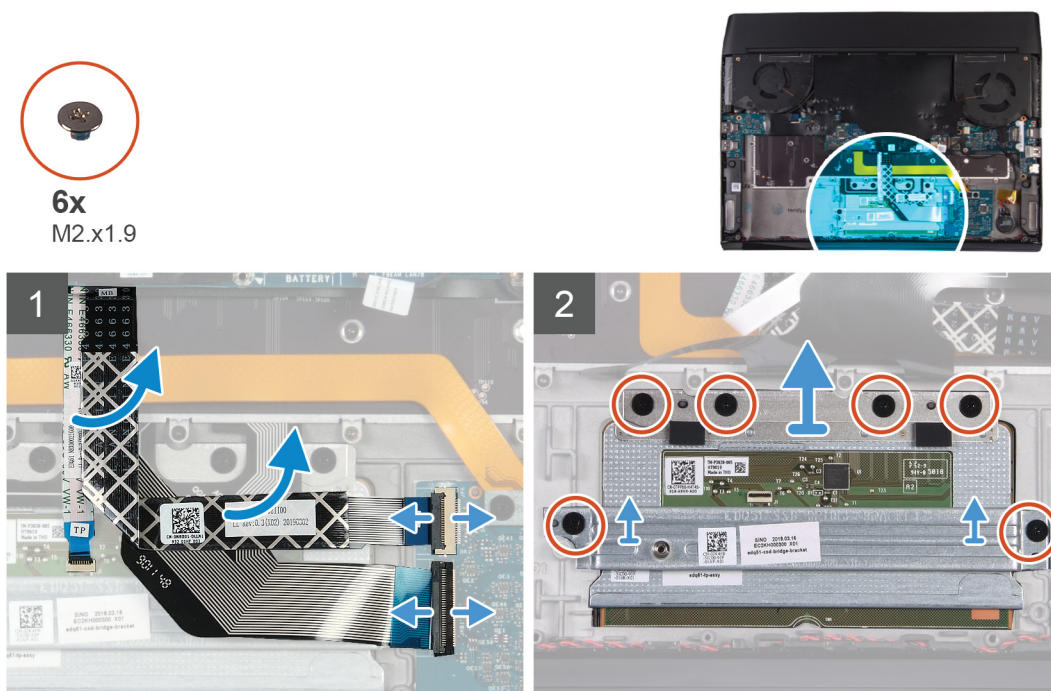
## Removing the touchpad

### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [2230 solid-state drive](#). (if applicable)
4. Remove the [2280 solid-state drive](#). (if applicable)
5. Remove the [rear I/O-cover](#).
6. Remove the [battery](#).
7. Remove the [right I/O-board](#). (only applicable when the touchpad cable needs to be removed)
8. Remove the [system board](#). (only applicable when the touchpad cable needs to be removed)

### About this task

The following image indicates the location of the touchpad and provides a visual representation of the removal procedure.



## Steps

1. Open the latch and disconnect the keyboard-controller board-cable from keyboard-controller board.
2. Lift the keyboard-controller board-cable off the palm-rest assembly.
3. Open the latch and disconnect the keyboard cable from the keyboard-controller board.

4. Fold up the keyboard cable.
5. Open the latch and disconnect the touchpad cable from the touchpad.
6. Lift the touchpad cable from the palm-rest assembly.
7. Remove the two (M2x1.9) screws that secure the solid-state drive support bracket to the palm-rest assembly.
8. Lift the solid-state drive support bracket off the palm-rest assembly.
9. Remove the four (M2x1.9) screws that secure the touchpad to the palm-rest assembly.
10. Lift the touchpad off the palm-rest assembly.

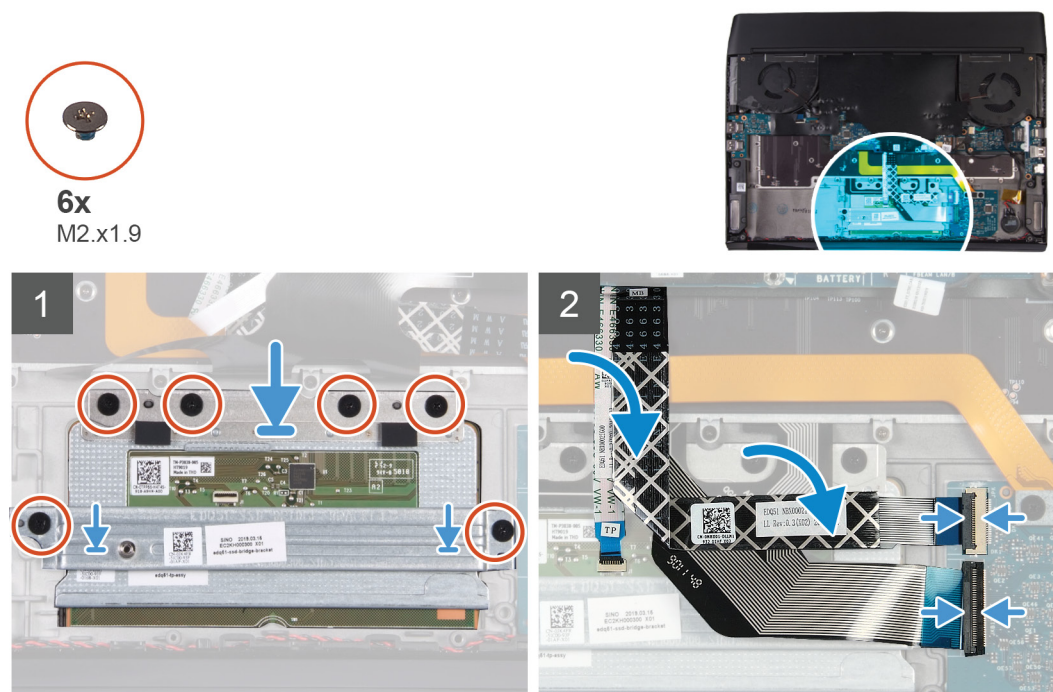
## Installing the touchpad

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of the touchpad and provides a visual representation of the installation procedure.



### Steps

1. Place the touchpad into the slot on the palm-rest assembly.
  - NOTE:** Turn the computer over and open the display. Ensure that the touchpad is equally aligned along all four sides.
2. Replace the four (M2x1.9) screws that secure the touchpad to the palm-rest assembly.
3. Place the solid-state drive support bracket on the palm-rest assembly.
4. Replace the two (M2x1.9) screws that secure the solid-state drive support bracket to the palm-rest assembly.
5. Connect the touchpad cable to the touchpad and close the latch.
  - NOTE:** This step is only applicable when the touchpad cable is not being replaced.
6. Fold down the keyboard cable.
7. Connect the keyboard cable to the keyboard-controller board and close the latch.
8. Connect the keyboard-controller board cable to the keyboard-controller board and close the latch.

### Next steps

1. Install the [system board](#). (only applicable when the touchpad cable has been replaced)
2. Install the [right I/O-board](#). (only applicable when the touchpad cable has been replaced)
3. Install the [battery](#).
4. Install the [rear I/O-cover](#).
5. Install the [2230 solid-state drive](#). (if applicable)
6. Install the [2280 solid-state drive](#). (if applicable)
7. Install the [base cover](#).
8. Follow the procedure in [After working inside your computer](#).

