

Alienware Area-51m

Service Manual

Computer Model: Alienware Area-51m
Regulatory Model: P38E
Regulatory Type: P38E001

A L I E N W A R E 

Notes, cautions, and warnings

-  **NOTE:** A NOTE indicates important information that helps you make better use of your product.
 -  **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.
 -  **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.
-

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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

- 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 shutdown 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.

After working inside your computer

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

- 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.

Safety instructions

Use the following safety guidelines to protect your computer from potential damage and ensure your personal safety.

-  **WARNING:** 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.
-  **WARNING:** 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:** To avoid damaging the components and cards, handle them by their edges, and avoid touching pins and contacts.
-  **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.
-  **CAUTION:** Before touching anything inside your computer, ground yourself by 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.

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.

Recommended tools

The procedures in this document may require the following tools:

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

Screw list

-  **NOTE:** When removing screws from a component, it is recommended to note the screw type, the quantity of screws, and then place them in a screw storage box. This is to ensure that the correct number of screws and correct screw type is restored when the component is replaced.
-  **NOTE:** Some computers have magnetic surfaces. Ensure that the screws are not left attached to such surface when replacing a component.
-  **NOTE:** Screw color may vary with the configuration ordered.

Table 1. Screw list

Component	Secured to	Screw type	Quantity	Screw image
Audio daughter-board	Palm-rest assembly	M2.5x2.5	3	
Battery	Palm-rest assembly	M2.5x5	6	
Computer base	Palm-rest assembly	M2.5x12	1	
Computer base	Palm-rest assembly	M2.5x8	14	
Display-cable bracket	Graphics card	M2x3	1	
Display assembly	Computer base	M2.5x8	2	
Display assembly	Palm-rest assembly	M2.5x2.5	4	
Graphics card	System board	M2x3	3	
Graphics-card cable	Graphics card	M2x3	2	
Graphics-card cable	System board	M2x3	2	
Heat-sink assembly	Palm-rest assembly	M2.5x5	2	
Keyboard bracket	Palm-rest assembly	M2x3	15	
Keyboard bracket	Keyboard	M2.5x2.5	3	

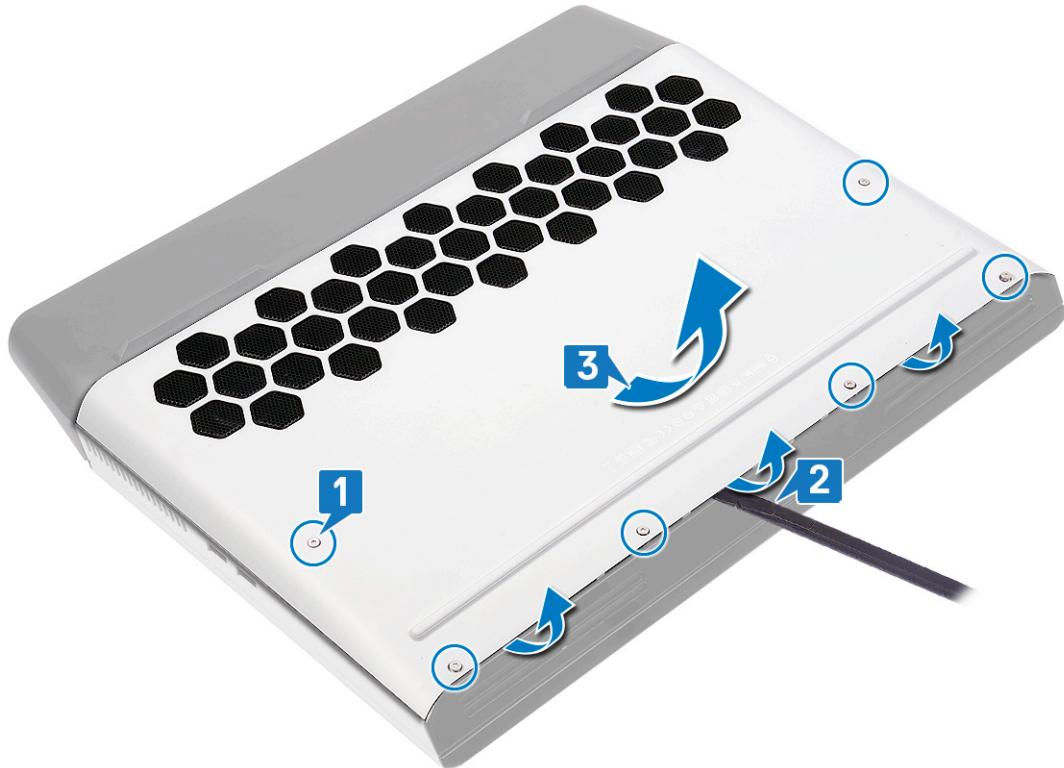
Component	Secured to	Screw type	Quantity	Screw image
Hard-drive assembly	Palm-rest assembly	M2.5x5	4	
Hard-drive bracket	Hard drive	M3x3	4	
Power-adapter port bracket	Palm-rest assembly	M2x3	1	
Rear-I/O cover	Computer base	M2.5x2.5	4	
Rear-I/O cover	Palm-rest assembly	M2.5x7	2	
System board	Palm-rest assembly	M2.5x5	2	
Solid-state drive	Palm-rest assembly	M2x3	2	
Touchpad bracket	Palm-rest assembly	M2x3	5	
Wireless-card bracket	System board	M2x3	1	

Removing the base cover

WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Procedure

- 1 Loose the six captive screws that secure the base cover to the computer base.
- 2 Starting from the middle of the bottom side, pry open the base cover with a plastic scribe.
- 3 Slide the base cover off the computer base.



- 4 Disconnect the battery cable from the system board.
- 5 Press and hold the power button for five seconds to ground the system board.

Replacing the base cover

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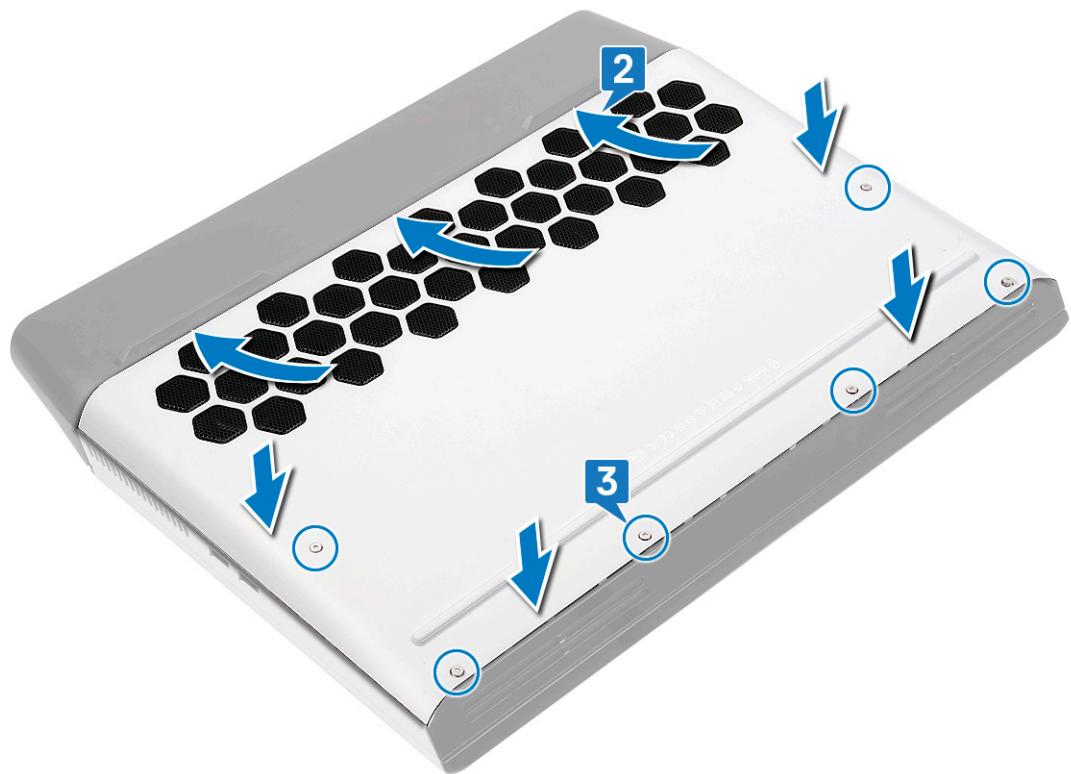
Procedure

- 1 Connect the battery cable to the system board.



- 2 Slide the tabs on the base cover into the slots on the computer base and snap the base cover into place.

- 3** Tighten the six captive screws that secure the base cover to the computer base.



Removing the battery

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Lithium-ion battery precautions

 **CAUTION:**

- Exercise caution when handling Lithium-ion batteries.
- Discharge the battery as much as possible before removing it from the system. This can be done by disconnecting the AC adapter from the system to allow the battery to drain.
- Do not crush, drop, mutilate, or penetrate the battery with foreign objects.
- Do not expose the battery to high temperatures, or disassemble battery packs and cells.
- Do not apply pressure to the surface of the battery.
- Do not bend the battery.
- Do not use tools of any kind to pry on or against the battery.
- If a battery gets stuck in a device as a result of swelling, do not try to free it as puncturing, bending, or crushing a Lithium-ion battery can be dangerous. In such an instance, the entire system should be replaced. Contact <https://www.dell.com/support> for assistance and further instructions.
- Always purchase genuine batteries from <https://www.dell.com> or authorized Dell partners and re-sellers.

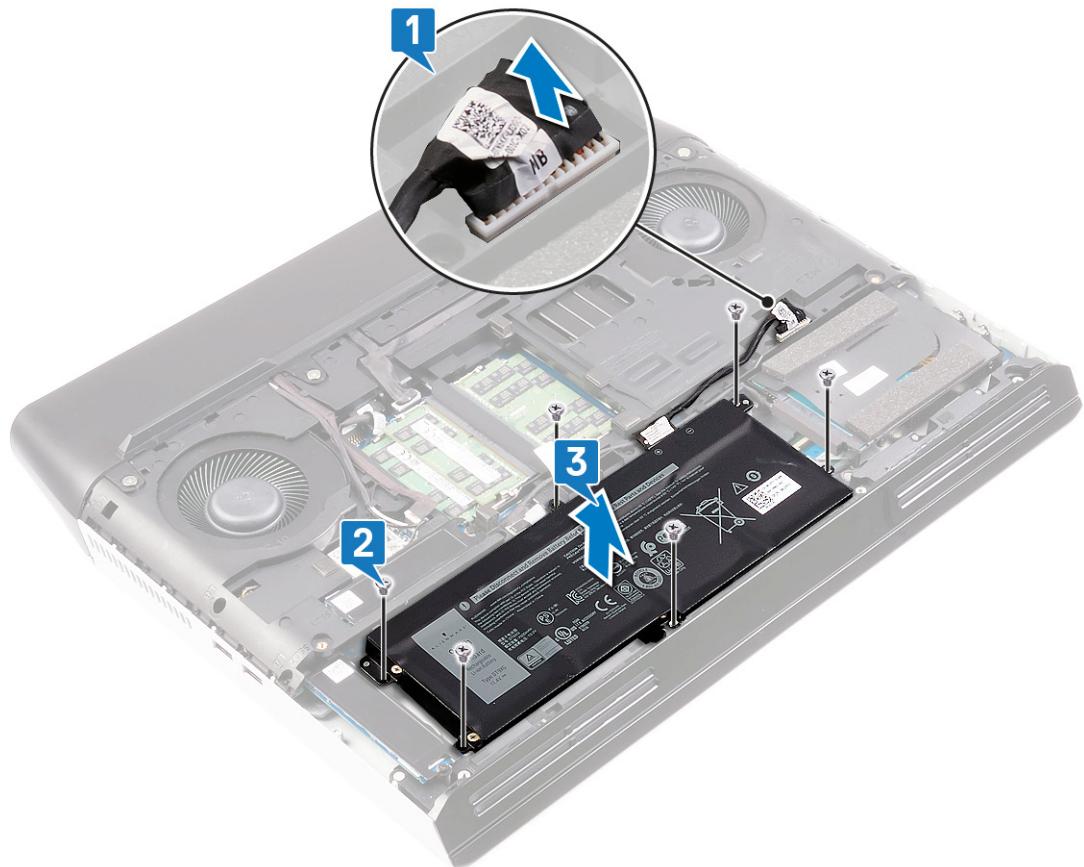
Prerequisites

Remove the [base cover](#).

Procedure

- 1 Using the pull tab, disconnect the battery cable from the system board and remove it from the routing guides on the computer base (applicable only if not disconnected earlier).
- 2 Remove the six screws (M2.5x5) that secure the battery to the palm-rest assembly.

- 3** Lift the battery off the palm-rest assembly.

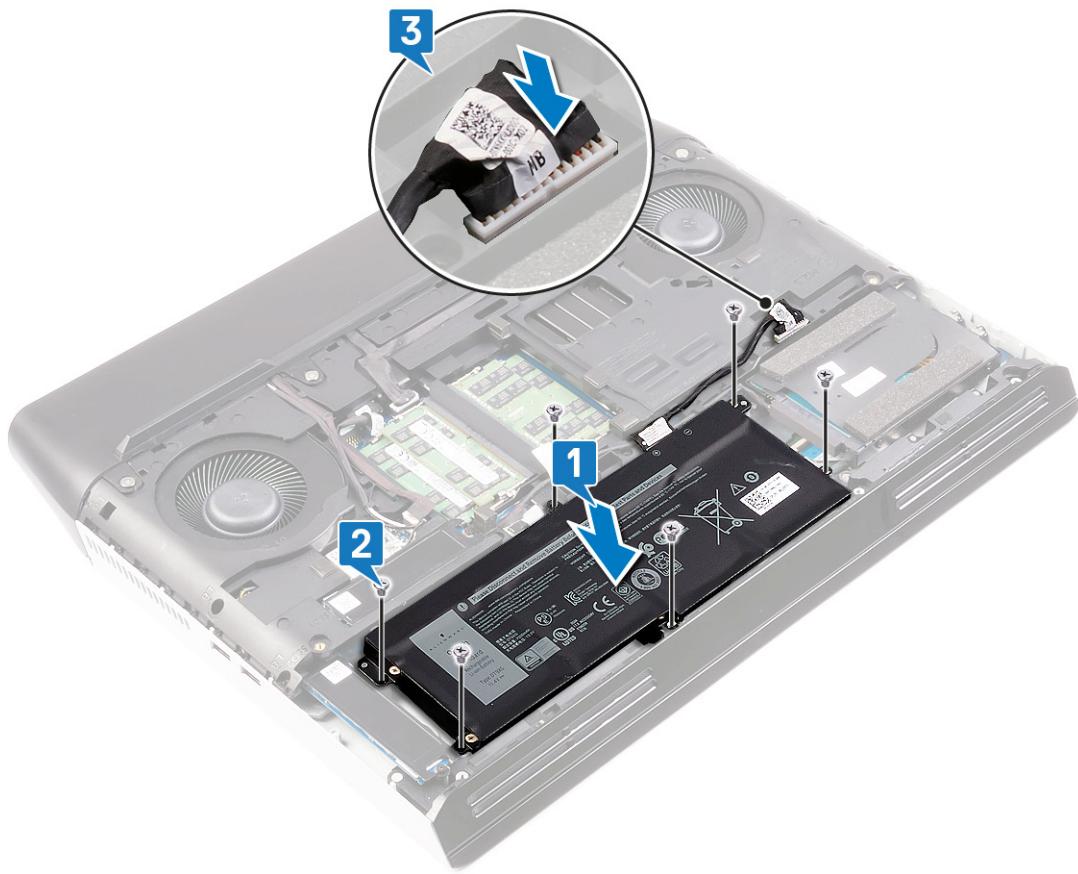


Replacing the battery

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Procedure

- 1 Align the screw holes on the battery with the screw holes on the palm-rest assembly.
- 2 Replace the six screws (M2.5x5) that secure the battery to the palm-rest assembly.
- 3 Route the battery cable through the routing guides on the computer base and connect the battery cable to the system board.



Post-requisites

Replace the [base cover](#).

Removing the memory modules

! **WARNING:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Prerequisites

Remove the [base cover](#).

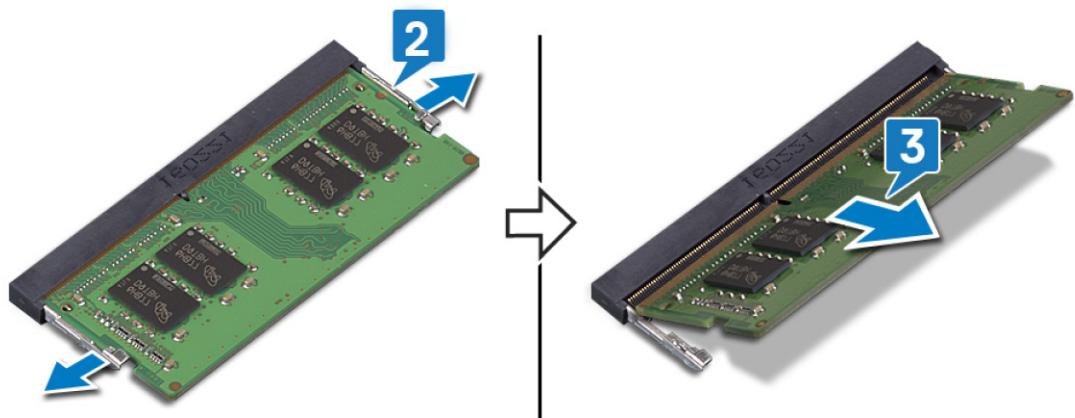
Procedure

- 1 Locate the memory modules on your computer.



- 2 Use your fingertips to carefully spread apart the securing-clips on each end of the memory-module slot until the memory module pops up.

- 3** Remove the memory module from the memory-module slot.



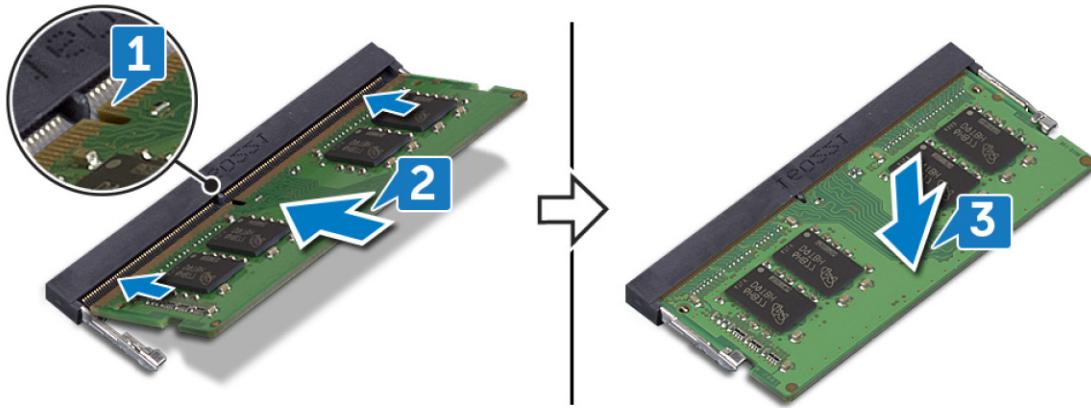
Replacing the memory modules

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Procedure

- 1 Align the notch on the memory module with the tab on the memory-module slot.
- 2 Slide the memory module firmly into the slot at an angle.
- 3 Press the memory module down until it clicks into place.

 **NOTE:** If you do not hear the click, remove the memory module and reinstall it.



Post-requisites

Replace the [base cover](#).

Removing the wireless card

! **WARNING:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Prerequisites

Remove the [base cover](#).

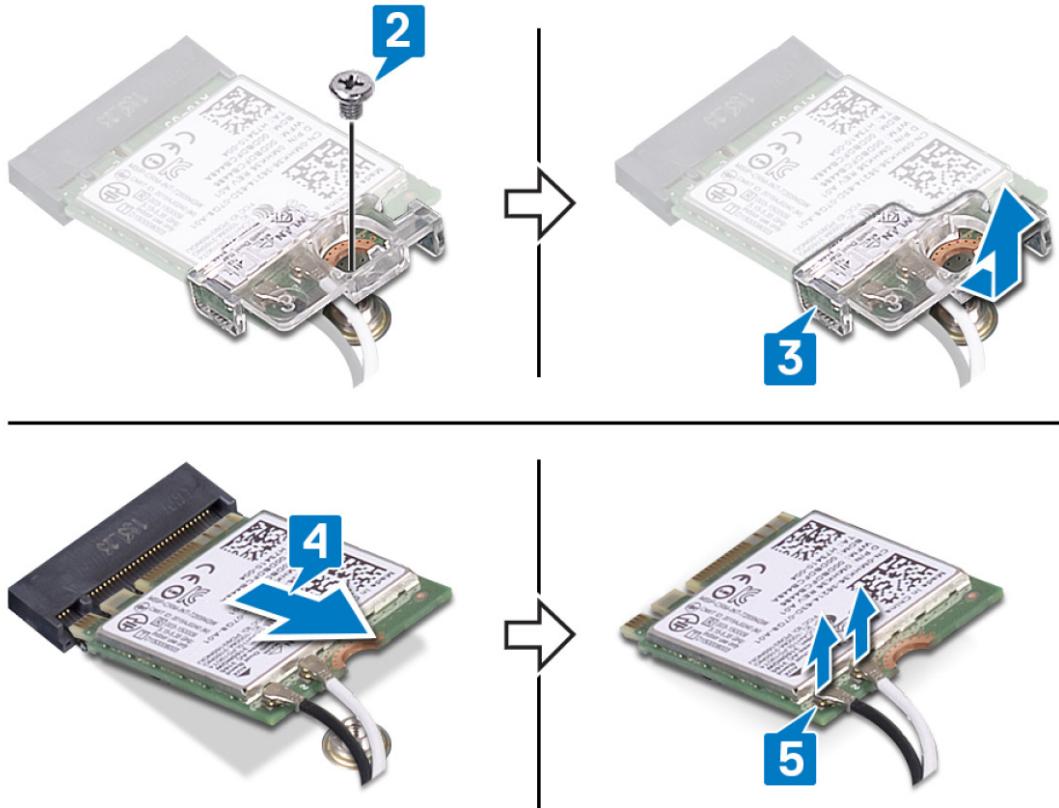
Procedure

- 1 Locate the wireless card on your computer.



- 2 Remove the screw (M2x3) that secures the wireless-card bracket to the system board.
- 3 Slide and remove the wireless-card bracket from the wireless card.
- 4 Slide and remove the wireless card from the wireless-card slot.

- 5 Disconnect the antenna cables from the wireless card.



Replacing the wireless card

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Procedure

CAUTION: To avoid damage to the wireless card, do not place any cables under it.

- 1 Connect the antenna cables to the wireless card.

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

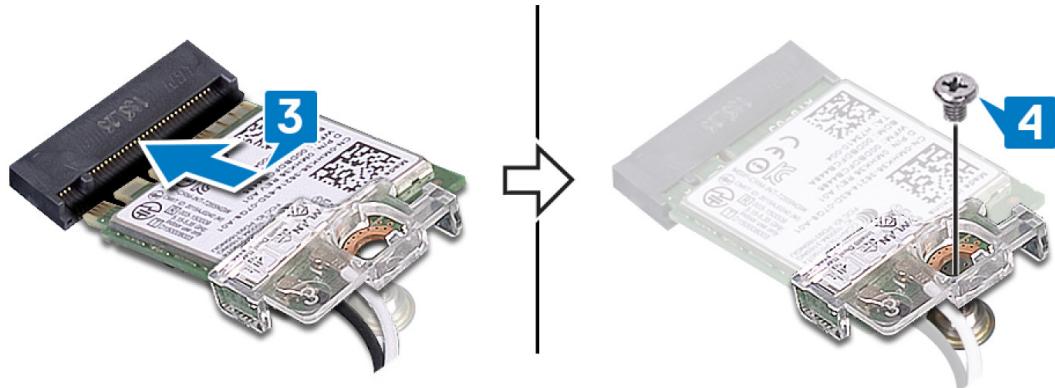
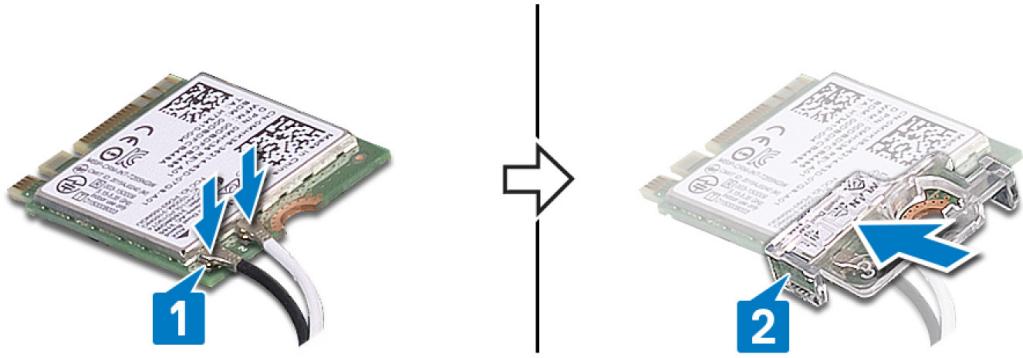
Table 2. Antenna-cable color scheme

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

2 Slide and replace the wireless-card bracket on the wireless-card slot.

3 Align the notch on the wireless card with the tab on the wireless-card slot and insert the wireless card at an angle into the wireless-card slot.

