

# Inspiron 5391

## Service Manual



## 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.

## Topics:

- [Before working inside your computer](#)
- [Electrostatic discharge—ESD protection](#)
- [ESD field service kit](#)
- [Transporting sensitive components](#)
- [After working inside your computer](#)

## 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:

- Phillips 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 and keyboard assembly	M2x6	4	
Battery	Palm-rest and keyboard assembly	M2x2	4	
Battery	Palm-rest and keyboard assembly	M1.6x4	1	
Touchpad bracket	Palm-rest and keyboard assembly	M1.6x2	3	
Touchpad	Palm-rest and keyboard assembly	M1.6x2	2	
I/O-board bracket	Palm-rest and keyboard assembly	M2.5x3.5	2	
I/O-board	Palm-rest and keyboard assembly	M2x3	1	
Solid-state drive	System board	M2x2.5	1	
Wireless-card bracket	Wireless card and system board	M2x2.5	1	
Fan	System board	M2x3	2	
Right display hinge	System board	M2x4	1	

Component	Secured to	Screw type	Quantity	Screw image
Left display hinge	Display back-cover and antenna assembly	M2.5x3.5	2	
Hinges	Display back-cover and antenna assembly	M2.5x2.5	6	
Display-cable bracket	System board	M2.5x3.5	1	
Power-adaptor port	Palm-rest and keyboard assembly	M2x3	1	
Power button with fingerprint reader bracket	Palm-rest and keyboard assembly	M1.6x2	1	
Power button with fingerprint reader	Palm-rest and keyboard assembly	M1.6x2	1	

## 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.



**4x**  
M2x6



### Steps

1. Loosen the three captive screws on the base cover.
2. Remove the four screws (M2x6) that secure the base cover to the palm-rest and keyboard assembly.
3. Pry the base cover starting from the top-left corner of the palm-rest and keyboard assembly.
4. Lift the base cover off the palm-rest and keyboard assembly.

## 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.



**4x**  
M2x6



### Steps

1. Place the computer with the hinges facing towards you.
2. Align the base cover on the palm-rest and keyboard assembly, and snap the base cover into place.
3. Replace the four screws (M2x6) that secure the base cover to the palm-rest and keyboard assembly.
4. Tighten the three captive screws that secure the base cover to the palm-rest and keyboard assembly.

### Next steps

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

## Battery

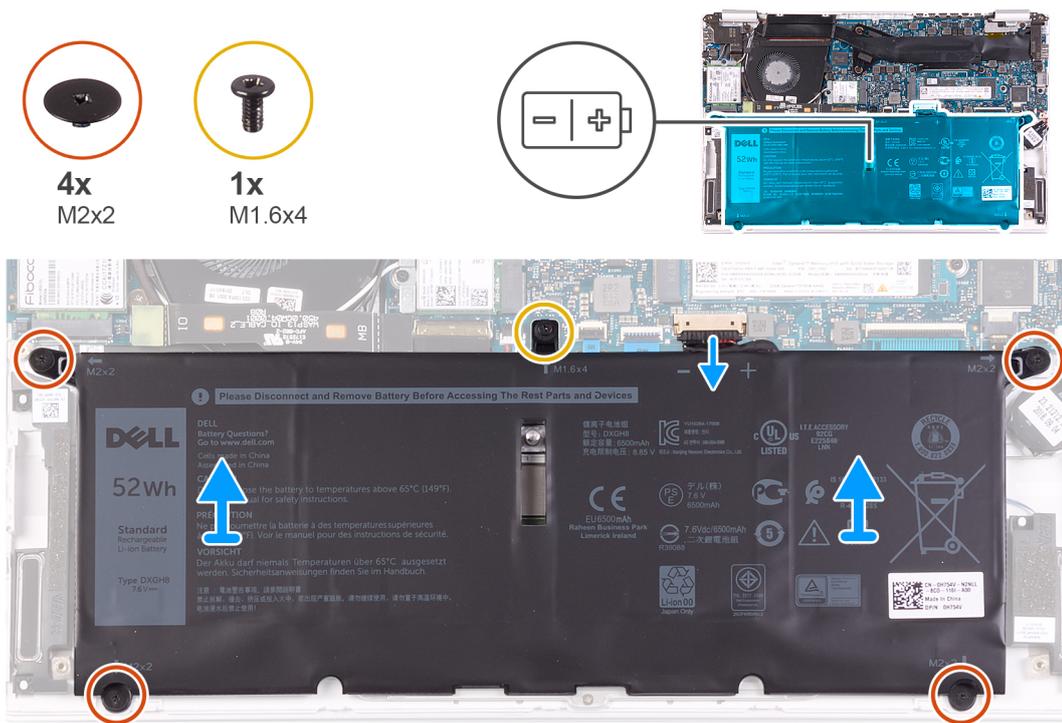
### Removing the battery

#### Prerequisites

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

#### About this task

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



### Steps

1. Disconnect the battery cable from the system board.
2. Remove the four screws (M2x2) that secure the battery to the palm-rest and keyboard assembly.
3. Remove the screw (M1.6x4) that secures the battery to the system board and palm-rest and keyboard assembly.
4. Lift the battery off the palm-rest and keyboard assembly.

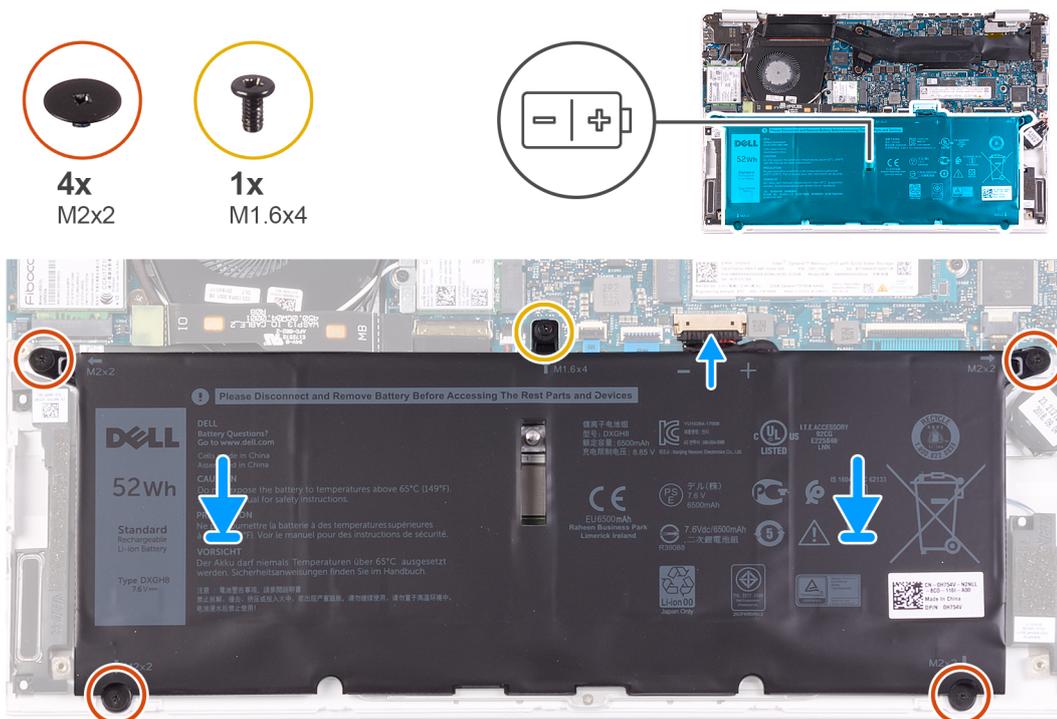
## Installing the battery

### 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. Connect the battery cable to the system board.
2. Replace the four screws (M2x2) that secure the battery to the palm-rest and keyboard assembly.
3. Replace the screw (M1.6x4) that secures the battery to the system board and palm-rest and keyboard assembly.

## Next steps

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

# Coin-cell battery

## Removing the coin-cell battery

### Prerequisites

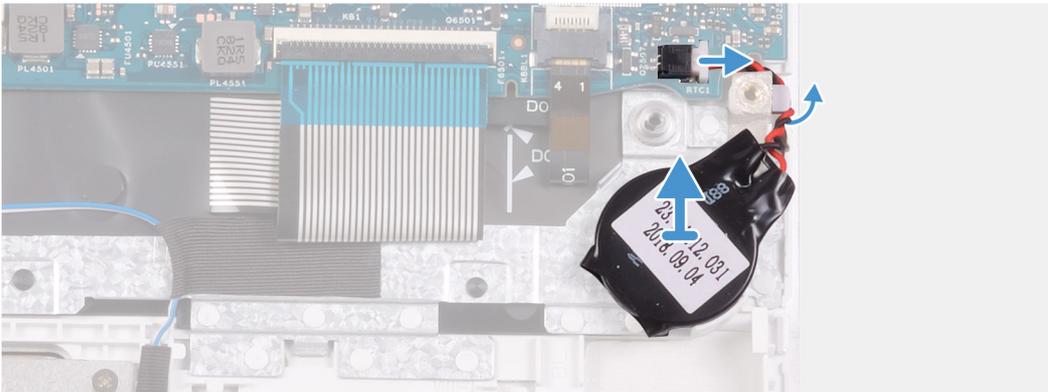
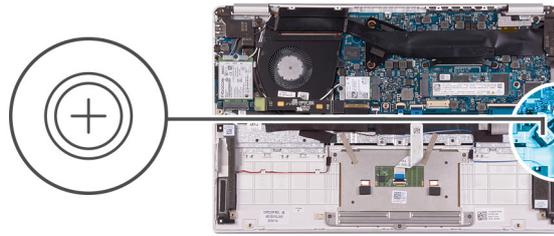
1. Follow the procedure in [Before working inside your computer](#).

**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.

2. Remove the [base cover](#).
3. 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 system board.
2. Remove the coin-cell battery cable from the routing guide.
3. Peel the coin-cell battery off the palm-rest and keyboard assembly.

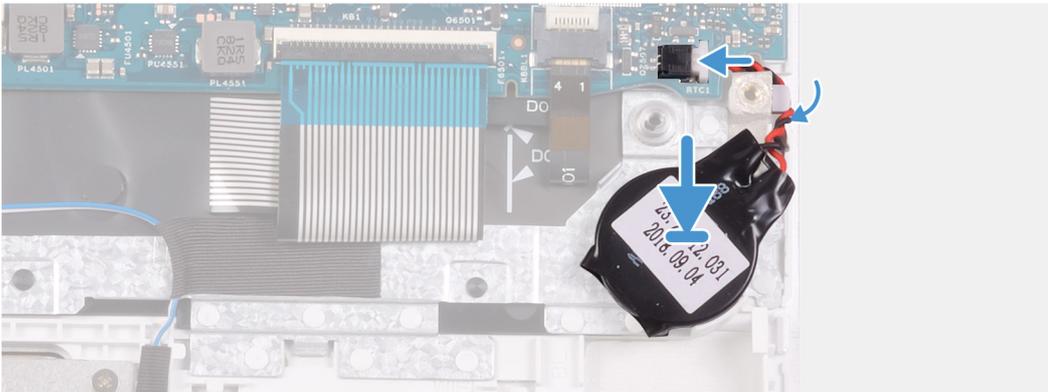
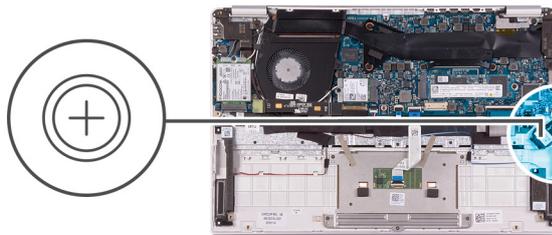
## Installing the coin-cell battery

### 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. Adhere the coin-cell battery to the slot on the palm-rest and keyboard assembly.
2. Route the coin-cell battery cable through the routing guide.
3. Connect the coin-cell battery cable to the system board.

### Next steps

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

## Solid-state drive

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

#### Prerequisites

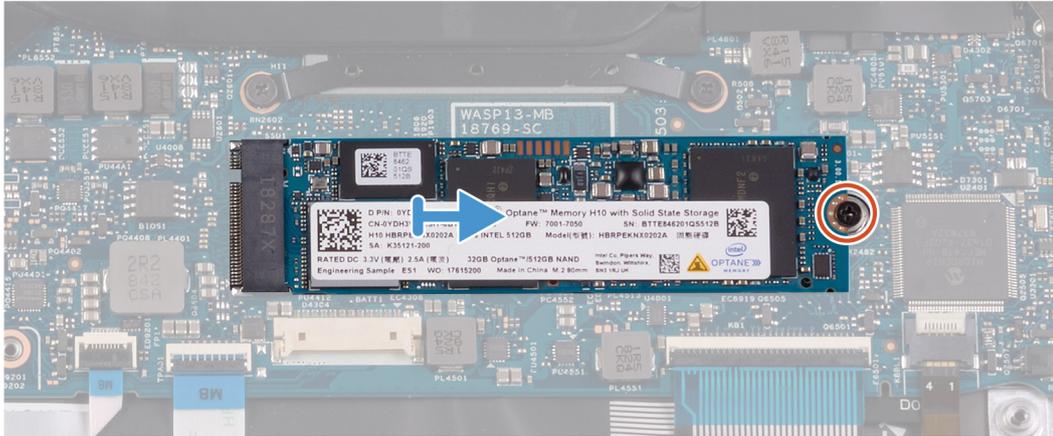
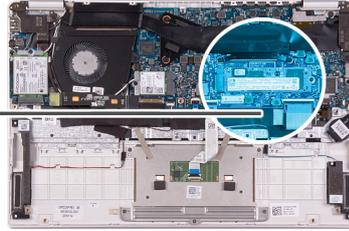
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

#### About this task

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



1x  
M2x2.5



### Steps

1. Remove the screw (M2x2.5) that secures the solid-state drive to the system board.
2. Slide and remove the solid-state drive from the solid-state drive slot on the system board.

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

### Prerequisites

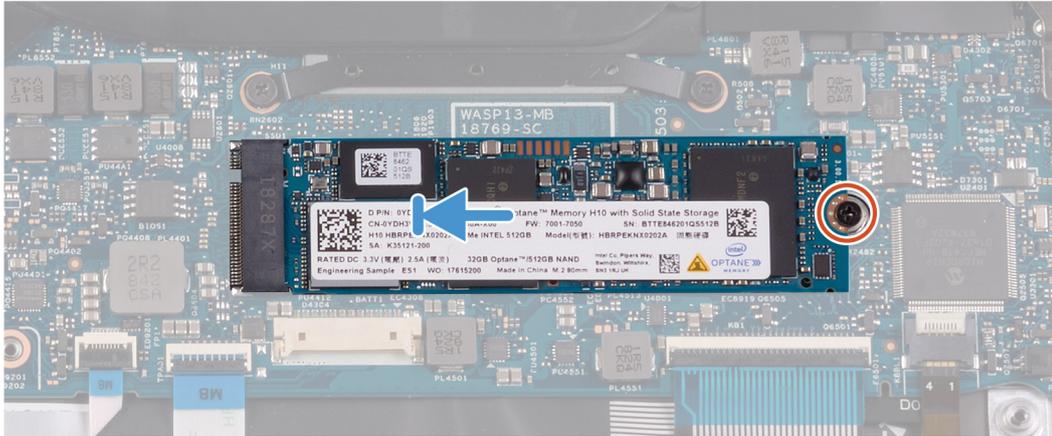
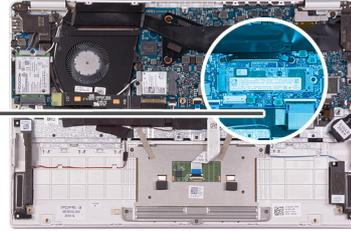
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

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



1x  
M2x2.5



### Steps

1. Align the notch on the solid-state drive with the tab on the solid-state drive slot and slide the solid-state drive into the solid-state drive slot on the system board.
2. Replace the screw (M2x2.5) that secures the solid-state drive to the system board.

### Next steps

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

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

### Prerequisites

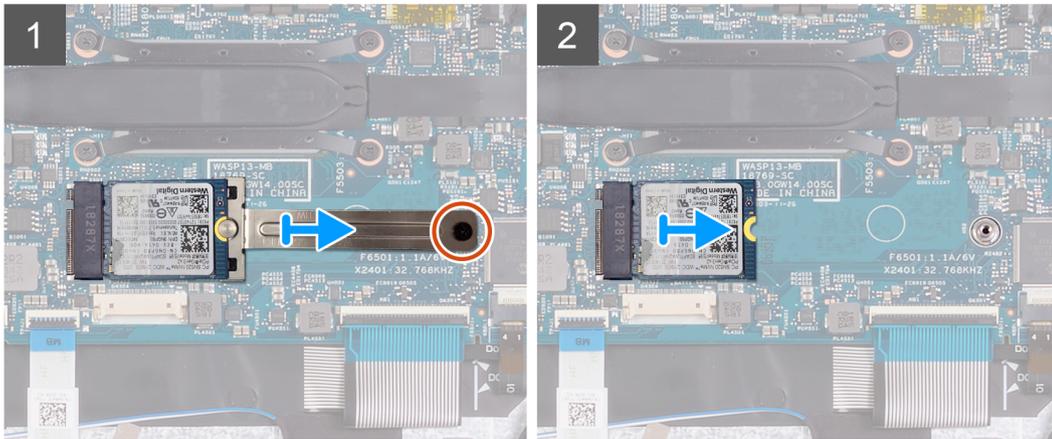
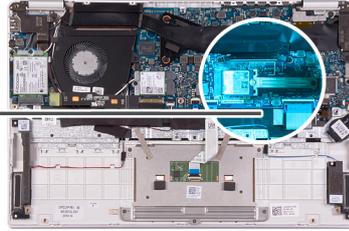
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

### About this task

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



1x  
M2x2.5



### Steps

1. Remove the screw (M2x2.5) that secures the solid-state drive bracket to the system board.
2. Slide and remove the solid-state drive bracket off the solid-state drive on the system board.
3. Slide and remove the solid-state drive off the solid-state drive slot on the system board.

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

### Prerequisites

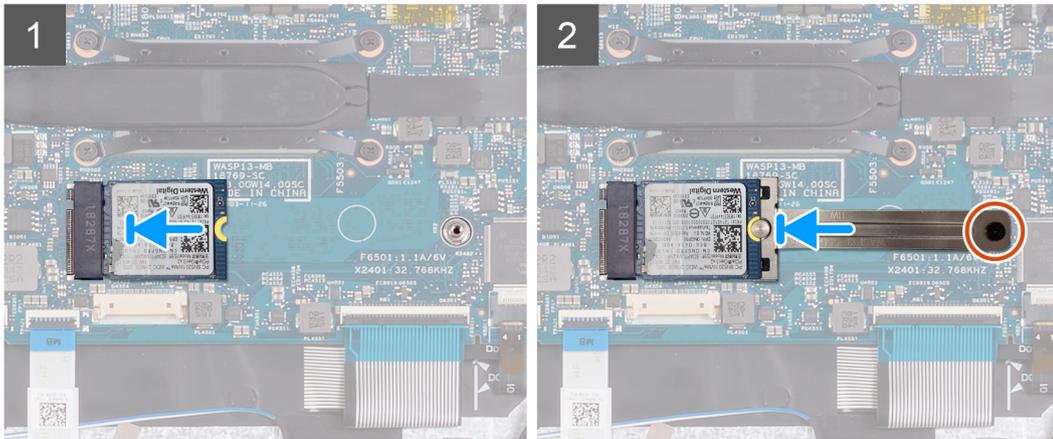
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

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



1x  
M2x2.5



### Steps

1. Align the notch on the solid-state drive with the tab on the solid-state drive slot and slide the solid-state drive into the solid-state drive slot on the system board.
2. Slide the solid-state bracket on to the solid-state drive on the system board.
3. Replace the screw (M2x2.5) that secures the solid-state drive to the system board.