## Power-adapter port

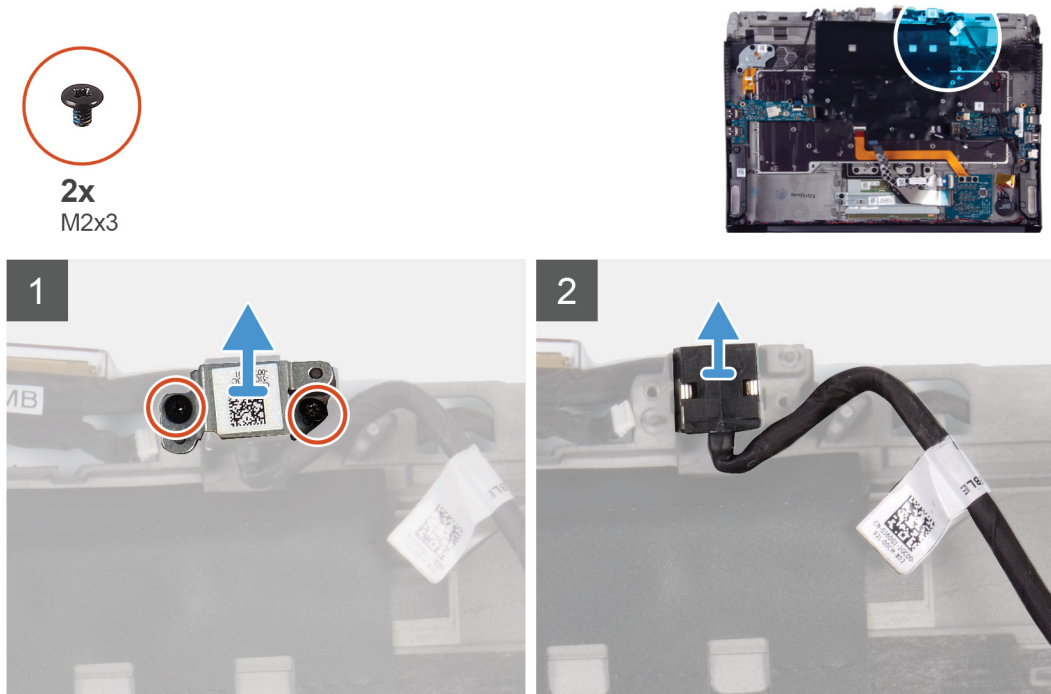
### Removing the power-adapter port

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [2230 solid-state drive](#). (if applicable)
4. Remove the [2280 solid-state drive](#). (if applicable)
5. Remove the [rear I/O-cover](#).
6. Remove the [battery](#).
7. Remove the [right I/O-board](#).
8. Remove the [system board](#).

#### About this task

The following image indicates the location of the power-adapter port and provides a visual representation of the removal procedure.



#### Steps

1. Remove the two screws (M2x3) that secure the power-adapter port bracket to the palm-rest assembly.
2. Lift the power-adapter port bracket off the palm-rest assembly.
3. Lift the power-adapter port along with its cable off the palm-rest assembly.



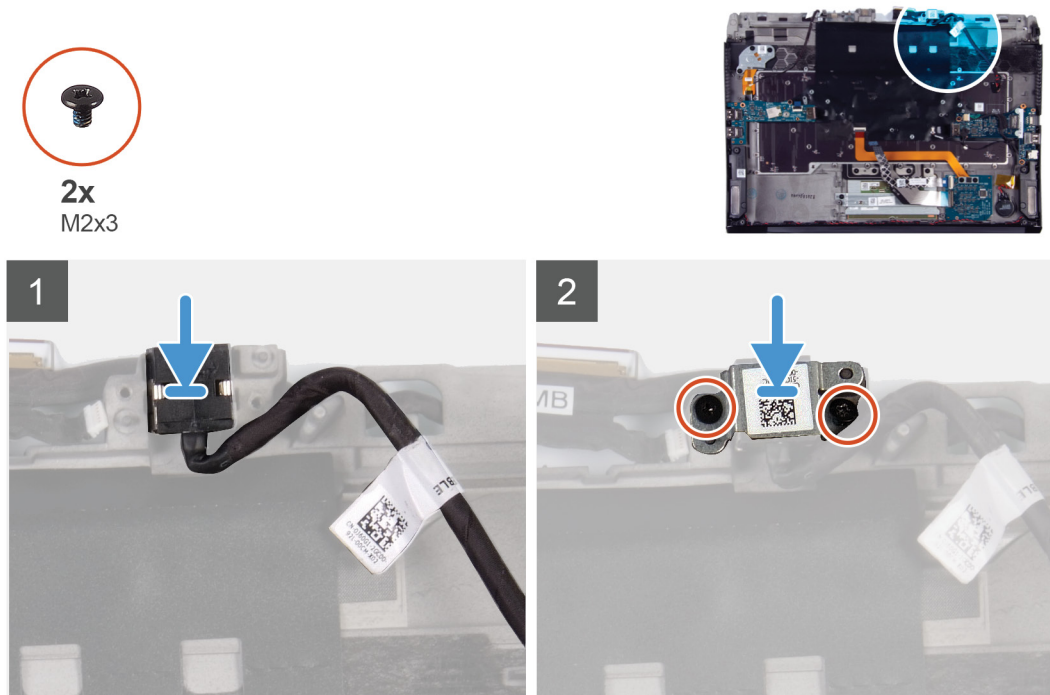
## Installing the power-adapter port

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of the power-adapter port and provides a visual representation of the installation procedure.



### Steps

1. Place the power-adapter port into the slot on the palm-rest assembly.
2. Place the power-adapter port bracket on the power-adapter port.
3. Replace the two screws (M2x3) that secure the power-adapter port bracket to the palm-rest assembly.

### Next steps

1. Install the [system board](#).
2. Install the [right I/O-board](#).
3. Install the [battery](#).
4. Install the [rear I/O-cover](#).
5. Install the [2230 solid-state drive](#), (if applicable)
6. Install the [2280 solid-state drive](#), (if applicable)
7. Install the [base cover](#).
8. Follow the procedure in [After working inside your computer](#).

## Power-button assembly

### Removing the power-button assembly

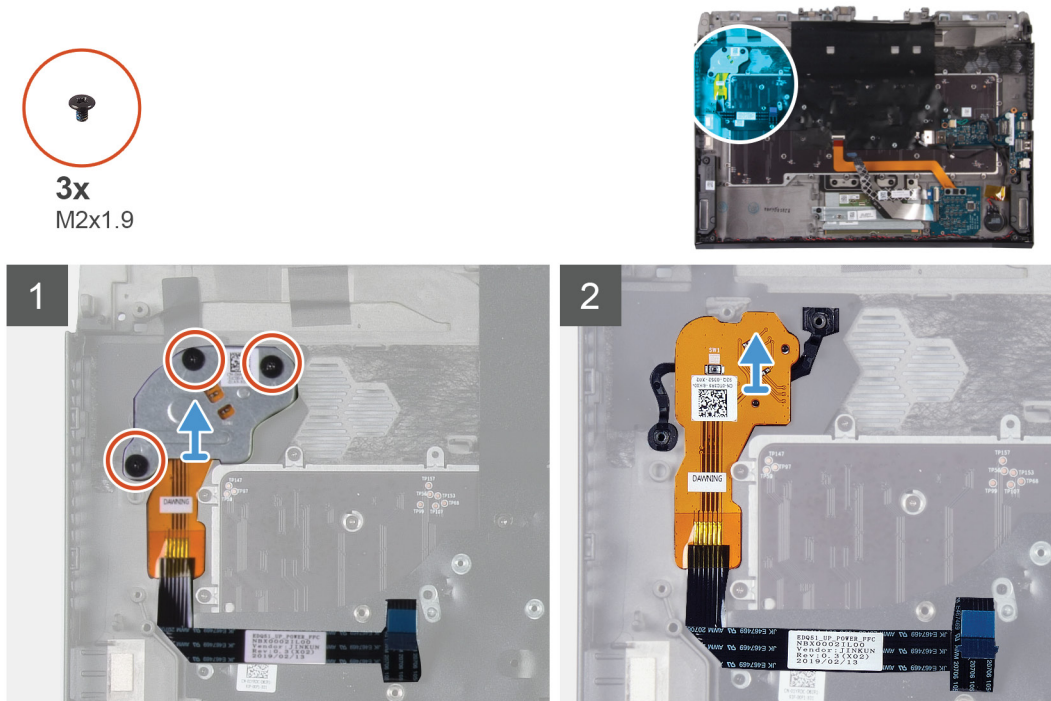
#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).