4 Replace the screw (M2x3) that secures the wireless-card bracket to the system board.



Post-requisites

Replace the [base cover](#).

Removing the solid-state drives

⚠ **WARNING:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

⚠ **CAUTION:** Solid-state drives are fragile. Exercise care when handling the solid-state drive.

⚠ **CAUTION:** To avoid data loss, do not remove the solid-state drive while the computer is in sleep or on state.

Prerequisites

Remove the [base cover](#).

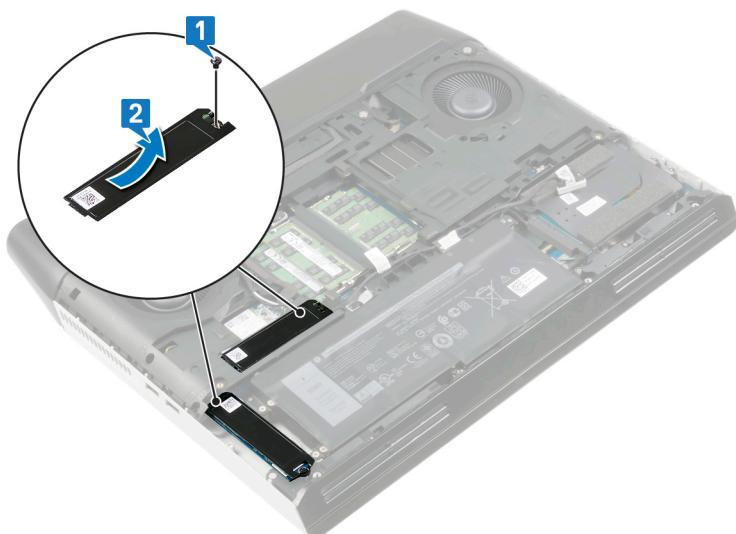
Procedure to remove M.2 2230 card

💡 **NOTE:** This procedure applies only to computers shipped with a M.2 2230 card installed.

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

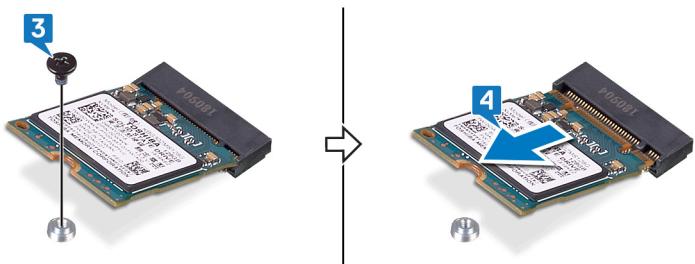
- M.2 2230 solid-state drive
- M.2 2280 solid-state drive/Intel Optane storage

- 1 Remove the screw (M2x3) that secures the M.2 thermal shield to the palm-rest assembly and system board.
- 2 Lift the M.2 thermal shield from the palm-rest assembly and system board.



- 3 Remove the screw (M2x3) that secures the M.2 2230 card to the palm-rest assembly.

- 4 Slide and remove the M.2 2230 solid-state drive from the M.2 solid-state drive slot on the system board.



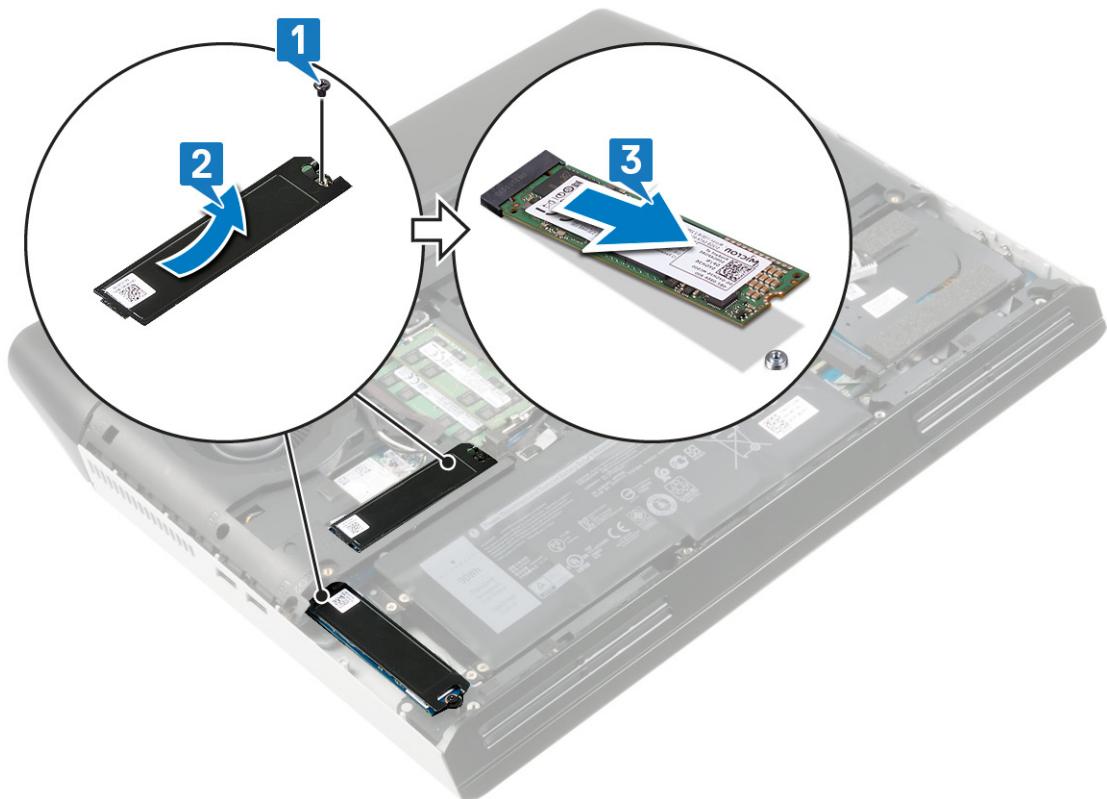
Procedure to remove M.2 2280 card

NOTE: This procedure applies only to computers shipped with a M.2 2280 card installed.

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

- M.2 2230 solid-state drive
- M.2 2280 solid-state drive/Intel Optane storage

- 1 Remove the screw (M2x3) that secures the thermal shield and the solid-state drive to the computer base.
- 2 Slide and lift the thermal shield from the computer base.
- 3 Slide and remove the M.2 2280 solid-state drive from the M.2 solid-state drive slot on the system board.



Replacing the solid-state drives

⚠ WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

⚠ CAUTION: Solid-state drives are fragile. Exercise care when handling the solid-state drive.

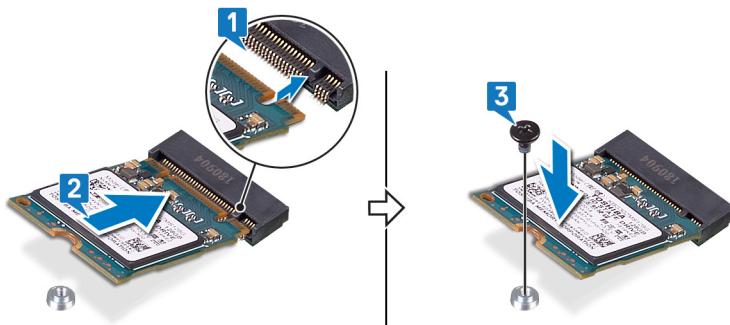
Procedure to replace M.2 2230 card

 NOTE: This procedure applies only to computers shipped with a M.2 2230 card installed.

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

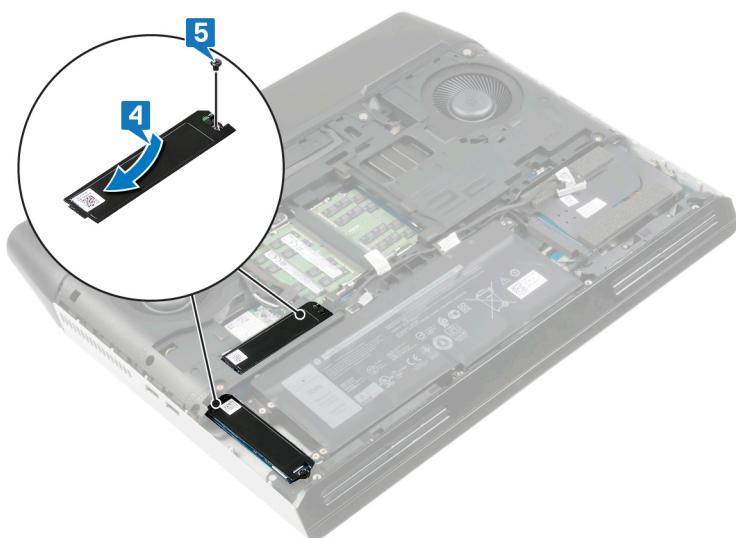
- M.2 2230 solid-state drive
- M.2 2280 solid-state drive/Intel Optane storage

- 1 Align the notch on the M.2 2230 solid-state drive with the tab on the M.2 solid-state drive slot on the system board.
- 2 Slide the M.2 2230 solid-state drive into the M.2 solid-state drive slot on the system board.
- 3 Replace the screw (M2x3) that secures the M.2 2230 solid-state drive to the palm-rest assembly.



- 4 Align the screw holes of the M.2 thermal shield with the screw holes on the palm-rest assembly and system board.

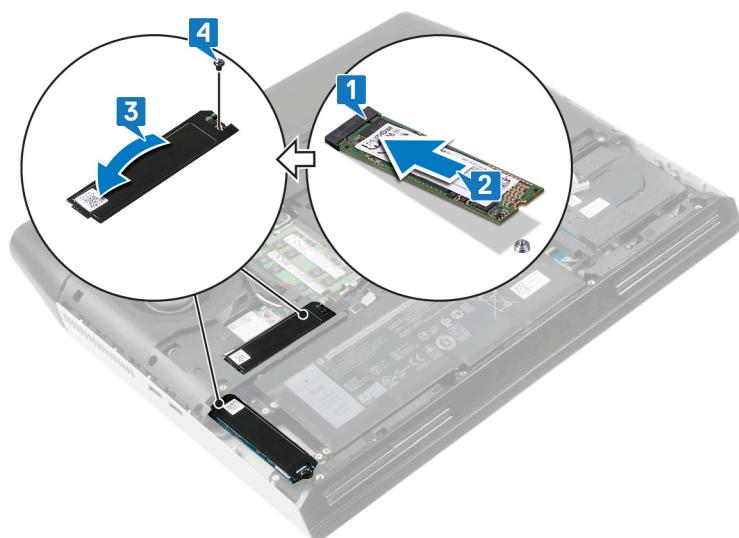
- Replace the screw (M2x3) that secures the M.2 thermal shield to the palm-rest assembly and system board.



Procedure to replace M.2 2280 card

- NOTE:** This procedure applies only to computers shipped with a M.2 2280 card installed.
 - NOTE:** Depending on the configuration ordered, the computer may have up to two M.2 cards installed. Supported card configurations per M.2 card slot:
 - M.2 2230 solid-state drive
 - M.2 2280 solid-state drive/Intel Optane storage
 - NOTE:** Install the solid-state drive to the SSD1 slot before installing the solid-state drive to the SSD2 slot on the system board.
- Align the notch on the M.2 2280 solid-state drive with the tab on the M.2 solid-state drive slot on the system board.
 - Slide the M.2 2280 solid-state drive into the M.2 solid-state drive slot on the system board.
 - Align the screw holes on the thermal shield with the screw holes on the computer base.

- Replace the screw (M2x3) that secures the solid-state drive and the thermal shield to the computer base.



Post-requisites

Replace the [base cover](#).

Removing the hard drive

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△ CAUTION: Hard drives are fragile. Exercise care when handling the hard drive.

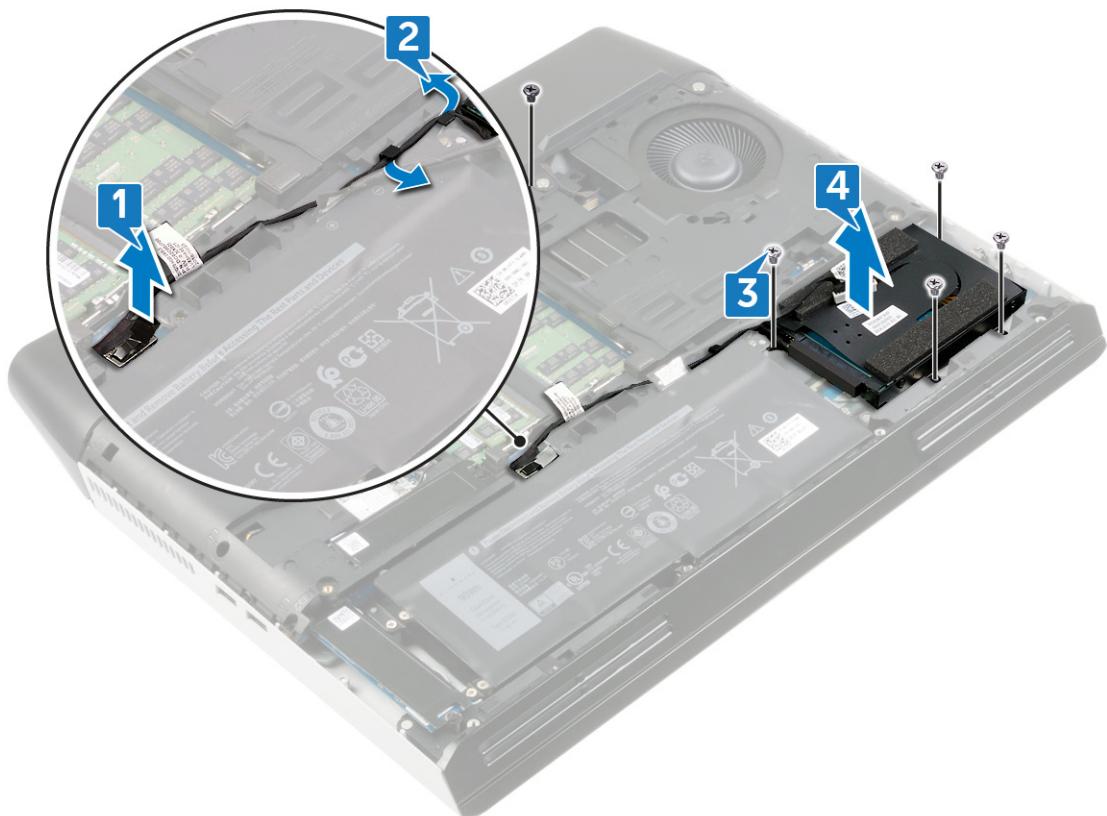
△ CAUTION: To avoid data loss, do not remove the hard drive while the computer is in sleep or on state.

Prerequisites

Remove the [base cover](#).

Procedure

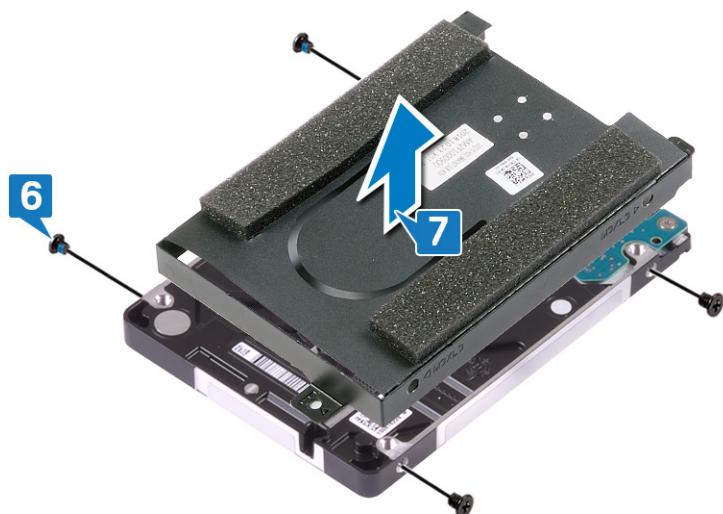
- 1 Using the pull tab, disconnect the hard-drive cable from the system board.
- 2 Remove the hard-drive cable from the routing guides on the computer base.
- 3 Remove the four screws (M2.5x5) that secure the hard-drive assembly to the palm-rest assembly.
- 4 Lift the hard-drive assembly along with its cable off the palm-rest assembly.



- 5 Disconnect the interposer from the hard-drive assembly.



- 6 Remove the four screws (M3x3) that secure the hard-drive bracket to the hard drive.
- 7 Lift the hard drive off the hard-drive bracket.



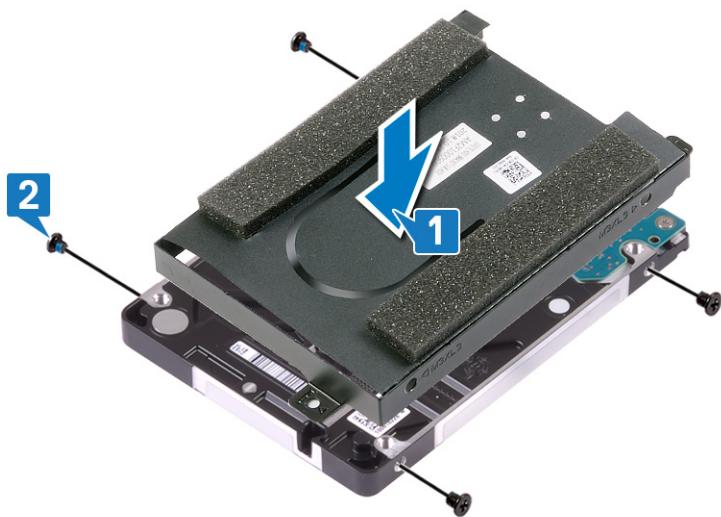
Replacing the hard drive

! WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

△ CAUTION: Hard drives are fragile. Exercise care when handling the hard drive.

Procedure

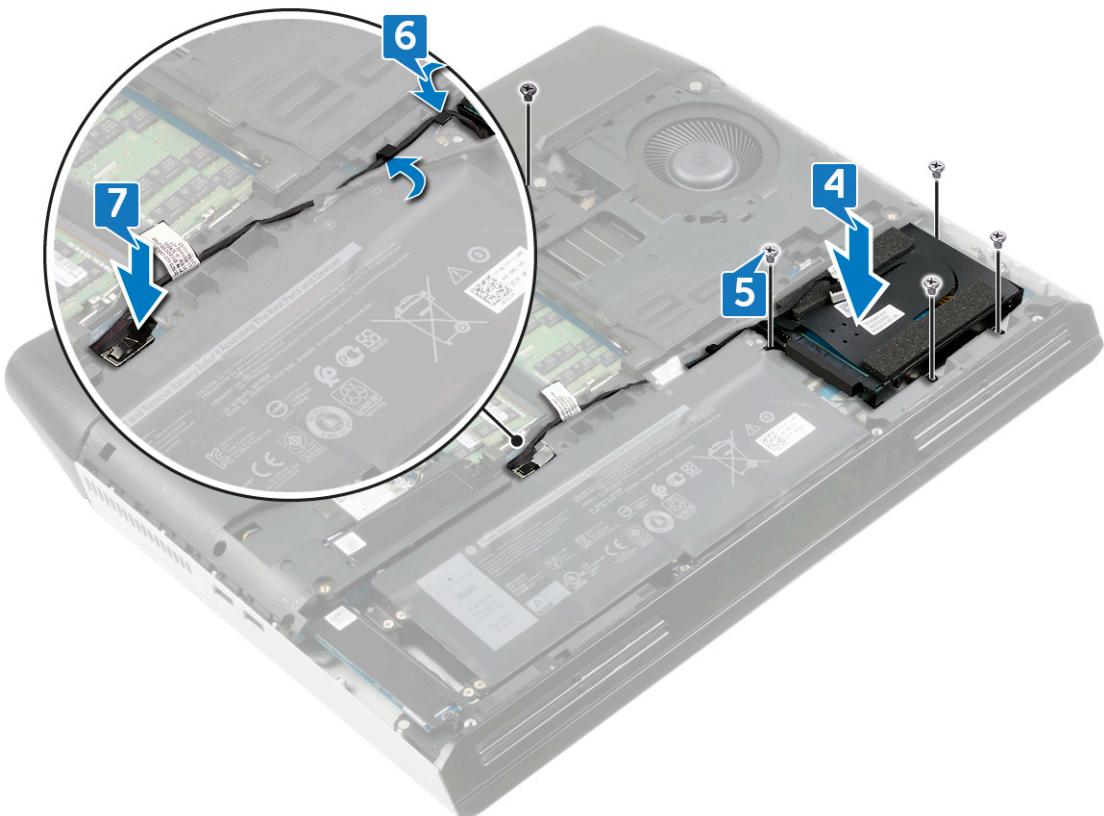
- 1 Place the hard drive on the hard-drive bracket and align the screw holes on the hard-drive bracket with the screw holes on the hard drive.
- 2 Replace the four screws (M3x3) that secure the hard-drive bracket to the hard drive.



- 3 Connect the interposer to the hard-drive assembly.



- 4 Align the screw holes on the hard-drive assembly with the screw holes on the palm-rest assembly.
- 5 Replace the four screws (M2.5x5) that secure the hard-drive assembly to the palm-rest assembly.
- 6 Route the hard-drive cable through the routing guides on the computer base.
- 7 Connect the hard-drive cable to the system board.



Post-requisites

Replace the [base cover](#).

Removing the rear-I/O cover

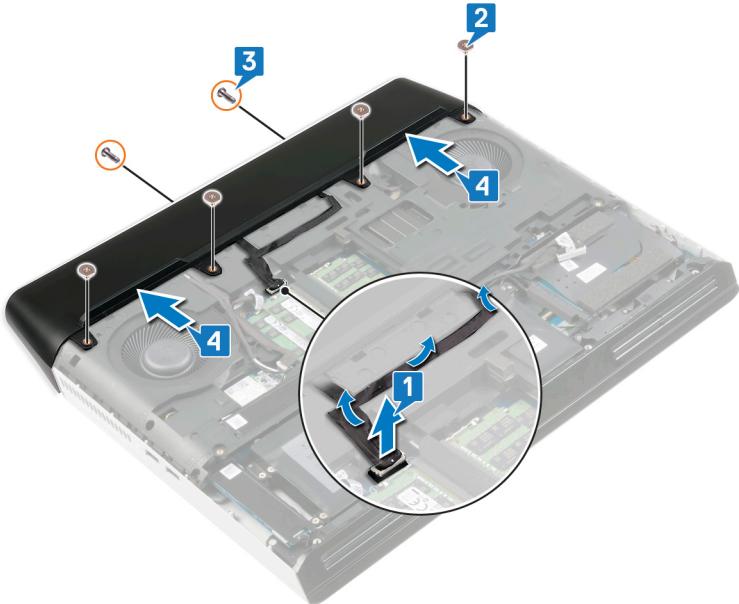
WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Prerequisites

Remove the [base cover](#).

Procedure

- 1 Disconnect the tron-light cable from the system board and peel it off from the computer base.
- 2 Remove the four screws (M2.5x2.5) that secure the rear I/O cover to the computer base.
- 3 Remove the two screws (M2.5x7) that secure the rear I/O cover to the palm-rest assembly.
- 4 Push the rubber feet on the rear I/O cover to remove it from the palm-rest assembly.