### Next steps

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

## Heat sink

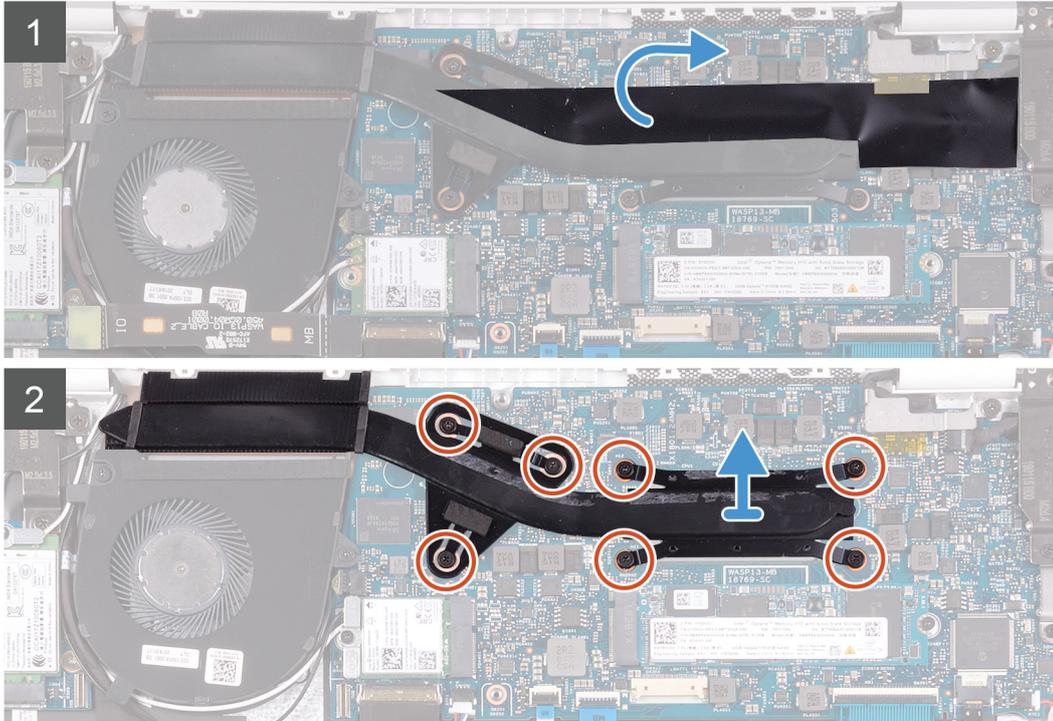
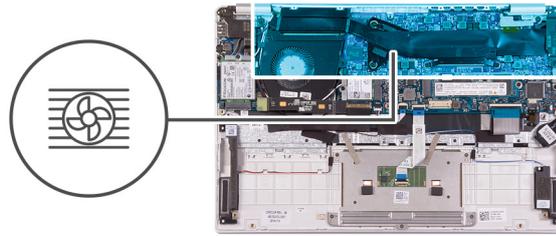
## Removing the heat sink

### Prerequisites

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

### About this task

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



### Steps

1. Peel the mylar tape that secures the heat sink to the system board.
2. In the reverse sequential order (7>6>5>4>3>2>1), loosen the seven captive screws that secure the heat sink to the system board.
3. Lift the heat sink off the system board.

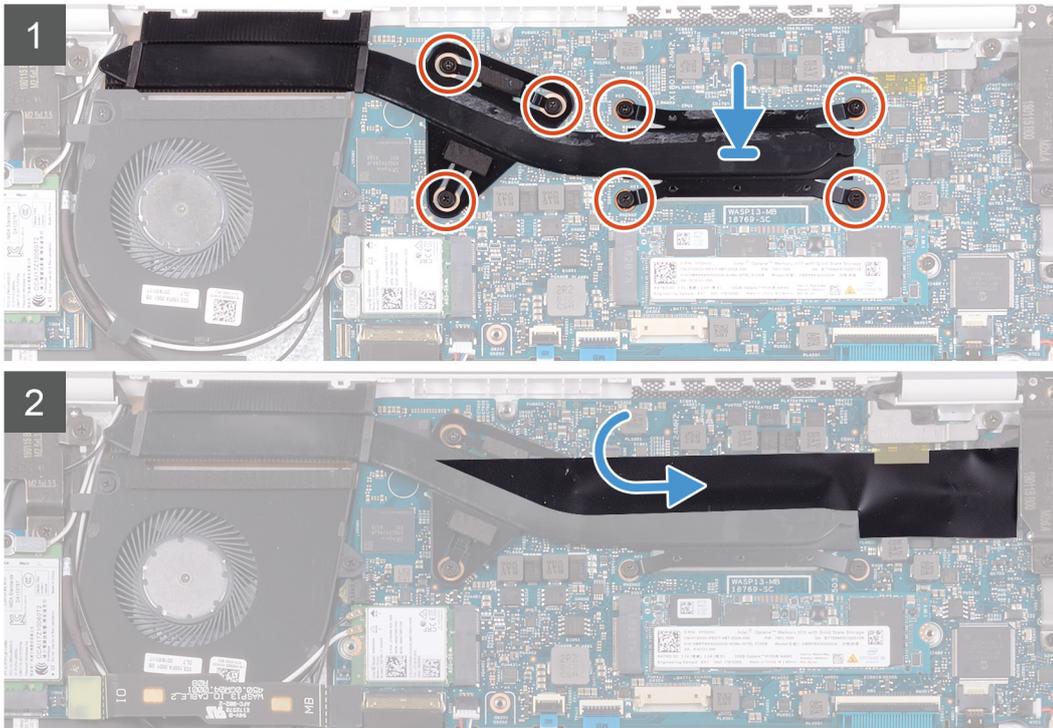
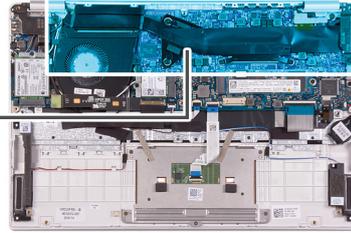
## Installing the heat sink

### 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.



### Steps

1. Align and place the screw holes on the heat sink with the screw holes on the system board.
2. In sequential order (as indicated on the heat sink), tighten the seven captive screws that secure the heat sink to the system board.
3. Adhere the mylar tape that secures the heat sink to the system board.

### Next steps

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

## Fan

### Removing the fan

#### Prerequisites

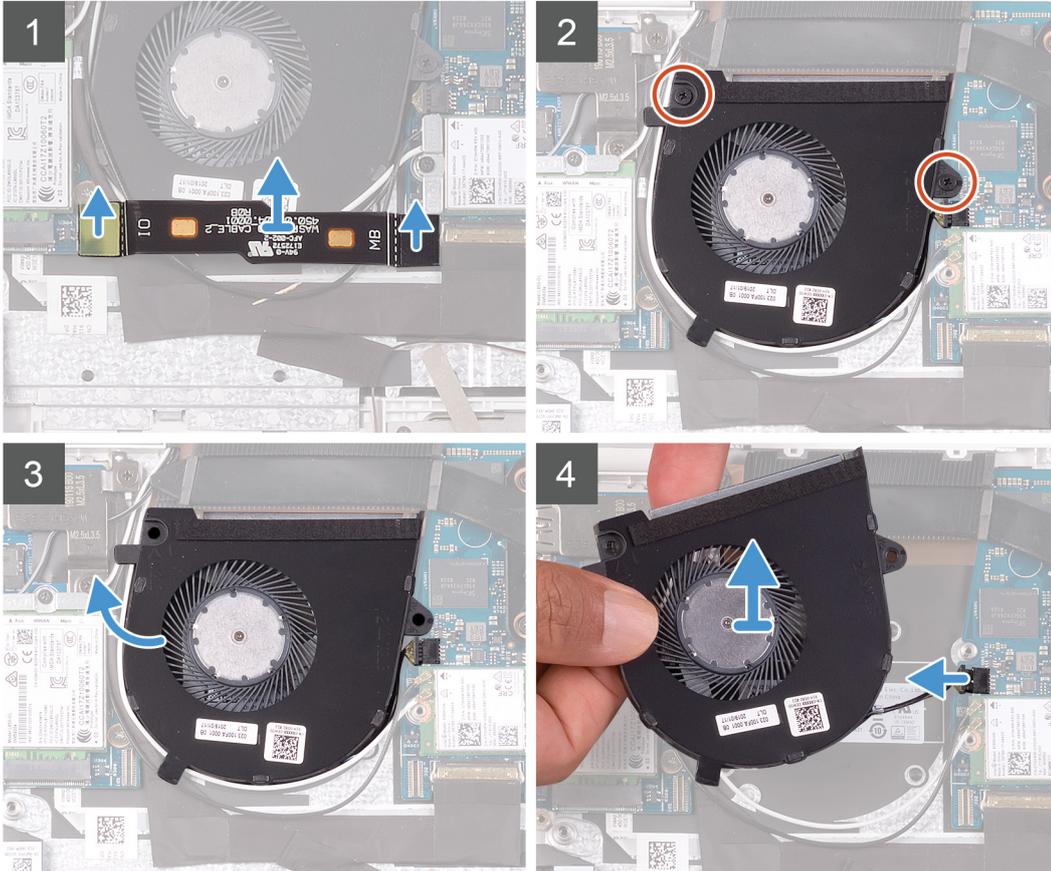
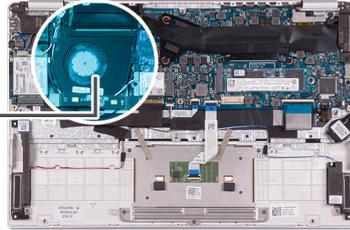
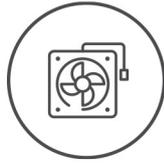
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

#### About this task

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



2x  
M2x3



### Steps

1. Disconnect the I/O-board cable from the system board and I/O board.  
**i** | **NOTE:** This step is only applicable for computers shipped with a WWAN configuration.
2. Remove the two (M2x3) screws that secure the fan to the system board.
3. Lift the fan slightly off the palm-rest and keyboard assembly.
4. Disconnect the fan cable from the system board and completely lift the fan off the palm-rest and keyboard assembly.

## Installing the fan

### Prerequisites

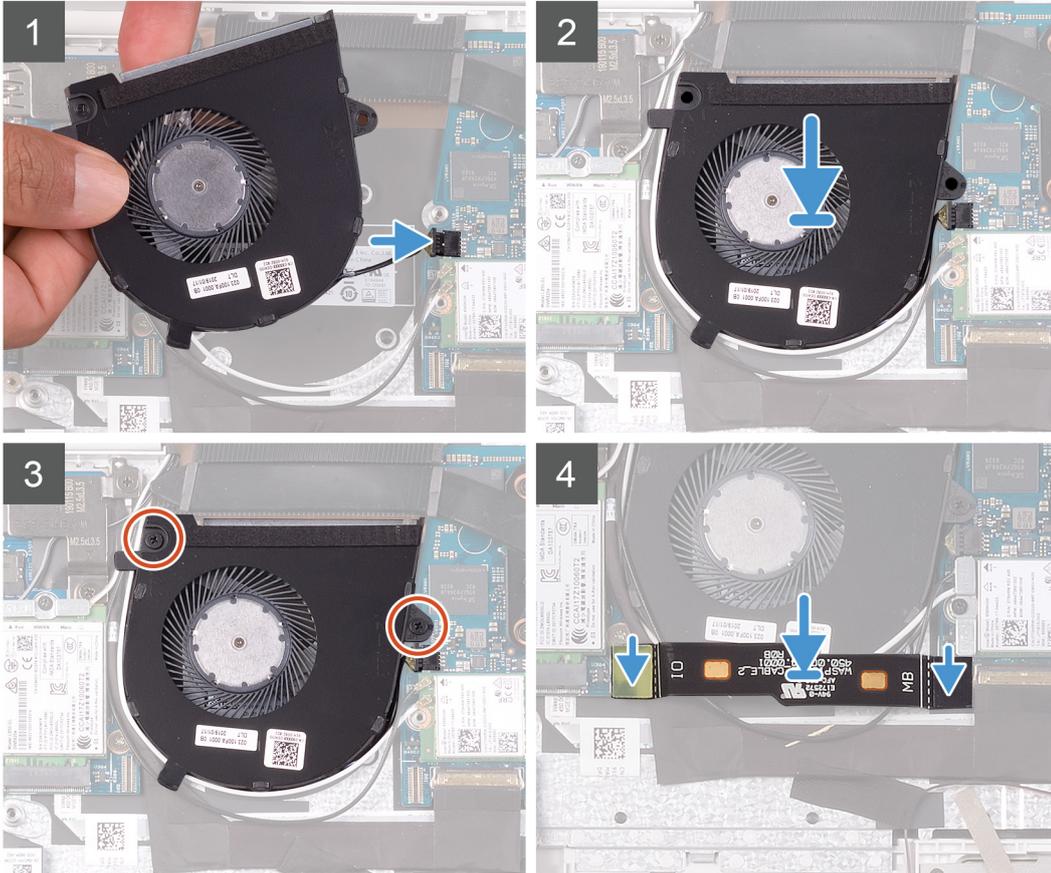
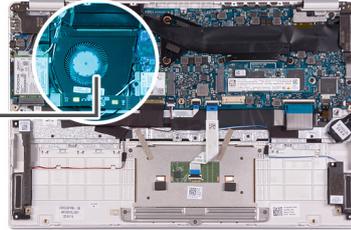
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

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



2x  
M2x3



### Steps

1. Connect the fan cable to the system board.
2. Align the screw holes on the fan with the screw holes on the palm-rest and keyboard assembly.
3. Replace the two (M2x3) screws that secure the fan to the palm-rest and keyboard assembly.
4. Connect the I/O-board cable to the system board and I/O board.

**NOTE:** This step is only applicable for computers shipped with a WWAN configuration.

### Next steps

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

# Speakers

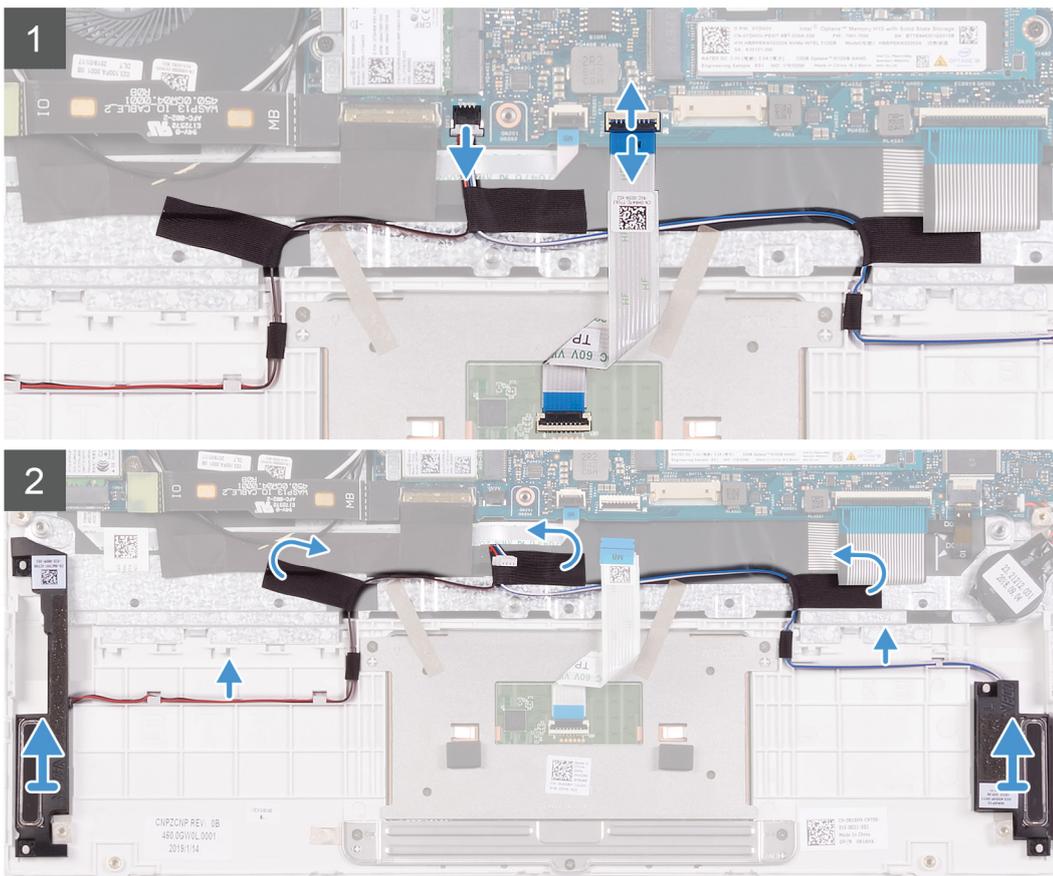
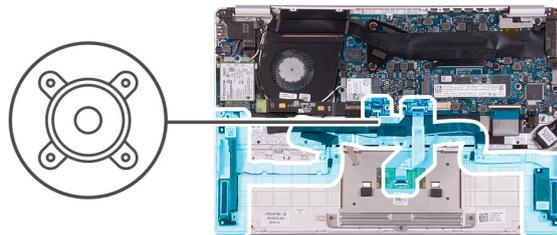
## Removing the speakers

### Prerequisites

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

### About this task

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



### Steps

1. Open the latch and disconnect the touchpad cable from the system board.
2. Disconnect the speaker cable from the system board.
3. Peel the tapes that secure the speaker cable to the palm-rest and keyboard assembly.
4. Note the routing of the speaker cable and remove the speaker cable from the routing guides on the palm-rest and keyboard assembly.

**NOTE:** Note the position of the rubber grommets before lifting the speakers.

5. Lift the speakers, along with the cable, off the palm-rest and keyboard assembly.

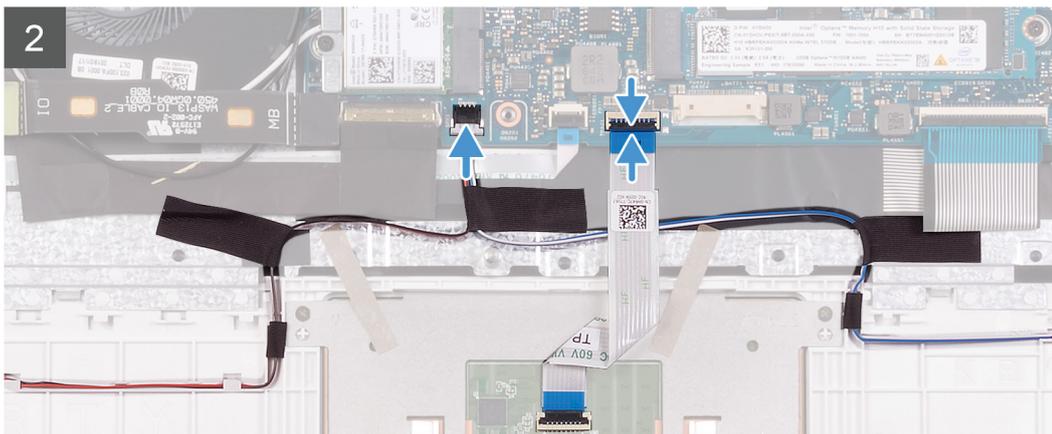
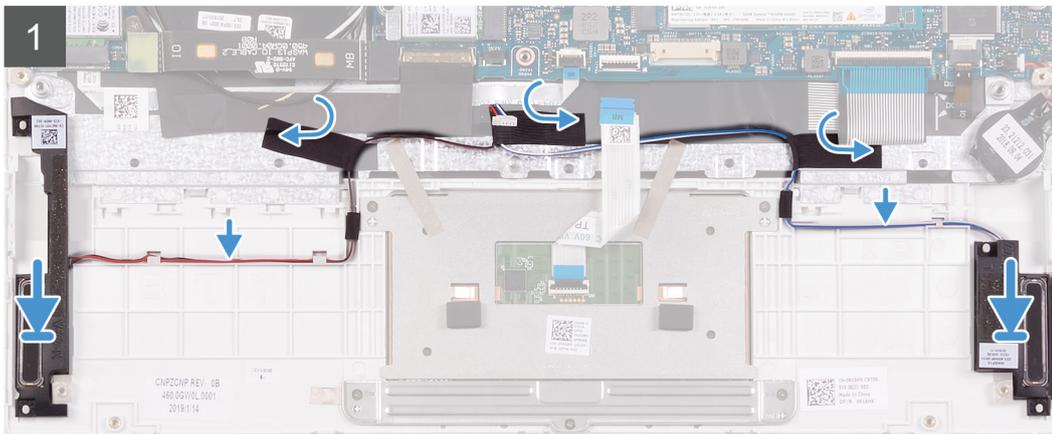
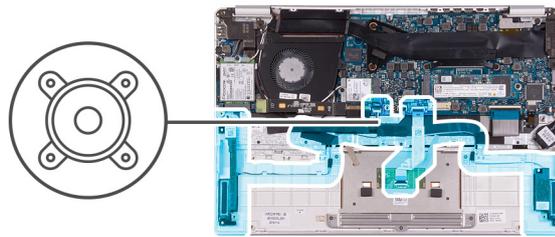
## Installing the speakers

### 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 speakers and provides a visual representation of the installation procedure.