2. Remove the [base cover](#).
3. Remove the [2230 solid-state drive](#). (if applicable)
4. Remove the [2280 solid-state drive](#). (if applicable)
5. Remove the [rear I/O-cover](#).
6. Remove the [battery](#).
7. Remove the [left I/O-board](#).
8. Remove the [right I/O-board](#).
9. Remove the [system board](#).

### About this task

The following image indicates the location of the power-button assembly and provides a visual representation of the removal procedure.



### Steps

1. Remove the three (M2x1.9) screws that secure the power-button bracket to the palm-rest assembly.
2. Lift the power-button bracket off the power-button assembly.
3. Peel the power-button assembly and its cable off the palm-rest assembly.

## Installing the power-button assembly

### Prerequisites

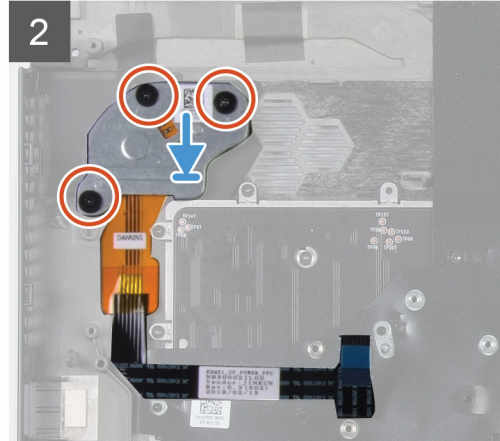
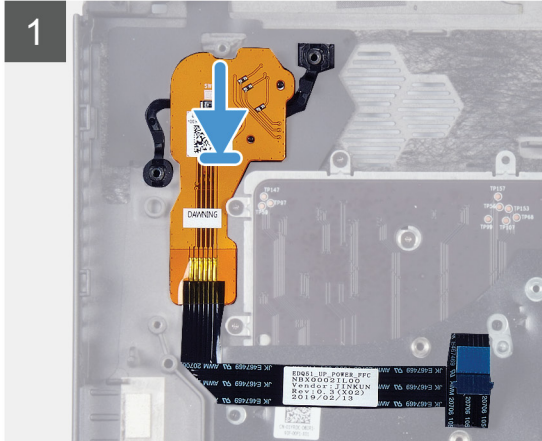
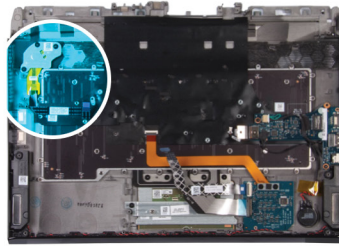
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of the power-button assembly and provides a visual representation of the installation procedure.



**3x**  
M2x1.9



## Steps

1. Place the power-button assembly and its cable in the slot on the palm-rest assembly.
2. Place the power-button bracket on the power-button assembly.
3. Replace the three (M2x1.9) screws that secure the power-button bracket to the palm-rest assembly.
4. Adhere the power-button assembly cable on the palm-rest assembly.

## Next steps

1. Install the [system board](#).
2. Install the [right I/O-board](#).
3. Install the [left I/O-board](#).
4. Install the [battery](#).
5. Install the [rear I/O-cover](#).
6. Install the [2230 solid-state drive](#). (if applicable)
7. Install the [2280 solid-state drive](#). (if applicable)
8. Install the [base cover](#).
9. Follow the procedure in [After working inside your computer](#).

# Keyboard

## Removing the keyboard

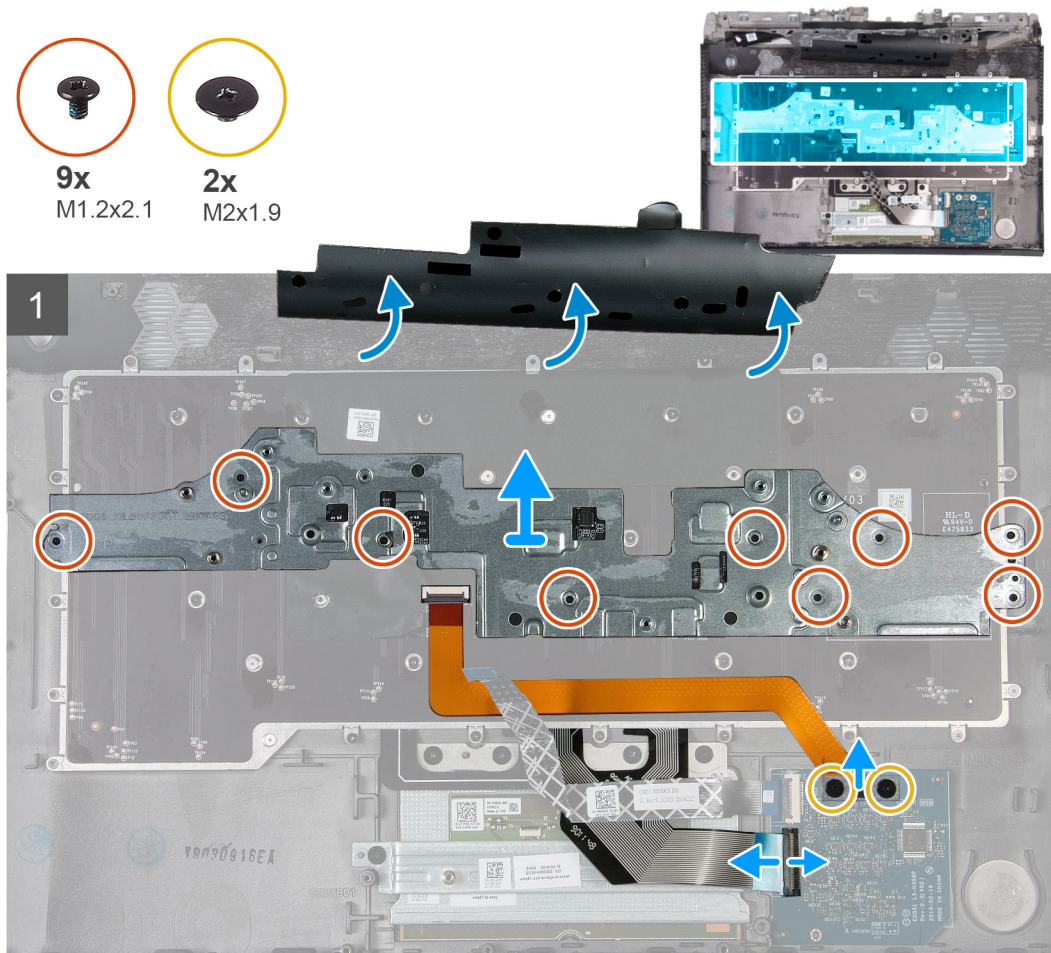
### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [2230 solid-state drive](#). (if applicable)
4. Remove the [2280 solid-state drive](#). (if applicable)
5. Remove the [rear I/O-cover](#).
6. Remove the [battery](#).
7. Remove the [left I/O-board](#).
8. Remove the [right I/O-board](#).
9. Remove the [system board](#).