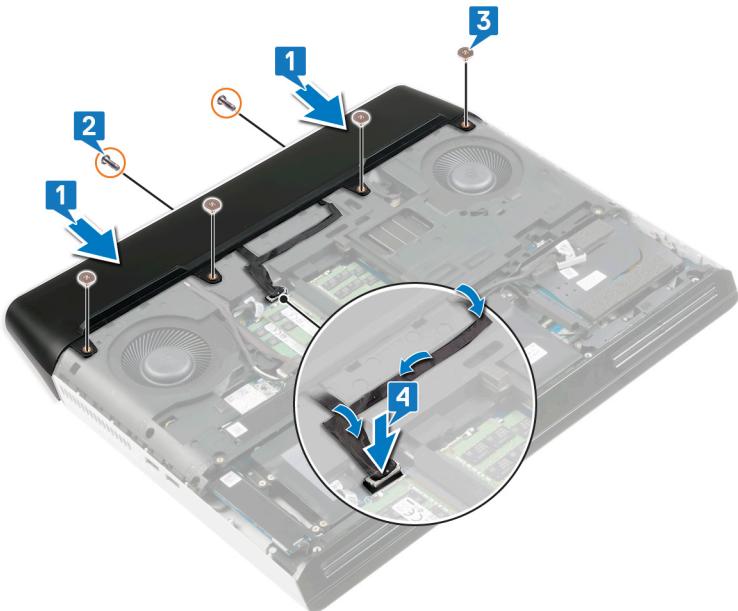


Replacing the rear-I/O cover

WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Procedure

- 1 Align the tabs on the rear I/O cover with the slots on the computer base and snap the rear I/O cover into place.
- 2 Replace the two screws (M2.5x7) that secure the rear I/O cover to the palm-rest assembly.
- 3 Replace the four screws (M2.5x2.5) that secure the rear I/O cover to the computer base.
- 4 Adhere the tron-light cable to the computer base and connect the tron-light cable to the system board.



Post-requisites

Replace the [base cover](#).

Removing the audio daughter-board

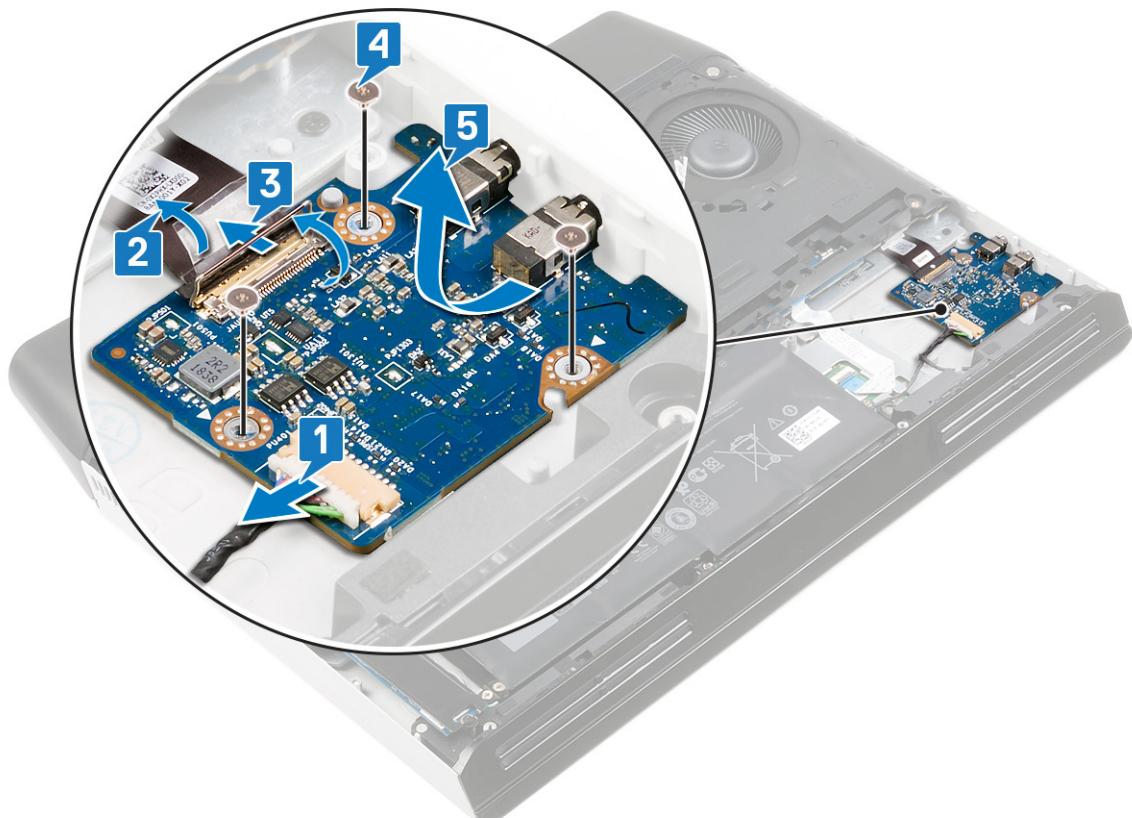
WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Prerequisites

- 1 Remove the [base cover](#).
- 2 Follow the procedure from step 1 to step 4 in [Removing the hard drive](#).

Procedure

- 1 Disconnect the speaker cable from the audio daughter-board.
- 2 Peel the tape that secures the audio daughter-board cable to the audio daughter-board.
- 3 Open the latch and disconnect the audio daughter-board cable from the audio daughter-board.
- 4 Remove the three screws (M2.5x2.5) that secure the audio daughter-board to the palm-rest assembly.
- 5 Lift the audio daughter-board at an angle off the palm-rest assembly.

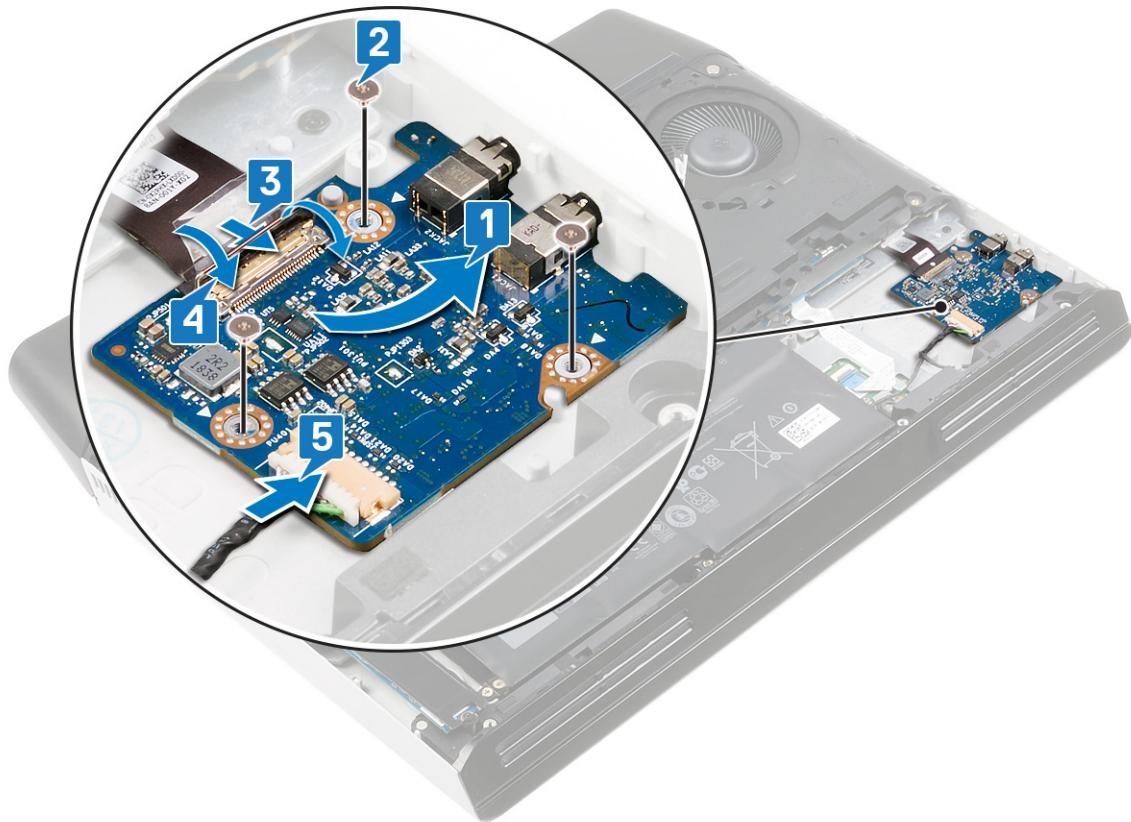


Replacing the audio daughter-board

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Procedure

- 1 Slide the audio daughter-board at an angle into the slot on the palm-rest assembly.
- 2 Replace the three screws (M2.5x2.5) that secure the audio daughter-board to the palm-rest assembly.
- 3 Connect the audio daughter-board cable to the connector on the audio daughter-board and close the latch to secure the cable.
- 4 Adhere the tape that secures the audio daughter-board cable.
- 5 Connect the speaker cable to the audio daughter-board.



Post-requisites

- 1 Replace the [base cover](#).
- 2 Follow the procedure from step 4 to step 7 in [Replacing the hard drive](#).

Removing the speakers

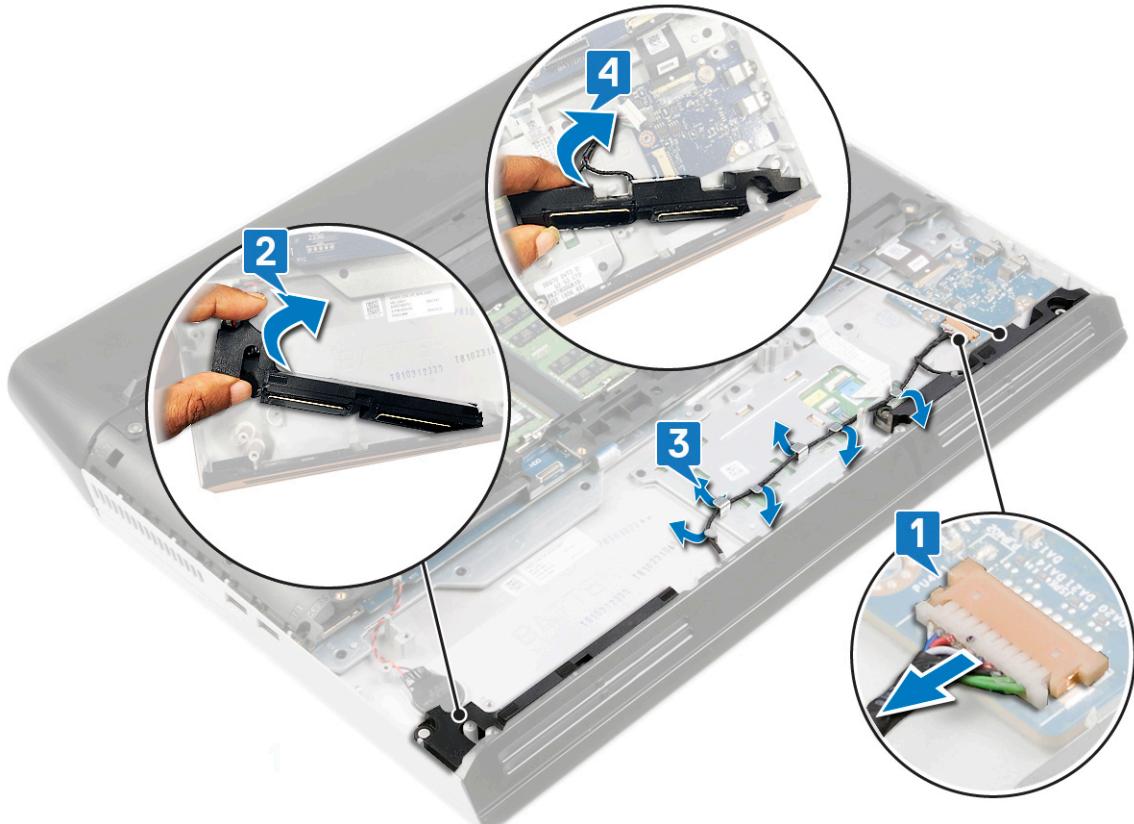
WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [solid-state drive](#) (in SSD2 slot).
- 4 Follow the procedure from step 1 to step 4 in [Removing the hard drive](#).

Procedure

- 1 Disconnect the speaker cable from the audio daughter-board.
- 2 Using the tab on the right speaker, slightly pull the right speaker upwards to release it from the palm-rest assembly. Slide the right speaker in a clockwise direction to remove it from the palm-rest assembly.
- 3 Note the speaker cable routing and remove the speaker cable from the routing guides on palm-rest assembly.
- 4 Using the tab on the left speaker, slightly pull the left speaker upwards to release it from the palm-rest assembly. Slide the left speaker in a clockwise direction to remove it from the palm-rest assembly.



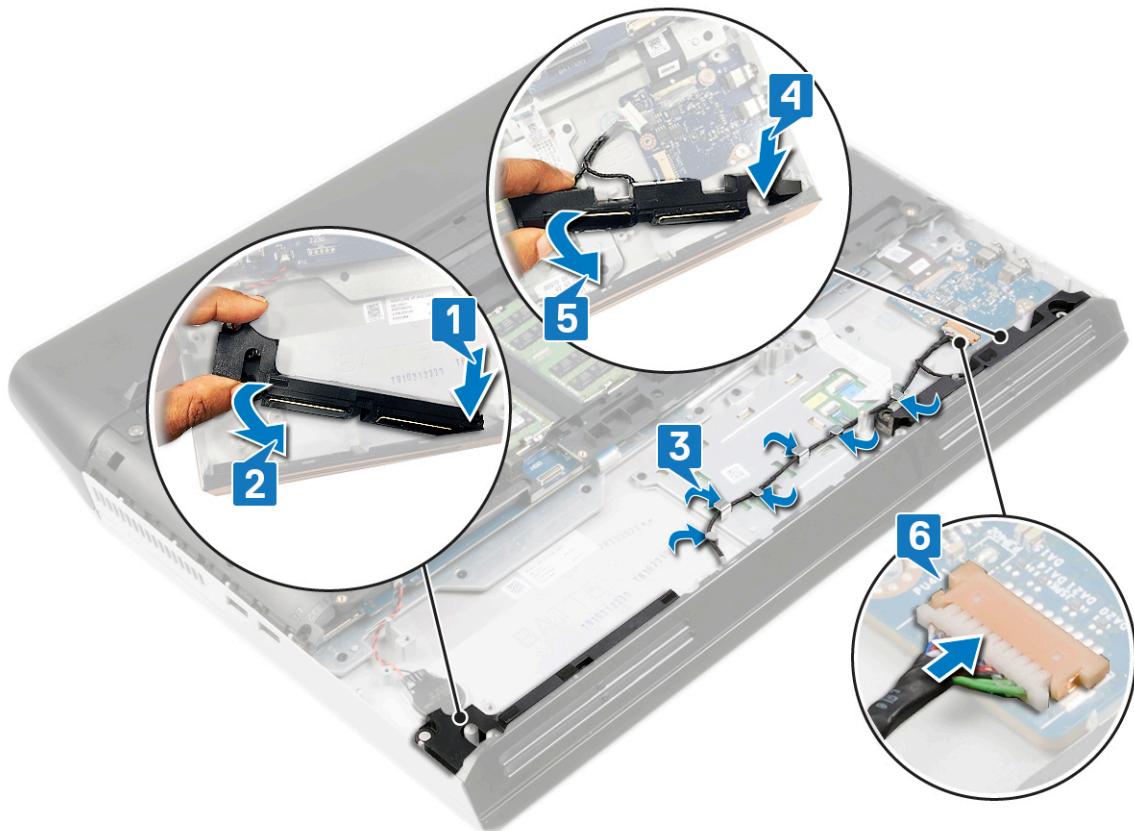
Replacing the speakers

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Procedure

 **NOTE:** If the rubber grommets are pushed out of the speakers when removing the speakers, push them back in place before replacing the speakers.

- 1 Using the alignment posts and rubber grommets, place the right speaker in the slot on the palm-rest assembly.
- 2 Holding the tab on the right speaker, rotate the right speaker into place and secure it using the alignment posts.
- 3 Route the speaker cable through the routing guides on the palm-rest assembly.
- 4 Using the alignment posts and rubber grommets, place the left speaker in the slot on the palm-rest assembly.
- 5 Holding the tab on the left speaker, rotate the left speaker into place and secure it using the alignment posts.
- 6 Connect the speaker cable to the system board.



Post-requisites

- 1 Follow the procedure from step 4 to step 7 in [Replacing the hard drive](#).
- 2 Replace the [solid-state drive](#) (in SSD2 slot).
- 3 Replace the [battery](#).

- 4 Replace the [base cover](#).

Removing the coin-cell battery

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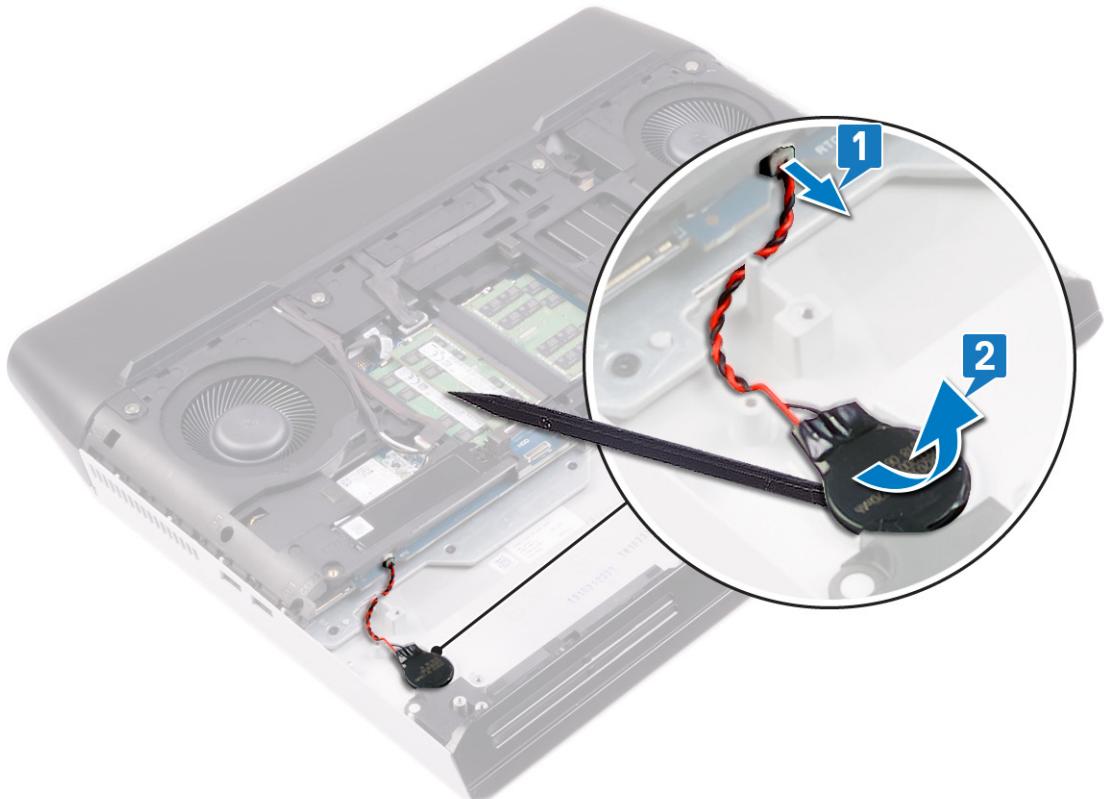
⚠ CAUTION: Removing the coin-cell battery resets the BIOS setup program's settings to default. It is recommended that you note the BIOS setup program's settings before removing the coin-cell battery.

Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [solid-state drive](#) (in SSD2 slot).

Procedure

- 1 Disconnect the coin-cell battery cable from the system board.
- 2 Using a plastic scribe, pry off the coin-cell battery from the system board.

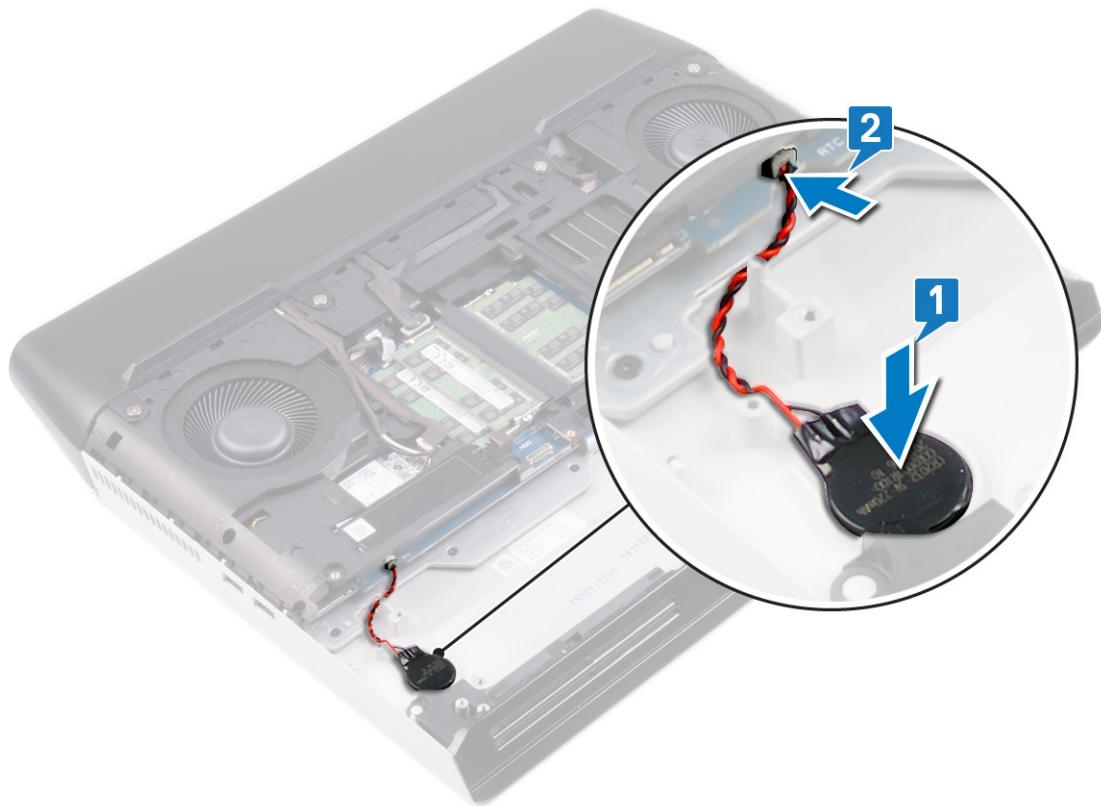


Replacing the coin-cell battery

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Procedure

- 1 Adhere the coin-cell battery to the slot on the palm-rest assembly.
- 2 Connect the coin-cell battery to the system board.



Post-requisites

- 1 Replace the [solid-state drive](#) (in SSD2 slot).
- 2 Replace the [base cover](#).
- 3 Replace the [battery](#).