### Steps

1. Using the alignment posts and rubber grommets, place the speakers in the slots on the palm-rest and keyboard assembly.
2. Route the speaker cable through the routing guides on the palm-rest and keyboard assembly.
3. Adhere the tapes that secure the speaker cable to the palm-rest and keyboard assembly.
4. Connect the speaker cable to the system board.
5. Connect the touchpad cable to the system board and close the latch to secure the cable.

## Next steps

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

# WLAN card

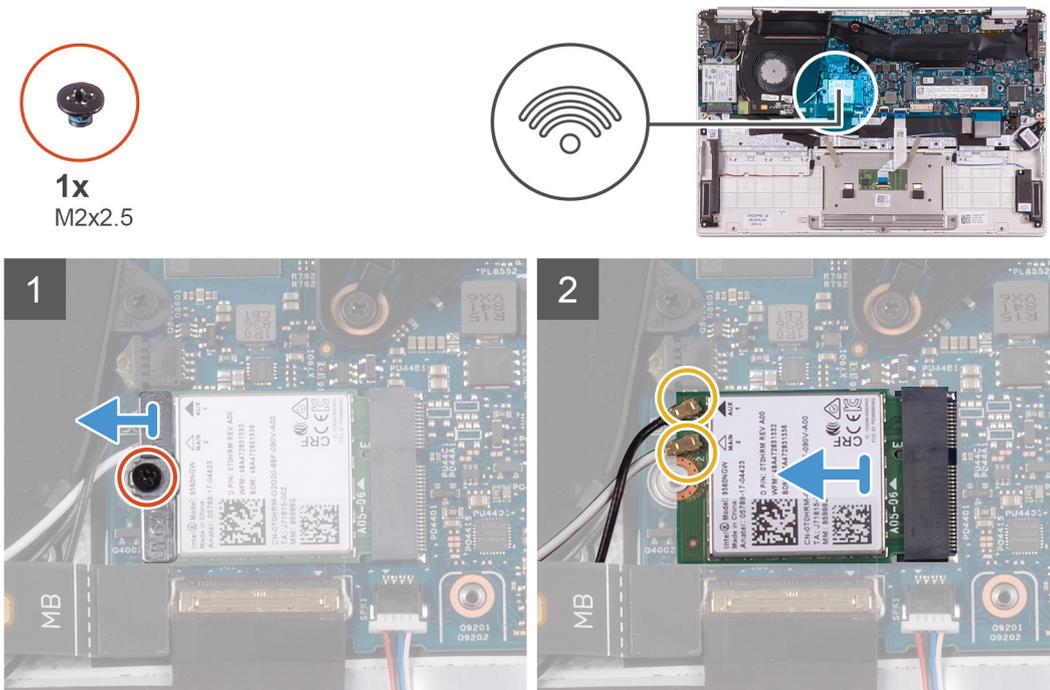
## Removing the WLAN card

### Prerequisites

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

### About this task

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



### Steps

1. Remove the screw (M2x2.5) that secures the WLAN-card bracket to the WLAN card and lift the WLAN-card bracket off the WLAN card.
2. Disconnect the antenna cables from the WLAN card.
3. Slide and remove the WLAN card from the WLAN-card slot.

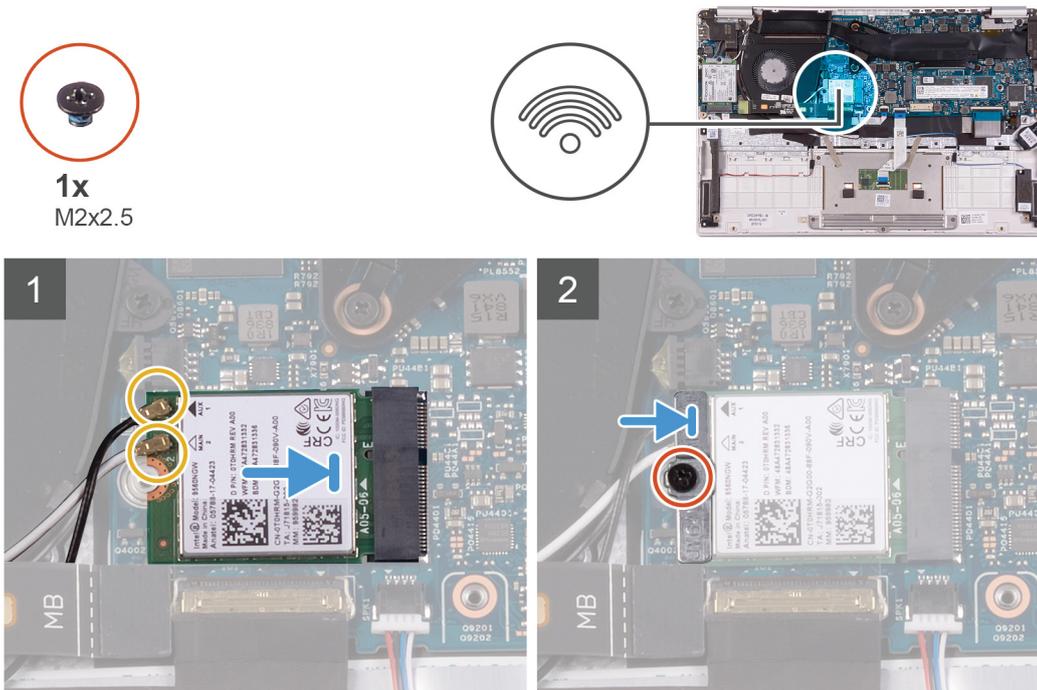
## Installing the WLAN card

### 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 WLAN card and provides a visual representation of the installation procedure.



## Steps

1. Connect the antenna cables to the WLAN card.
2. Align the notch on the WLAN card with the tab on the WLAN card slot and insert the WLAN card at an angle into the WLAN card slot.
3. Align and place the WLAN card bracket on the WLAN card.
4. Replace the screw (M2x2.5) to secure the WLAN card bracket to the WLAN card.

## Next steps

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

# WWAN card

## Removing the WWAN card

### Prerequisites

**i** **NOTE:** This procedure is only applicable for computers shipped with a WWAN configuration.

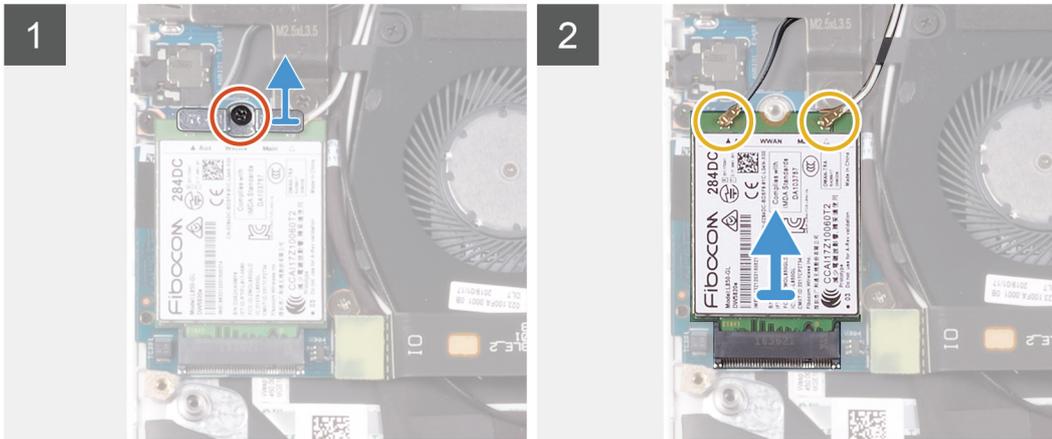
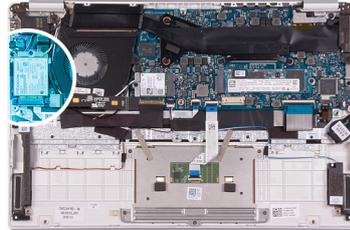
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

## About this task

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



1x  
M2x2.5



### Steps

1. Remove the screw (M2x2.5) that secures the WWAN card bracket to the WWAN card.
2. Note the alignment of the WWAN-card bracket before lifting it off the WWAN card.
3. Disconnect the antenna cables from the WWAN card.
4. Slide and remove the WWAN card from the WWAN card slot.

## Installing the WWAN card

### Prerequisites

**i** **NOTE:** This procedure is only applicable for computers shipped with a WWAN configuration.

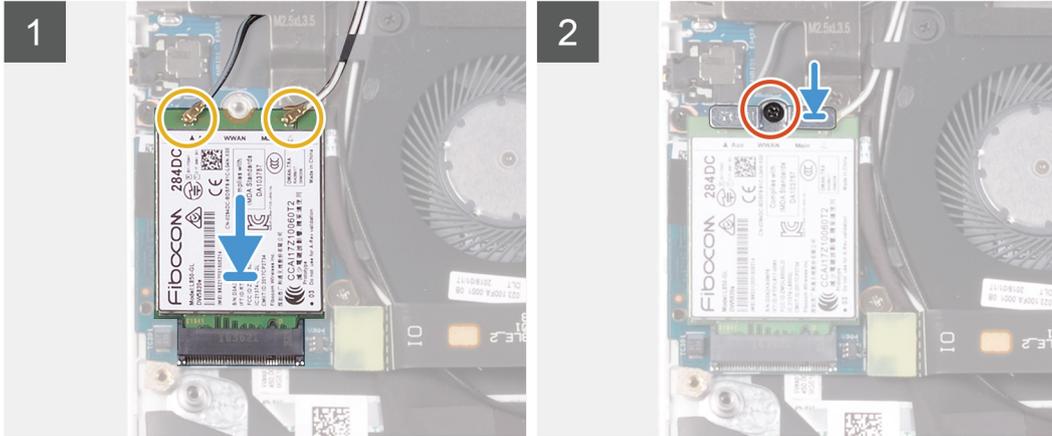
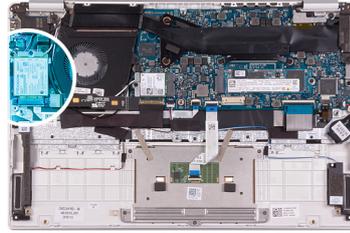
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

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



1x  
M2x2.5



### Steps

1. Align the notch on the WWAN card with the tab on the WWAN-card slot and insert the WWAN card at an angle into the WWAN-card slot.
2. Connect the antenna cables to the WWAN card and align the WWAN-card bracket on the WWAN card.
3. Replace the screw (M2x2.5) that secures the WWAN bracket to the WWAN card.

### Next steps

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

## Touchpad

### Removing the touchpad

#### Prerequisites

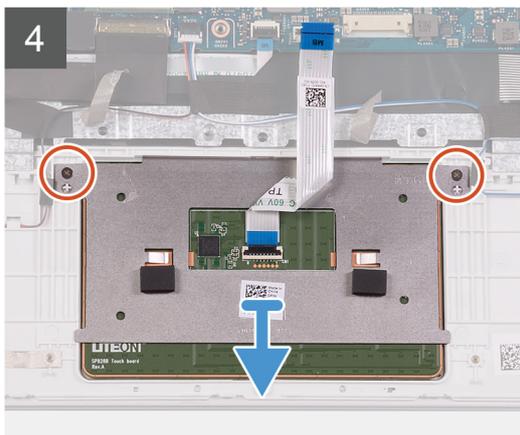
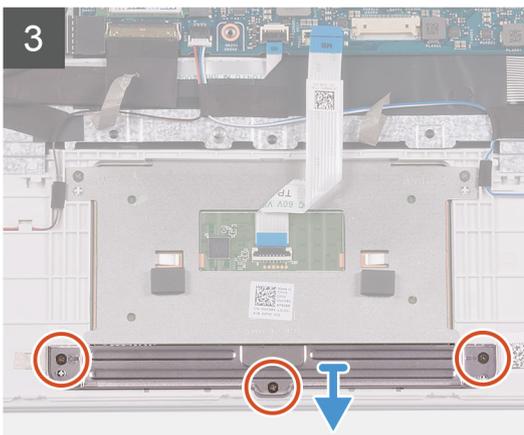
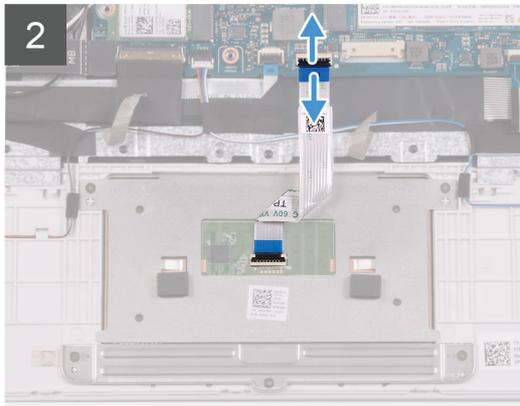
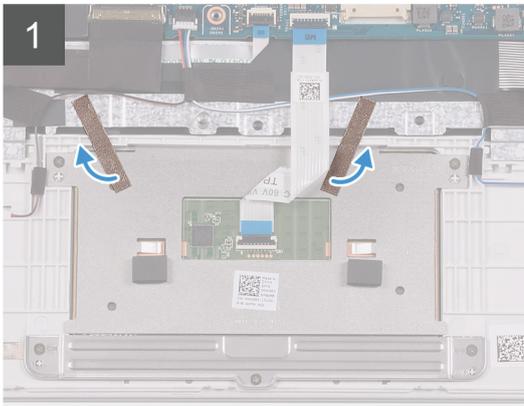
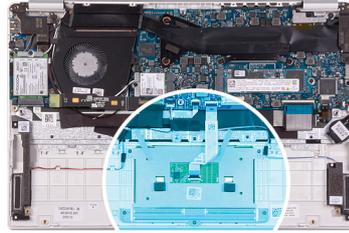
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

#### About this task

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



5x  
M1.6x2



### Steps

1. Peel the tapes that secure the touchpad to the palm-rest and keyboard assembly.
2. Open the latch and disconnect the touchpad cable from the system board.
3. Remove the three (M1.6x2) screws that secure the touchpad bracket to the palm-rest and keyboard assembly.
4. Lift the touchpad bracket off the palm-rest and keyboard assembly.
5. Remove the two (M1.6x2) screws that secure the touchpad to the palm-rest and keyboard assembly.
6. Lift the touchpad, along with the cable, off the palm-rest and keyboard assembly.

## Installing the touchpad

### Prerequisites

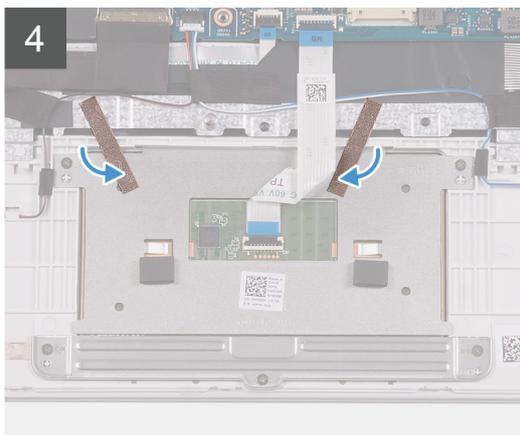
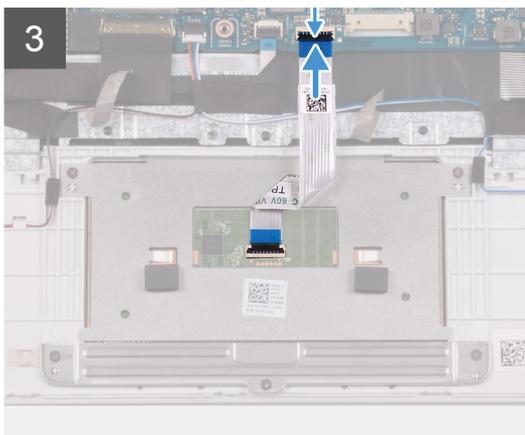
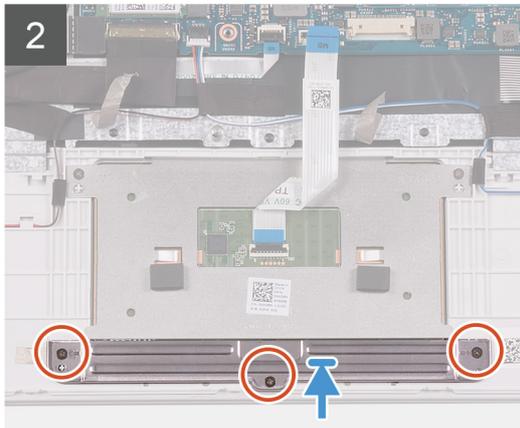
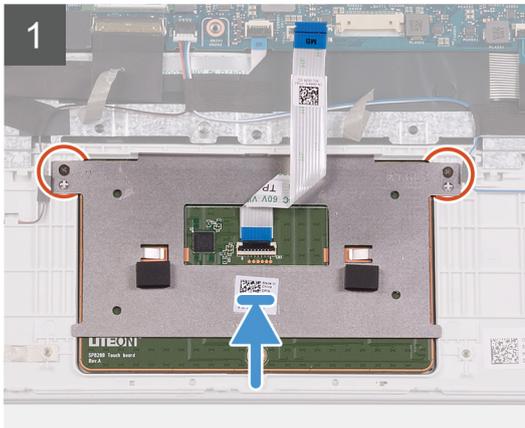
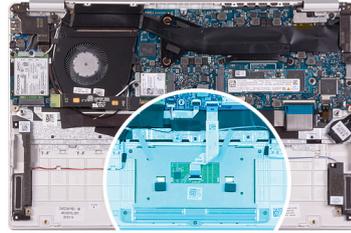
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

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



5x  
M1.6x2



### Steps

1. Align and place the touchpad into the slot on the palm-rest and keyboard assembly.
2. Replace the two (M1.6x2) screws that secure the touchpad to the palm-rest and keyboard assembly.
3. Align and place the touchpad bracket into the slot on the palm-rest and keyboard assembly.
4. Replace the three (M1.6x2) screws that secure the touchpad bracket to the palm-rest and keyboard assembly.
5. Slide the touchpad cable into its connector on the system board and close the latch to secure the cable.
6. Adhere the tape that secures the touchpad to the palm-rest and keyboard assembly.