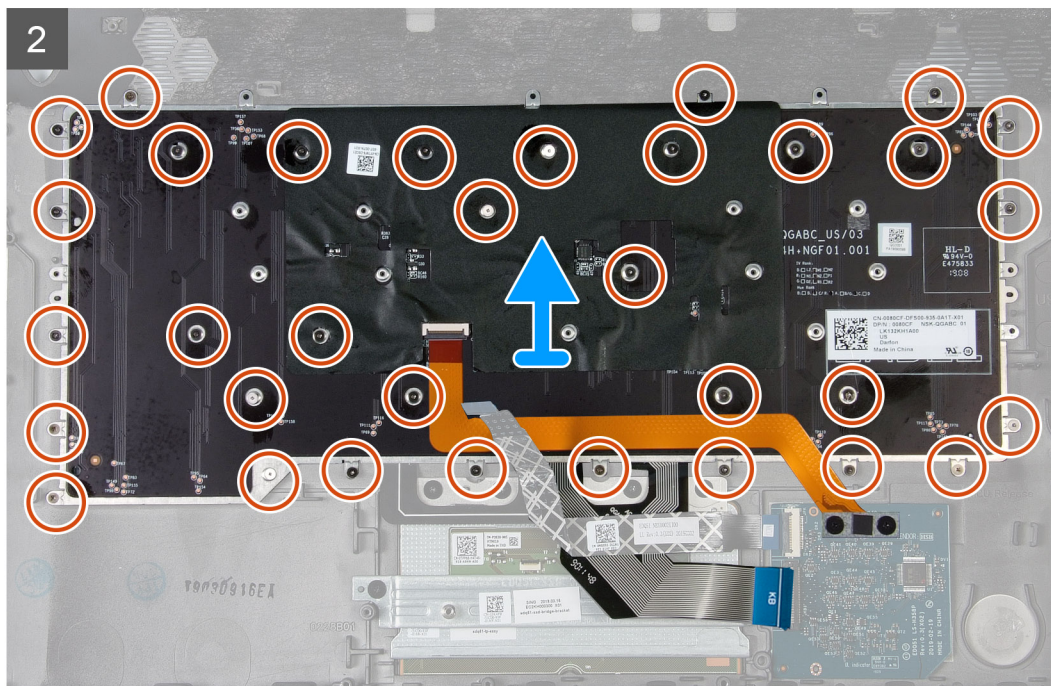
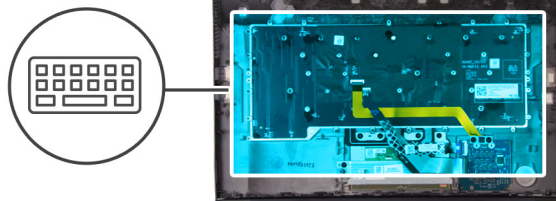
10. Remove the [power-button assembly](#).

#### About this task

The following image indicates the location of the keyboard and provides a visual representation of the removal procedure.







## Steps

1. Remove the two (M2x1.9) screws that secure the keyboard-backlight cable to the keyboard-controller board.
2. Disconnect the keyboard-backlight cable from the keyboard-controller board.
3. Lift the latch and disconnect the keyboard cable from the keyboard-controller board.
4. Remove the nine (M1.2x2.1) screws that secure the keyboard bracket to the keyboard.
5. Lift the keyboard bracket off the keyboard.
6. Remove the 33 (M1.2x1.6) screws that secure the keyboard to the palm-rest assembly.
7. Lift the keyboard off the palm-rest assembly.

## Installing the keyboard

### Prerequisites

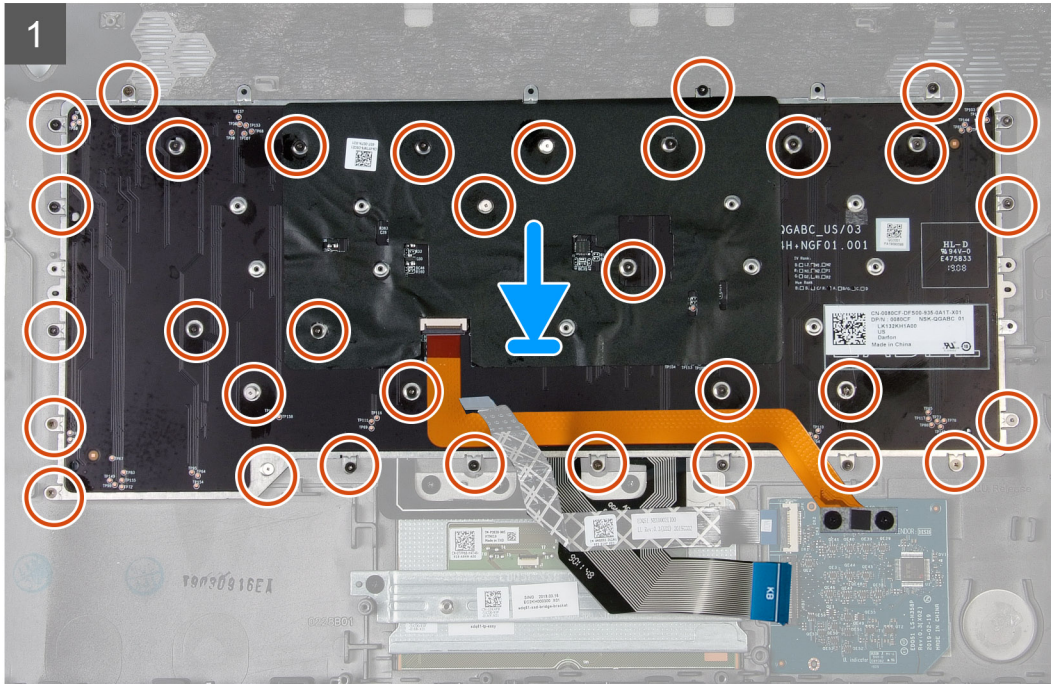
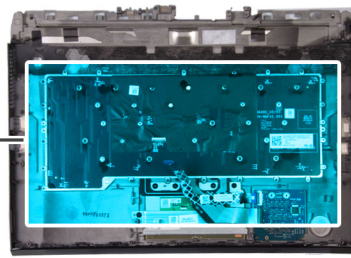
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