Removing the touchpad

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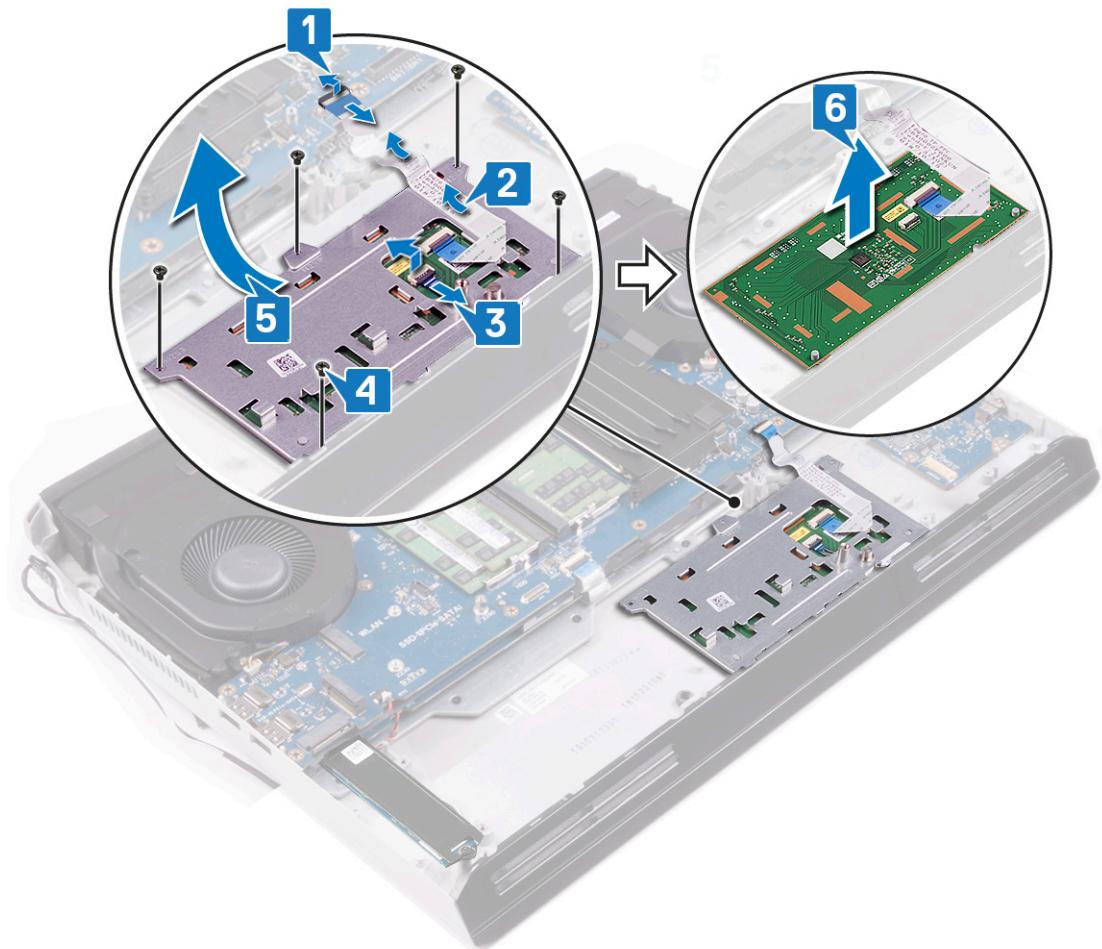
Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [solid-state drive](#) (in SSD2 slot).
- 4 Follow the procedure from step 1 to step 4 in [Removing the hard drive](#).
- 5 Remove the [speakers](#).
- 6 Remove the [computer base](#).

Procedure

- 1 Open the latch and disconnect the touchpad cable from the system board.
- 2 Peel off the touchpad cable from the touchpad bracket.
- 3 Open the latch and disconnect the touchpad-button cable from the touchpad.
- 4 Remove the five screws (M2x2.5) that secure the touchpad bracket to the palm-rest assembly.
- 5 Slide the touchpad bracket at an angle and lift it off the palm-rest assembly.

- 6 Lift the touchpad off the palm-rest assembly.

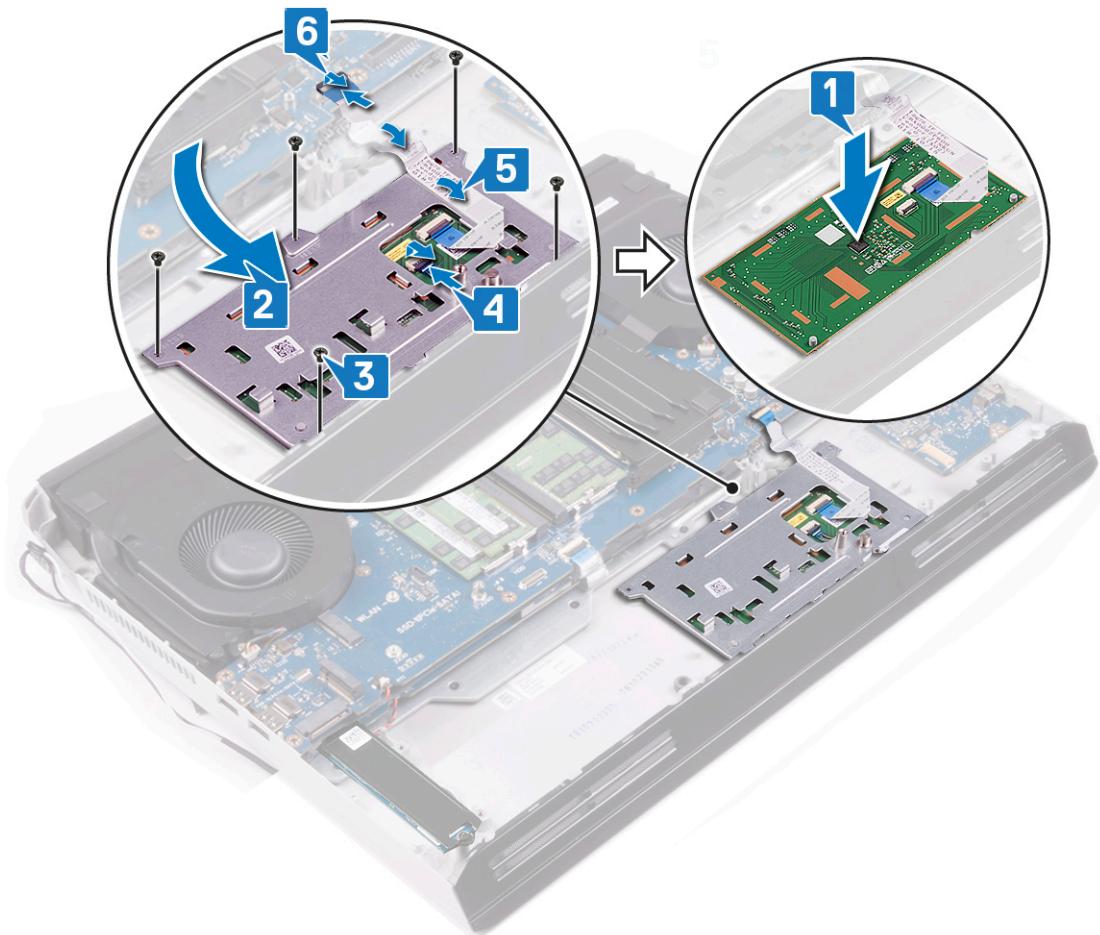


Replacing the touchpad

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Procedure

- 1 Place the touchpad into the slot on the palm-rest assembly. Ensure to align the touchpad using the alignment pins on the palm-rest assembly.
- 2 Slide and place the touchpad bracket into the slot on the palm-rest assembly.
- 3 Replace the five screws (M2x2.5) that secure the touchpad bracket to the palm-rest assembly.
- 4 Slide the touchpad-button cable into the connector on the touchpad and close the latch to secure the touchpad-button cable.
- 5 Adhere the touchpad cable to the touchpad bracket.
- 6 Slide the touchpad cable into the connector on the system board and close the latch to secure the touchpad cable.



Post-requisites

- 1 Replace the [computer base](#).

- 2** Replace the [speakers](#).
- 3** Follow the procedure from step 4 to step 7 in [Replacing the hard drive](#).
- 4** Replace the [solid-state drive](#) (in SSD2 slot).
- 5** Replace the [battery](#).
- 6** Replace the [base cover](#).

Removing the display assembly

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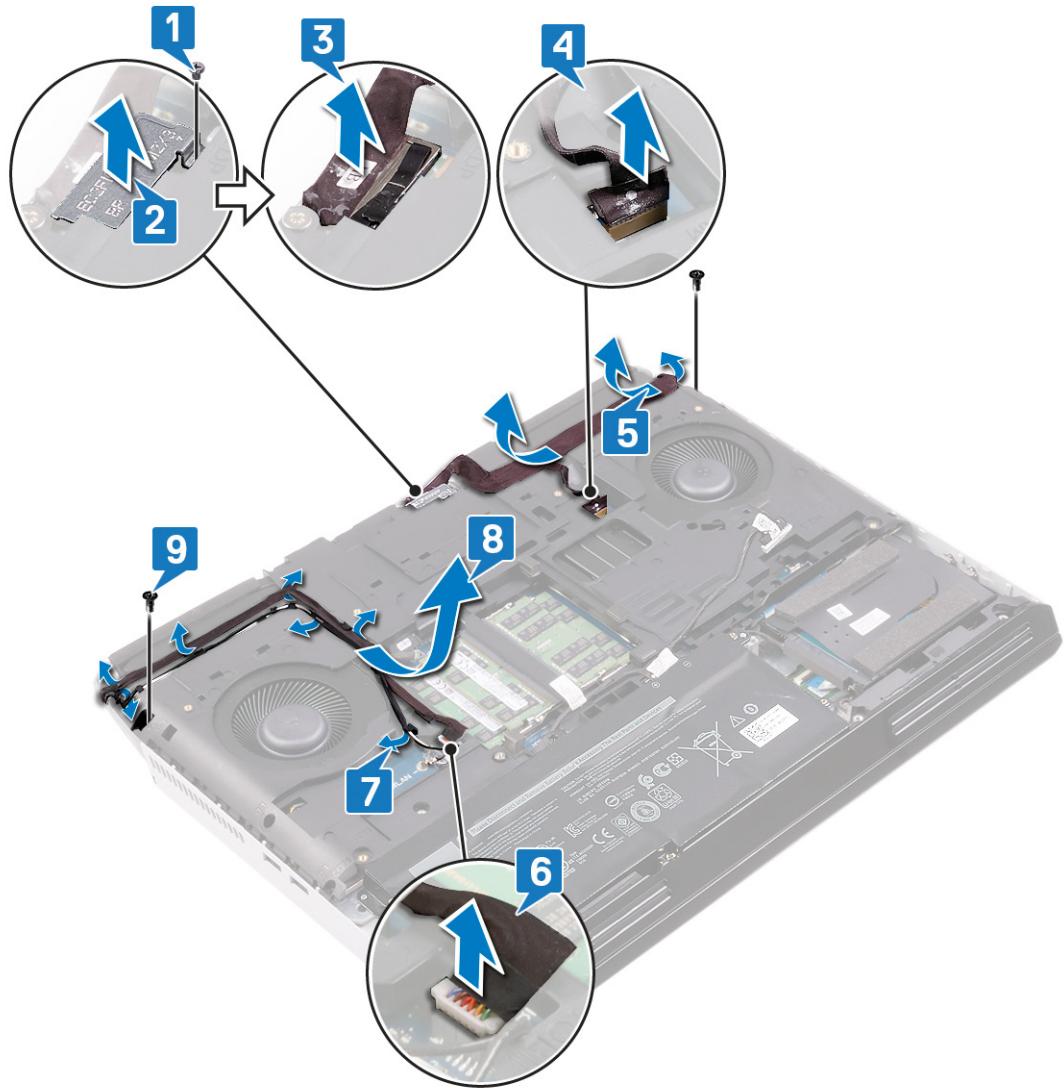
Prerequisites

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

Procedure

- 1 Remove the screw (M2x3) 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 Disconnect the camera cable from the system board.
- 5 Peel off the display cable and the camera cable from the computer base.
- 6 Disconnect the tobii cable from the system board.
- 7 Remove the antenna cables from the routing guides on the computer base.
- 8 Peel off the tobii cable from the computer base.

- 9** Remove the two screws (M2.5x8) that secures the computer base to the display assembly.



10 Turn the computer over.

11 Remove the four screws (M2.5x2.5) that secure the display hinges to the palm-rest assembly.

12 Lift the display assembly off the palm-rest assembly.

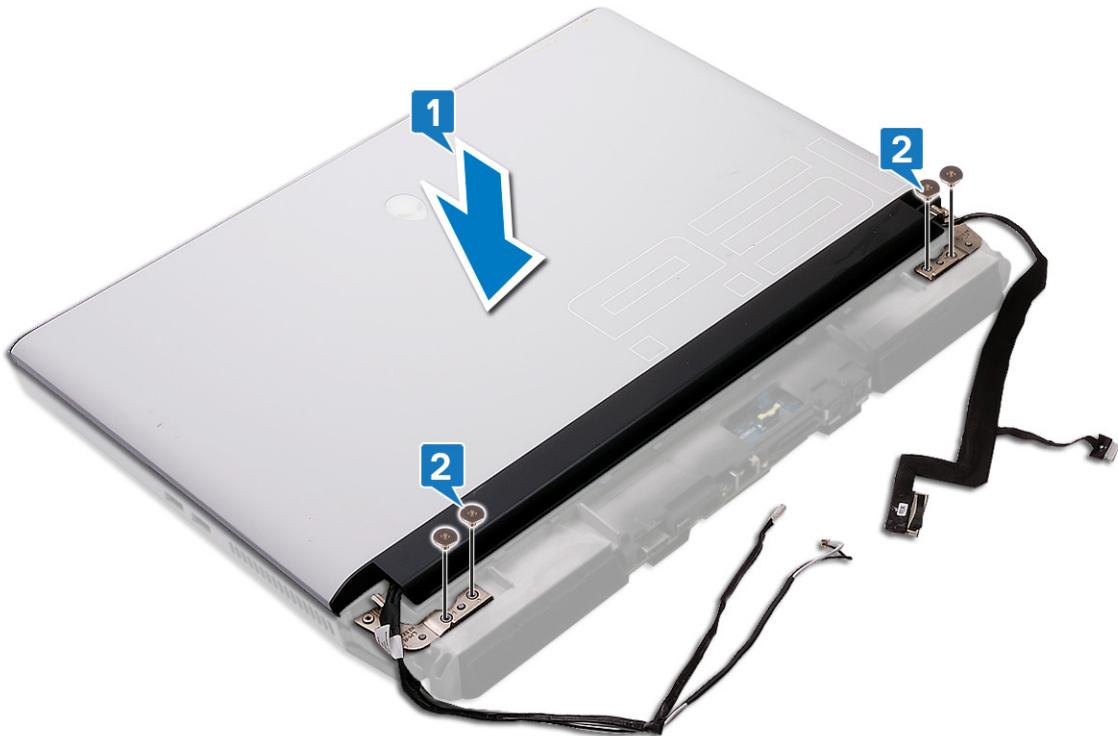


Replacing the display assembly

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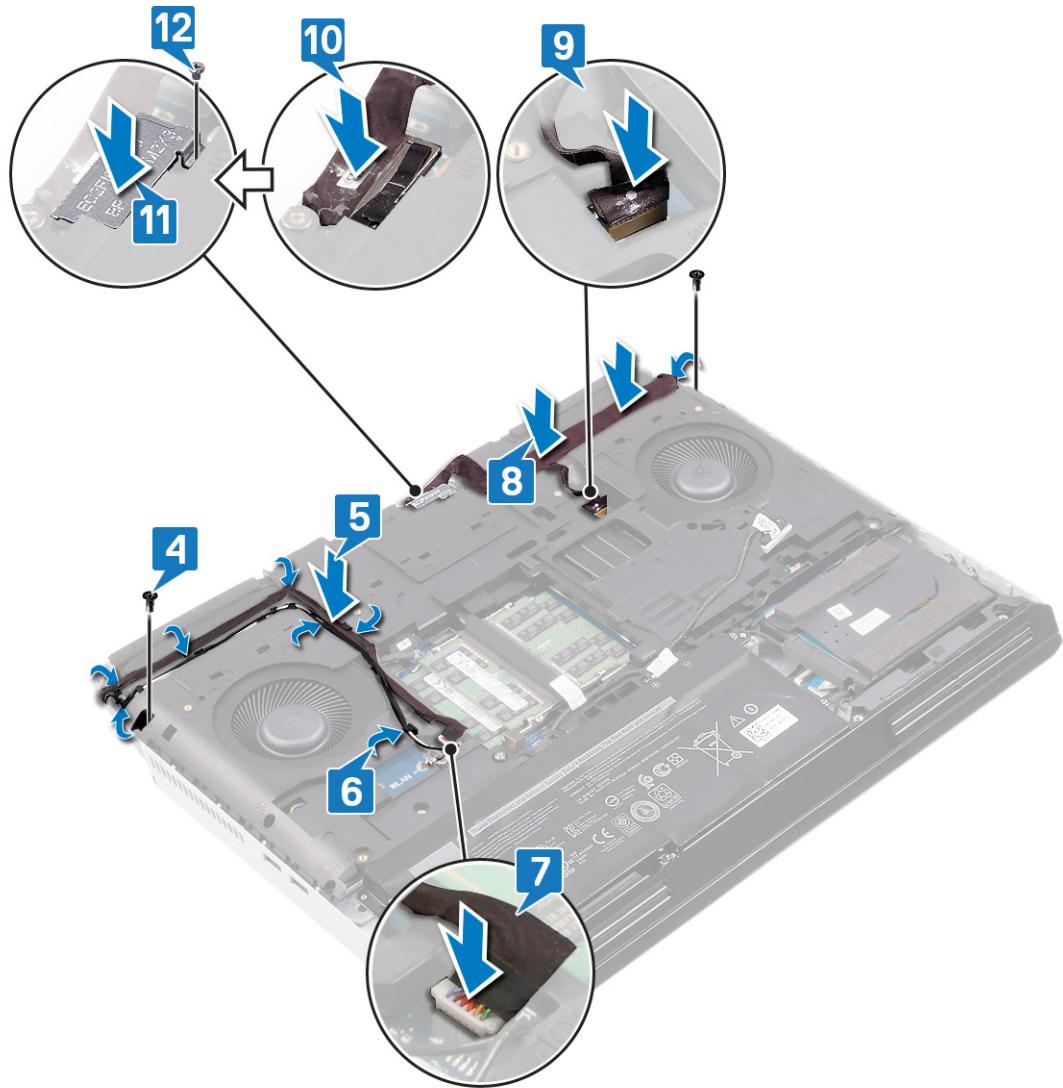
Procedure

- 1 Align the screw holes on the display hinges with the screw holes on the palm-rest assembly.
- 2 Replace the four screws (M2.5x2.5) that secure the display assembly to the palm-rest assembly.



- 3 Turn the computer over.
- 4 Replace the two screws (M2.5x8) that secure the computer base to the display assembly.
- 5 Adhere the tobii cable to the computer base.
- 6 Route the antennas cable through the routing guides on the computer base.
- 7 Connect the tobii cable to the system board.
- 8 Adhere the display cable and the camera cable to the computer base.
- 9 Connect the camera cable to the system board.
- 10 Connect the display cable to the system board.
- 11 Align the screw hole on the display-cable bracket with the screw hole on the system board.

12 Replace the screw (M2x3) that secures the display-cable bracket to the system board.



Post-requisites

- 1** Replace the [rear I/O cover](#).
- 2** Replace the [wireless card](#).
- 3** Replace the [base cover](#).

Removing the computer base

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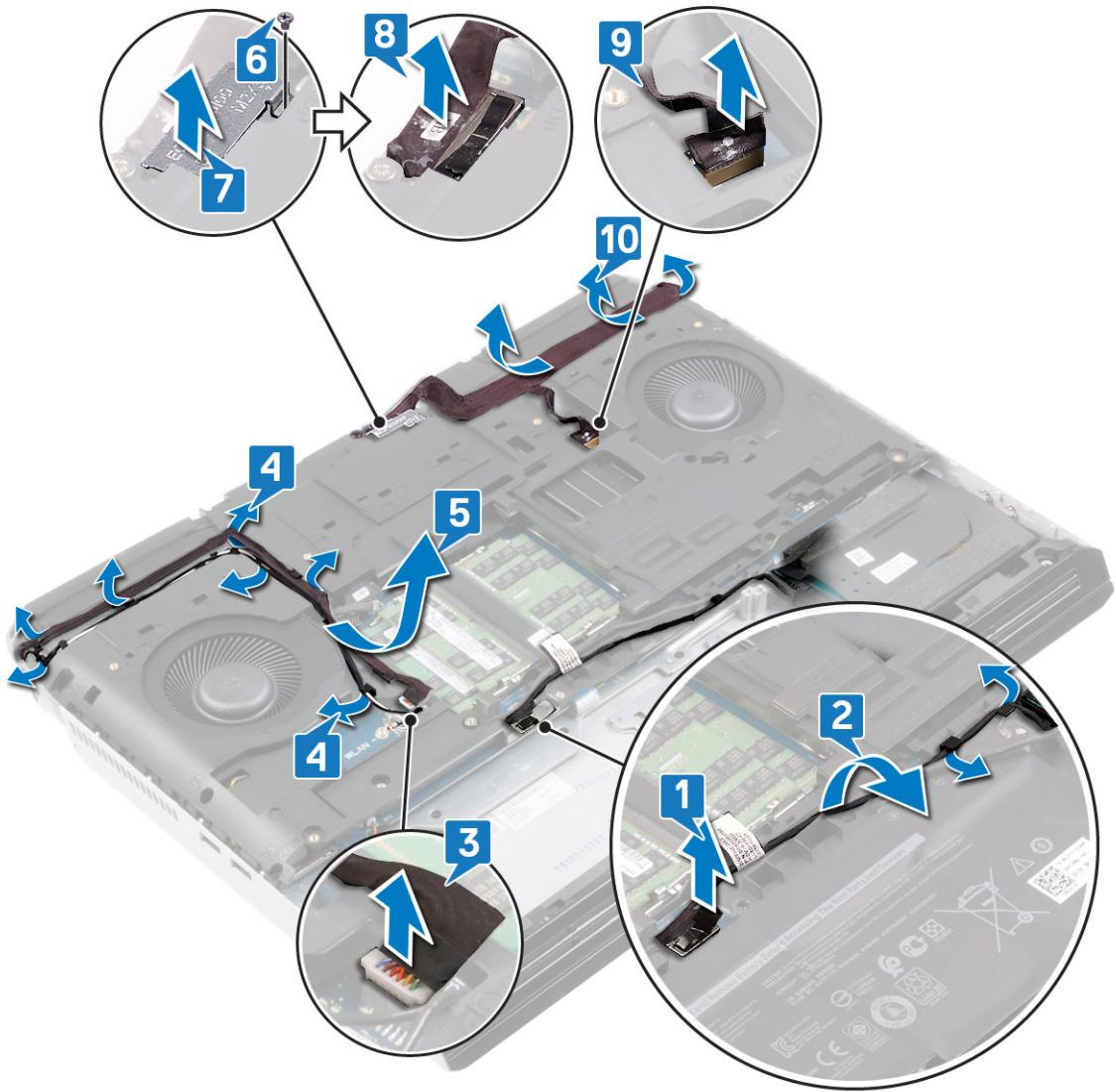
Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [wireless card](#).
- 4 Remove the [solid-state drive](#) (in SSD1 slot).
- 5 Remove the [rear-I/O cover](#).

Procedure

- 1 Using the pull tab, disconnect the hard-drive cable.
- 2 Remove the hard-drive cable from the routing guides on the computer base.
- 3 Disconnect the tobii cable from the system board.
- 4 Remove the antenna cables from the routing guides on the computer base.
- 5 Peel off the tobii cable from the system board.
- 6 Remove the screw (M2x3) that secures the display-cable bracket on the system board.
- 7 Lift the display-cable bracket off the system board.
- 8 Using the pull tab, disconnect the display cable from the system board.
- 9 Disconnect the camera cable from the system board.