### Next steps

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

# Power-adapter port

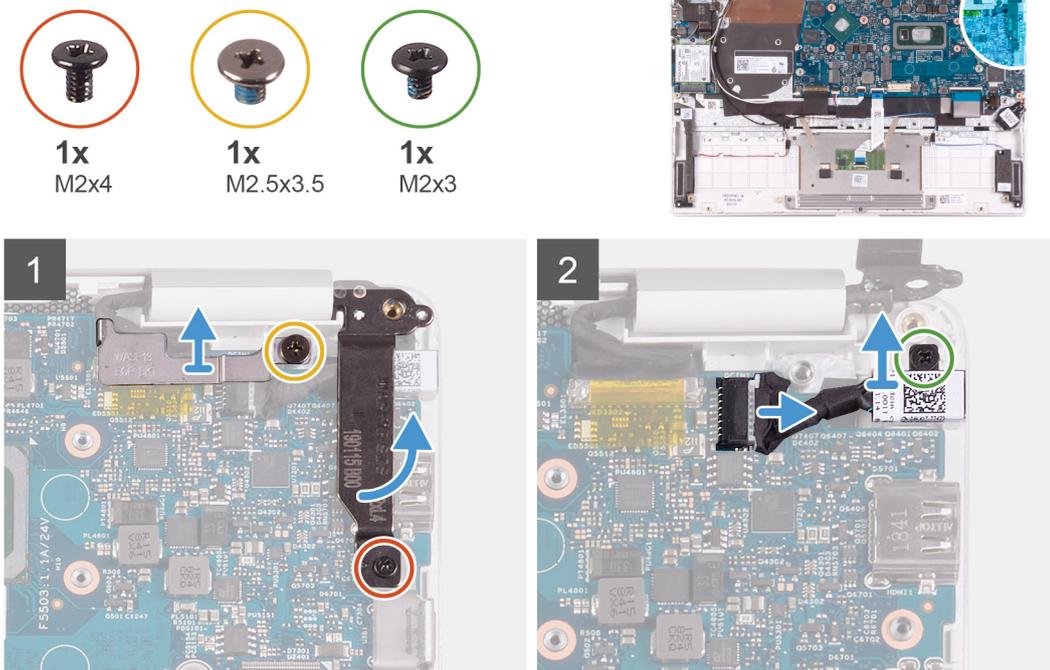
## Removing the power-adapter port

### Prerequisites

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

### About this task

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



### Steps

1. Remove the screw (M2.5x3.5) that secures the display-cable bracket to the system board.
2. Remove the screw (M2x4) that secures the right display hinge to the system board.
3. Open the display hinges at an angle of 90 degrees.
4. Disconnect the power-adapter port cable from the system board.
5. Remove the screw (M2x3) that secures the power-adapter port to the palm-rest and keyboard assembly.
6. Lift the power-adapter port, along with its cable, off the palm-rest and keyboard 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 power-adapter port and provides a visual representation of the installation procedure.



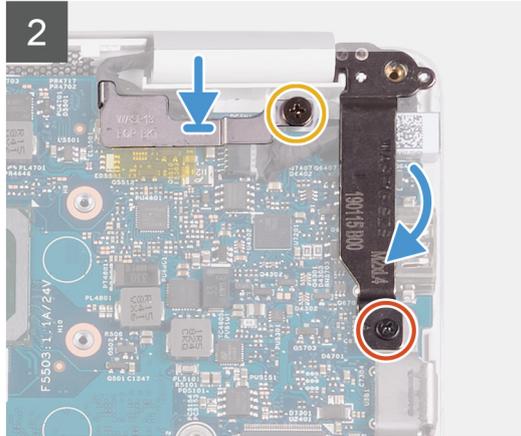
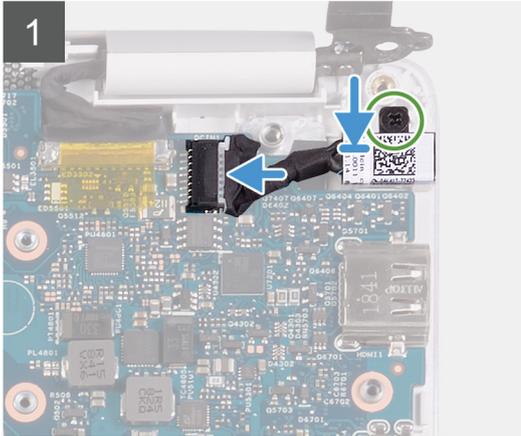
1x  
M2x4



1x  
M2.5x3.5



1x  
M2x3



### Steps

1. Connect the power-adapter port cable to the system board.
2. Replace the screw (M2x3) that secures the power-adapter port to the palm-rest and keyboard assembly.
3. Align and place the display-cable bracket on the system board.
4. Replace the screw (M2.5x3.5) that secure the display-cable bracket to the system board.
5. Using the alignment posts, close the display hinges.
6. Replace the screw (M2x4) that secure the right display hinge to the system board.

### Next steps

1. Install the [battery](#).
2. Install the [base cover](#).
3. 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 [battery](#).

#### About this task

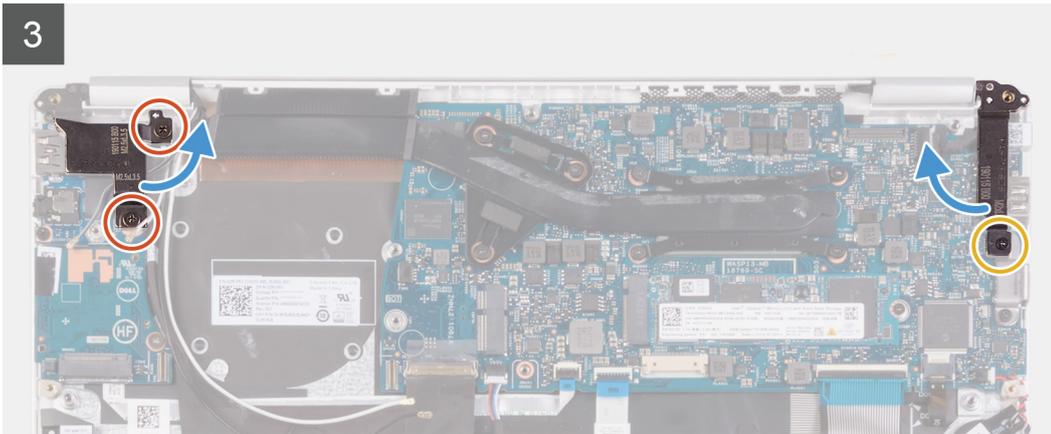
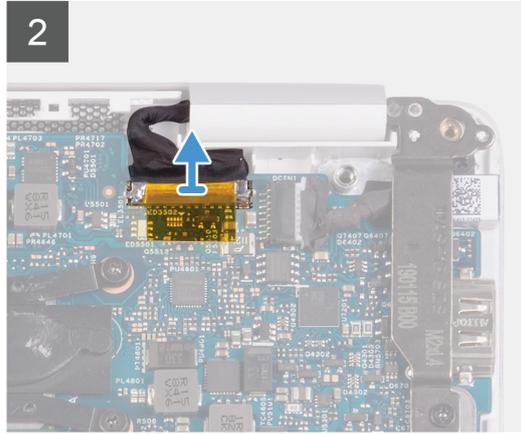
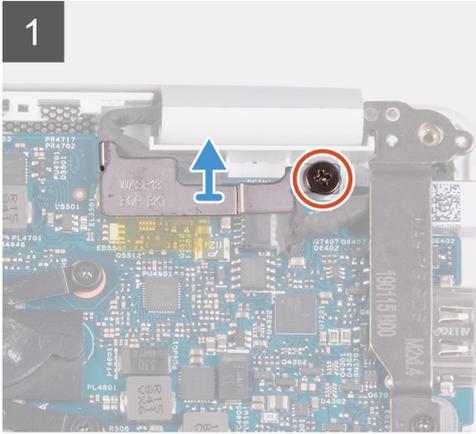
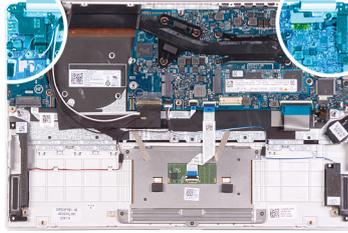
The following image indicates the location of display assembly and provides a visual representation of the removal procedure.



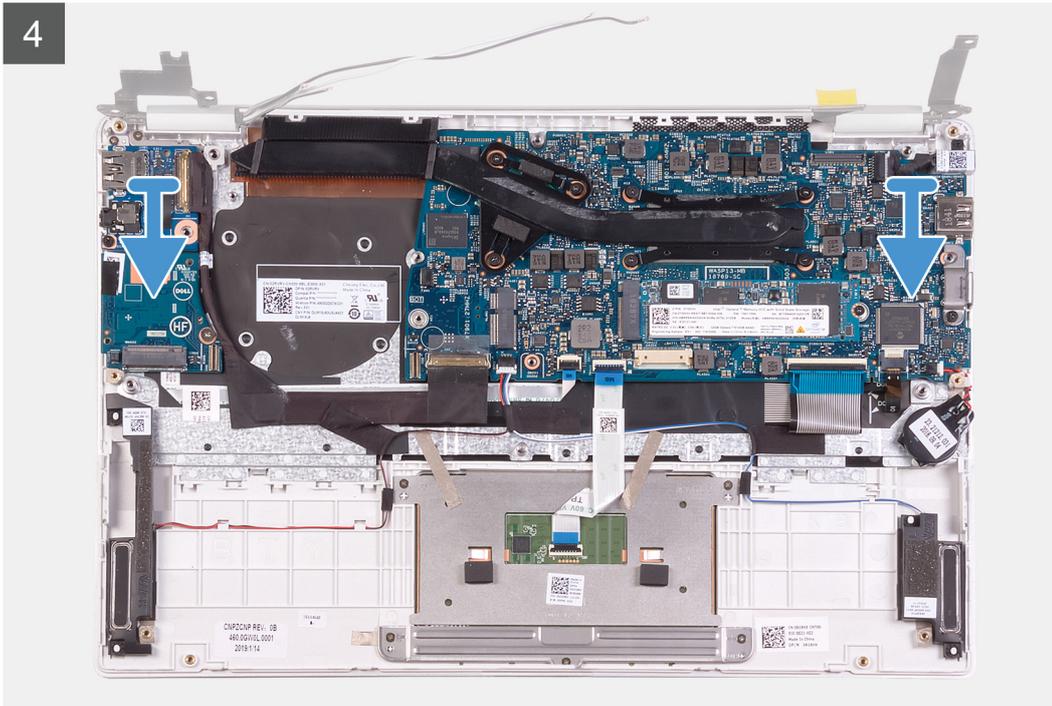
**3x**  
M2.5x3.5



**1x**  
M2x4



4



### Steps

1. Remove the screw (M2.5x3.5) that secures the display-cable bracket to the system board.
2. Lift the display-cable bracket off the system board.
3. Using the pull tab, disconnect the display cable from the system board.
4. Remove the two screws (M2.5x3.5) that secure the left display hinge to the I/O board and palm-rest and keyboard assembly.
5. Remove the screw (M2x4) that secures the right display hinge to the system board.
6. Open the display hinges at an angle of 90 degrees.
7. Remove the palm-rest and keyboard assembly off the display assembly.



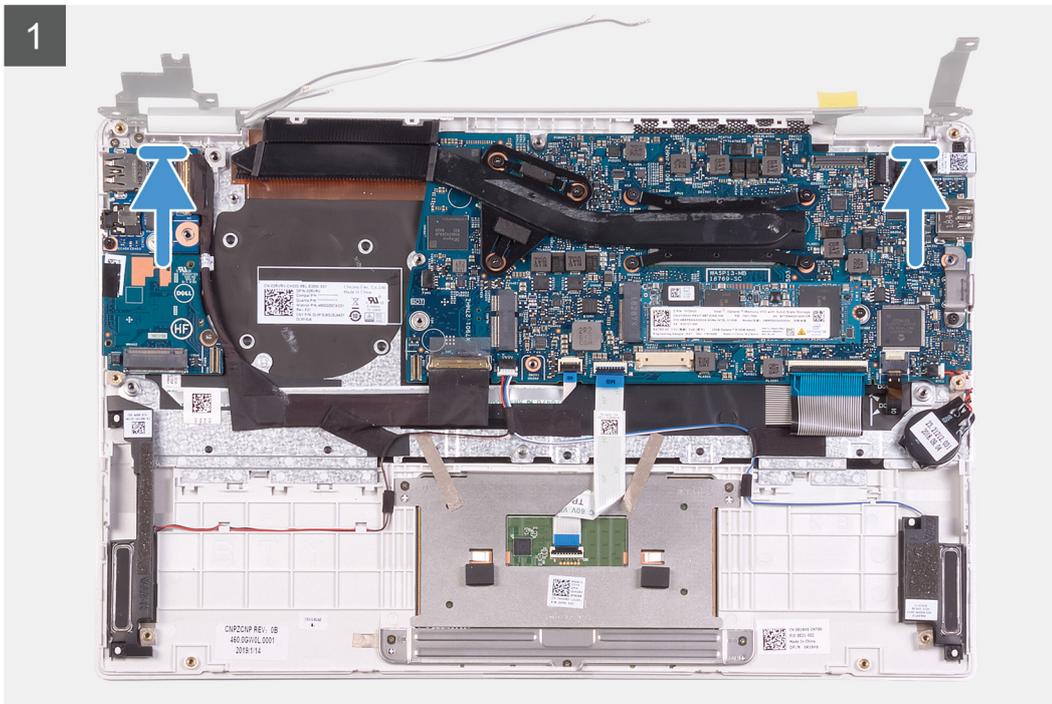
# Installing the display assembly

## 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 display assembly and provides a visual representation of the installation procedure.

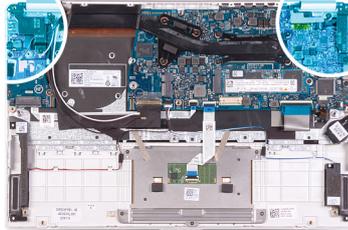




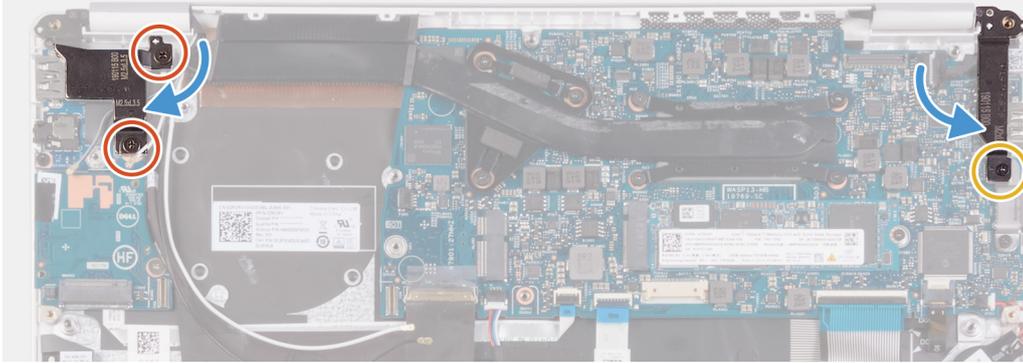
**3x**  
M2.5x3.5



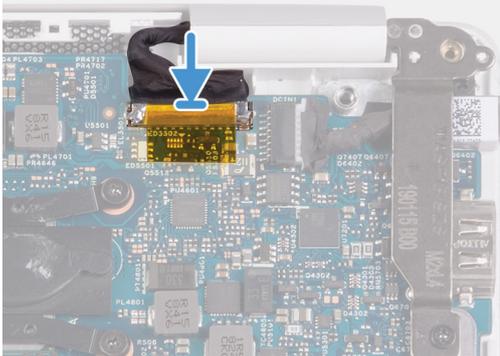
**1x**  
M2x4



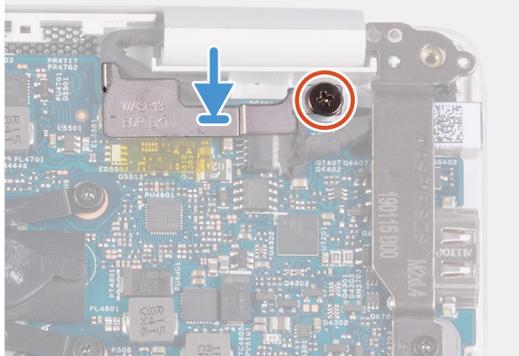
**2**



**3**



**4**



## Steps

1. Align and place the palm-rest and keyboard assembly on the display assembly.
2. Using the alignment posts, close the display hinges.
3. Replace the two screws (M2.5x3.5) that secures the left display hinge to the I/O board and palm-rest and keyboard assembly.
4. Replace the screw (M2x4) that secures the right display hinge to the system board.
5. Connect the display cable on to the connector on the system board.
6. Align and place the display-cable bracket on the display cable.
7. Replace the screw (M2x4) that secures the display-cable bracket to the system board.

## Next steps

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

# I/O board

## Removing the I/O board

### Prerequisites

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

### About this task

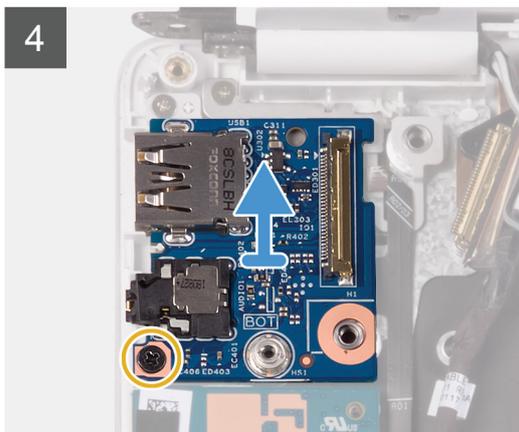
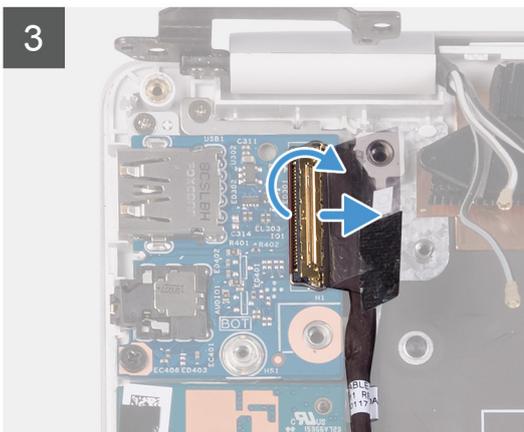
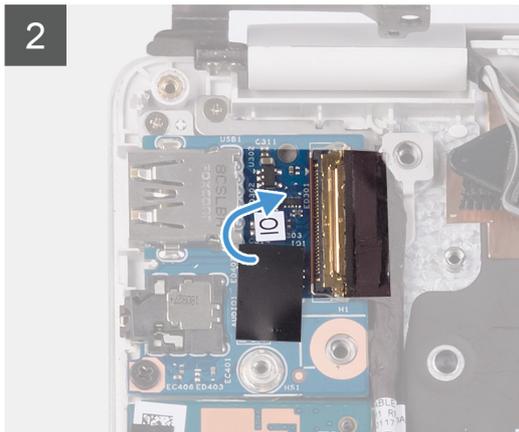
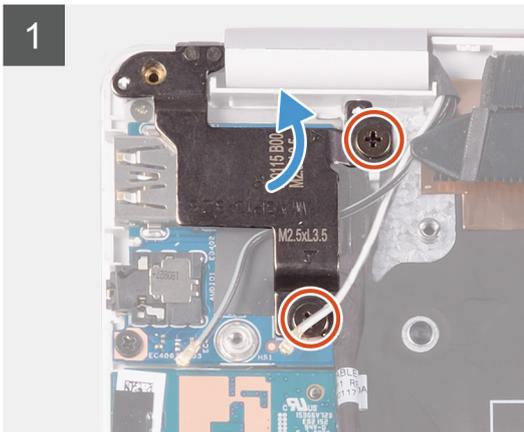
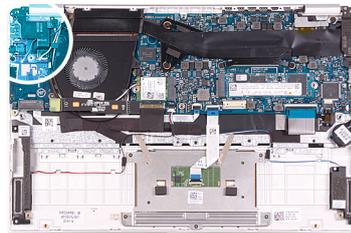
The following image indicates the location of I/O board and provides a visual representation of the removal procedure.



2x  
M2.5x3.5



1x  
M2x3



### Steps

1. Remove the two screws (M2.5x3.5) that secure the left display hinge to the I/O board and palm-rest and keyboard assembly.
2. Open the display hinges at an angle of 90 degrees.
3. Peel the tape that secures the I/O-board cable to the I/O board.

4. Open the latch and disconnect the I/O-board cable from the I/O board.
5. Remove the screw (M2.5x2.5) that secures the I/O board to the palm-rest and keyboard assembly.
6. Remove the screw (M2x3) that secures the I/O board to the palm-rest and keyboard assembly.
7. Lift the I/O board off the palm-rest and keyboard assembly.