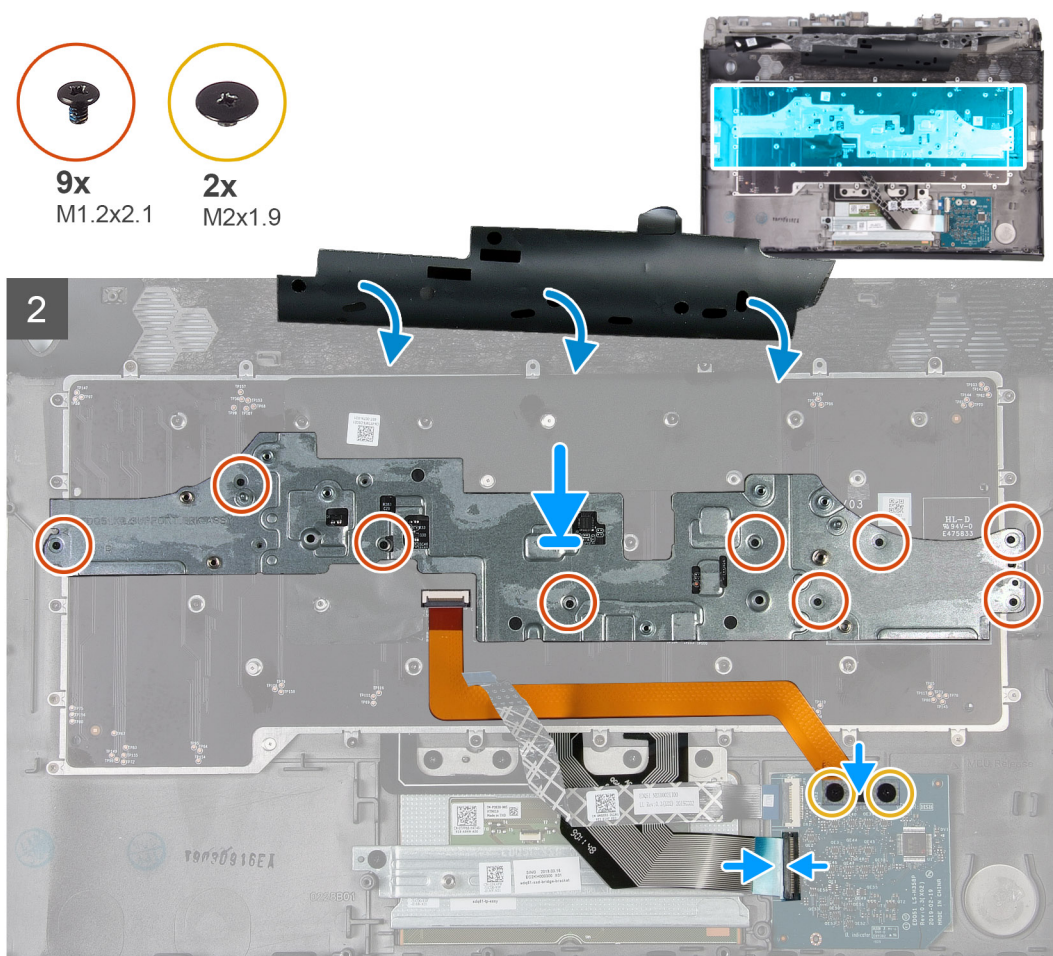
The following image indicates the location of the keyboard and provides a visual representation of the installation procedure.



**33x**  
M1.2x1.6







## Steps

1. Place the keyboard on the palm-rest assembly.
2. Replace the 33 (M1.2x1.6) screws that secure the keyboard to the palm-rest assembly.
3. Place the keyboard bracket on the keyboard.
4. Replace the nine (M1.2x2.1) screws that secure the keyboard bracket to the keyboard.
5. Connect the keyboard cable to the keyboard-controller board and close the latch.
6. Connect the keyboard-backlight cable to the keyboard controller board.
7. Replace the two (M2x1.9) screws that secure the keyboard-backlight cable to the keyboard-controller board.

## Next steps

1. Install the [power-button assembly](#).
2. Install the [system board](#).
3. Install the [right I/O-board](#).
4. Install the [left I/O-board](#).
5. Install the [battery](#).
6. Install the [rear I/O-cover](#).
7. Install the [2230 solid-state drive](#). (if applicable)
8. Install the [2280 solid-state drive](#). (if applicable)
9. Install the [base cover](#).
10. Follow the procedure in [After working inside your computer](#).

# Palmrest

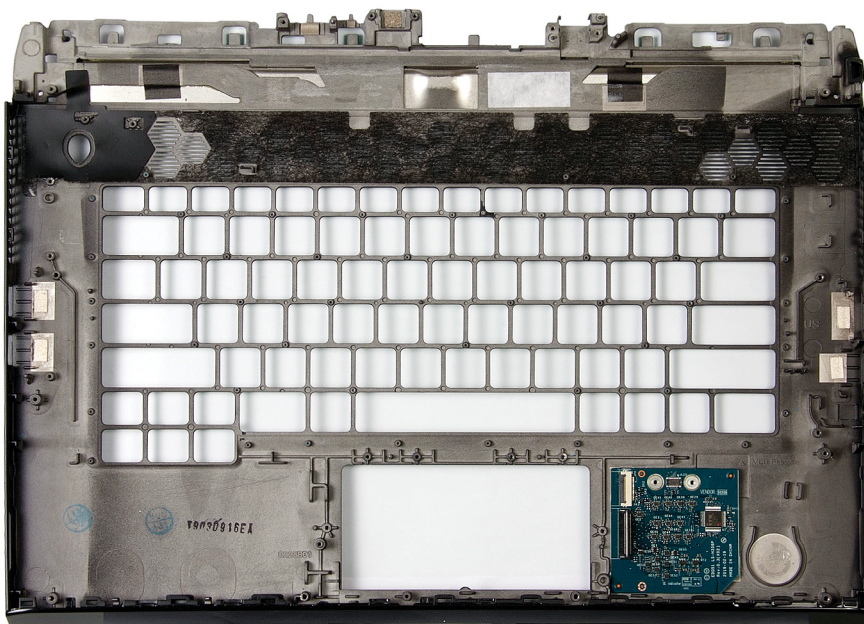
## Removing the palm rest

### Prerequisites

1. Follow the procedure in [Before working inside your computer.](#)
2. Remove the [base cover.](#)
3. Remove the [2230 solid-state drive.](#) (if applicable)
4. Remove the [2280 solid-state drive.](#) (if applicable)
5. Remove the [rear I/O-cover.](#)
6. Remove the [battery.](#)
7. Remove the [display assembly.](#)
8. Remove the [coin-cell battery.](#)
9. Remove the [keyboard-controller board.](#)
10. Remove the [left I/O-board.](#)
11. Remove the [right I/O-board.](#)
12. Remove the [speakers.](#)
13. Remove the [system board.](#)
14. Remove the [touchpad.](#)
15. Remove the [power-adaptor port.](#)
16. Remove the [power-button assembly.](#)
17. Remove the [keyboard.](#)

### Steps

After performing the pre-requisites, you are left with the palm rest.



## Installing the palm rest

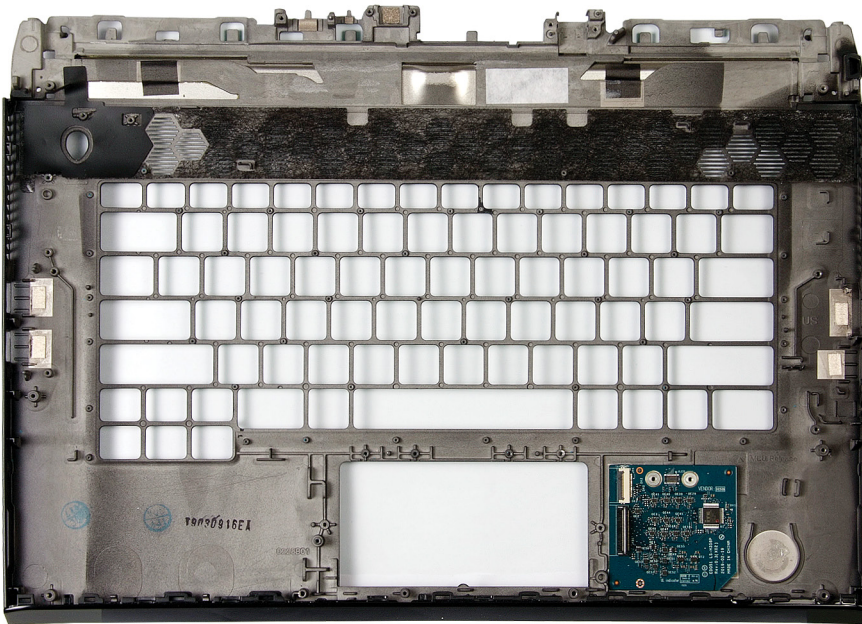
### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.