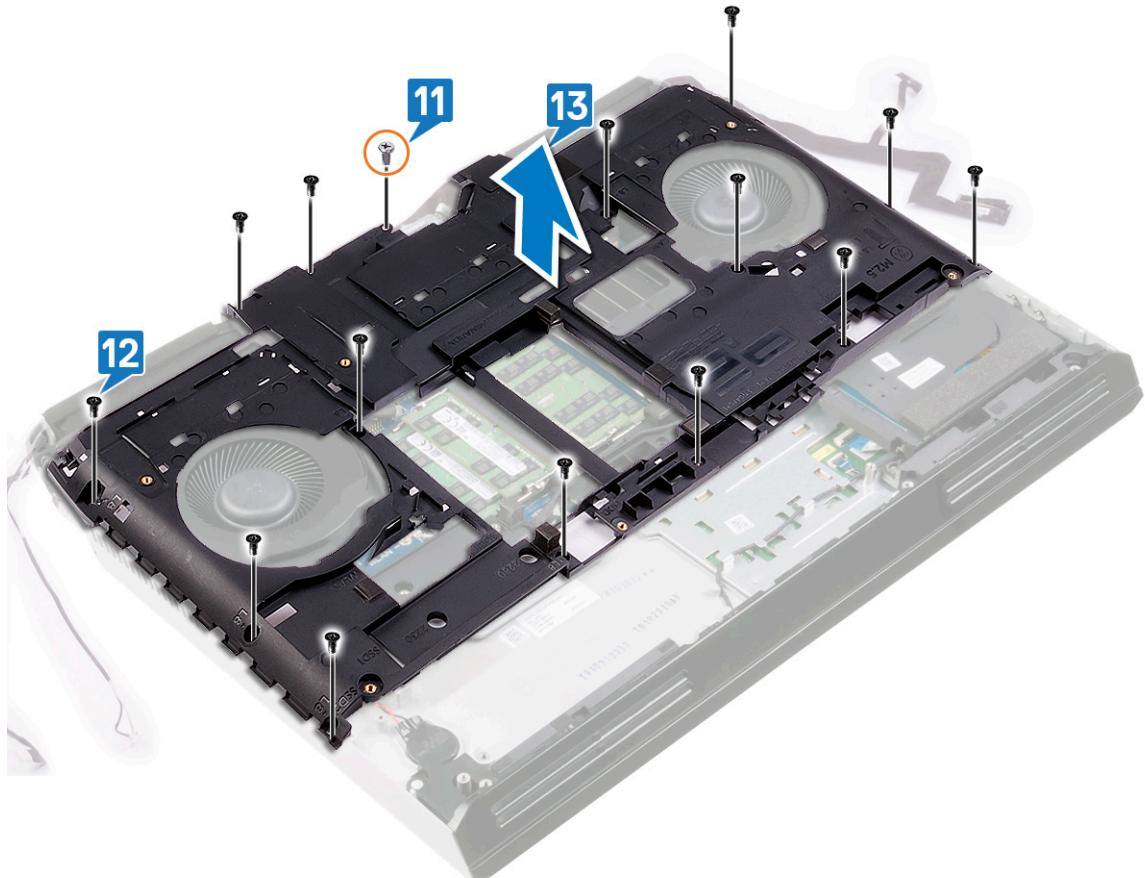
10 Peel off the display cable and the camera cable from the computer base.



11 Remove the screw (M2.5x12) that secures the computer base to the palm-rest assembly.

12 Remove the 14 screws (M2.5x8) that secure the computer base to the palm-rest assembly.

13 Lift the computer base off the palm-rest assembly.

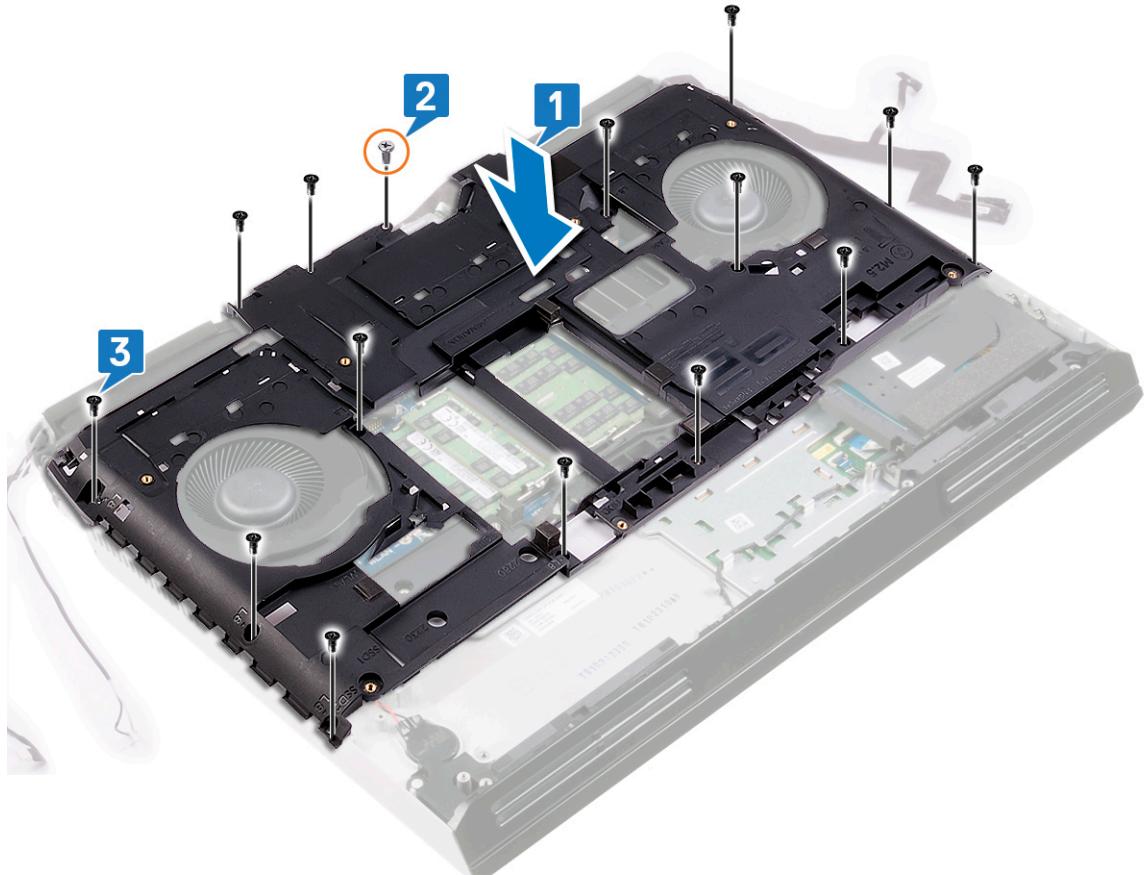


Replacing the computer base

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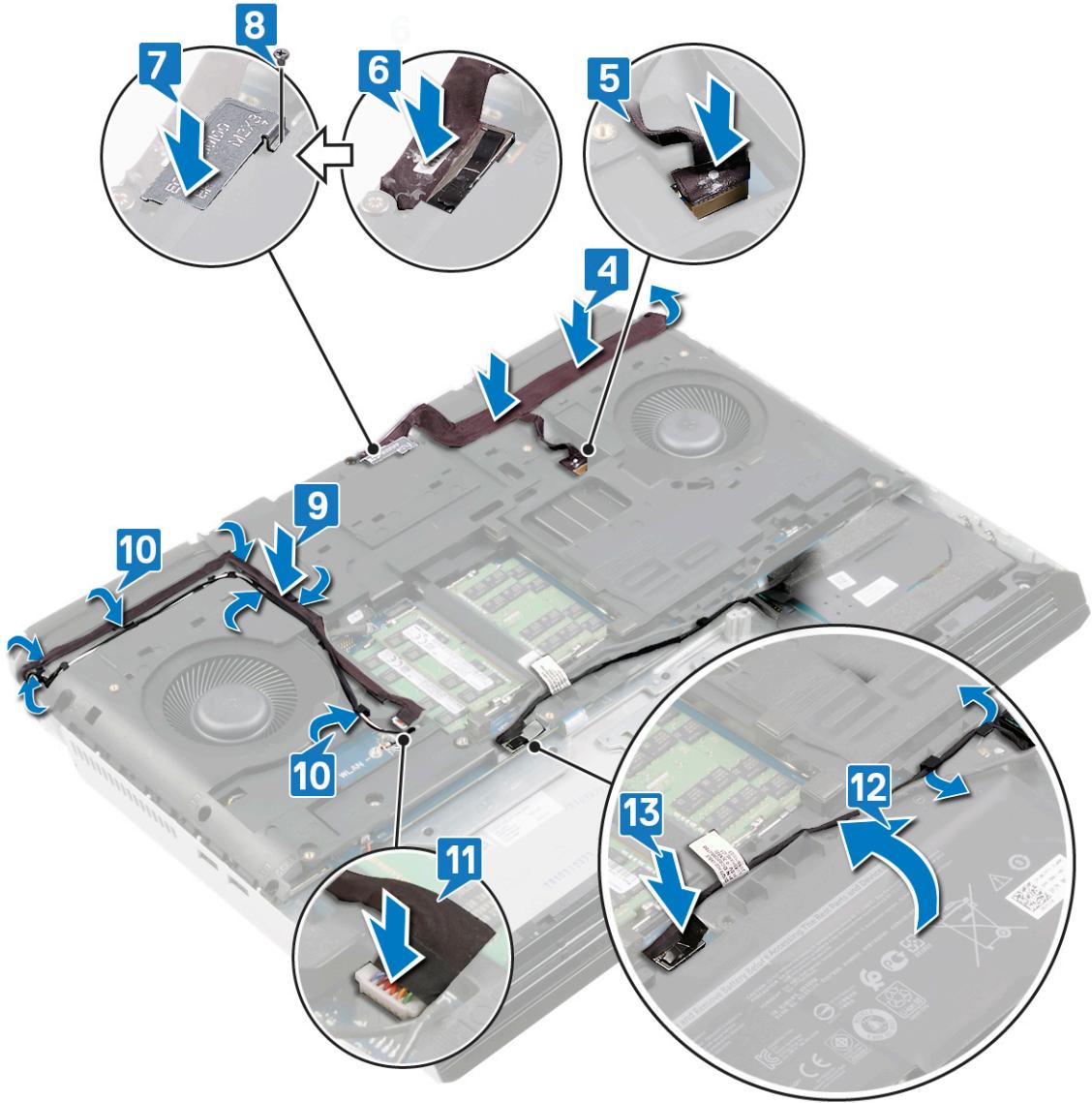
Procedure

- 1 Align the screw holes on the computer base with the screw holes on the palm-rest assembly.
- 2 Replace the screw (M2.5x12) that secures the computer base to the palm-rest assembly.
- 3 Replace the 14 screws (M2.5x8) that secure the computer base to the palm-rest assembly.



- 4 Adhere the display cable and camera cable to the computer base.
- 5 Connect the camera cable to the system board.
- 6 Connect the display cable to the system board.
- 7 Align the screw hole on the display-cable bracket with the screw hole on the system board.
- 8 Replace the screw (M2x3) that secures the display-cable bracket to the system board.
- 9 Adhere the tobii cable to the computer base.
- 10 Route the antennas cable through the routing guides on the computer base.
- 11 Connect the tobii cable to the system board.
- 12 Route the hard-drive cable through routing guides on the computer base.

13 Connect the hard-drive cable to the system board.



Post-requisites

- 1** Replace the [rear I/O cover](#).
- 2** Replace the [solid-state drive](#) (in SSD1 slot).
- 3** Replace the [wireless card](#).
- 4** Replace the [battery](#).
- 5** Replace the [base cover](#).

Removing the heat-sink assembly

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

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

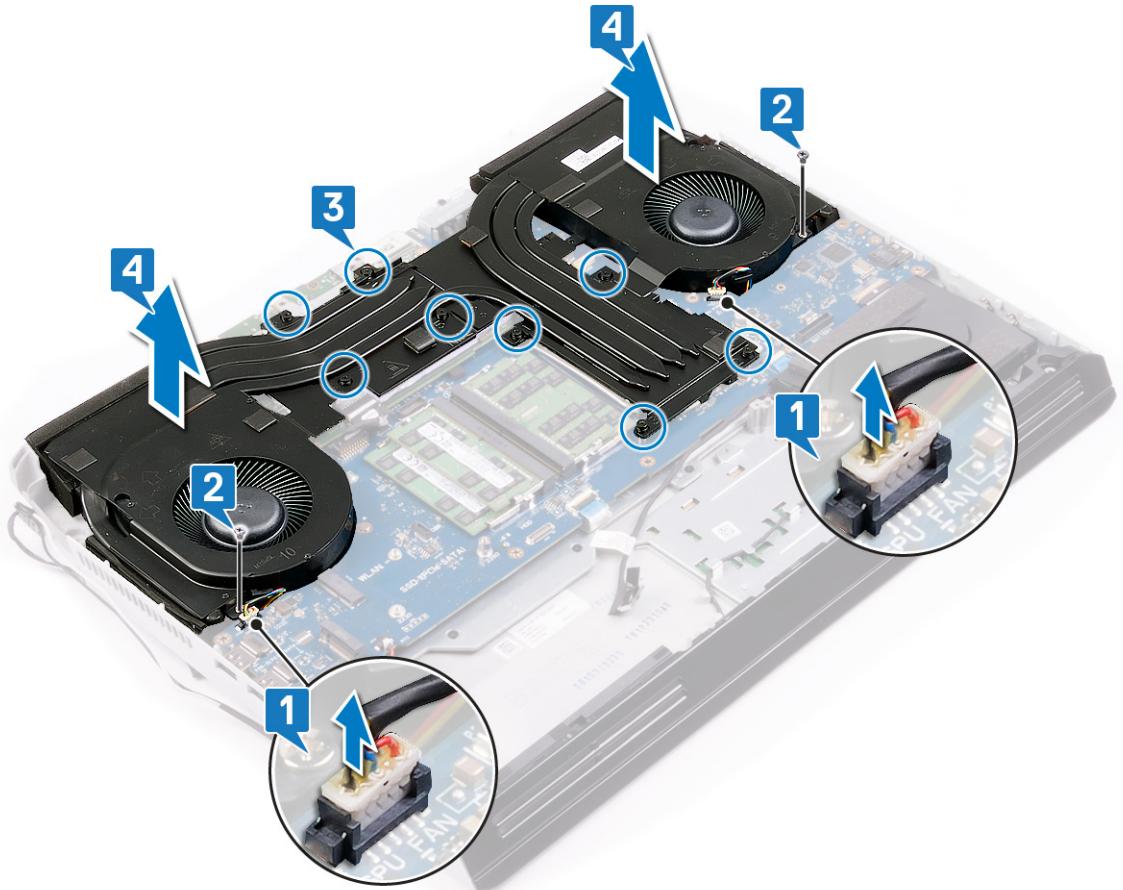
Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [wireless card](#).
- 4 Remove the [solid-state drive](#) (in SSD1 slot).
- 5 Remove the [rear-I/O cover](#).
- 6 Remove the [computer base](#).

Procedure

- 1 Disconnect the fan cables from the system board.
- 2 Remove the two screws (M2.5x5) that secure the heat-sink assembly to the palm-rest assembly.
- 3 In the reverse sequential order (8>7>6>5>4>3>2>1), loosen the eight captive screws that secure the heat-sink assembly to the system board.

- 4 Lift the heat-sink assembly off the system board.



Replacing the heat-sink assembly

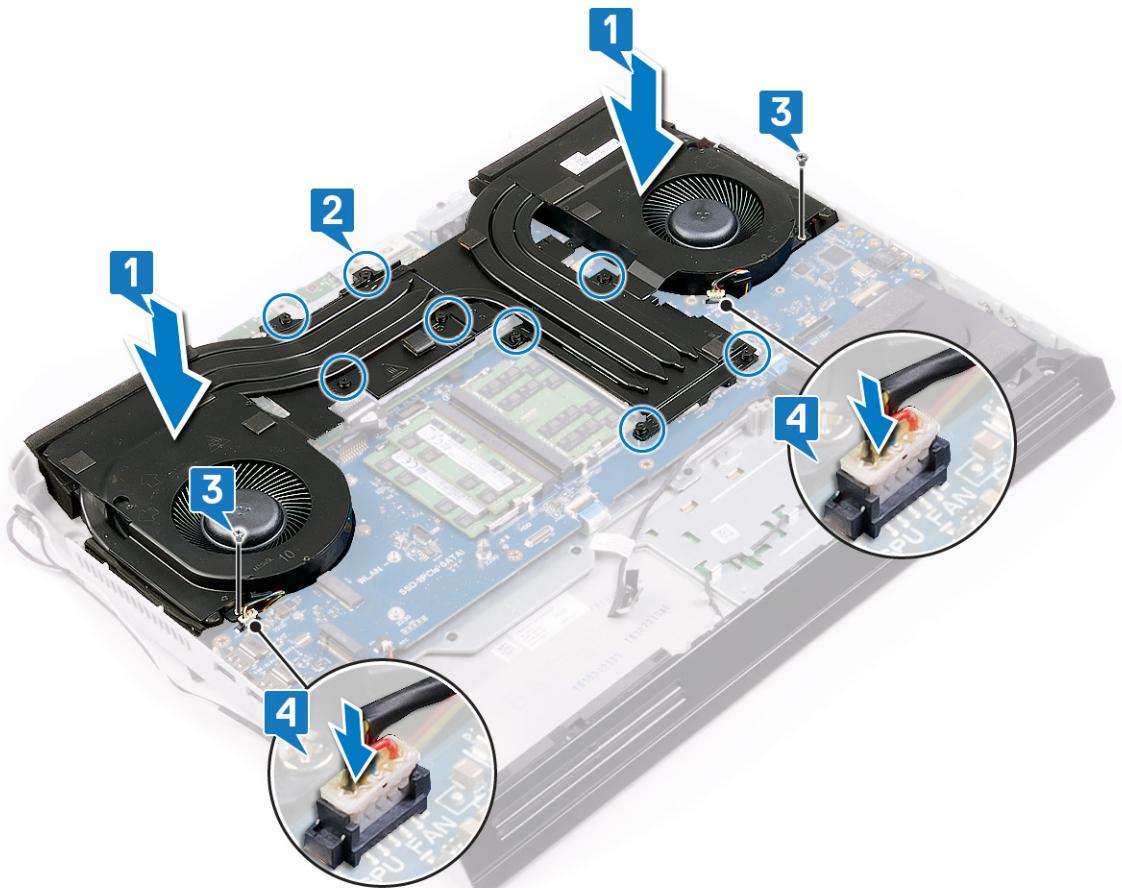
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! CAUTION: Incorrect alignment of the heat sink can damage the system board and processor.

! NOTE: If either the system board or the fan and heat-sink assembly is replaced, use the thermal pad provided in the kit to ensure that thermal conductivity is achieved.

Procedure

- 1 Place the heat-sink assembly on the palm-rest assembly and align the screw holes on the heat-sink assembly with the screw holes on the palm-rest assembly.
- 2 Tighten the captive screws in the sequential order (1>2>3>4>5>6>7>8) to secure the heat-sink assembly to the palm-rest assembly.
- 3 Replace the two screws (M2.5x5) that secure the heat-sink assembly to the palm-rest assembly.
- 4 Connect the fan cables to the system board.



Post-requisites

- 1** Replace the [computer base](#).
- 2** Replace the [rear I/O cover](#)
- 3** Replace the [wireless card](#).
- 4** Replace the [solid-state drive](#) (in SSD1 slot).
- 5** Replace the [battery](#).
- 6** Replace the [base cover](#).

Removing the left power-adapter port

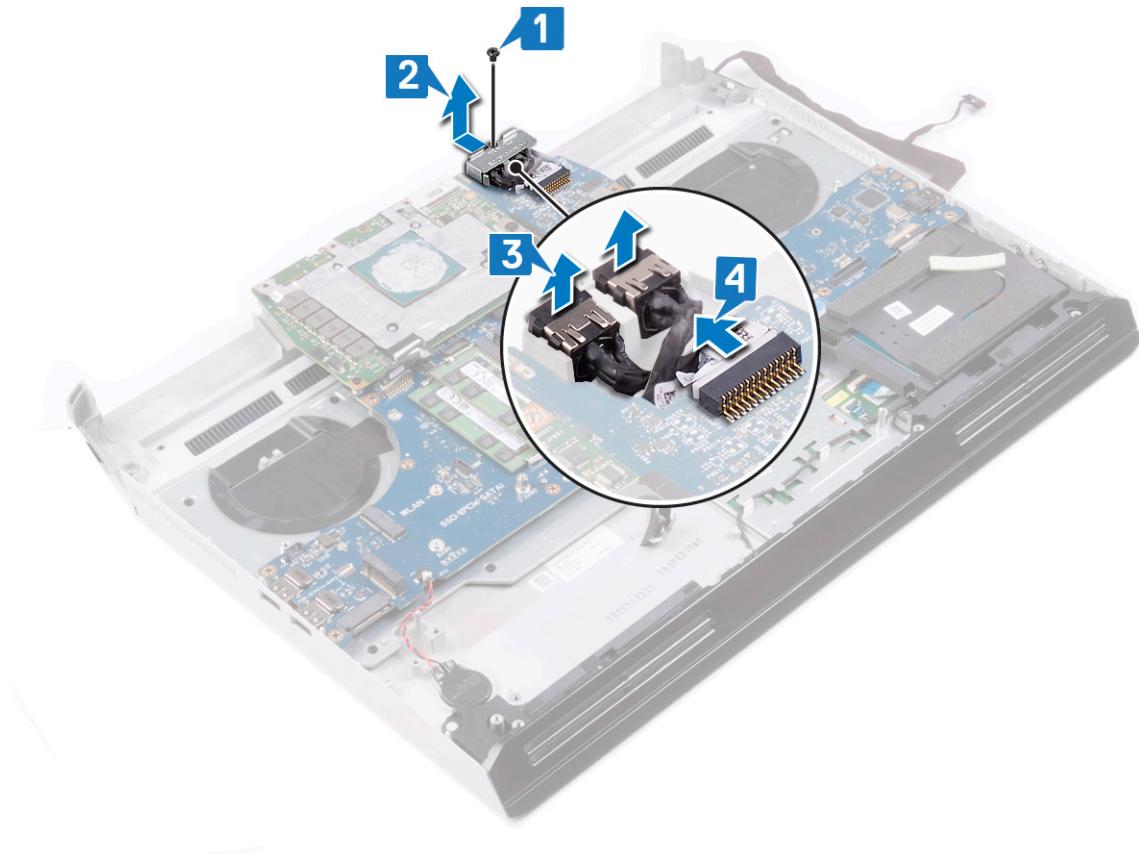
WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [wireless card](#).
- 4 Remove the [solid-state drive](#) (in SSD1 slot).
- 5 Remove the [rear-I/O cover](#).
- 6 Remove the [computer base](#).
- 7 Remove the [heat-sink assembly](#).

Procedure

- 1 Remove the screw (M2x3) that secures the power-adapter port bracket to the palm-rest assembly.
- 2 Slide the power-adapter port bracket off the palm-rest assembly.
- 3 Lift both power-adapter ports off the palm-rest assembly to uncross the cables.
- 4 Disconnect the right power-adapter port cable from the system board.

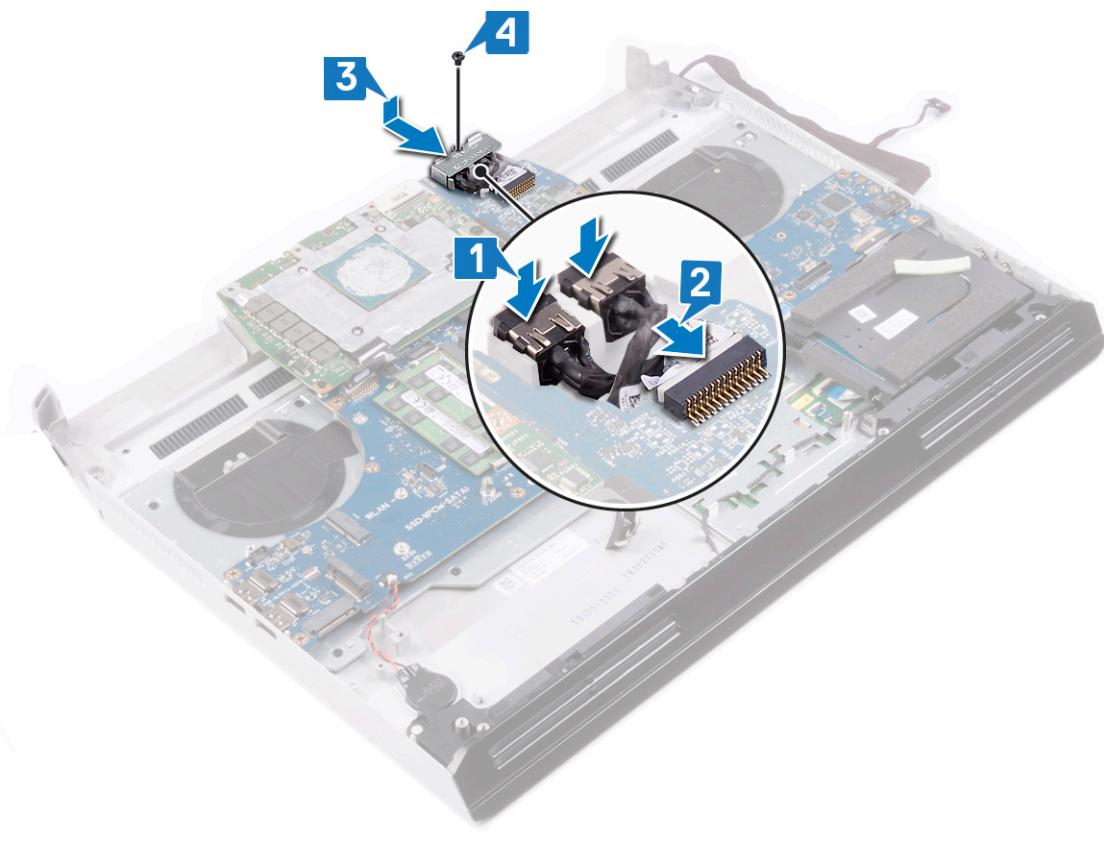


Replacing the left power-adapter port

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Procedure

- 1 Route the right power-adapter port cable under the left power-adapter port cable and place both power-adapter ports into the slots on the palm-rest assembly.
- 2 Connect the right power-adapter port cable to the system board.
- 3 Slide and place the power-adapter board bracket on the palm-rest assembly.
- 4 Replace the screw (M2x3) that secures the power-adapter port bracket to the palm-rest assembly.