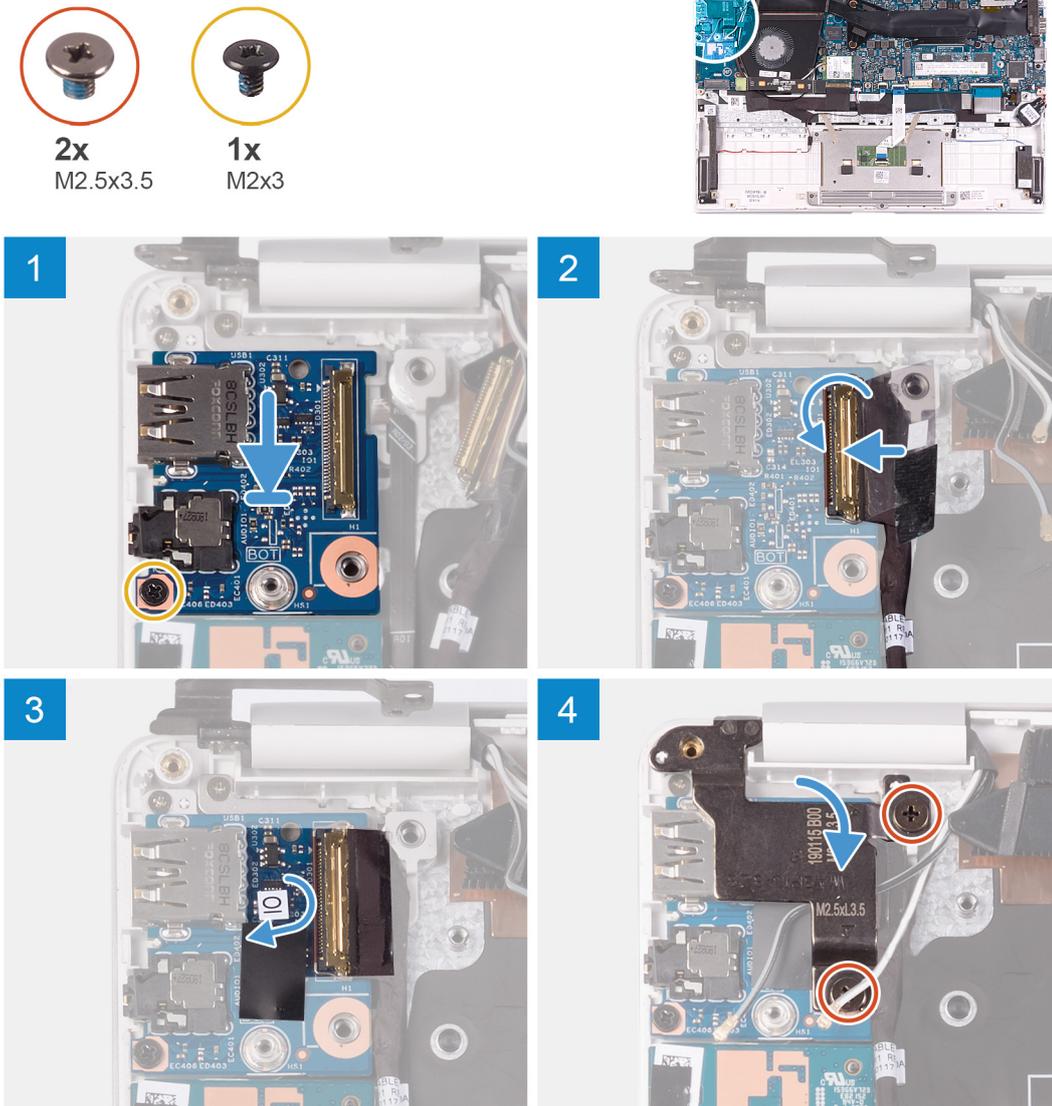
## Installing the I/O board

### 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 I/O board and provides a visual representation of the installation procedure.



### Steps

1. Align and place the I/O board on the palm-rest and keyboard assembly.
2. Replace the screw (M2x3) that secures the I/O board to the palm-rest and keyboard assembly.
3. Replace the screw (M2.5x2.5) that secures the I/O board to the palm-rest and keyboard assembly.
4. Connect the I/O-board cable to the I/O board and close the latch to secure the cable.

5. Adhere the tape that secures the I/O board to the I/O board.
6. Using the alignment posts, close the display hinges.
7. Replace the two screws (M2.5x3.5) that secure the left display hinge to the I/O board and palm-rest and keyboard assembly.

### Next steps

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

## Power-button board

### Removing the power-button board

#### Prerequisites

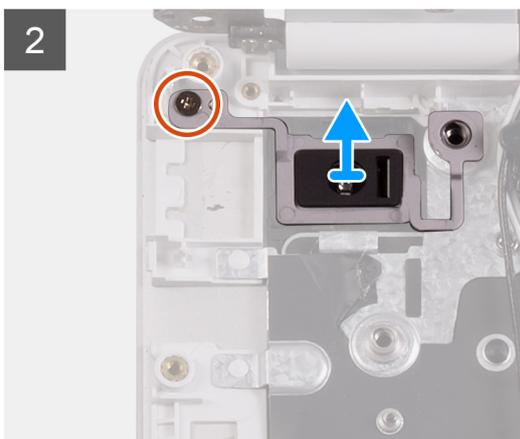
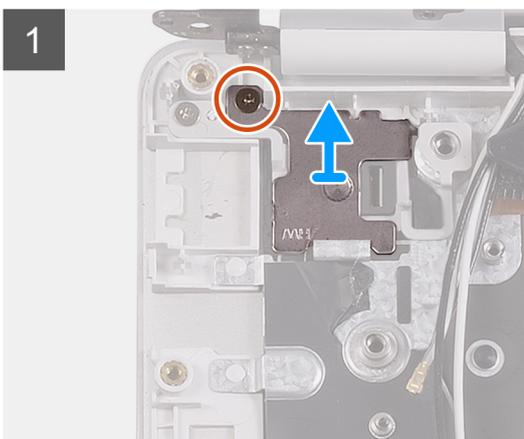
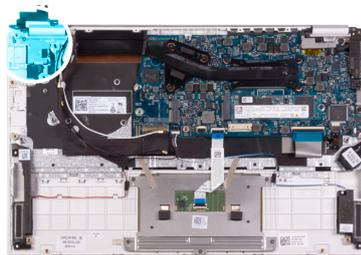
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [fan](#).
6. Remove the [I/O board](#).

#### About this task

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



2x  
M1.6x2



#### Steps

1. Remove the screw (M1.6x2) that secures the power-button bracket to the palm-rest and keyboard assembly.
2. Remove the screw (M1.6x2) that secures the power-button board to the palm-rest and keyboard assembly and lift the power-button board off the palm-rest and keyboard assembly.

# Installing the power-button board

## Prerequisites

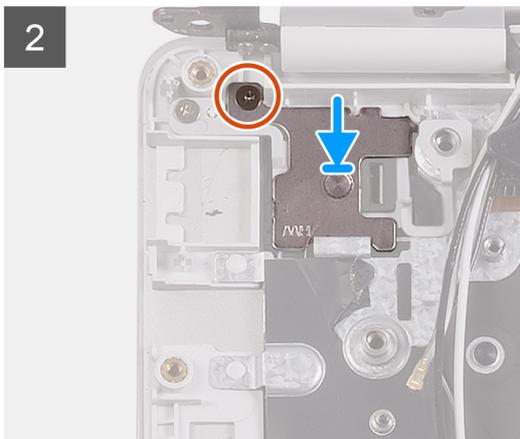
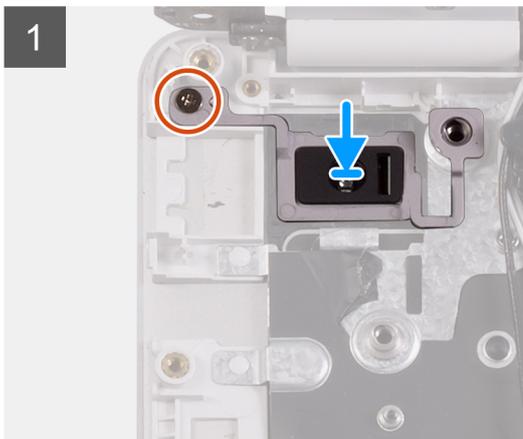
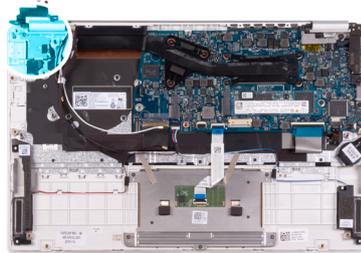
If you are replacing a component, remove the existing component before performing the installation procedure.

## About this task

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



2x  
M1.6x2



## Steps

1. Align the screw hole on the power-button board with the screw hole on the palm-rest and keyboard assembly.
2. Replace the screw (M1.6x2) that secures the power-button board to the palm-rest and keyboard assembly.
3. Align the screw hole on the power-button bracket with the screw hole on the palm-rest and keyboard assembly.
4. Replace the screw (M1.6x2) that secures the power-button bracket to the palm-rest and keyboard assembly.

## Next steps

1. Install the [I/O board](#).
2. Install the [fan](#).
3. Install the [WLAN card](#).
4. Install the [battery](#).
5. Install the [base cover](#).
6. Follow the procedure in [After working inside your computer](#).

# Power button with fingerprint reader

## Removing the power button with fingerprint reader

## Prerequisites

 **NOTE:** This procedure is only applicable for computers shipped with a fingerprint reader.

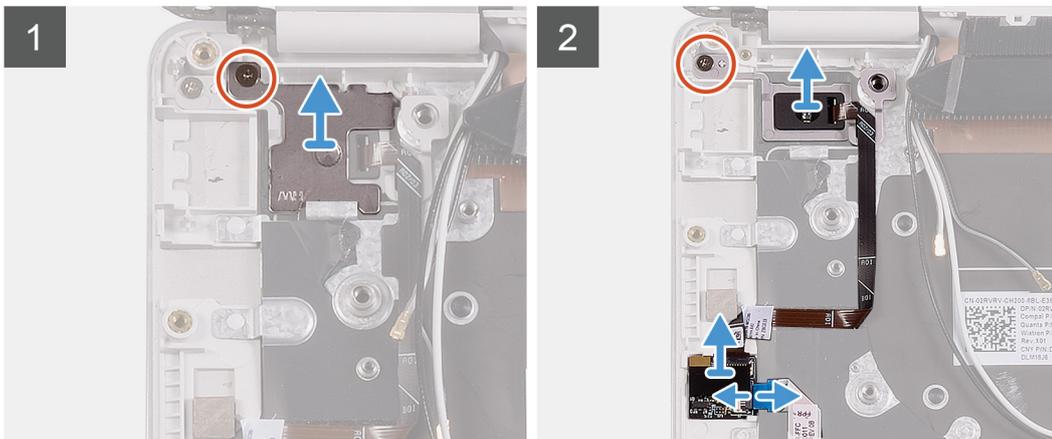
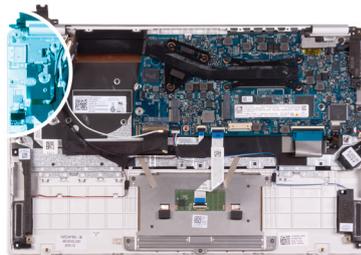
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [fan](#).
6. Remove the [I/O board](#).

### About this task

The following image indicates the location of power button with fingerprint reader and provides a visual representation of the removal procedure.



**2x**  
M1.6x2



### Steps

1. Remove the screw (M1.6x2) that secures the power-button bracket to the palm-rest and keyboard assembly.
2. Remove the screw (M1.6x2) that secures the power button with fingerprint reader to the palm-rest and keyboard assembly.
3. Open the latch and disconnect the fingerprint-reader cable from the fingerprint-reader board.
4. Lift the power button with fingerprint-reader, along with the power-button cable, off the palm-rest and keyboard assembly.
5. Lift the power button with fingerprint-reader, along with the power-button cable, off the palm-rest and keyboard assembly.

## Installing the power button with fingerprint reader

### Prerequisites

**NOTE:** This procedure is only applicable for computers shipped with a fingerprint reader.

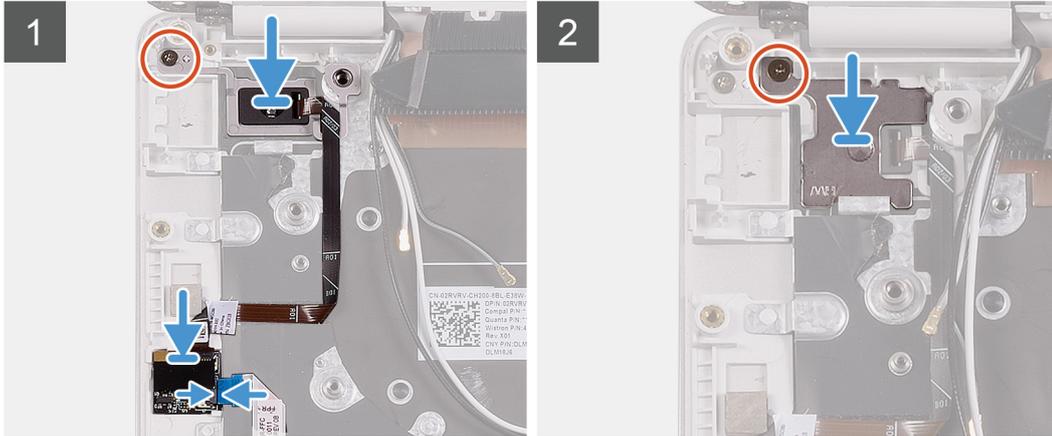
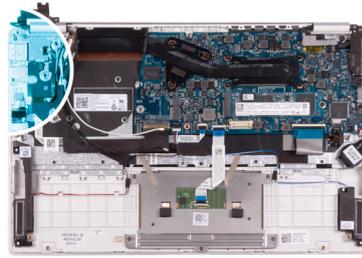
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of power button with fingerprint reader and provides a visual representation of the installation procedure.



**2x**  
M1.6x2



### Steps

1. Align and place the power button with fingerprint reader on the palm-rest and keyboard assembly.
2. Replace the screw (M1.6x2) that secure the power button with fingerprint reader to the palm-rest and keyboard assembly.
3. Connect the fingerprint-reader cable to the fingerprint-reader board and close the latch to secure the cable.
4. Align and place the power-button bracket on the palm-rest and keyboard assembly.
5. Replace the screw (M1.6x2) that secure the power-button bracket to the palm-rest and keyboard assembly.

### Next steps

1. Install the [I/O board](#).
2. Install the [fan](#).
3. Install the [WLAN card](#).
4. Install the [battery](#).
5. Install the [base cover](#).
6. Follow the procedure in [After working inside your computer](#).

## System board

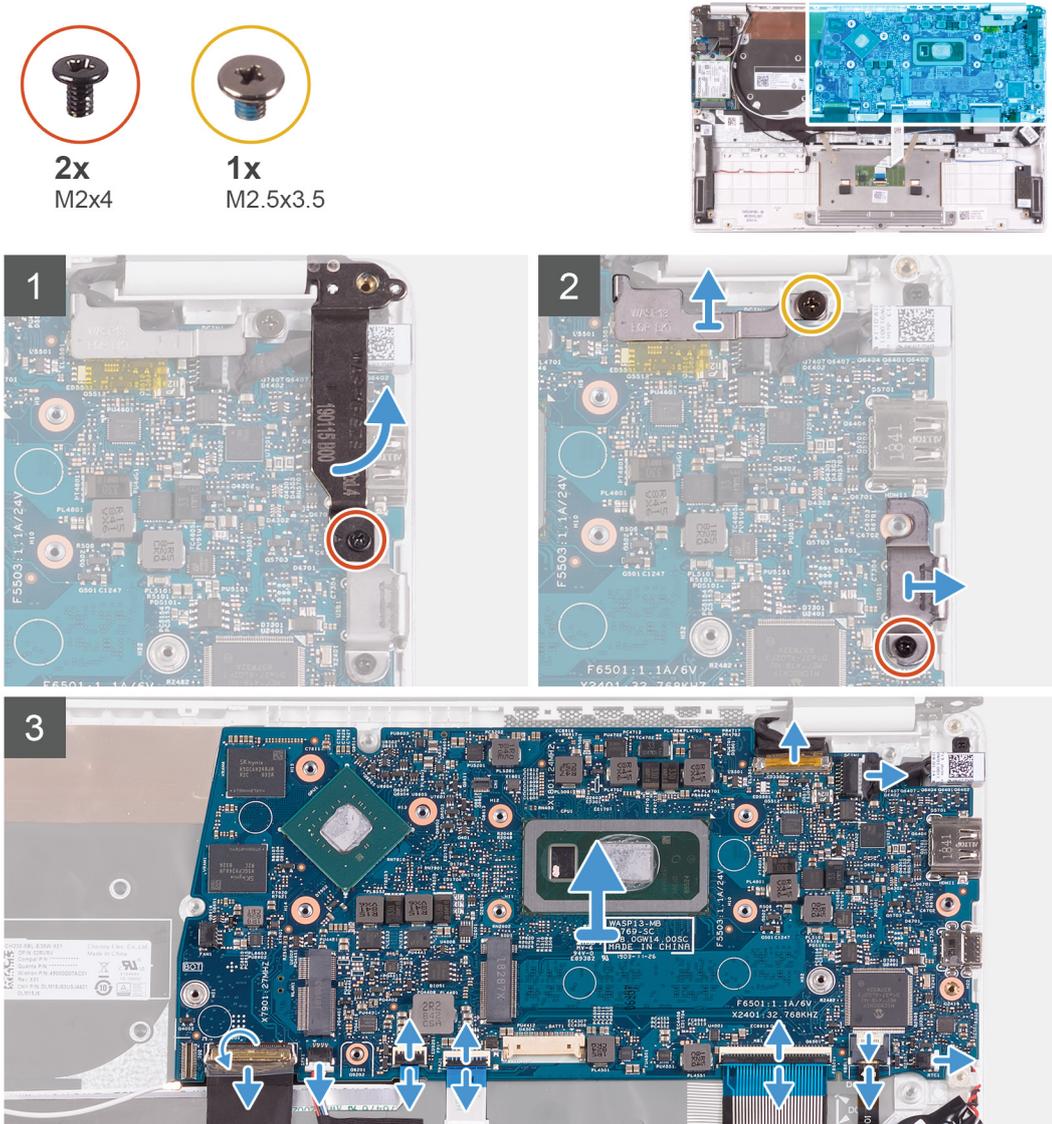
### Removing the system board

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [M.2 2280 solid-state drive](#) or [M.2 2230 solid-state drive](#), whichever applicable.
5. Remove the [WLAN card](#).
6. Remove the [fan](#).
7. Remove the [heat sink](#).

## About this task

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



## Steps

1. Remove the screw (M2x4) screw that secures the right display hinge to the system board.
2. Remove the screw (M2x4) that secures the display-cable bracket to the system board.
3. Remove the screw (M2.5x3.5) screw that secures the USB Type-C port bracket to the system board.
4. Peel the tape that secures the I/O-board cable to the system board.
5. Open the latch and disconnect the I/O-board cable from the system board.
6. Disconnect the speaker cable from the system board.
7. Open the latch and disconnect the fingerprint-reader cable from the system board.
8. Open the latch and disconnect the touchpad cable from the system board.
9. Open the latch and disconnect the keyboard cable from the system board.
10. Open the latch and disconnect the keyboard backlit cable from the system board.
11. Disconnect the coin-cell battery cable from the system board.
12. Disconnect the power-adaptor port cable from the system board.
13. Using the pull tab, disconnect the display cable from the system board.
14. Gently release the ports on the system board from the slots on the palm-rest and keyboard assembly and lift the system board off the palm-rest and keyboard assembly.