## Steps

To install the palm rest perform the post-requisites.



## Next steps

1. Install the [keyboard](#).
2. Install the [power-button assembly](#).
3. Install the [power-adaptor port](#).
4. Install the [touchpad](#).
5. Install the [system board](#).
6. Install the [speakers](#).
7. Install the [right I/O-board](#).
8. Install the [left I/O-board](#).
9. Install the [keyboard-controller board](#).
10. Install the [coin-cell battery](#).
11. Install the [display assembly](#).
12. Install the [battery](#).
13. Install the [rear I/O-cover](#).
14. Install the [2230 solid-state drive](#). (if applicable)
15. Install the [2280 solid-state drive](#). (if applicable)
16. Install the [base cover](#).
17. Follow the procedure in [After working inside your computer](#).

# Device drivers

## Intel Chipset Software Installation Utility

In the Device Manager, check if the chipset driver is installed.

Install the Intel chipset updates from [www.dell.com/support](http://www.dell.com/support).

## Video drivers

In the Device Manager, check if the video driver is installed.

Install the video driver update from [www.dell.com/support](http://www.dell.com/support).

## Intel Serial IO driver

In the Device Manager, check if the Intel Serial IO driver is installed.

Install the driver updates from [www.dell.com/support](http://www.dell.com/support).

## Intel Trusted Execution Engine Interface

In the Device Manager, check if the Intel Trusted Execution Engine Interface driver is installed.

Install the driver update from [www.dell.com/support](http://www.dell.com/support).

## Intel Virtual Button driver

In the Device Manager, check if the Intel Virtual Button driver is installed.

Install the driver updates from [www.dell.com/support](http://www.dell.com/support).

## Wireless and Bluetooth drivers

In the Device Manager, check if the network card driver is installed.

Install the driver updates from [www.dell.com/support](http://www.dell.com/support).

In the Device Manager, check if the Bluetooth driver is installed.

Install the driver updates from [www.dell.com/support](http://www.dell.com/support).

# System setup

**NOTE:** Depending on the computer and its installed devices, the items listed in this section may or may not be displayed.

## System setup

**CAUTION:** Unless you are an expert computer user, do not change the settings in the BIOS Setup program. Certain changes can make your computer work incorrectly.

**NOTE:** Before you change BIOS Setup program, it is recommended that you write down the BIOS Setup program screen information for future reference.

Use the BIOS Setup program for the following purposes:

- Get information about the hardware installed in your computer, such as the amount of RAM and the size of the hard drive.
- Change the system configuration information.
- Set or change a user-selectable option, such as the user password, type of hard drive installed, and enabling or disabling base devices.

## Entering BIOS setup program

### Steps

1. Turn on (or restart) your computer.
2. During POST, when the DELL logo is displayed, watch for the F2 prompt to appear, and then press F2 immediately.

**NOTE:** The F2 prompt indicates that the keyboard is initialized. This prompt can appear very quickly, so you must watch for it, and then press F2. If you press F2 before the F2 prompt, this keystroke is lost. If you wait too long and the operating system logo appears, continue to wait until you see the desktop. Then, turn off your computer and try again.

## Navigation keys

**NOTE:** For most of the System Setup options, changes that you make are recorded but do not take effect until you restart the system.

Keys	Navigation
Up arrow	Moves to the previous field.
Down arrow	Moves to the next field.
Enter	Selects a value in the selected field (if applicable) or follow the link in the field.
Spacebar	Expands or collapses a drop-down list, if applicable.
Tab	Moves to the next focus area.
Esc	Moves to the previous page until you view the main screen. Pressing Esc in the main screen displays a message that prompts you to save any unsaved changes and restarts the system.

## Boot Sequence

Boot Sequence allows you to bypass the System Setup-defined boot device order and boot directly to a specific device (for example: optical drive or hard drive). During the Power-on Self Test (POST), when the Dell logo appears, you can:

- Access System Setup by pressing F2 key
- Bring up the one-time boot menu by pressing F12 key

The one-time boot menu displays the devices that you can boot from including the diagnostic option. The boot menu options are:

- Removable Drive (if available)
- STXXXX Drive (if available)

**NOTE: XXX denotes the SATA drive number.**

- Optical Drive (if available)
- SATA Hard Drive (if available)
- Diagnostics

The boot sequence screen also displays the option to access the System Setup screen.

## System setup options

**NOTE: Depending on your computer and its installed devices, the items listed in this section may or may not appear.**

**Table 5. System setup options—Main menu**

Main		
System Time		Displays the current time in hh:mm:ss format.
System Date		Displays the current date in mm/dd/yyyy format.
BIOS Version		Displays the BIOS version.
Product Name		Displays the model number of your computer.
Service Tag		Displays the service tag of your computer.
Asset Tag		Displays the asset tag of your computer.
CPU Type		Displays the processor type.
CPU Speed		Displays the processor speed.
CPU ID		Displays the processor identification code.
CPU L1 Cache		Displays the processor L1 cache size.
CPU L2 Cache		Displays the processor L2 cache size.
CPU L3 Cache		Displays the processor L3 cache size.
Integrated Graphics		Displays the integrated graphics.
Discrete Graphics 1		Displays the first discrete graphics installed on your computer.
Discrete Graphics 1		Displays the second discrete graphics installed on your computer.
First HDD		Displays the type of hard drive installed.
M.2 PCIe SSD-1		Displays the type of primary SSD installed.
AC Adapter Type		Displays the AC adapter type.
System Memory		Displays the system memory information.
Memory Speed		Displays the memory speed information.

**Table 6. System setup options—Advanced menu**

Advanced		
Intel(R) SpeedStep(TM)		Enables you to enable or disable Intel Speedstep Technology. Default: Enabled <b>NOTE: If enabled, the processor clock speed and core voltage are adjusted dynamically based on the processor load.</b>
Integrated NIC		Enables you to enable or disable the on-board LAN controller. Default: Enabled
USB Emulation		Enables you to enable or disable the USB emulation feature. This feature defines how the BIOS, in the absence of a USB-



**Table 6. System setup options—Advanced menu(continued)**

Advanced	
	<p>aware operating system, handles USB devices. USB emulation is always enabled during POST.</p> <p>Default: Enabled</p> <p><b>i</b> <b>NOTE: You cannot boot any type of USB device (floppy, hard drive, or memory key) when this option is off.</b></p>
USB Powershare	<p>Enables you to charge USB devices when the computer is turned off or in standby mode.</p> <p>Default: Enabled</p>
USB Wake Support	<p>Enables you to enable the USB devices to wake the computer from Standby.</p> <p>Default: Disabled</p> <p><b>i</b> <b>NOTE: If USB PowerShare is enabled, a device connected to the USB PowerShare connector may not wake the computer.</b></p>
Sleep Mode	<p>Enable or disable sleep mode.</p>
Intel Speed Shift Technology	<p>Enable/disable Intel Speed Shift Technology support. Setting this option to enable to allows the operating system to select the appropriate processor performance automatically.</p> <p>Default: Enabled</p>
SATA Operation	<p>Enables you to configure the operating mode of the integrated SATA hard drive controller.</p> <p>Default: AHCI</p>
Adapter Warnings	<p>Enables you to choose if the computer should display warning messages when you use AC adapters that are not supported by your computer.</p> <p>Default: Enabled</p>
Function Key Behavior	<p>Enables you to set function key or multimedia key as the default function key behavior.</p> <p>Default: Function key</p>
Express Charge	<p>Enables you to charge your computer battery using Standard Charge or Express Charge mode.</p> <p>Default: Express Charge</p>
Battery Health	<p>Displays the battery health.</p>
Intel(R) Software Guard Extensions	<p>Enable or disable Intel Software Guard Extensions.</p> <p>Default: Software Controlled</p>
Intel(R) Software Guard Extensions allocated memory size	<p>Displays the allocated memory size for Intel Software Guard Extensions.</p>
BIOS Recovery from Hard Drive	<p>Enable the user to recover from certain corrupted BIOS conditions from a recovery file on the user primary hard drive</p> <p>Default: Enabled</p>
BIOS Auto-Recovery	<p>Enable or disable BIOS Auto-Recovery.</p> <p>Default: Disabled</p>
<b>SupportAssist System Resolution</b>	