Post-requisites

- 1 Replace the [heat-sink assembly](#).
- 2 Replace the [computer base](#).
- 3 Replace the [rear I/O cover](#)
- 4 Replace the [wireless card](#).
- 5 Replace the [solid-state drive](#) (in SSD1 slot).
- 6 Replace the [battery](#).

- 7 Replace the [base cover](#).

Removing the processor

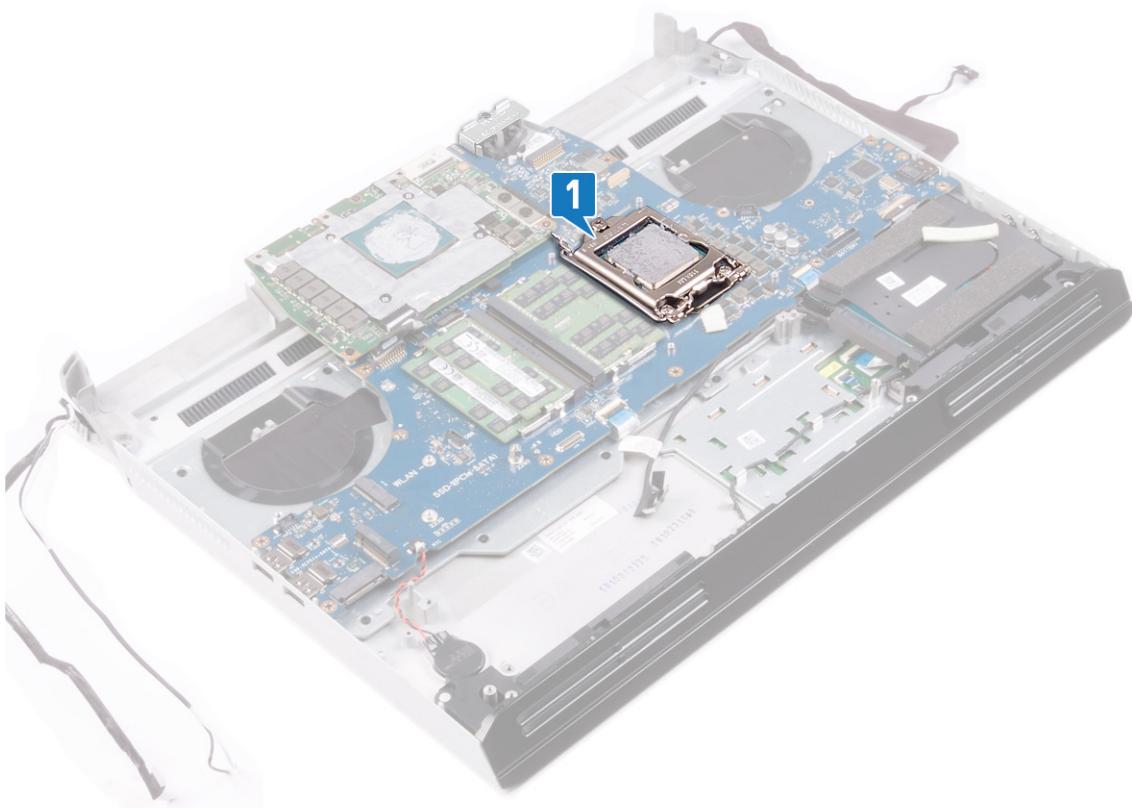
WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [wireless card](#).
- 4 Remove the [solid-state drive](#) (in SSD1 slot).
- 5 Remove the [rear-I/O cover](#).
- 6 Remove the [computer base](#).
- 7 Remove the [heat-sink assembly](#).

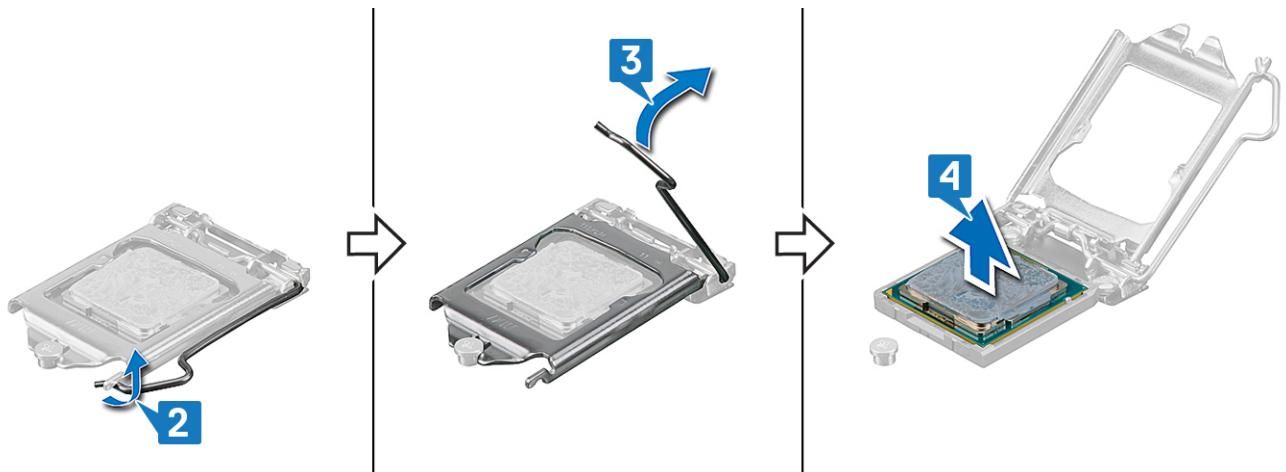
Procedure

- 1 Locate the processor on the system board.



- 2 Push down on the lever on the processor cover and move it away from the processor.
- 3 Pull the lever back to open the processor cover.

- 4 Lift the processor straight up to remove it from the system board.



Replacing the processor

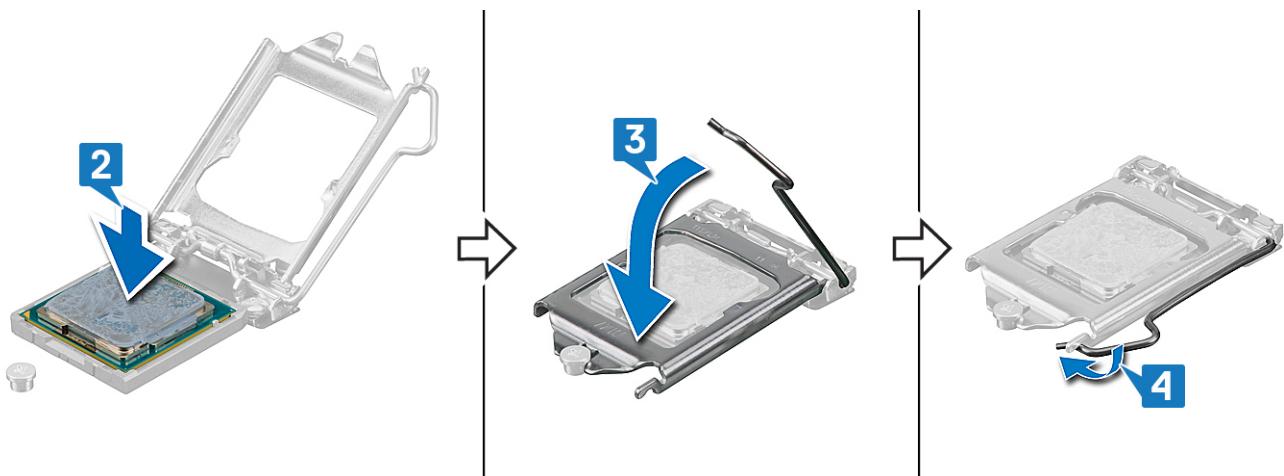
! WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

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

! NOTE: A new processor ships with a thermal pad in the package. In some cases, the processor may ship with the thermal pad attached to it.

Procedure

- 1 Align the triangle on the processor with the triangle on the processor socket.
- 2 Place the processor in the processor socket on the system board.
- 3 Close the processor cover.
- 4 Push the lever on the processor cover and lock it in place to secure the processor.



Post-requisites

- 1 Replace the [heat-sink assembly](#).
- 2 Replace the [computer base](#).
- 3 Replace the [rear I/O cover](#)
- 4 Replace the [wireless card](#).
- 5 Replace the [solid-state drive](#) (in SSD1 slot).
- 6 Replace the [battery](#).
- 7 Replace the [base cover](#).

Removing the graphics card

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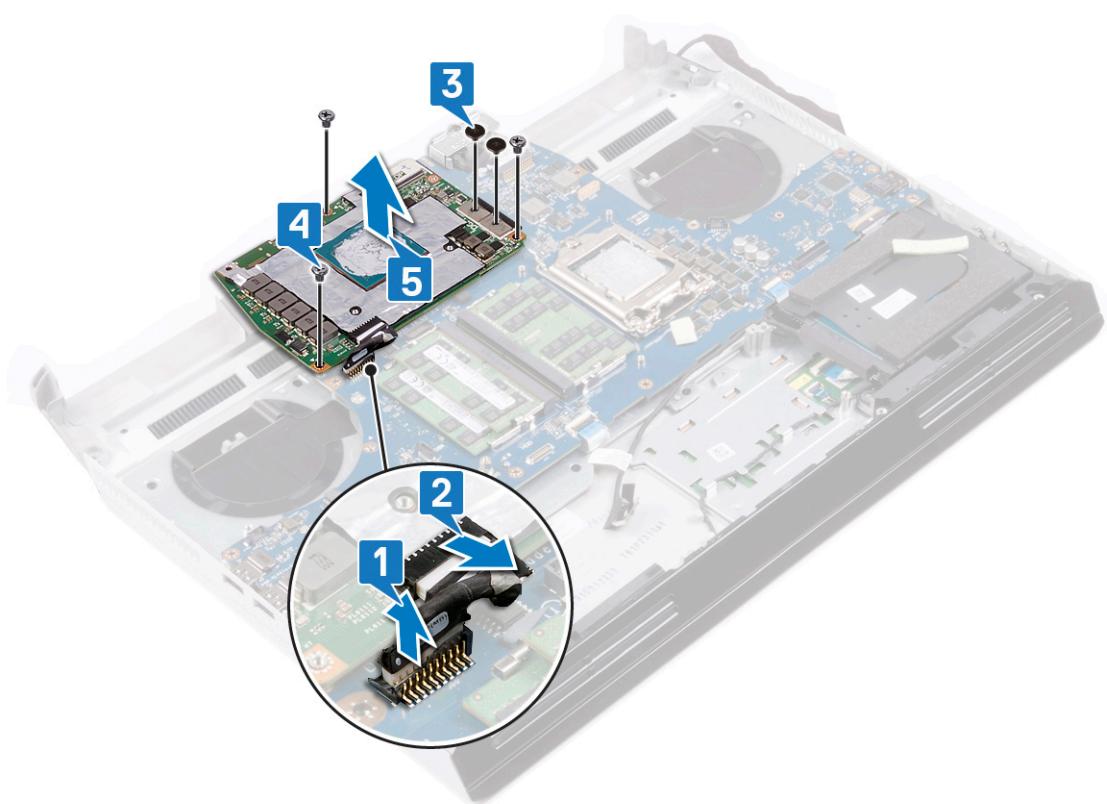
Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [wireless card](#).
- 4 Remove the [solid-state drive](#) (in SSD1 slot).
- 5 Remove the [rear-I/O cover](#).
- 6 Remove the [computer base](#).
- 7 Remove the [heat-sink assembly](#).

Procedure

- 1 Disconnect the graphics-card power cable from the system board.
- 2 Disconnect the graphics-card power cable from the graphics card.
- 3 Remove the two screws (M2x3) that secure the two graphics-card cable to the graphics card.
- 4 Remove the three screws (M2x3) that secure the graphics card to the system board.

- 5** Lift the graphics card off the system board.

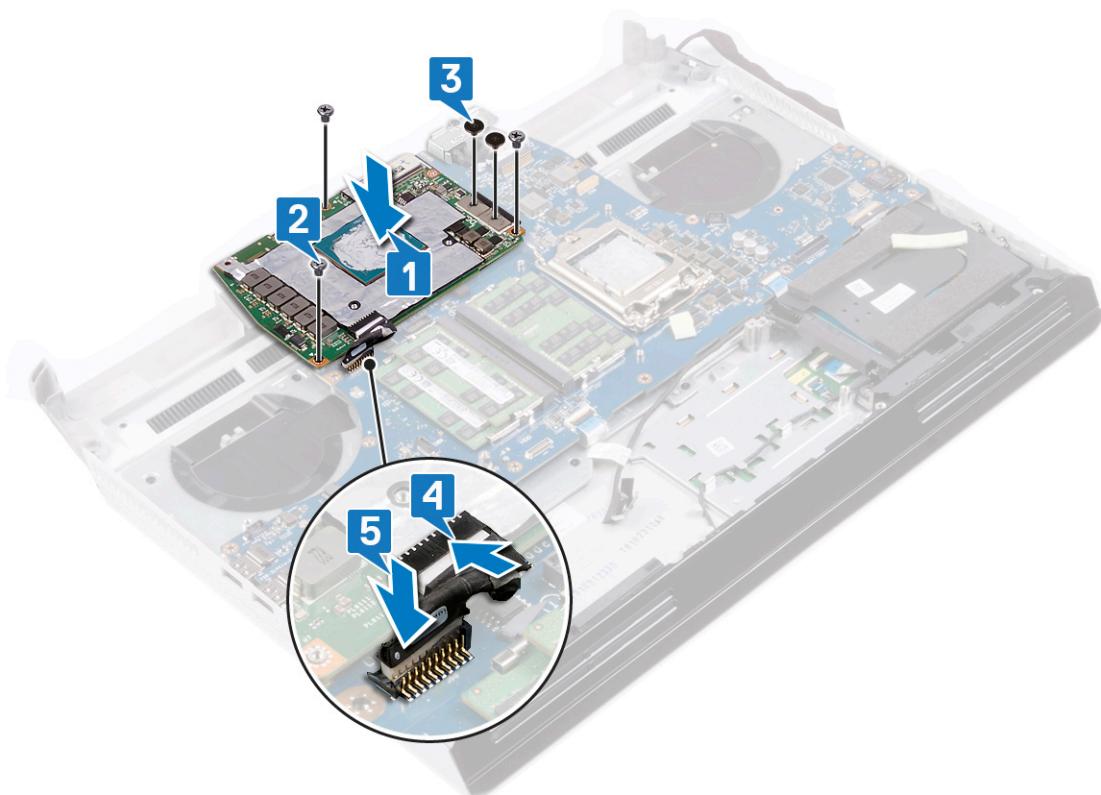


Replacing the graphics card

WARNING: Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Procedure

- 1 Place the graphics card on the system board and align the screw holes on the graphics card with the screw holes on the system board.
- 2 Replace the three screws (M2x3) that secure the graphics card to the system board.
- 3 Replace the two screws (M2x3) that secure the two graphics-card cables to the graphics card.
- 4 Connect the graphics-card power cable to the graphics card.
- 5 Connect the graphics-card power cable to the system board.



Post-requisites

- 1 Replace the [heat-sink assembly](#).
- 2 Replace the [computer base](#).
- 3 Replace the [rear I/O cover](#)
- 4 Replace the [wireless card](#).
- 5 Replace the [solid-state drive](#) (in SSD1 slot).

- 6** Replace the [battery](#).
- 7** Replace the [base cover](#).

Removing the system board

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-  **NOTE:** Your computer's Service Tag is stored in the system board. You must enter the Service Tag in the BIOS setup program after you replace the system board.
-  **NOTE:** Replacing the system board removes any changes you have made to the BIOS using the BIOS setup program. You must make the appropriate changes again after you replace the system board.
-  **NOTE:** Before disconnecting the cables from the system board, note the location of the connectors so that you can reconnect the cables correctly after you replace the system board.

Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [memory modules](#).
- 4 Remove the [wireless card](#).
- 5 Remove the [solid-state drive](#).
- 6 Remove the [rear-I/O cover](#).
- 7 Remove the [computer base](#).
- 8 Remove the [coin-cell battery](#).
- 9 Remove the [heat-sink assembly](#).
- 10 Remove the [right power-adapter port](#).
- 11 Remove the [graphics card](#).
- 12 Remove the [processor](#).

Procedure

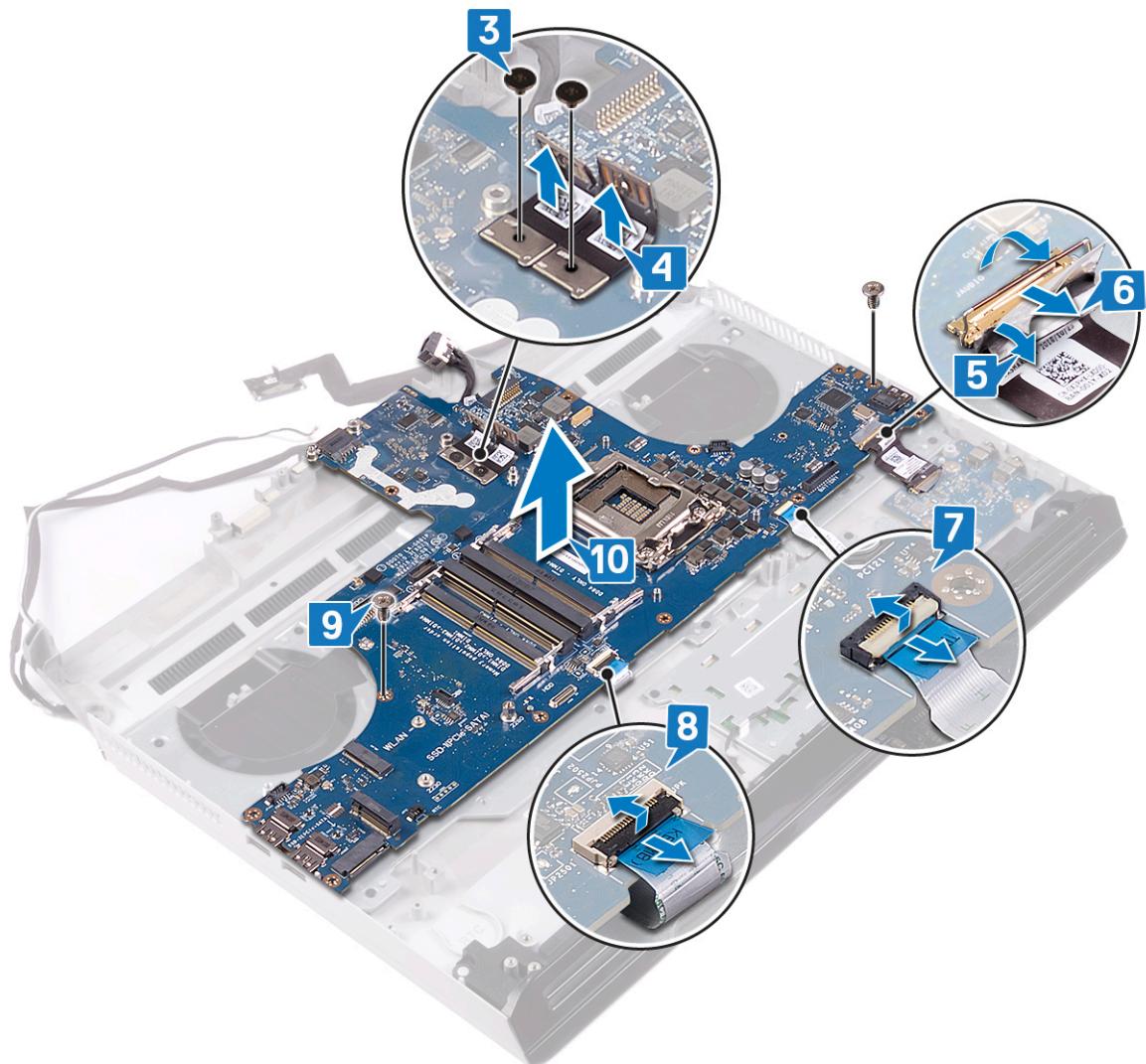
- 1 Place the palm-rest assembly on a clean and flat surface with keyboard facing up, disconnect the power-button board cable.

- 2 Turn the palm-rest assembly over.

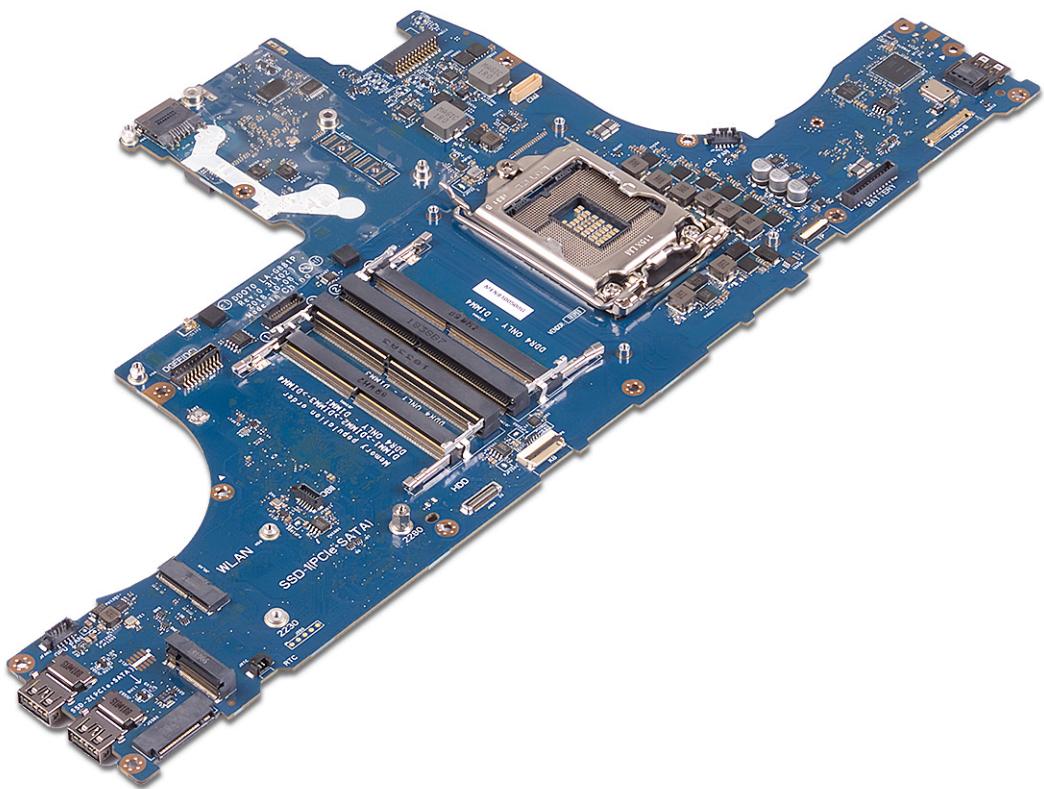


- 3 Remove the two screws (M2x3) that secure the graphics card cables on the system board.
- 4 Lift the two graphics card cables off the system board.
- 5 Peel the tape that secures the audio daughter-board cable to the system board.
- 6 Open the latch and disconnect the audio daughter-board cable from the system board.
- 7 Open the latch and disconnect the touchpad cable from the system board.
- 8 Open the latch and disconnect the keyboard cable from the system board.
- 9 Remove the two screws (M2.5x5) that secure the system board to the palm-rest assembly.
- 10 Lift the system board off the palm-rest assembly along with the right power-adapter port.