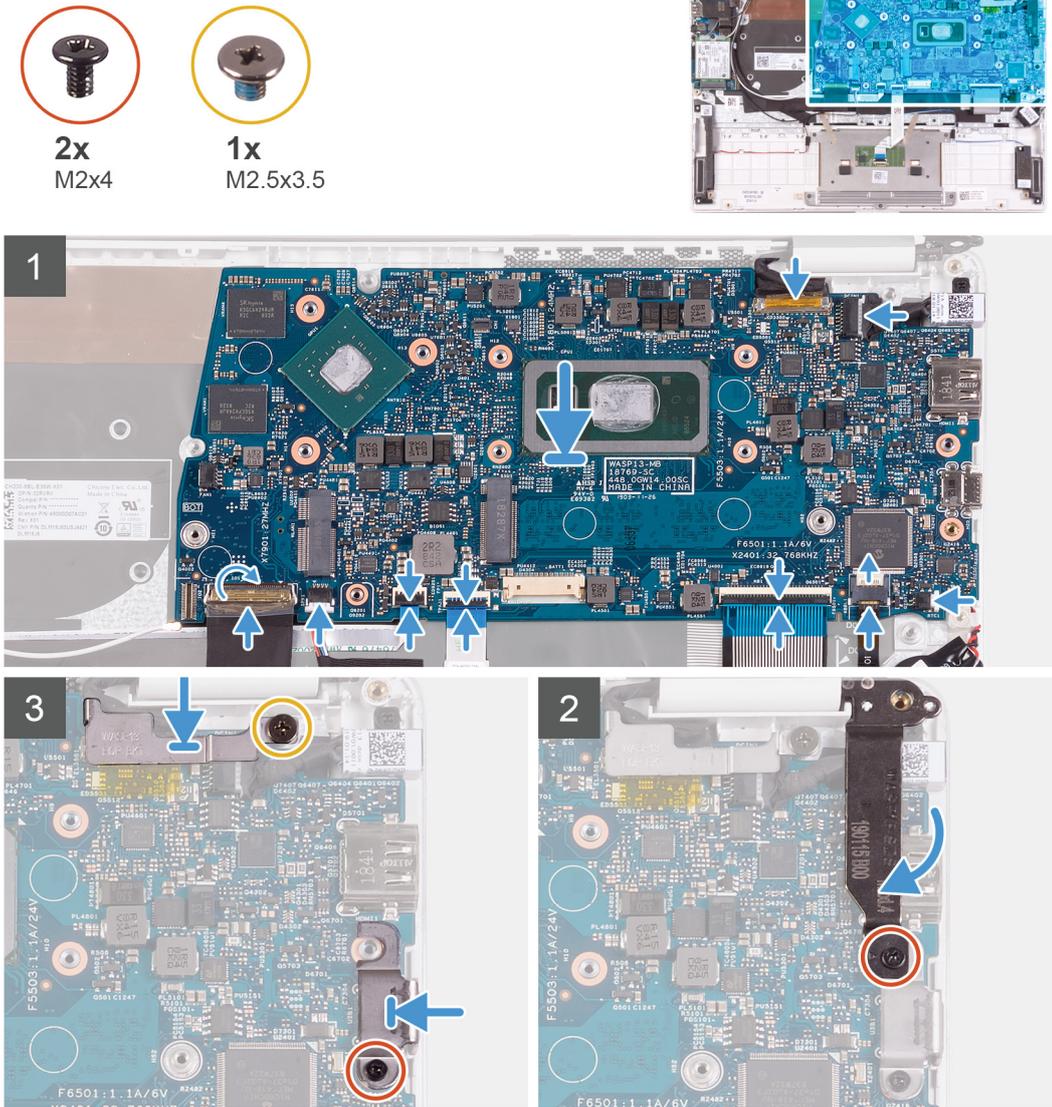
# Installing the system board

## 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 system board and provides a visual representation of the installation procedure.



## Steps

1. Slide the ports on the system board into the slots on the palm-rest and keyboard assembly and align the screw holes on the system board with the screw holes on the palm-rest and keyboard assembly.
2. Replace the screw (M2x4) that secures the system board to palm-rest and keyboard assembly.
3. Connect the display cable on to the connector on the system board
4. Connect the power-adapter port cable to the system board.
5. Connect the coin-cell battery cable to the system board.
6. Connect the keyboard backlit cable to the system board and close the latch to secure the cable.
7. Connect the keyboard cable to the system board and close the latch to secure the cable.
8. Connect the touchpad cable to the system board and close the latch to secure the cable.

9. Connect the fingerprint-reader cable to the system board and close the latch to secure the cable.
10. Connect the speaker cable to the system board.
11. Connect the I/O-board cable to the system board and close the latch to secure the cable.
12. Adhere the tape that secures the I/O-board cable to the system board.
13. Replace the screw (M2x4) screw that secures the right display hinge to the system board.
14. Replace the screw (M2x4) that secures the display-cable bracket to the system board.
15. Replace the screw (M2.5x3.5) screw that secures the USB Type-C port bracket to the system board.

#### Next steps

1. Install the [power-adapter port](#).
2. Install the [display assembly](#).
3. Install the [heat sink](#).
4. Install the [fan](#).
5. Install the [WLAN card](#).
6. Install the [M.2 2280 solid-state drive](#) or [M.2 2230 solid-state drive](#), whichever applicable.
7. Install the [battery](#).
8. Install the [base cover](#).
9. Follow the procedure in [After working inside your computer](#).

## Display bezel

### Removing the display bezel

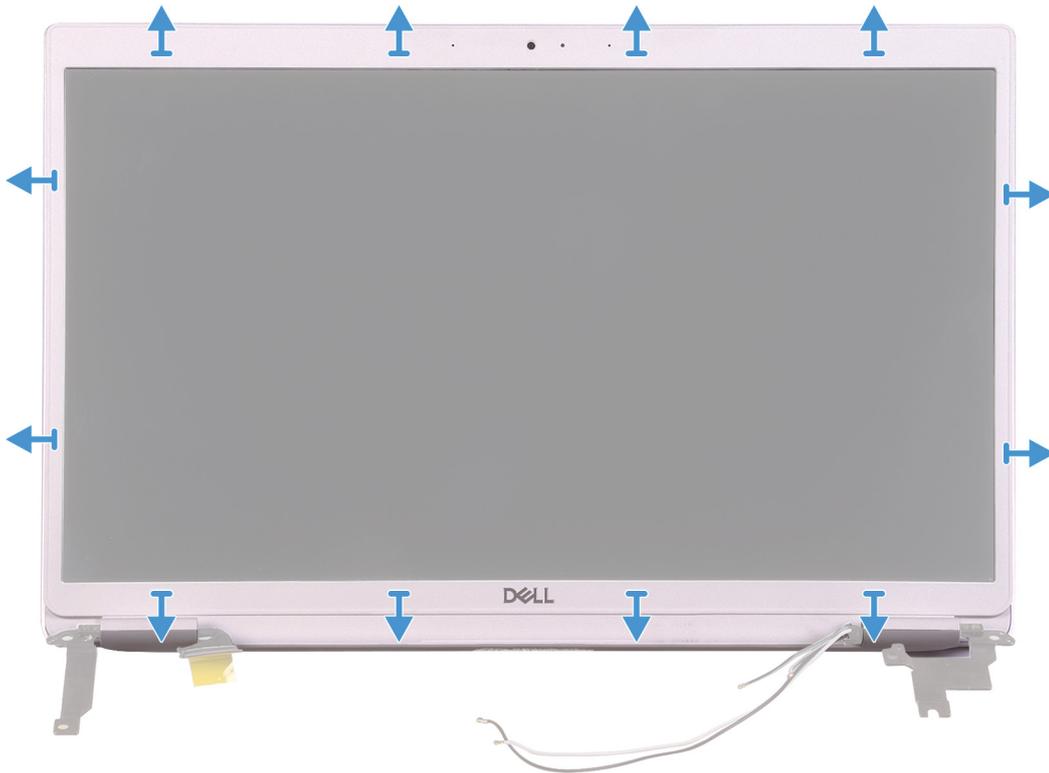
#### Prerequisites

 **NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [display assembly](#).

#### About this task

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



### Steps

1. Carefully pry the edges of the display bezel off the display back-cover and antenna assembly.
2. Remove the display bezel off the display back-cover and antenna assembly.

## Installing the display bezel

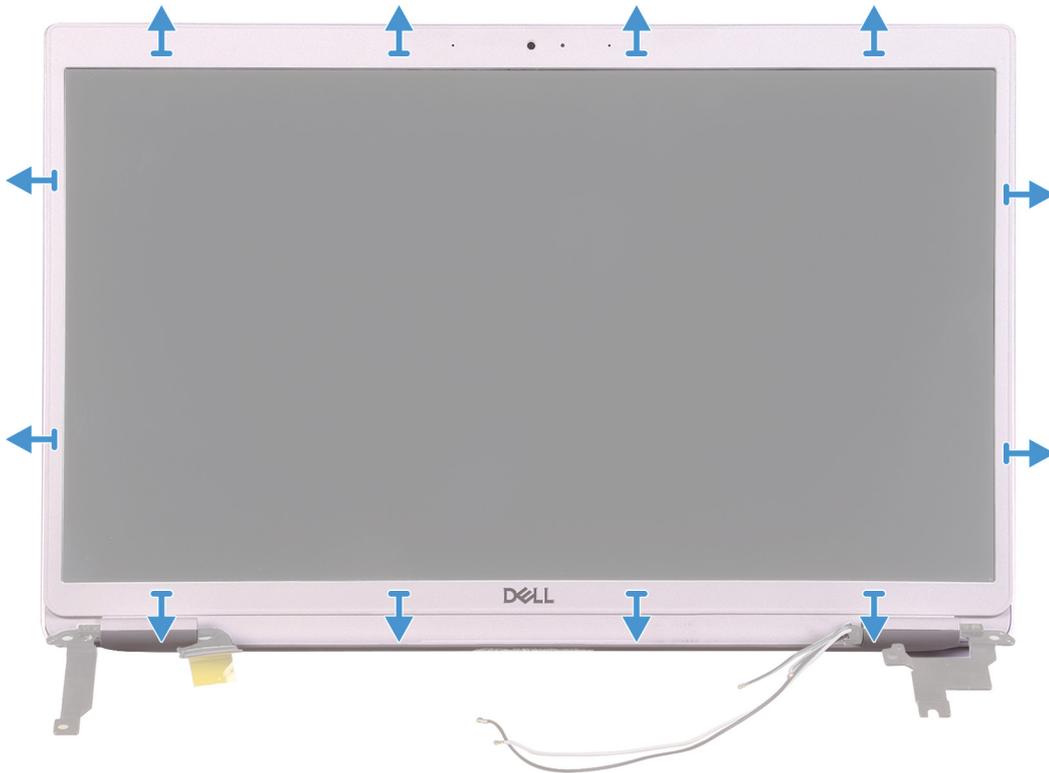
### Prerequisites

**NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

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 display bezel and provides a visual representation of the installation procedure.



### Steps

Align the display bezel with the display back-cover and antenna assembly, and gently snap the display bezel into place.

### Next steps

1. Install the [display assembly](#).
2. Install the [WLAN card](#).
3. Install the [battery](#).
4. Install the [base cover](#).
5. Follow the procedure in [After working inside your computer](#).

## Display panel

### Removing the display panel

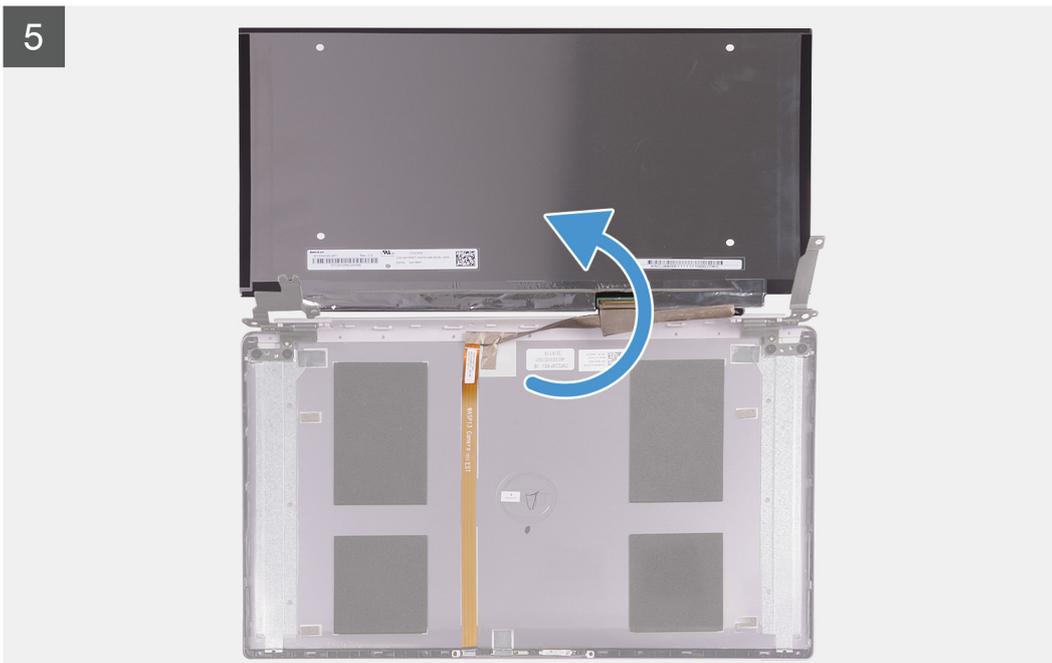
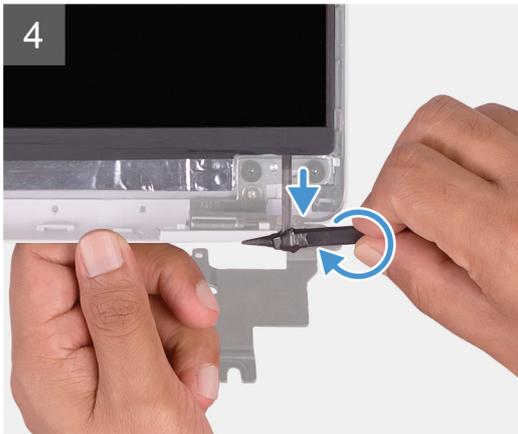
#### Prerequisites

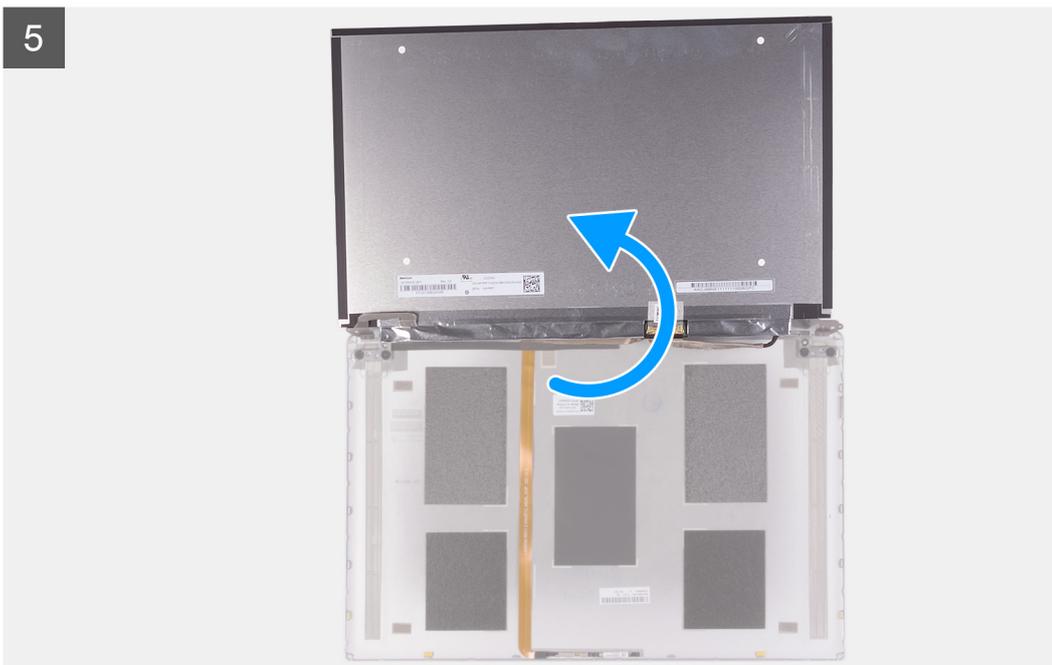
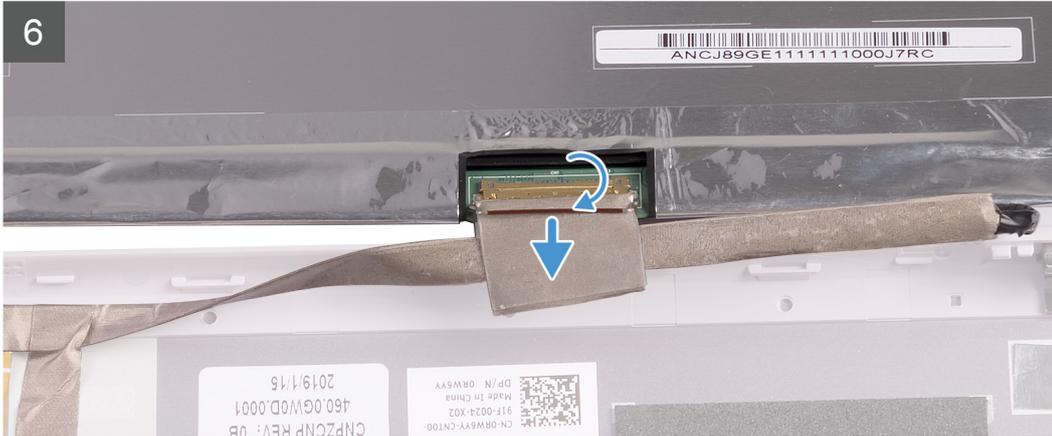
**NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [display assembly](#).
6. Remove the [display bezel](#).

#### About this task

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







## Steps

1. Using a plastic scribe, slide out the pull tab of the SR tape from both sides of the display panel.
2. Pull out a small section of the SR tape.
3. Roll the SR tape around the plastic scribe.

**NOTE:** To avoid severing/breaking the SR tape, pull out only a small section of the SR tape and then roll the SR tape around the scribe.

4. Lift the display panel off the display back-cover.
5. Peel the tape that secures the display cable to the display back-cover.
6. Open the latch and disconnect the display cable from the display back-cover.