**Table 6. System setup options—Advanced menu(continued)**

<b>Advanced</b>	
Auto OS Recovery Threshold	Control the automatic boot flow for SupportAssist System Resolution Console and for Dell OS Recovery tool. Default: 2
SupportAssist OS Recovery	Enable or disable SupportAssist OS recovery. Default: Enabled
<b>Intel(R) Rapid Storage Technology</b>	
Non-RAID Physical Disks	Displays the disk using the Intel(R) Rapid Storage Technology.

**Table 7. System setup options—Security menu**

<b>Security</b>	
Unlock Setup Status	Displays if the setup status is unlocked.
Admin Password Status	Displays if the administrator password is clear or set. Default: Not set
System Password Status	Displays if the system password is clear or set. Default: Not set
HDD Password Status	Displays if the HDD password is clear or set. Default: Not set
Admin Password	Enables you to set the administrator password. The administrator password controls access to the system setup utility.
System Password	Enables you to set the system password. The system password controls access to the computer at boot.
HDD password	Enables you to set, change or delete the hard-disk drive password.
Password Change	Enables you to permit or deny system password or HDD password changes. Default: Permitted
Computrace	Enable or disable the BIOS module interface of the optional Computrace Service from Absolute Software. Default: Activate
Firmware TPM	Enables you to enable or disable the firmware TPM function. Default: Enabled
PPI Bypass for Clear Command	Enables you to control the TPM Physical Presence Interface (PPI). When enabled, this setting will allow the OS to skip BIOS PPI user prompts when issuing the Clear command. Changes to this setting take effect immediately. Default: Enabled
UEFI Capsule Firmware Updates	Enable or disable BIOS updates through UEFI capsule update packages. Default: Enabled

**Table 8. System setup options—Boot menu**

Boot	
Boot List Option	Displays the available boot options. Default: UEFI
File Browser Add Boot Option	Enables you to add the boot options.
File Browser Del Boot Option	Enables you to delete the boot options
Secure Boot	Enable or disable the secure boot feature. Default: Disabled
Legacy Option ROMs	Enable or disable the Legacy Option ROMs. Default: Disabled
Attempt Legacy Boot	Enable or disable Attempt Legacy Boot. Default: Disabled
Boot Option Priorities	Displays the boot sequence.
Boot Option #1	Displays the available first boot option.
Boot Option #2	Displays the available second boot option.
Boot Option #3	Displays the available third boot option.

**Table 9. System setup options—Exit menu**

Exit	
Save Changes and Reset	Allows you to exit system setup and save your changes.
Discard Changes and Reset	Allows you to exit system setup and load previous values for all system setup options.
Restore Defaults	Allows you to restore default values for all system setup options.
Discard Changes	Allows you to load previous values for all system setup options.
Save Changes	Allows you to save the changes for all system setup options.

## Clearing CMOS settings

### About this task

 **CAUTION:** Clearing CMOS settings will reset the BIOS settings on your computer.

### Steps

1. Remove the [base cover](#).
2. Follow step 1 of removing the [coin-cell battery](#) to disconnect the coin-cell battery cable from the system board.
3. Wait for one minute.
4. Follow step 3 of installing the [coin-cell battery](#) to connect the coin-cell battery cable to the system board.
5. Replace the [back cover](#).

## Clearing BIOS (System Setup) and System passwords

### About this task

To clear the system or BIOS passwords, contact Dell technical support as described at [www.dell.com/contactdell](http://www.dell.com/contactdell).

 **NOTE:** For information on how to reset Windows or application passwords, refer to the documentation accompanying Windows or your application.



# Troubleshooting

## Enhanced Pre-Boot System Assessment (ePSA) diagnostics

### About this task

The ePSA diagnostics (also known as system diagnostics) performs a complete check of your hardware. The ePSA is embedded with the BIOS and is launched by the BIOS internally. The embedded system diagnostics provides a set of options for particular devices or device groups allowing you to:

- Run tests automatically or in an interactive mode
- Repeat tests
- Display or save test results
- Run thorough tests to introduce additional test options to provide extra information about the failed device(s)
- View status messages that inform you if tests are completed successfully
- View error messages that inform you of problems encountered during testing

**NOTE:** Some tests for specific devices require user interaction. Always ensure that you are present at the computer terminal when the diagnostic tests are performed.

### Running the ePSA diagnostics

#### Steps

1. Turn on your computer.
2. As the computer boots, press the F12 key as the Dell logo appears.
3. On the boot menu screen, select the **Diagnostics** option.
4. Click the arrow at the bottom left corner.  
Diagnostics front page is displayed.
5. Click the arrow in the lower-right corner to go to the page listing.  
The items detected are listed.
6. To run a diagnostic test on a specific device, press Esc and click **Yes** to stop the diagnostic test.
7. Select the device from the left pane and click **Run Tests**.
8. If there are any issues, error codes are displayed.  
Note the error code and validation number and contact Dell.

## System diagnostic lights

### Battery-status light

Indicates the power and battery-charge status.

**Solid white** — Power adapter is connected and the battery has more than 5 percent charge.

**Amber** — Computer is running on battery and the battery has less than 5 percent charge.

#### Off

- Power adapter is connected and the battery is fully charged.
- Computer is running on battery and the battery has more than 5 percent charge.
- Computer is in sleep state, hibernation, or turned off.

The power and battery-status light blinks amber along with beep codes indicating failures.

For example, the power and battery-status light blinks amber two times followed by a pause, and then blinks white three times followed by a pause. This 2,3 pattern continues until the computer is turned off indicating no memory or RAM is detected.

The following table shows different power and battery-status light patterns and associated problems.

**Table 10. LED codes**

D diagnostic light codes	Problem description
2,1	Processor failure

**Table 10. LED codes(continued)**

Diagnostic light codes	Problem description
2,2	System board: BIOS or ROM (Read-Only Memory) failure
2,3	No memory or RAM (Random-Access Memory) detected
2,4	Memory or RAM (Random-Access Memory) failure
2,5	Invalid memory installed
2,6	System-board or chipset error
2,7	Display failure
2,8	LCD power rail failure. Replace system board
3,1	Coin-cell battery failure
3,2	PCI, video card/chip failure
3,3	Recovery image not found
3,4	Recovery image found but invalid
3,5	Power-rail failure
3,6	System BIOS Flash incomplete
3,7	Management Engine (ME) error

**Camera status light:** Indicates whether the camera is in use.

- Solid white — Camera is in use.
- Off — Camera is not in use.