11 Remove the [left power-adapter port](#).



12 After performing all the above steps, you are left with the system board.



Replacing the system board

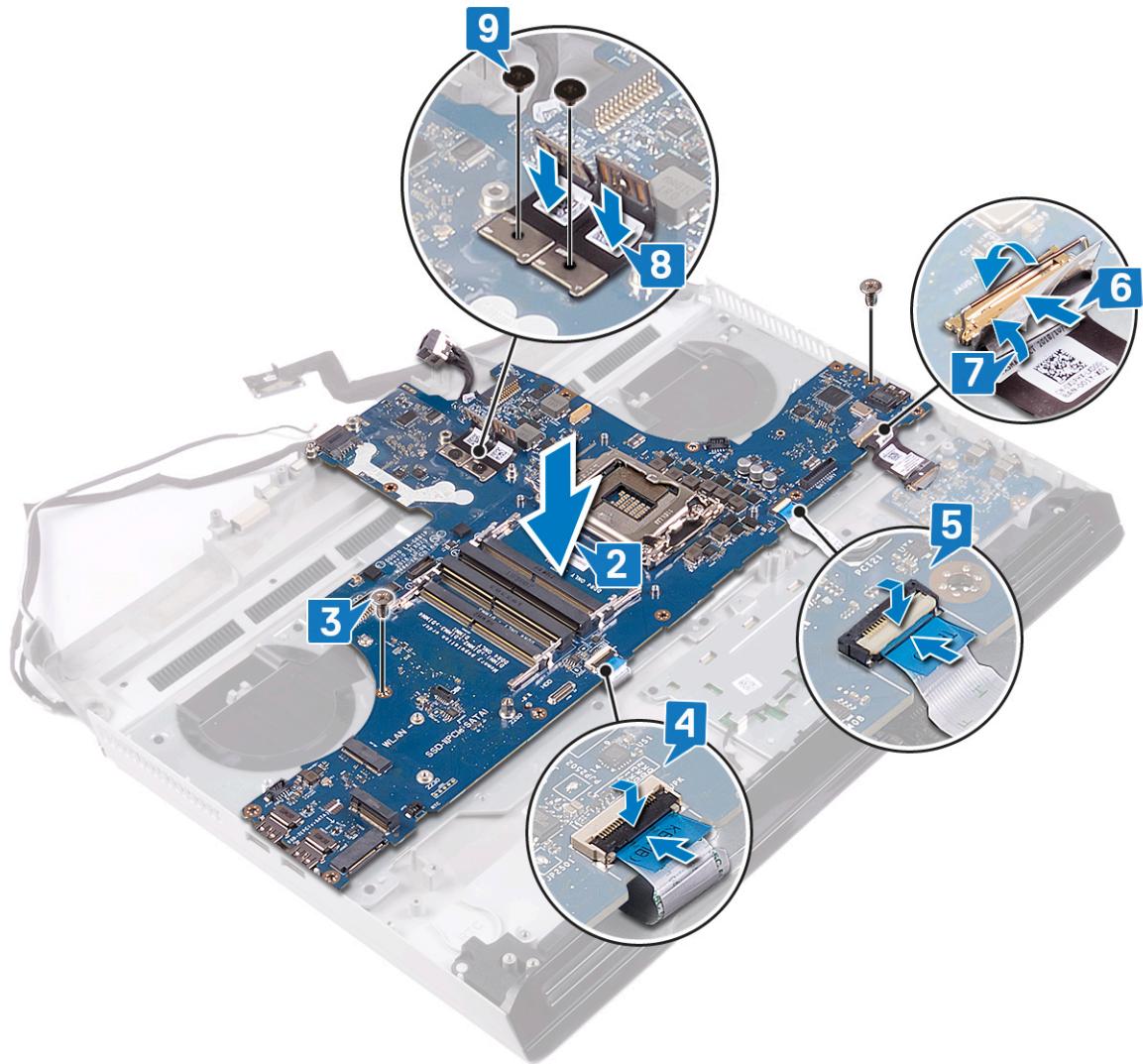
 **WARNING:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

-  **NOTE:** Your computer's Service Tag is stored in the system board. You must enter the Service Tag in the BIOS setup program after you replace the system board.
-  **NOTE:** Replacing the system board removes any changes you have made to the BIOS using the BIOS setup program. You must make the appropriate changes again after you replace the system board.

Procedure

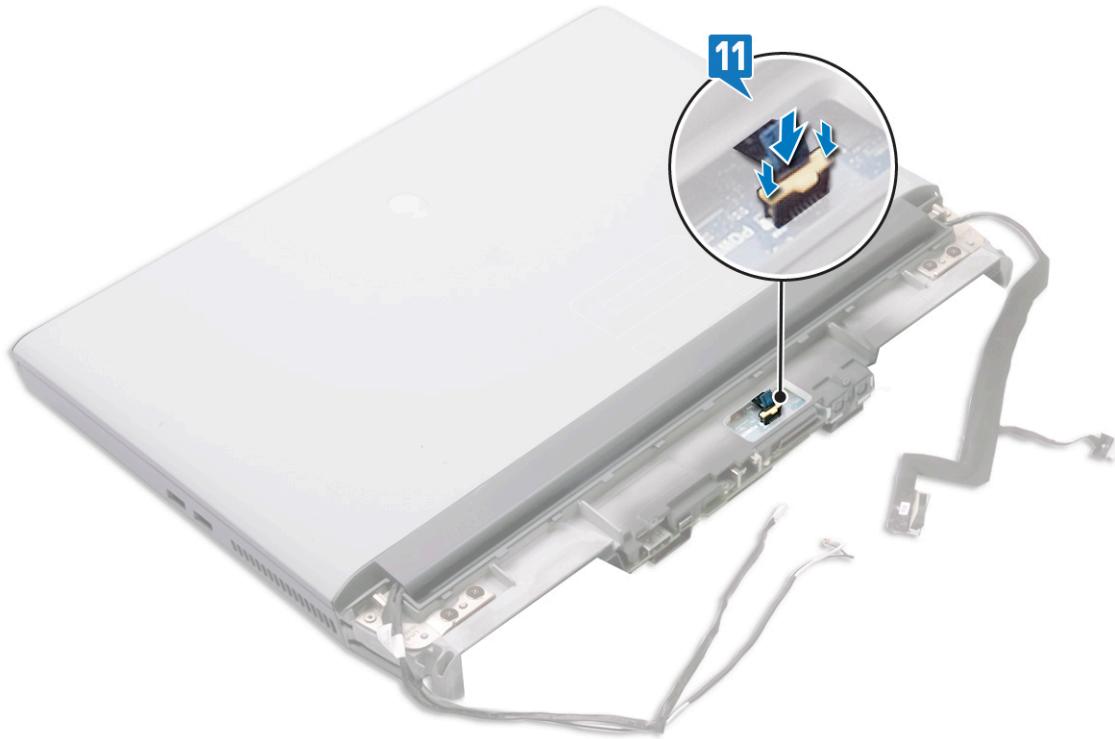
- 1 Replace the [left power-adapter port](#).
- 2 Turn the system board over and place it into the slot on the palm-rest assembly.
 -  **NOTE:** Do not keep the power-button board cable under the system board.
- 3 Replace the two screws (M2.5x5) that secure the system board to the palm-rest assembly.
- 4 Connect the keyboard cable to the system board and close the latch to secure the cable.
- 5 Connect the touchpad cable to the system board and close the latch to secure the cable.
- 6 Connect the audio daughter-board cable to the system board and close the latch to secure the cable.
- 7 Adhere the tape that secures the audio daughter-board cable to the system board.
- 8 Connect the connectors marked "MB" on the two graphics card cables to the system board.

- 9 Replace the two screws (M2x3) that secure the graphics card cables to the system board.



- 10 Turn the palm-rest assembly over.

- 11 Connect the power-button board cable to the system board.



Post-requisites

- 1 Replace the [processor](#).
- 2 Replace the [graphics card](#).
- 3 Replace the [right power-adapter port](#).
- 4 Replace the [heat-sink assembly](#).
- 5 Replace the [coin-cell battery](#).
- 6 Replace the [computer base](#).
- 7 Replace the [rear I/O cover](#)
- 8 Replace the [wireless card](#).
- 9 Replace the [solid-state drive](#).
- 10 Replace the [memory modules](#).
- 11 Replace the [battery](#).
- 12 Replace the [base cover](#).

Entering the Service Tag in the BIOS setup program

- 1 Turn on or restart your computer.
- 2 Press F2 when the Dell logo is displayed to enter the BIOS setup program.
- 3 Navigate to the **Main** tab and enter the Service Tag in the **Service Tag Input** field.

 **NOTE:** Service tag is the alphanumeric identifier located at the back side of your computer.

Removing the right power-adapter port

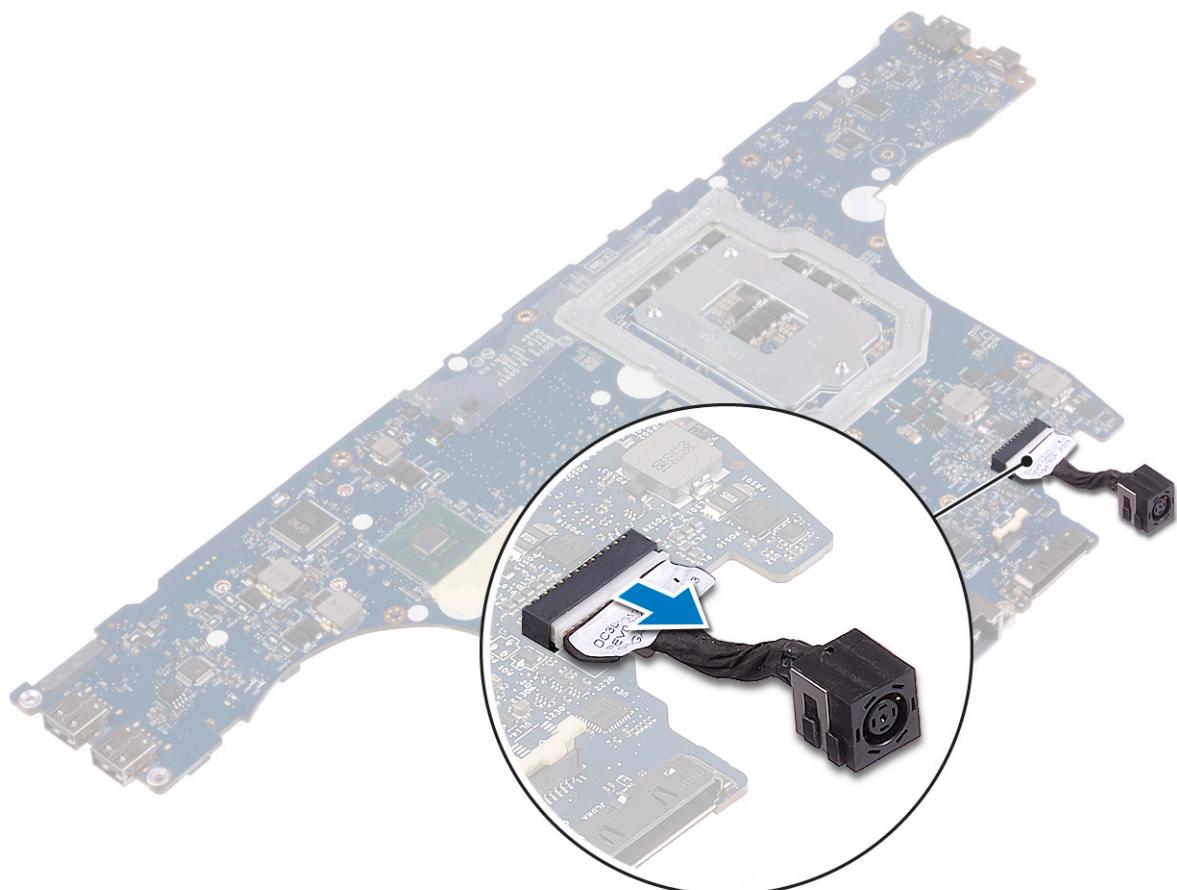
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Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [memory modules](#).
- 4 Remove the [wireless card](#).
- 5 Remove the [solid-state drive](#).
- 6 Remove the [rear-I/O cover](#).
- 7 Remove the [computer base](#).
- 8 Remove the [right power-adapter port](#).
- 9 Remove the [graphics card](#).
- 10 Remove the [processor](#).
- 11 Remove the [system board](#).

Procedure

Disconnect the left power-adapter port cable from the system board.

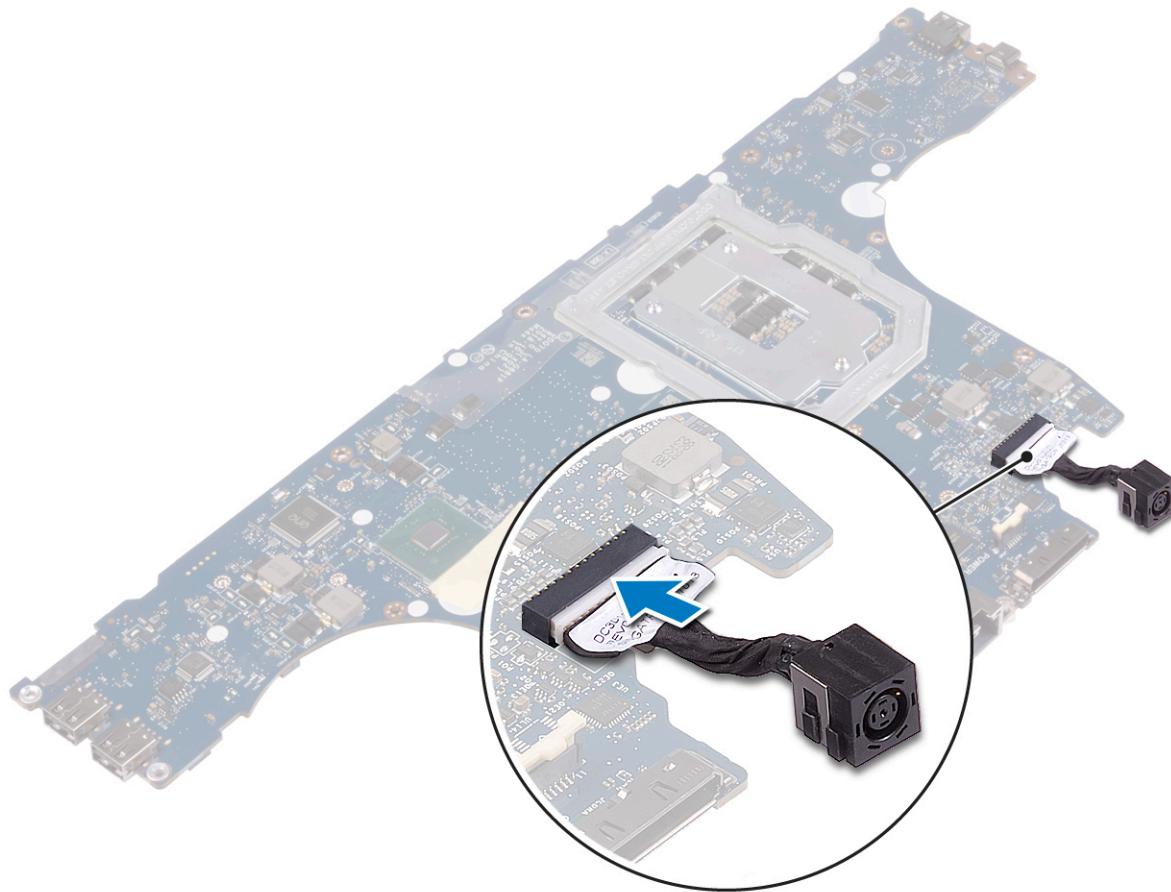


Replacing the right power-adapter port

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Procedure

Connect the left power-adapter port cable to the system board.



Post-requisites

- 1 Replace the [system board](#).
- 2 Replace the [processor](#).
- 3 Replace the [graphics card](#).
- 4 Replace the [right power-adapter port](#).
- 5 Replace the [computer base](#).
- 6 Replace the [rear I/O cover](#)
- 7 Replace the [wireless card](#).
- 8 Replace the [solid-state drive](#).
- 9 Replace the [memory modules](#).

10 Replace the [battery](#).

11 Replace the [base cover](#).

Removing the keyboard

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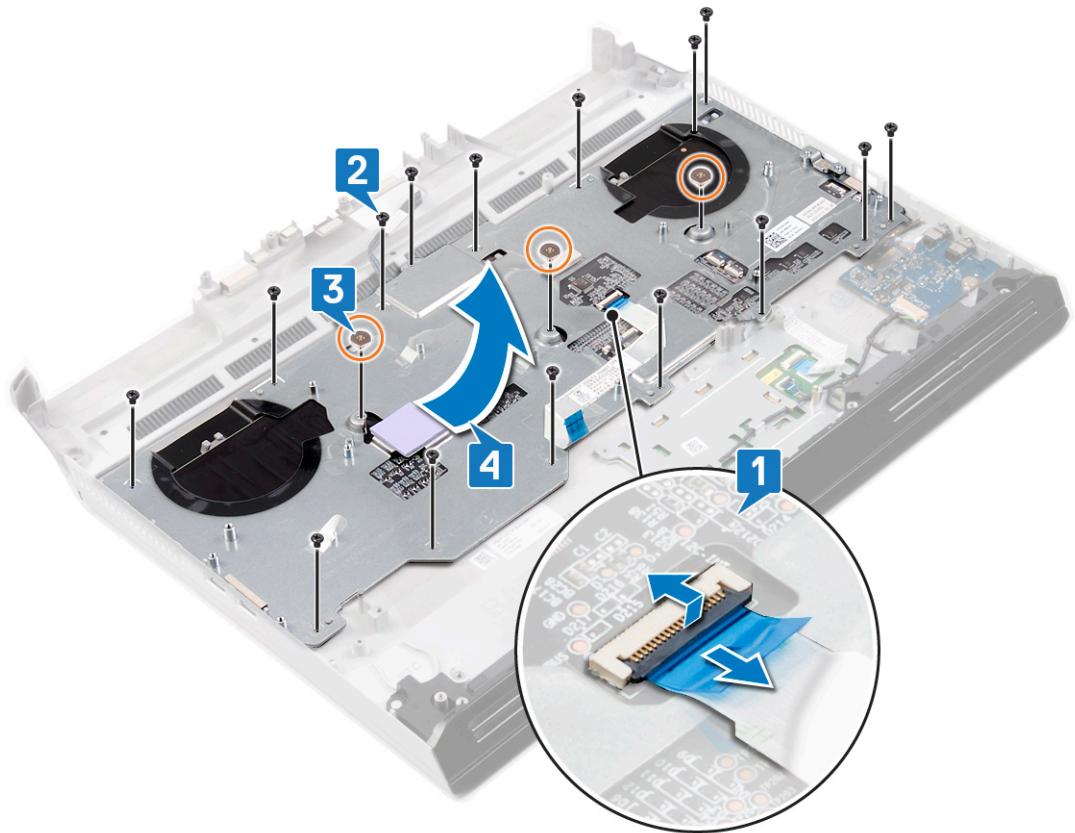
Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [memory modules](#).
- 4 Remove the [wireless card](#).
- 5 Remove the [solid-state drive](#).
- 6 Follow the procedure from step 1 to step 4 in [Removing the hard drive](#).
- 7 Remove the [rear-I/O cover](#).
- 8 Remove the [computer base](#).
- 9 Remove the [heat-sink assembly](#).
- 10 Remove the [right power-adapter port](#).
- 11 Remove the [system board](#).

Procedure

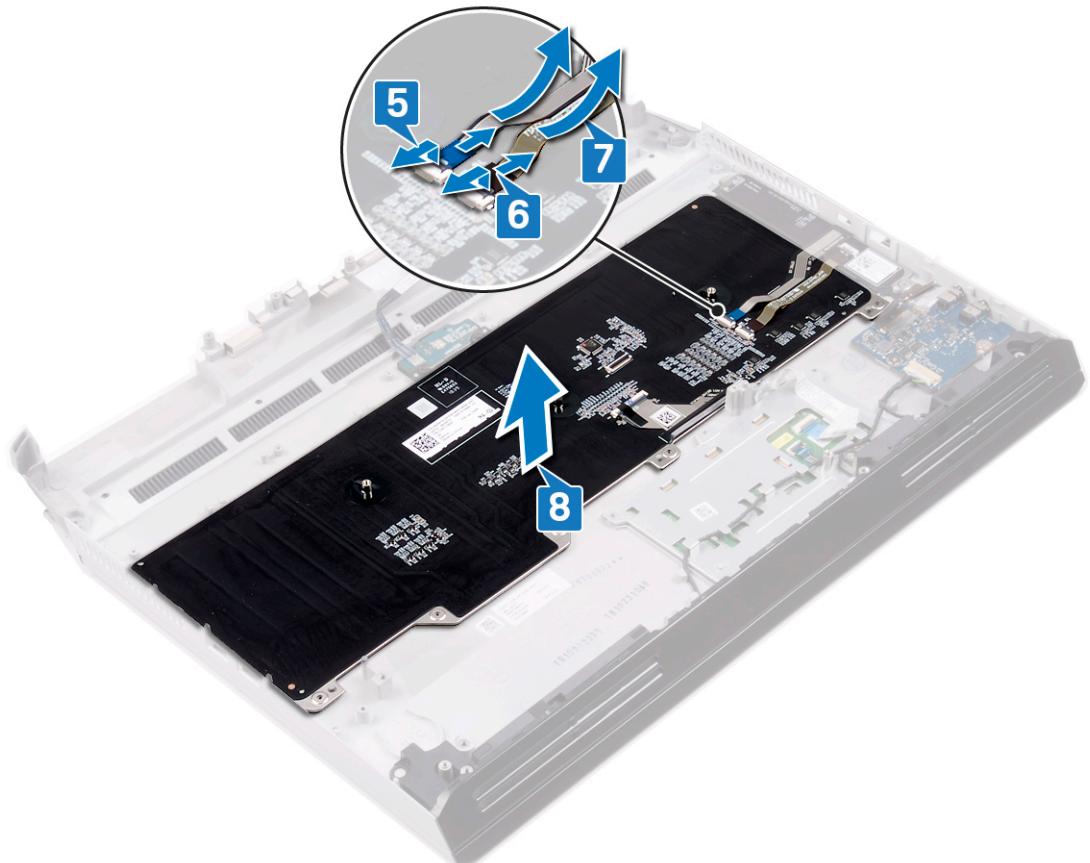
- 1 Open the latch and disconnect the keyboard cable from the keyboard.
- 2 Remove the 15 screws (M2x3) that secure the keyboard bracket to the palm-rest assembly.
- 3 Remove the three screws (M2.5x2.5) that secure the keyboard bracket to the palm-rest assembly.

- 4 Lift the keyboard bracket from the macro side and slide out of clips on the opposite side.



- 5 Open the latch and disconnect the macro-keys cable from the keyboard.
- 6 Open the latch and disconnect the macro-keys backlight cable from the keyboard.
- 7 Peel off the macro-keys cable and the macro-keys backlight cable from the keyboard.

- 8** Lift the keyboard from bottom and slide out of the clips at top.