## Installing the display panel

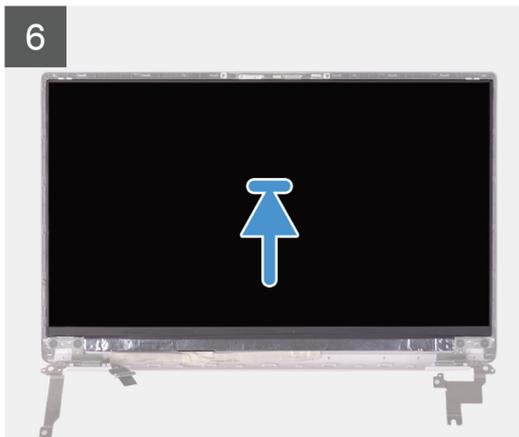
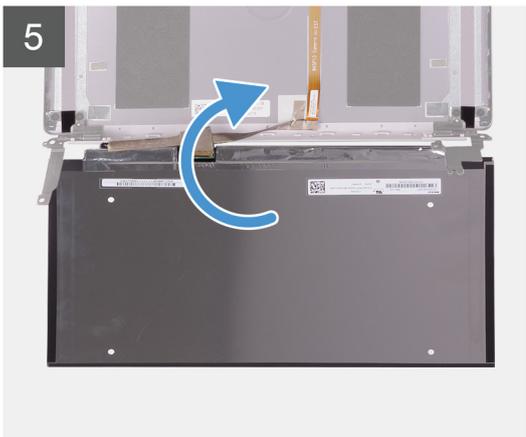
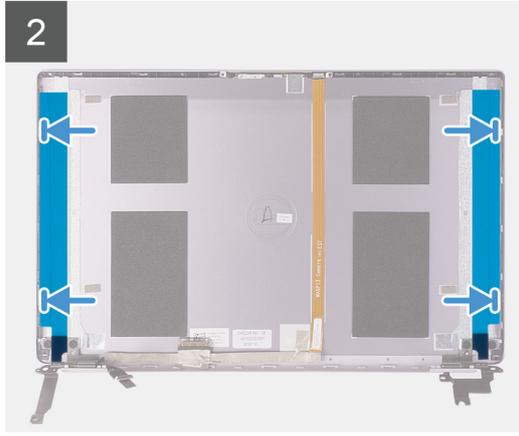
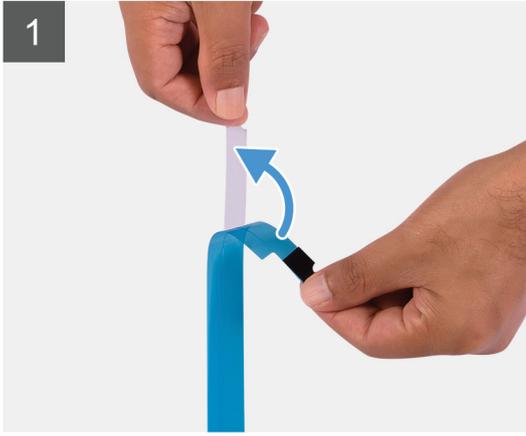
### Prerequisites

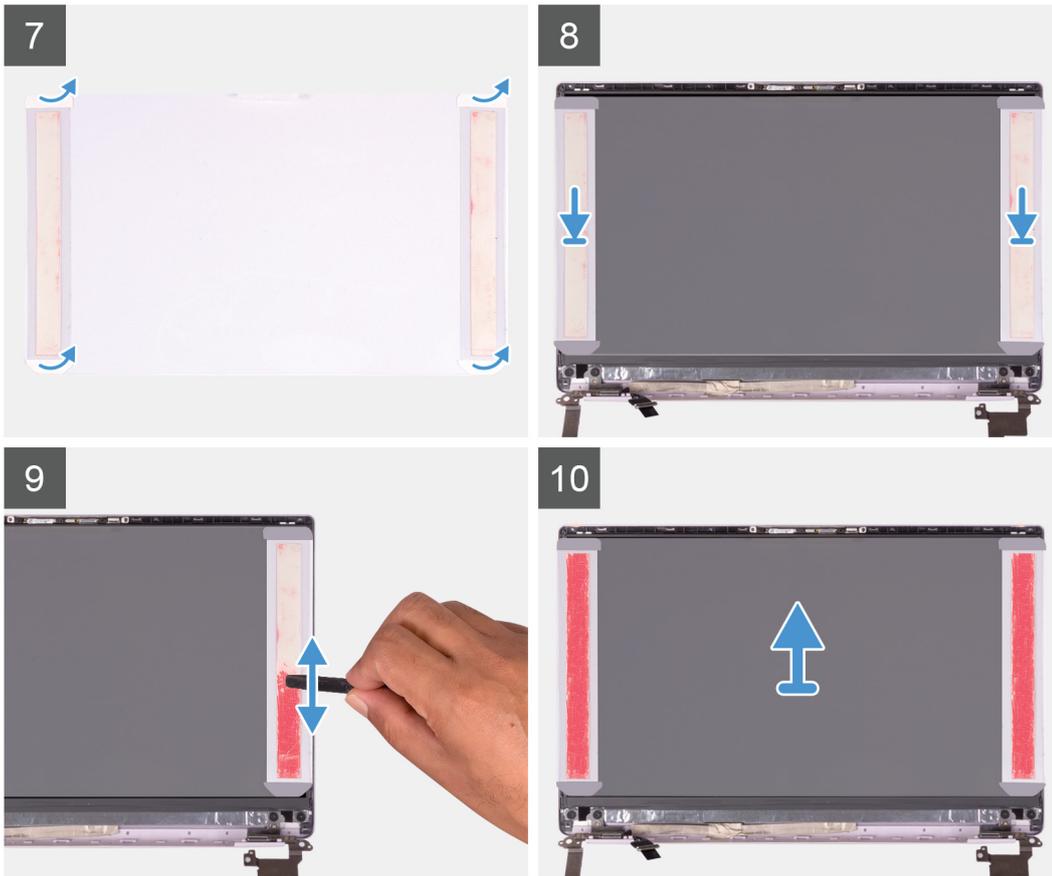
**NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

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 display panel and provides a visual representation of the installation procedure.





### Steps

1. Peel off the transparent protective films from the SR tapes.
2. Align and adhere both the SR tapes to the plastic edge of the display back-cover.
3. Peel off the blue protective films from the SR tapes.
4. Starting from the top, align and place the display panel on the display back-cover.
5. Remove the release paper from the pressure film.
6. Adhere the pressure film on the display panel.
7. Using the flat end of the plastic scribe or handle of the screwdriver, press and roll over the pressure films until they turn pink.
8. Peel off the pressure film from the display panel.
9. Place the display bezel on the display back-cover and snap it into place.

### Next steps

1. Install the [display bezel](#).
2. Install the [display assembly](#).
3. Install the [WLAN card](#).
4. Install the [battery](#).
5. Install the [base cover](#).
6. Follow the procedure in [After working inside your computer](#).

# Display hinges

## Removing the display hinges

### Prerequisites

**NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [display assembly](#).
6. Remove the [display bezel](#).

### About this task

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



### Steps

1. Remove the four (M2.5x2.5) screws that secure the display hinges to the display back-cover.
2. Remove the two (M2x2) screws that secure the display hinges to the display back-cover.
3. Lift the display hinges off the display back-cover.

## Installing the display hinges

### Prerequisites

**NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

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 display hinges and provides a visual representation of the installation procedure.



### Steps

1. Align the screw holes on the hinges with the screw holes on the display back-cover.
2. Replace the two (M2x2) screws that secure the display hinges to the display back-cover.
3. Replace the four (M2.5x2.5) screws to secure the display hinges to the display back-cover.

### Next steps

1. Install the [display bezel](#).
2. Install the [display assembly](#).
3. Install the [WLAN card](#).
4. Install the [battery](#).
5. Install the [base cover](#).
6. Follow the procedure in [After working inside your computer](#).

## Camera

### Removing the camera

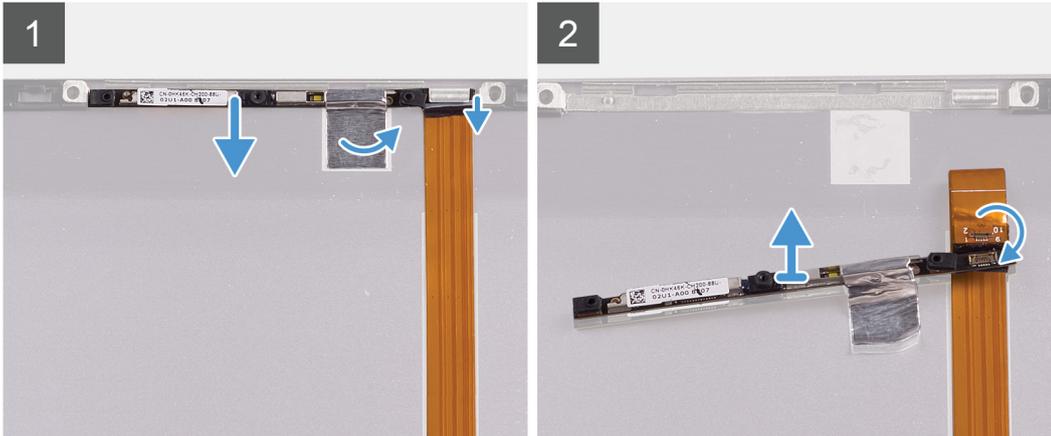
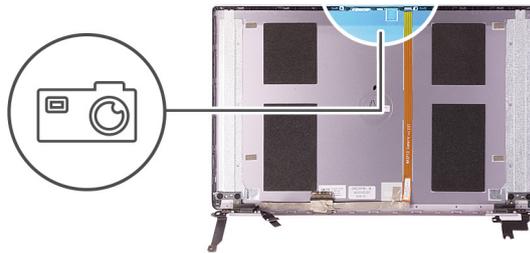
#### Prerequisites

**NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [display assembly](#).
6. Remove the [display bezel](#).
7. Remove the [display panel](#).

### About this task

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



### Steps

1. Peel the tape that secures the camera to the display back-cover
2. Using a plastic scribe, pry the camera from the alignment post on the display back-cover.
3. Turn over the camera and disconnect the camera cable off the camera.
4. Peel the tape off the camera and lift the camera off the display back-cover.

## Installing the camera

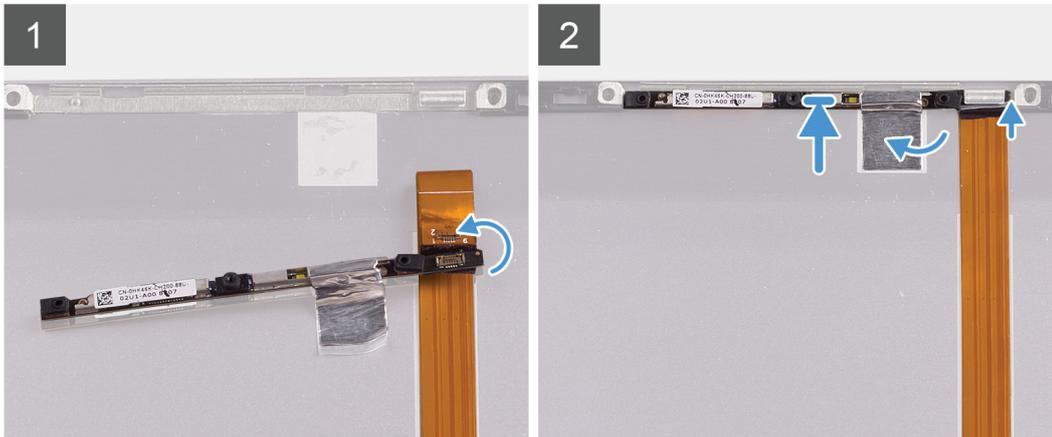
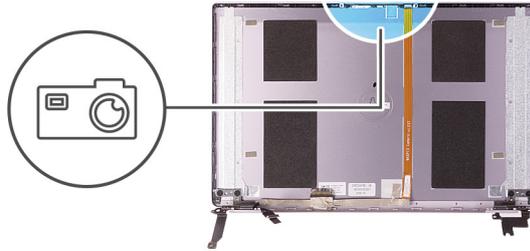
### Prerequisites

**NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

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 camera and provides a visual representation of the installation procedure.



### Steps

1. Adhere the camera to the display cable (tape) and connect the camera cable to the camera and turn it over.
2. Using the alignment post, turn the camera over and adhere to the display back-cover.
3. Adhere the tape that secures the camera to the display back-cover.

### Next steps

1. Install the [display panel](#).
2. Install the [display bezel](#).
3. Install the [display assembly](#).
4. Install the [WLAN card](#).
5. Install the [battery](#).
6. Install the [base cover](#).
7. Follow the procedure in [After working inside your computer](#).

## Display back-cover

### Removing the display back-cover

#### Prerequisites

**NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [display assembly](#).
6. Remove the [display bezel](#).
7. Remove the [display hinges](#).
8. Remove the [display panel](#).
9. Remove the [display cable](#).

10. Remove the camera.

### About this task

The following image indicates the display back-cover and provides a visual representation of the removal procedure.



### Steps

After performing all the prerequisites, we are left with the display back-cover.

**i** **NOTE:** Antenna cables are a part of the palm-rest and keyboard assembly for computers shipping with WLAN configurations.

## Installing the display back-cover

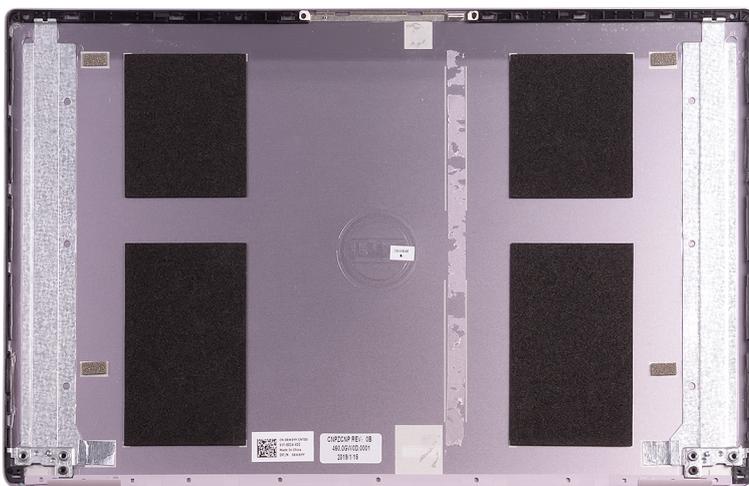
### Prerequisites

**i** **NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

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

### About this task

The following image indicates the display back-cover and provides a visual representation of the installation procedure.



## Steps

Place the display back-cover on a flat surface.

**i** **NOTE:** Antenna cables are a part of the palm-rest and keyboard assembly for computers shipping with WLAN configurations.

## Next steps

1. Install the [camera](#).
2. Install the [display cable](#).
3. Install the [display panel](#).
4. Install the [display hinges](#).
5. Install the [display bezel](#).
6. Install the [display assembly](#).
7. Install the [WLAN card](#).
8. Install the [battery](#).
9. Install the [base cover](#).
10. Follow the procedure in [After working inside your computer](#).

# Display cable

## Removing the display cable

### Prerequisites

**i** **NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [display assembly](#).
5. Remove the [display panel](#).
6. Remove the [display bezel](#).

### About this task

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



### Steps

1. Peel off the tape securing the display cable to the back-cover.
2. Peel the display cable off the display back-cover.

## Installing the display cable

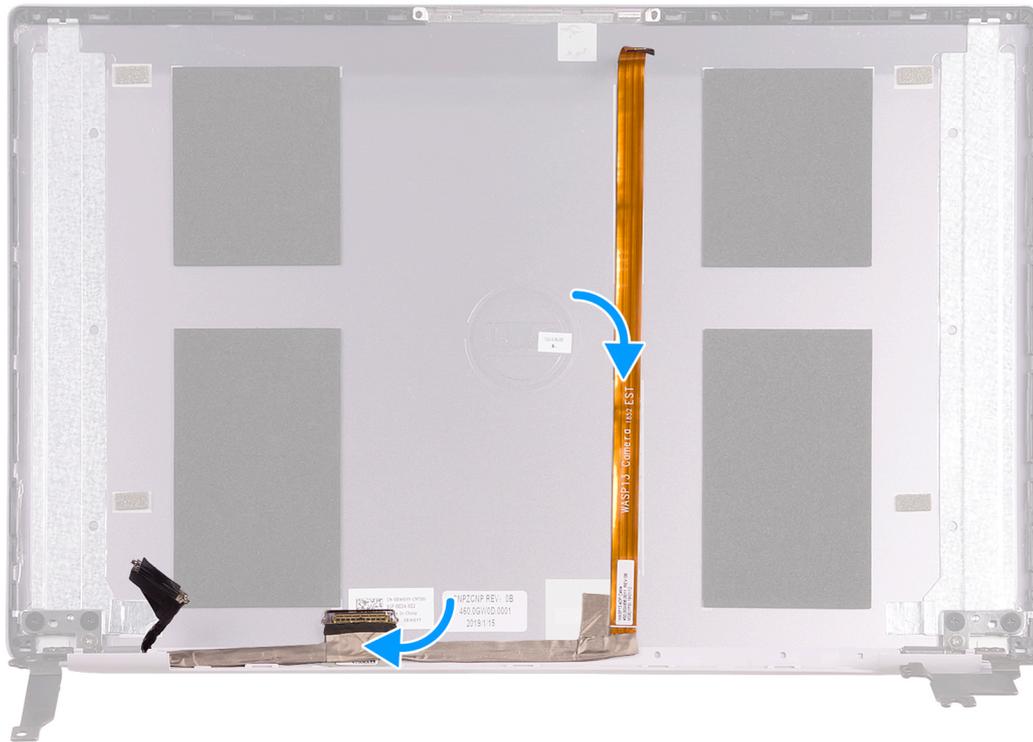
### Prerequisites

**NOTE:** This procedure is not applicable to computers shipped with a WWAN configuration.

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 display cable and provides a visual representation of the installation procedure.



### Steps

1. Adhere the tape securing the display cable to the back-cover.
2. Adhere the display cable to the display back-cover.

### Next steps

1. Install the [display bezel](#).
2. Install the [display panel](#).
3. Install the [display assembly](#).
4. Install the [battery](#).
5. Install the [base cover](#).
6. Follow the procedure in [After working inside your computer](#).

## Palm-rest and keyboard assembly

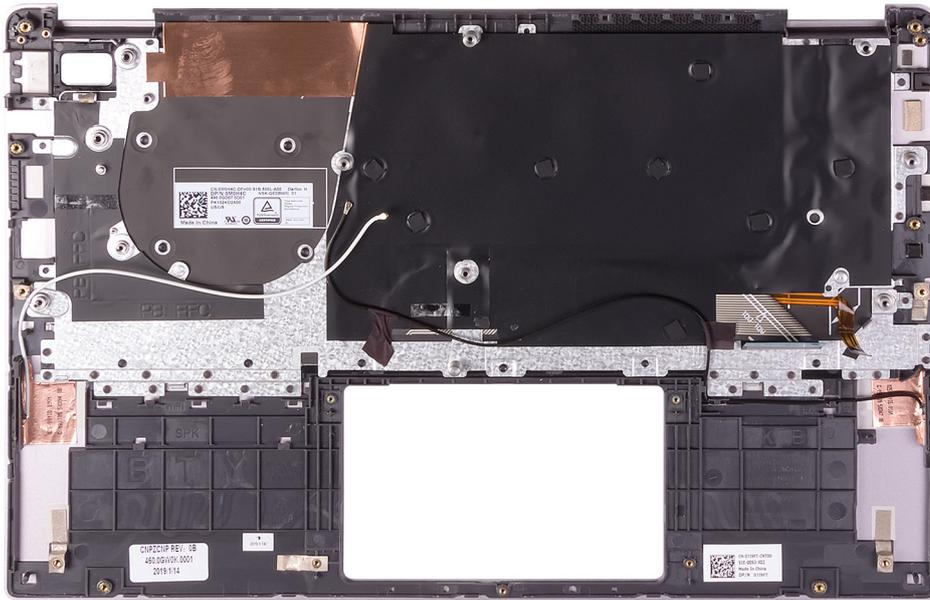
### Removing the palm-rest and keyboard assembly

#### Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [speakers](#).
6. Remove the [system board](#).
7. Remove the [display assembly](#).
8. Remove the [power button with fingerprint reader](#) or [power-button board](#), whichever applicable.
9. Remove the [power-adapter port](#).
10. Remove the [touchpad](#).

### About this task

The following image indicates the palm-rest and keyboard assembly and provides a visual representation of the removal procedure.



### Steps

After performing the steps in the pre-requisites, we are left with the palm-rest and keyboard assembly.

**NOTE:** Antenna cables are a part of the display back-cover for computers shipping with WWAN configuration.

**NOTE:** System board can be removed with heatsink attached.

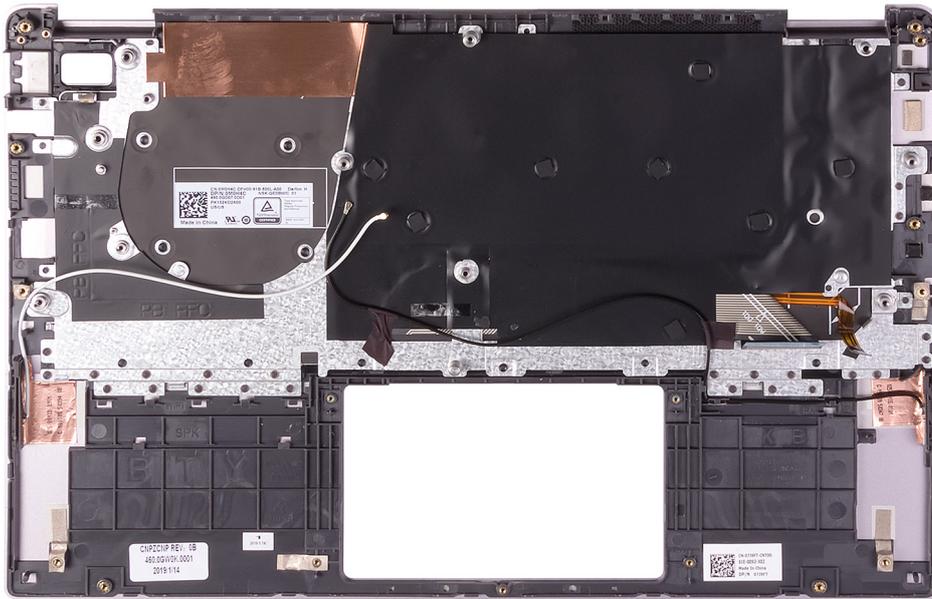
## Installing the palm-rest and keyboard assembly

### Prerequisites

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

### About this task

The following image indicates the palm-rest and keyboard assembly and provides a visual representation of the installation procedure.