**Caps Lock status light:** Indicates whether Caps Lock is enabled or disabled.

- Solid white — Caps Lock enabled.
- Off — Caps Lock disabled.

## Flashing BIOS (USB key)

### Steps

1. Follow the procedure from step 1 to step 7 in "[Flashing the BIOS](#)" to download the latest BIOS setup program file.
2. Create a bootable USB drive. For more information see the knowledge base article [SLN143196](#) at [www.dell.com/support](http://www.dell.com/support).
3. Copy the BIOS setup program file to the bootable USB drive.
4. Connect the bootable USB drive to the computer that needs the BIOS update.
5. Restart the computer and press **F12** when the Dell logo is displayed on the screen.
6. Boot to the USB drive from the **One Time Boot Menu**.
7. Type the BIOS setup program filename and press **Enter**.
8. The **BIOS Update Utility** appears. Follow the instructions on the screen to complete the BIOS update.

## Flashing the BIOS

### About this task

You may need to flash (update) the BIOS when an update is available or when you replace the system board.

Follow these steps to flash the BIOS:

### Steps

1. Turn on your computer.
2. Go to [www.dell.com/support](http://www.dell.com/support).
3. Click **Product support**, enter the Service Tag of your computer, and then click **Submit**.

 **NOTE:** If you do not have the Service Tag, use the auto-detect feature or manually browse for your computer model.

4. Click **Drivers & downloads > Find it myself**.
5. Select the operating system installed on your computer.
6. Scroll down the page and expand **BIOS**.
7. Click **Download** to download the latest version of the BIOS for your computer.
8. After the download is complete, navigate to the folder where you saved the BIOS update file.
9. Double-click the BIOS update file icon and follow the instructions on the screen.

## Backup media and recovery options

It is recommended to create a recovery drive to troubleshoot and fix problems that may occur with Windows. Dell proposes multiple options for recovering Windows operating system on your Dell PC. For more information, see [Dell Windows Backup Media and Recovery Options](#).

## WiFi power cycle

### About this task

If your computer is unable to access the internet due to WiFi connectivity issues a WiFi power cycle procedure may be performed. The following procedure provides the instructions on how to conduct a WiFi power cycle:

 **NOTE:** Some ISPs (Internet Service Providers) provide a modem/router combo device.

### Steps

1. Turn off your computer.
2. Turn off the modem.
3. Turn off the wireless router.
4. Wait for 30 seconds.
5. Turn on the wireless router.
6. Turn on the modem.
7. Turn on your computer.

## Flea power release

### About this task

Flea power is the residual static electricity that remains on the computer even after it has been powered off and the battery has been removed. The following procedure provides the instructions on how to conduct flea power release:


### Steps

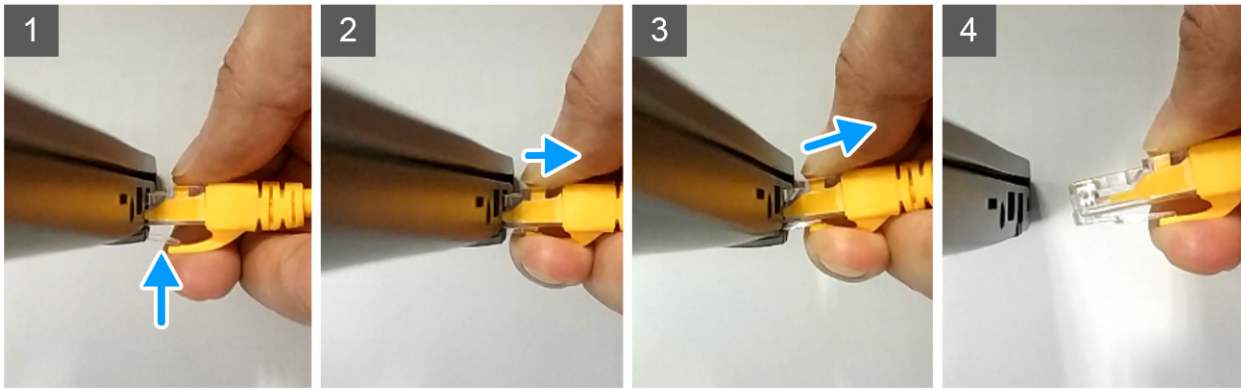
1. Turn off your computer.
2. Disconnect the power adapter from your computer.
3. Remove the [base cover](#).
4. Press and hold the power button for 15 seconds to drain the flea power.
5. Install the [base cover](#).
6. Connect the power adapter to your computer.
7. Turn on your computer.

## Disconnecting the ethernet cable from the RJ-45 port

### About this task

Perform the following procedure if you are having difficulty removing the ethernet cable from the RJ-45 port.

 **CAUTION:** To avoid damaging your computer, follow this procedure when disconnecting the ethernet port from the RJ-45 port. Do not disconnect the ethernet cable from the RJ-45 port when it is angled straight or downwards, ensure that you disconnect the cable only when it is angled upwards.



### Steps

1. Press down on the securing clip that secures the ethernet cable to the RJ-45 port on your computer.
2. With the securing clip held down, pull on the ethernet cable and lift the cable upwards at an angle to release the ethernet cable from the RJ-45 port on your computer.
3. Disconnect the ethernet cable from the RJ-45 port on your computer.





# Getting help and contacting Dell

## Self-help resources


You can get information and help on Dell products and services using these self-help resources:

**Table 11. Self-help resources**

Self-help resources	Resource location
Information about Dell products and services	<a href="http://www.dell.com">www.dell.com</a>
My Dell	
Tips	
Contact Support	In Windows search, type <code>Contact Support</code> , and press Enter.
Online help for operating system	<a href="http://www.dell.com/support/windows">www.dell.com/support/windows</a> <a href="http://www.dell.com/support/linux">www.dell.com/support/linux</a>
Troubleshooting information, user manuals, set up instructions, product specifications, technical help blogs, drivers, software updates, and so on.	<a href="http://www.dell.com/support">www.dell.com/support</a>
Dell knowledge base articles for a variety of computer concerns	<ol style="list-style-type: none"> <li>1. Go to <a href="http://www.dell.com/support">www.dell.com/support</a>.</li> <li>2. On the menu bar at the top of the Support page, select <b>Support &gt; Knowledge Base</b>.</li> <li>3. In the Search field on the Knowledge Base page, type the keyword, topic, or model number, and then click or tap the search icon to view the related articles.</li> </ol>
Learn and know the following information about your product: <ul style="list-style-type: none"> <li>▪ Product specifications</li> <li>▪ Operating system</li> <li>▪ Setting up and using your product</li> <li>▪ Data backup</li> <li>▪ Troubleshooting and diagnostics</li> <li>▪ Factory and system restore</li> <li>▪ BIOS information</li> </ul>	See <i>Me and My Dell</i> at <a href="http://www.dell.com/support/manuals">www.dell.com/support/manuals</a> . To locate the <i>Me and My Dell</i> relevant to your product, identify your product through one of the following: <ul style="list-style-type: none"> <li>▪ Select <b>Detect Product</b>.</li> <li>▪ Locate your product through the drop-down menu under <b>View Products</b>.</li> <li>▪ Enter the <b>Service Tag number</b> or <b>Product ID</b> in the search bar.</li> </ul>

## Contacting Dell

To contact Dell for sales, technical support, or customer service issues, see [www.dell.com/contactdell](http://www.dell.com/contactdell).

 **NOTE:** Availability varies by country/region and product, and some services may not be available in your country/region.

 **NOTE:** If you do not have an active Internet connection, you can find contact information about your purchase invoice, packing slip, bill, or Dell product catalog.