## Steps

Place the palm-rest and keyboard assembly on a flat surface.

**NOTE:** Antenna cables are a part of the display back-cover for computers shipping with WWAN configuration.

## Next steps

1. Install the [touchpad](#).
2. Install the [power-adapter port](#).
3. Install the [power button with fingerprint reader](#) or [power-button board](#), whichever applicable.
4. Install the [display assembly](#).
5. Install the [system board](#).
6. Install the [speakers](#).
7. Install the [WLAN card](#).
8. Install the [battery](#).
9. Install the [base cover](#).
10. 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.

## Topics:

- System setup
- Entering BIOS setup program
- Navigation keys
- Boot Sequence
- System setup options
- Clearing CMOS settings
- Clearing BIOS (System Setup) and System passwords

## 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.

Keys	Navigation
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)

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

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

**i** **NOTE: Choosing Diagnostics, will display the ePSA diagnostics screen.**

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

## System setup options

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

**Table 2. System setup options—System information menu**

Overview	
BIOS Version	Displays the BIOS version number.
Service Tag	Displays the Service Tag of the computer.
Asset Tag	Displays the Asset Tag of the computer.
Ownership Tag	Displays the ownership tag of the computer.
Manufacture Date	Displays the manufacture date of the computer.
Ownership Date	Displays the ownership date of the computer.
Express Service Code	Displays the express service code of the computer.
Ownership Tag	Displays the ownership tag of the computer.
Signed Firmware Update	Displays whether the signed firmware update is enabled.
<b>Battery</b>	Displays the battery health information.
Primary	Displays the primary battery.
Battery Level	Displays the battery level.
Battery State	Displays the battery state.
Health	Displays the battery health.
AC Adapter	Displays whether an AC adapter is installed.
<b>Processor Information</b>	

## Overview

Processor Type	Displays the processor type.
Maximum Clock Speed	Displays the maximum processor clock speed.
Core Count	Displays the number of cores on the processor.
Processor L2 Cache	Displays the processor L2 Cache size.
Processor ID	Displays the processor identification code.
Processor L3 Cache	Displays the processor L3 Cache size.
Current Clock Speed	Displays the current processor clock speed.
Minimum Clock Speed	Displays the minimum processor clock speed.
Microcode Version	Displays the microcode version.
Intel Hyper-Threading Capable	Displays whether the processor is Hyper-Threading (HT) capable.
64-Bit Technology	Displays whether 64-bit technology is used.
<b>Memory Information</b>	
Memory Installed	Displays the total computer memory installed.
Memory Available	Displays the total computer memory available.
Memory Speed	Displays the memory speed.
Memory Channel Mode	Displays single or dual channel mode.
Memory Technology	Displays the technology that is used for the memory.
<b>Device Information</b>	
Video Controller	Displays the integrate graphics information of the computer.
dGPU Video Controller	Displays the discrete graphics information of the computer.
Video BIOS Version	Displays the video BIOS version of the computer.
Video Memory	Displays the video memory information of the computer.
Panel Type	Displays the Panel Type of the computer.
Native Resolution	Displays the native resolution of the computer.
Audio Controller	Displays the audio controller information of the computer.
Wi-Fi Device	Displays the wireless device information of the computer.
Bluetooth Device	Displays the Bluetooth device information of the computer.

**Table 3. System setup options—Boot options menu**

## Boot options

<b>Advanced Boot Options</b>	
Enable UEFI Network Stack	Enables or disables UEFI Network Stack. Default: OFF.
<b>Boot Mode</b>	
Boot Mode: UEFI only	Displays the boot mode of this computer.
Enable Boot Devices	Enables or disables boot devices for this computer.
Boot Sequence	Displays the boot sequence.
<b>BIOS Setup Advanced Mode</b>	Enables or disables advanced BIOS settings. Default: ON.

## Boot options

<b>UEFI Boot Path Security</b>	Enables or disables the system to prompt the user to enter the Admin password when booting a UEFI boot path from the F12 boot menu. Default: Always Except Internal HDD.
--------------------------------	---

**Table 4. System setup options—System Configuration menu**

## System Configuration

### Date/Time

Date	Sets the computer date in MM/DD/YYYY format. Changes to the date take effect immediately.
------	---

Time	Sets the computer time in HH/MM/SS 24-hour format. You can switch between 12-hour and 24-hour clock. Changes to the time take effect immediately.
------	---

<b>Enable SMART Reporting</b>	Enables or disables SMART (Self-Monitoring, Analysis, and Reporting Technology) during computer startup to report hard drive errors. Default: OFF.
-------------------------------	---

<b>Enable Audio</b>	Enables or disables all integrated audio controller. Default: ON.
---------------------	--

<b>Enable Microphone</b>	Enables or disables microphone. Default: ON.
--------------------------	---

<b>Enable Internal Speaker</b>	Enables or disables internal speaker. Default: ON.
--------------------------------	---

### USB Configuration

Enable Boot Support	Enables or disables booting from USB mass storage devices such as external hard drive, optical drive, and USB drive.
---------------------	--

Enable External USB Ports	Enables or disables USB ports to be functional in an operating system environment.
---------------------------	--

<b>SATA Operation</b>	Configures operating mode of the integrated SATA hard drive controller. Default: RAID. SATA is configured to support RAID (Intel Rapid Restore Technology).
-----------------------	--

<b>Drives</b>	Enables or disables various onboard drives.
---------------	---

M.2 PCIe SSD-0/SATA-2	Default: ON.
-----------------------	--------------

SATA-0	Default: ON.
--------	--------------

Drive Information	Displays the information of various onboard drives.
-------------------	---

<b>Miscellaneous Devices</b>	Enables or disables various onboard devices.
------------------------------	--

Enable Camera	Enables or disables the camera. Default: ON.
---------------	---

Keyboard Illumination	Configures the operating mode of the keyboard illumination feature. Default: Disabled. The keyboard illumination will always be off.
-----------------------	---

Keyboard Backlight Timeout on AC	Configures the timeout value for the keyboard when an AC adapter is connected to the computer. The keyboard backlight timeout value is only effect when the backlight is enabled. Default: 10 seconds.
----------------------------------	---

## System Configuration

Keyboard Backlight Timeout on Battery	Configures the timeout value for the keyboard when the computer is running on battery. The keyboard backlight timeout value is only effect when the backlight is enabled.  Default: 10 seconds.
Touchscreen	Enables or disables the touchscreen for the operating system. <b>NOTE: Touchscreen will always work in the BIOS setup irrespective of this setting.</b>  Default: ON.

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

### Video

<b>LCD Brightness</b>	
Brightness on battery power	Sets the screen brightness when the computer is running on battery power.
Brightness on AC power	Sets the screen brightness when the computer is running on AC power.
<b>EcoPower</b>	Enables or disables EcoPower which increases the battery life by reducing the screen brightness when appropriate.  Default: ON.

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

### Security

Enable Admin Setup Lockout	Enables or disables the user from entering BIOS Setup when an Admin Password is set.  Default: OFF.
Password Bypass	Bypass the System (Boot) Password and the internal hard drive password prompts during a system restart.  Default: Disabled.
Enable Non-Admin Password Changes	Enables or disables the user to change the system and hard drive password without the need for admin password.  Default: ON.
<b>Non-Admin Setup Changes</b>	
Allow Wireless Switch Changes	Enables or disables changes to the setup option when an Administrator password is set.  Default: OFF.
Enable UEFI Capsule Firmware Updates	Enables or disables BIOS updates through UEFI capsule update packages.
<b>Computrace</b>	Enable or disable the BIOS module interface of the optional Computrace(R) Service from Absolute Software.
<b>Intel Platform Trust Technology On</b>	Enables or disables Platform Trust Technology (PTT) visibility to the operating system.  Default: ON.
PPI Bypass for Clear Commands	Enables or disables the operating system to skip BIOS Physical Presence Interface (PPI) user prompts when issuing the Clear command.  Default: OFF.
Clear	Enables or disables the computer to clear the PTT owner information, and returns the PTT to the default state.  Default: OFF.

## Security

<b>Intel SGX</b>	Enables or disables the Intel Software Guard Extensions (SGX) to provide a secured environment for running code/storing sensitive information. Default: Software Control
<b>SMM Security Mitigation</b>	Enables or disables additional UEFI SMM Security Mitigation protections. Default: OFF. <b>NOTE:</b> This feature may cause compatibility issues or loss of functionality with some legacy tools and applications.
Enable Strong Passwords	Enables or disables strong passwords. Default: OFF.
<b>Password Configuration</b>	Control the minimum and maximum number of characters that are allowed for Admin and System passwords.
<b>Admin Password</b>	Sets, Changes, or deletes the administrator (admin) password (sometimes called the "setup" password).
<b>System Password</b>	Sets, Changes, or deletes the system password.
Enable Master Password Lockout	Enables or disables the master password support. Default: OFF.

**Table 7. System setup options—Secure Boot menu**

### Secure Boot

Enable Secure Boot	Enables or disables the computer to boot using only validated boot software. Default: OFF. <b>NOTE:</b> For Secure Boot to be enabled, the computer needs to be in UEFI boot mode and the Enable Legacy Option ROMs option needs to be turned off.
Secure Boot Mode	Selects the Secure Boot operation mode. Default: Deployed Mode. <b>NOTE:</b> Deployed Mode should be selected for normal operation of Secure Boot.

**Table 8. System setup options—Expert Key Management menu**

### Expert Key Management

Enable Custom Mode	Enables or disables the keys in the PK, KEK, db, and dbx security key databases to be modified. Default: OFF.
Custom Mode Key Management	Selects the custom values for expert key management. Default: PK.

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

### Performance

Intel Hyper-Threading Technology	Enables or disables the Intel Hyper-Threading Technology to use processor resources more efficiently. Default: ON.
----------------------------------	---

## Performance

Intel SpeedStep	Enables or disables the Intel SpeedStep Technology to dynamically adjust processor voltage and core frequency, decreasing average power consumption and heat production. Default: ON.
Intel TurboBoost Technology	Enabled or disabled the Intel TurboBoost mode of the processor. If enabled, the Intel TurboBoost driver increases the performance of the CPU or graphics processor. Default: ON.
Multi-Core Support	Changes the number of CPU cores available to the operating system. The default value is set to the maximum number of cores. Default: All Cores.
Enable C-State Control	Enables or disables the CPU's ability to enter and exit low-power states. Default: ON.

**Table 10. System setup options—Power Management menu**

## Power Management

Wake on AC	Enables the computer to turn on and go to boot when AC power is supplied to the computer. Default: OFF.
Auto on Time	Enables the computer to automatically power on for defined days and times. Default: Disabled. The system will not automatically power up.
Battery Charge Configuration	Enables the computer to run on battery during power usage hours. Use the below options to prevent AC power usage between certain times of each day. Default: Adaptive. Battery settings are adaptively optimized based on your typical battery usage pattern.
Enable Advanced Battery Charge Configuration	Enables Advanced Battery Charge Configuration from the beginning of the day to a specified work period. Advanced Battery Charged maximizes battery health while still supporting heavy use during the work day. Default: OFF.
Block Sleep	Blocks the computer from entering Sleep (S3) mode in the operating system. Default: OFF. <b>NOTE: If enabled, the computer will not go to sleep, Intel Rapid Start will be disabled automatically, and the operating system power option will be blank if it was set to Sleep.</b>
Enable USB Wake Support	Enables the USB devices to wake the computer from Standby mode. Default: OFF.
Enable Intel Speed Shift Technology	Enables or disables Intel Speed Shift Technology support which enables the operating system to select the appropriate processor performance automatically. Default: ON.
Lid Switch	Enables the computer to power up from the off state whenever the lid is opened. Default: ON.

**Table 11. System setup options—Wireless menu**

**Wireless**

<b>Wireless Switch</b>	Determines which wireless devices can be controlled by the Wireless Switch. For Windows 8 systems, this is controlled by an operating system drive directly. As a result, the setting does not affect the Wireless Switch behavior. <b>NOTE:</b> When both WLAN and WiGig are present, enable/disable controls are tied together. Thus, they cannot be enabled or disabled independently.
WLAN	Default: ON.
Bluetooth	Default: ON.
<b>Wireless Device Enable</b>	Enable or disable internal WLAN/Bluetooth devices.
WLAN	Default: ON.
Bluetooth	Default: ON.

**Table 12. System setup options—POST Behavior menu**

**POST Behavior**

Numlock Enable	Enables or disables Numlock when the computer boots. Default: ON.
Enable Adapter Warnings	Enables the computer to display adapter warning messages during boot. Default: ON.
Extend BIOS POST Time	Configures the BIOS POST (Power-On Self-Test) load time. Default: 0 seconds.
Fastboot	Configures the speed of the UEFI boot process. Default: Thorough. Performs complete hardware and configuration initialization during boot.
Fn Lock Options	Enables or disables the Fn lock mode. Default: ON.
Lock Mode	Default: Lock Mode Secondary. Lock Mode Secondary = If this option is selected, the F1-F12 keys scan the code for their secondary functions.
Pull Screen Logo	Enabled or disabled the computer to display full screen logo if the image match screen resolution. Default: OFF.
Warnings and Errors	Selects an action on encountering a warning or error during boot. Default: Prompt on Warnings and Errors. Stop, prompt and wait for user input when warnings or errors are detected. <b>NOTE:</b> Errors deemed critical to the operation of the computer hardware will always halt the computer.

**Table 13. System setup options—Virtualization menu**

**Virtualization**

Intel Virtualization Technology	Enables the computer to run a virtual machine monitor (VMM). Default: ON.
---------------------------------	--

## Virtualization

VT for Direct I/O	Enables the computer to perform Virtualization Technology for Direct I/O (VT-d). VT-d is an Intel method that provides virtualization for memory map I/O. Default: ON.
-------------------	---

**Table 14. System setup options—Maintenance menu**

## Maintenance

Asset Tag	Creates a system Asset Tag that can be used by an IT administrator to uniquely identify a particular system. Once set in BIOS, the Asset Tag cannot be changed.
Service Tag	Displays the Service Tag of the computer.
BIOS Recovery from Hard Drive	Enables the computer to recover from a bad BIOS image, as long as the Boot Block portion is intact and functioning. Default: ON.

**NOTE:** BIOS recovery is designed to fix the main BIOS block and cannot work if the Boot Block is damaged. In addition, this feature cannot work in the event of EC corruption, ME corruption, or a hardware issue. The recovery image must exist on an unencrypted partition on the drive.

BIOS Auto-Recovery	Enables the computer to automatically recover the BIOS without user actions. This feature requires BIOS Recovery from Hard Drive to be set to Enabled. Default: OFF.
--------------------	---

Start Data Wipe	<b>CAUTION:</b> This Secure Wipe Operation will delete information in a way that it cannot be reconstructed. If enabled, the BIOS will queue up a data wipe cycle for storage devices that are connected to the motherboard on the next reboot. Default: OFF.
-----------------	---

Allow BIOS Downgrade	Controls flashing of the system firmware to previous revisions. Default: ON.
----------------------	---

**Table 15. System setup options—System Logs menu**

## System Logs

Power Event Log	Displays Power events. Default: Keep.
BIOS Event Log	Displays BIOS events. Default: Keep.
Thermal Event Log	Displays Thermal events. Default: Keep.

**Table 16. System setup options—SupportAssist menu**

## SupportAssist

Dell Auto operating system Recovery Threshold	Controls the automatic boot flow for SupportAssist System Resolution Console and for Dell operating system Recovery tool. Default: 2.
SupportAssist operating system Recovery	Enables or disables the boot flow for SupportAssist operating system Recovery tool in the even of certain system errors. Default: ON.

# 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. Disconnect the battery cable from the system board.
3. Remove the [coin-cell battery](#).
4. Wait for one minute.
5. Replace the [coin-cell battery](#).
6. Connect the battery cable to the system board.
7. Replace the [base 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 17. LED codes**

Diagnostic light codes	Problem description
2,1	Processor failure
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	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.

## Diagnosics

**Table 18. Diagnostics**

	M-BIST (Built-In Self-Test)	L-BIST (LCD Built-In Self-Test)
Purpose of diagnostic tool	Evaluates the health of the system board, allowing users to assess whether the system board is the source of the problem if there is no power, no video output, or if the system does not start-up properly (no POST).	Checks if the system board is supplying power to the LCD display by performing an LCD Power Rail test, which allows for isolation of "No Video" symptom to Mainboard, LCD or Cable.
Trigger	Pressing M key and power button	Pressing D key and power button. Also automatically initiated during POST. Automatically initiated during POST
Indicator of fault	Amber colored battery indicator LED	Battery indicator LED blink error code [Amber, White] = [2,8]
Repair instruction	Indicates a problem with the system board.	Indicates a problem with the system board.

# M-BIST

## About this task

The M-BIST (Built-In Self-Test) diagnostics tool allows users to diagnose system-board failures.

 **NOTE: M-BIST can be manually-initiated before POST (Power-On Self-Test).**

## How to run M-BIST?

M-BIST must be initiated from a power-off state with the computer either connected to the supplied AC power adapter or running on a fully-charged battery.

## Steps

1. From the power-off state, press and hold both the **M** key on the keyboard and the power button to initiate M-BIST.
2. With both the **M** key and the power button held down, the battery indicator LEDs exhibit two states:
  - a. **OFF:** No fault is detected with the system board.
  - b. **AMBER:** Indicates a problem with the system board.

# LCD Built-In Self-Test (BIST)

## About this task

LCD BIST is a diagnostic tool that helps you determine if a screen abnormality is an inherent problem with the LCD screen of the computer, with the video card or with the computer's settings.

It is recommended to run BIST to isolate the cause of a screen abnormality if you encounter display issues such as:

- flickering
- distortion
- clarity issues
- fuzzy or blurry image
- horizontal or vertical lines
- color fading

## Starting the LCD BIST test

## Steps

1. Power off your computer.
2. Disconnect any peripherals connected to your computer. Connect only the supplied AC power adapter to your computer.
3. Ensure that the LCD screen is clean with no dust particles on the surface of the screen.
4. From the power-off state, press and hold the **D** key and power button to enter LCD BIST mode. Continue to hold the **D** key, until you see color bars on the LCD screen.
5. The screen displays multiple color bars and the entire screen changes to red, green and blue. During this process, carefully inspect the screen for any abnormalities.
6. Press **Esc** to exit.

 **NOTE: LCD BIST is also initiated when Enhanced Pre-Boot System Assessment (ePSA) diagnostics is launched. For more information about ePSA, see [Dell EPSA Diagnostic 3.0](#).**

# Recovering the operating system

When your computer is unable to boot to the operating system even after repeated attempts, it automatically starts Dell SupportAssist OS Recovery.

Dell SupportAssist OS Recovery is a standalone tool that is preinstalled in all Dell computers installed with Windows 10 operating system. It consists of tools to diagnose and troubleshoot issues that may occur before your computer boots to the operating system. It enables you to diagnose hardware issues, repair your computer, back up your files, or restore your computer to its factory state.

You can also download it from the Dell Support website to troubleshoot and fix your computer when it fails to boot into their primary operating system due to software or hardware failures.

For more information about the Dell SupportAssist OS Recovery, see *Dell SupportAssist OS Recovery User's Guide* at [www.dell.com/support](http://www.dell.com/support).

## 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](https://www.dell.com/support) 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.

## 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. Remove the [base cover](#).
3. Remove the [battery](#).
4. Press and hold the power button for 15 seconds to drain the flea power.
5. Replace the [battery](#).
6. Replace the [base cover](#).

7. Turn on your computer.

## Wi-Fi power cycle

### About this task

If your computer is unable to access the Internet due to Wi-Fi connectivity issues a Wi-Fi power cycle procedure may be performed. The following procedure provides the instructions on how to conduct a Wi-Fi 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.

# 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 19. 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, setup 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. Type the subject or keyword in the <b>Search</b> box.</li> <li>3. Click <b>Search</b> to retrieve 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>	<p>See <i>Me and My Dell</i> at <a href="http://www.dell.com/support/manuals">www.dell.com/support/manuals</a>.</p> <p>To locate the <i>Me and My Dell</i> relevant to your product, identify your product through one of the following:</p> <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 on your purchase invoice, packing slip, bill, or Dell product catalog.**