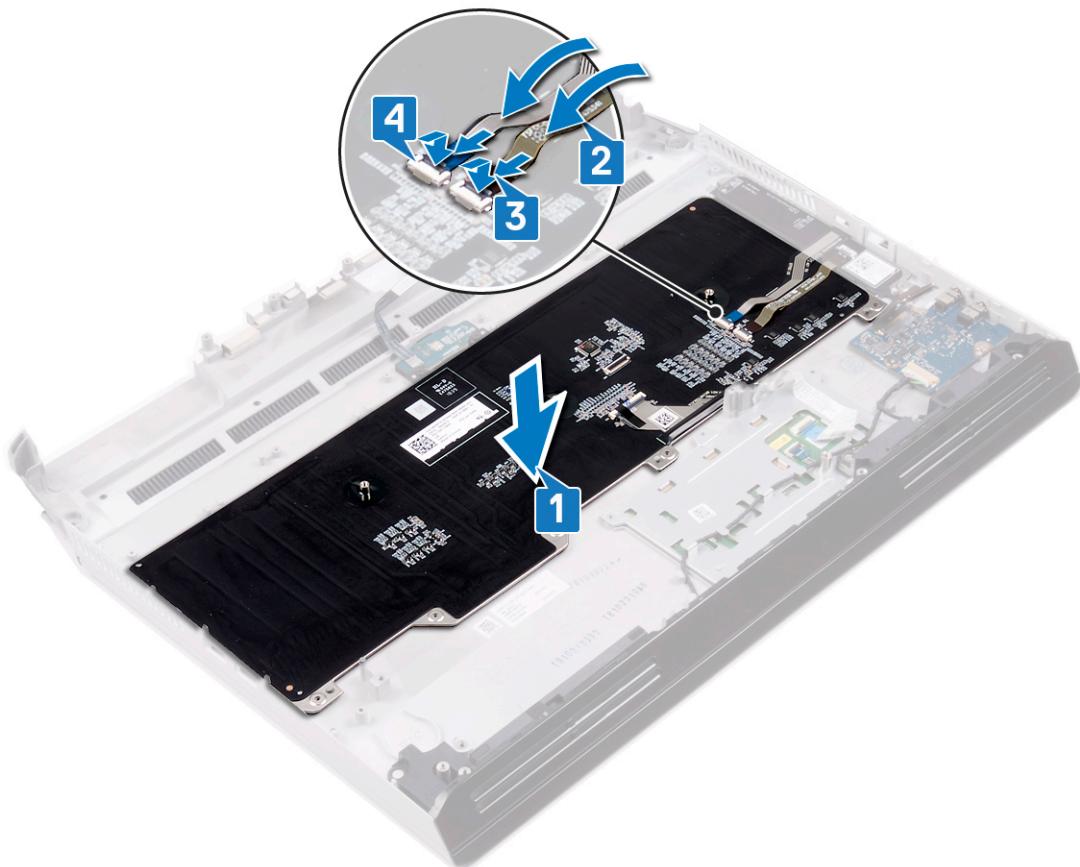


Replacing the keyboard

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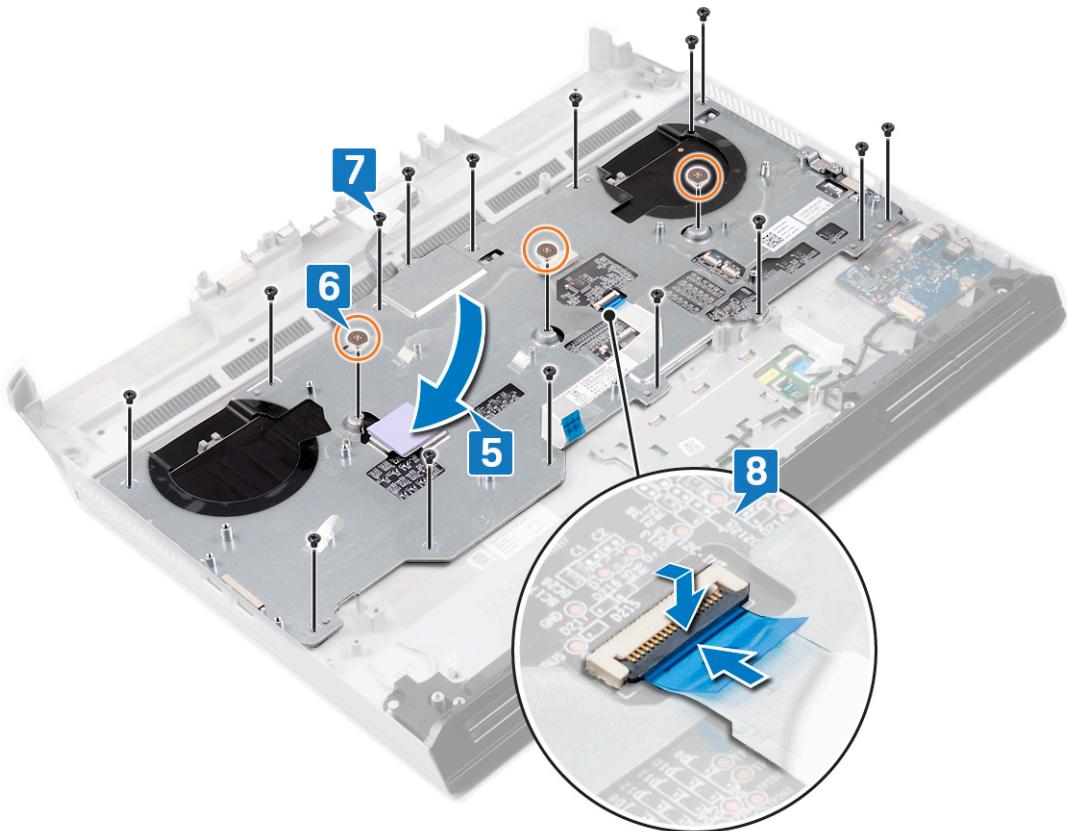
Procedure

- 1 Insert the tabs on the top side of the keyboard into the slots on the palm-rest assembly. Ensure that the openings at the bottom of the keyboard fit into the studs on the palm-rest assembly.
- 2 Adhere the macro-keys cable and the macro-keys backlight cable to the keyboard.
- 3 Connect the macro-keys backlight cable to the keyboard and close the latch to secure the cable.
- 4 Connect the macro-keys cable to the keyboard and close the latch to secure the cable.



- 5 Slide the keyboard bracket into the slots on the palm-rest assembly.
- 6 Replace the three screws (M2.5x2.5) that secure the keyboard bracket to the palm-rest assembly.
- 7 Replace the 15 screws (M2x3) that secure the keyboard bracket to the palm-rest assembly.

- 8 Connect the keyboard cable to the keyboard and close the latch to secure the cable.



Post-requisites

- 1 Replace the [system board](#).
- 2 Replace the [right power-adapter port](#).
- 3 Replace the [heat-sink assembly](#).
- 4 Replace the [computer base](#).
- 5 Replace the [rear I/O cover](#)
- 6 Follow the procedure from step 4 to step 7 in [Replacing the hard drive](#).
- 7 Replace the [wireless card](#).
- 8 Replace the [solid-state drive](#).
- 9 Replace the [memory modules](#).
- 10 Replace the [battery](#).
- 11 Replace the [base cover](#).

Removing the macro keys

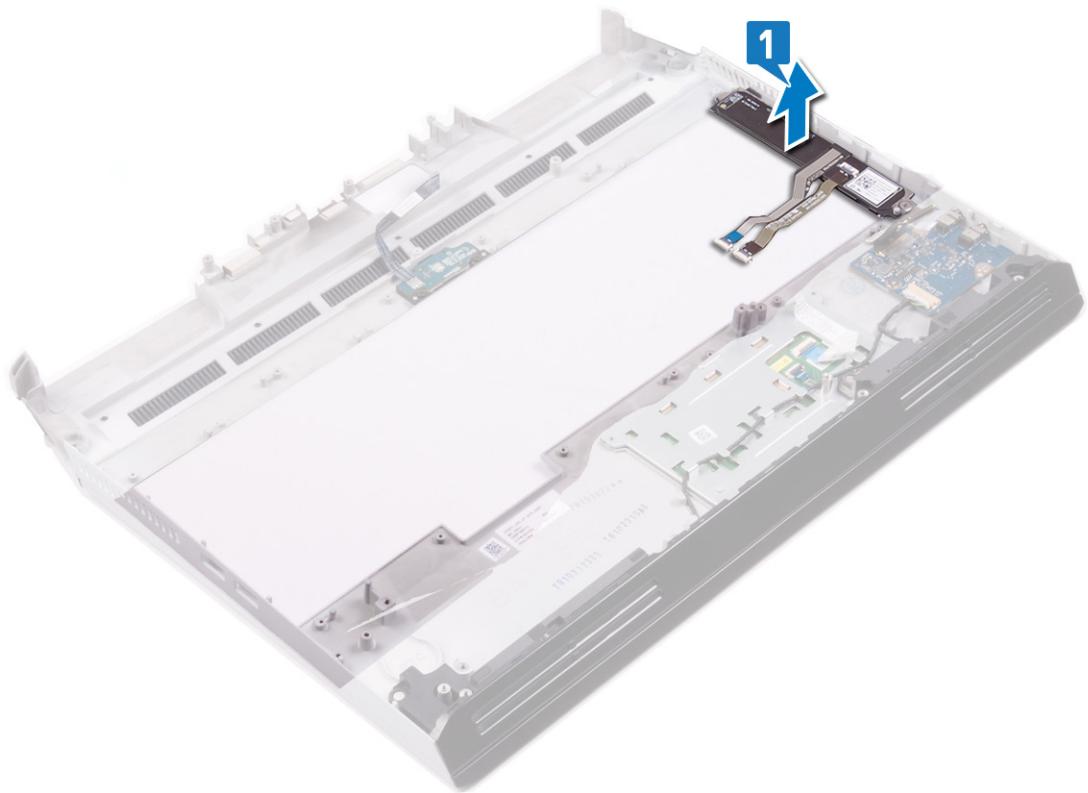
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Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [memory modules](#).
- 4 Remove the [wireless card](#).
- 5 Remove the [solid-state drive](#).
- 6 Follow the procedure from step 1 to step 4 in [Removing the hard drive](#).
- 7 Remove the [rear-I/O cover](#).
- 8 Remove the [computer base](#).
- 9 Remove the [heat-sink assembly](#).
- 10 Remove the [right power-adapter port](#).
- 11 Remove the [system board](#).
- 12 Remove the [keyboard](#).

Procedure

Lift the macro keys from bottom and slide out of slot on top.

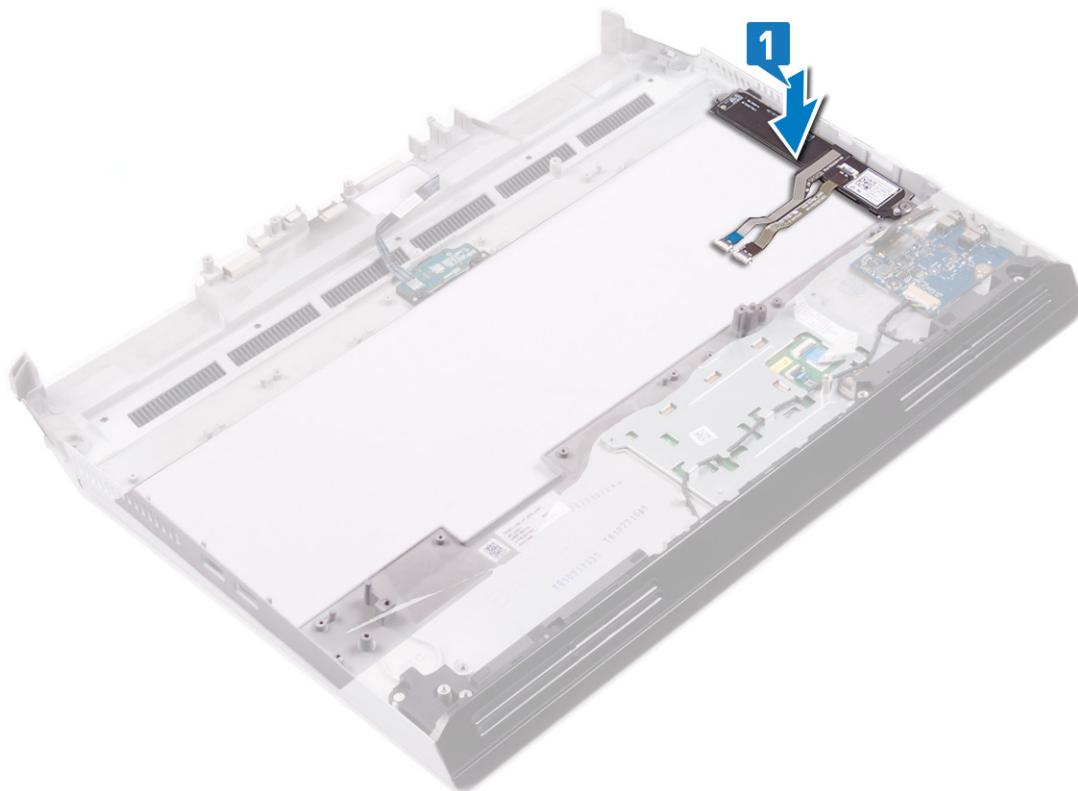


Replacing the macro keys

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Procedure

Insert the tabs on the top side of the macro keys into the slots on the palm-rest assembly. Ensure that the openings at the bottom of the macro keys fit into the studs on the palm-rest assembly.



Post-requisites

- 1 Replace the [keyboard](#).
- 2 Replace the [system board](#).
- 3 Replace the [right power-adapter port](#).
- 4 Replace the [heat-sink assembly](#).
- 5 Replace the [computer base](#).
- 6 Replace the [rear I/O cover](#)
- 7 Follow the procedure from step 4 to step 7 in [Replacing the hard drive](#).
- 8 Replace the [wireless card](#).
- 9 Replace the [solid-state drive](#).
- 10 Replace the [memory modules](#).

- 11** Replace the [battery](#).
- 12** Replace the [base cover](#).

Removing the palm-rest assembly

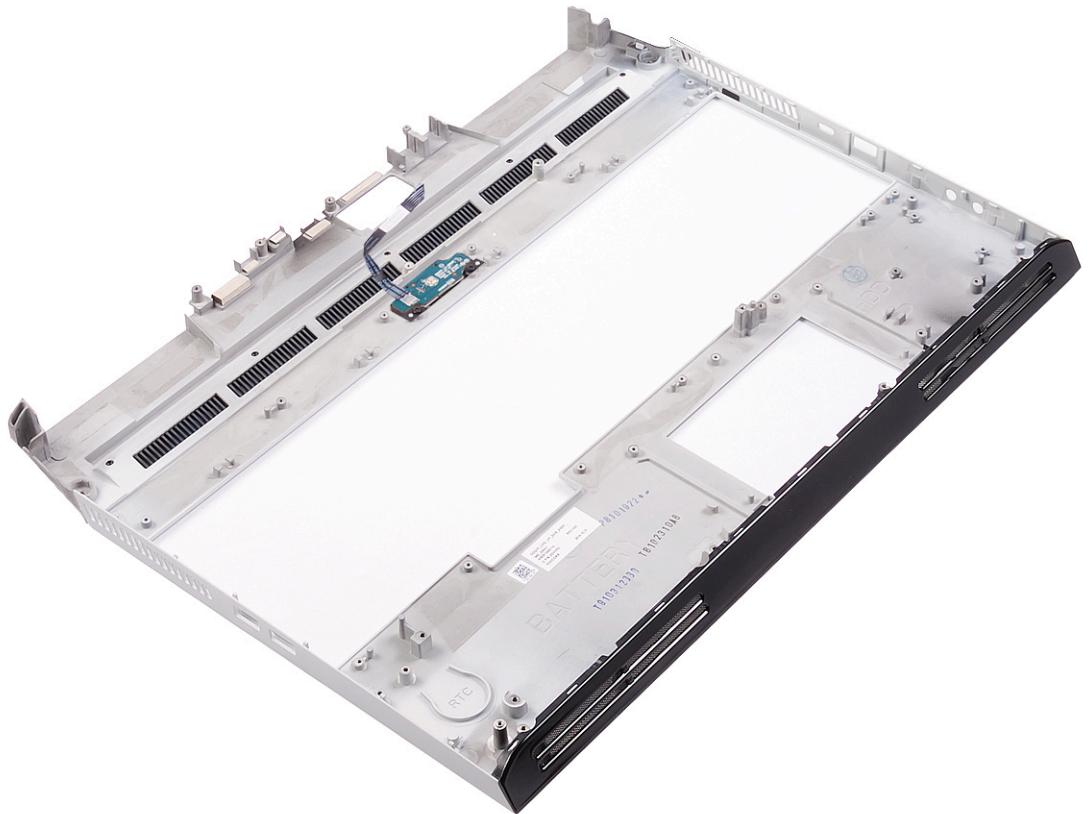
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Prerequisites

- 1 Remove the [base cover](#).
- 2 Remove the [battery](#).
- 3 Remove the [memory modules](#).
- 4 Remove the [wireless card](#).
- 5 Remove the [solid-state drive](#).
- 6 Follow the procedure from step 1 to step 4 in [Removing the hard drive](#).
- 7 Remove the [audio daughter-board](#).
- 8 Remove the [speakers](#).
- 9 Remove the [coin-cell battery](#).
- 10 Remove the [touchpad](#).
- 11 Remove the [rear-I/O cover](#).
- 12 Remove the [display assembly](#).
- 13 Remove the [computer base](#).
- 14 Remove the [heat-sink assembly](#).
- 15 Remove the [right power-adapter port](#).
- 16 Remove the [system board](#).
- 17 Remove the [left power-adapter port](#).
- 18 Remove the [keyboard](#).
- 19 Remove the [macro keys](#).

Procedure

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

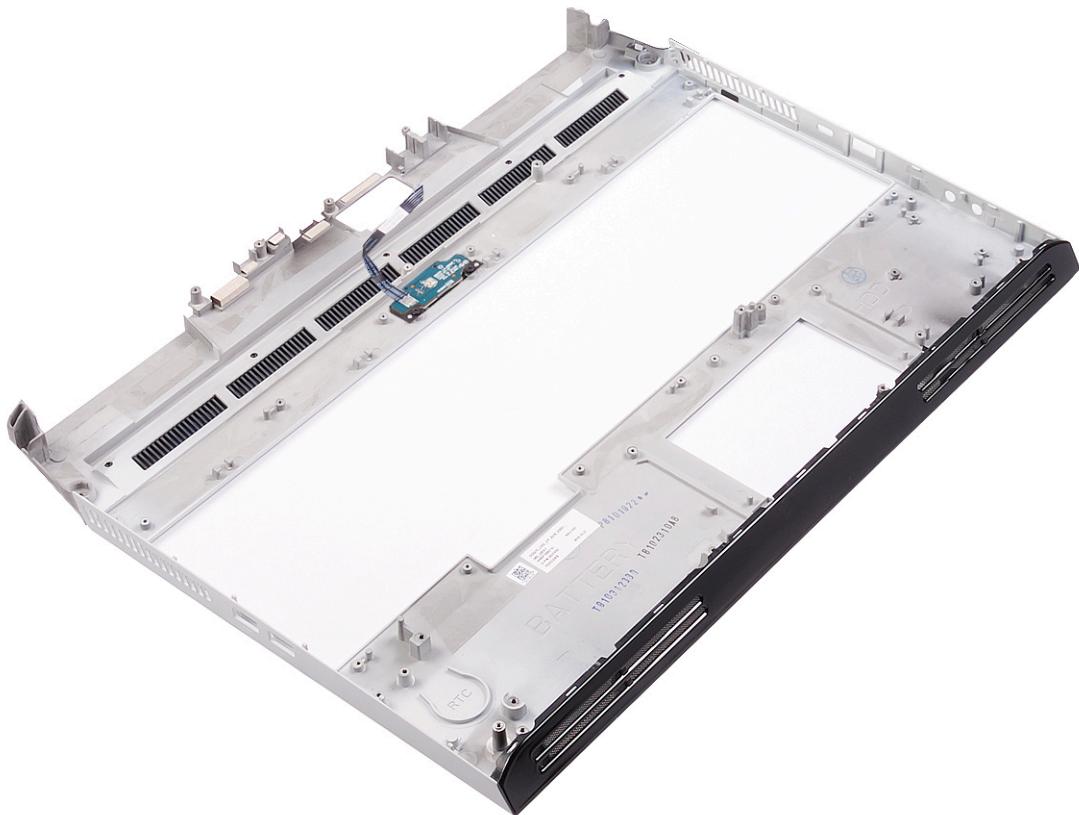


Replacing the palm-rest assembly

! **WARNING:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.

Procedure

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



Post-requisites

- 1 Replace the [macro keys](#).
- 2 Replace the [keyboard](#).
- 3 Replace the [left power-adapter port](#).
- 4 Replace the [system board](#).
- 5 Replace the [right power-adapter port](#).
- 6 Replace the [heat-sink assembly](#).
- 7 Replace the [computer base](#).
- 8 Replace the [display assembly](#).
- 9 Replace the [rear I/O cover](#)
- 10 Replace the [touchpad](#).

- 11** Replace the [coin-cell battery](#).
- 12** Replace the [speakers](#).
- 13** Replace the [coin-cell battery](#).
- 14** Follow the procedure from step 4 to step 7 in [Replacing the hard drive](#).
- 15** Replace the [wireless card](#).
- 16** Replace the [solid-state drive](#).
- 17** Replace the [memory modules](#).
- 18** Replace the [battery](#).
- 19** Replace the [base cover](#).

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.

Video drivers

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

Install the video driver update from 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.

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.

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.

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.

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

Install the driver updates from www.dell.com/support.

System setup

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

System setup

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

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

Use the BIOS Setup program for the following purposes:

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

Entering BIOS setup program

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

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

Navigation keys

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

Keys	Navigation
Up arrow	Moves to the previous field.
Down arrow	Moves to the next field.
Enter	Selects a value in the selected field (if applicable) or follow the link in the field.
Spacebar	Expands or collapses a drop-down list, if applicable.
Tab	Moves to the next focus area.
	 NOTE: For the standard graphics browser only.
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



NOTE: XXX denotes the SATA drive number.

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



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

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

Table 3. System setup options—System information menu

General-System Information	
System Information	
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.
Memory Information	
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 used for the memory.
DIMM A Size	Displays the DIMM A memory size.
DIMM B Size	Displays the DIMM B memory size.
Processor Information	
Processor Type	Displays the processor type.
Core Count	Displays the number of cores on the processor.
Processor ID	Displays the processor identification code.
Current Clock Speed	Displays the current processor clock speed.
Minimum Clock Speed	Displays the minimum processor clock speed.

General-System Information	
Maximum Clock Speed	Displays the maximum processor clock speed.
Processor L2 Cache	Displays the processor L2 Cache size.
Processor L3 Cache	Displays the processor L3 Cache size.
HT Capable	Displays whether the processor is HyperThreading (HT) capable.
64-Bit Technology	Displays whether 64-bit technology is used.
Device Information	
SATA-0	Displays the M.2 SATA SSD-0 device information of the computer.
SATA-1	Displays the M.2 SATA SSD-1 device information of the computer.
M.2 PCIe SSD-0	Displays the M.2 PCIe SSD-0 device information of the computer.
M.2 PCIe SSD-1	Displays the M.2 PCIe SSD-1 device information of the computer.
Video Controller	Displays the video controller type 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.
Battery Information	
	Displays the battery health information.
Boot Sequence	
Boot Sequence	Displays the boot sequence.
Boot List Option	Displays the available boot options.
Advanced Boot Options	
Enable Legacy Option ROMs	Enable or disable the Legacy Option ROMs.
Enable UEFI Network Stack	Enable or disable the UEFI Network Stack.
Enable Attempt Legacy Boot	Enable or disable Legacy Boot.
UEFI Boot Path Security	
	Enable or disable the system to prompt the user to enter the Admin password when booting a UEFI boot path from the F12 boot menu.
Date/Time	
	Displays the current date in MM/DD/YY format and current time in HH:MM:SS AM/PM format.

Table 4. System setup options—System Configuration menu

System Configuration	
SATA Operation	Configure operating mode of the integrated SATA hard drive controller.
Drives	Enable or disable various drives on board.
SMART Reporting	Enable or disable SMART Reporting during system startup.
USB Configuration	
Enable Boot Support	Enable or disable booting from USB mass storage devices such as external hard drive, optical drive, and USB drive.

System Configuration	
Enable External USB Port	Enable or disable booting from USB mass storage devices connected to external USB port.
Audio	Enable or disable the integrated audio controller.
Keyboard Illumination	Enables you to choose the operating mode of the keyboard illumination feature.
Keyboard Backlight Timeout on AC	When the backlight is enabled, this feature defines the timeout value for the keyboard backlight when an AC adapter is plugged into the computer.
Keyboard Backlight Timeout on Battery	When the backlight is enabled, this feature defines the timeout value for the keyboard backlight when the computer is running only on battery power.
Miscellaneous Devices	Enable or disable various onboard devices.

Table 5. System setup options—Video menu

Video	
LCD Brightness	Set the panel brightness independently for Battery and AC power.
Dynamic Backlight Control	Enable or disable the dynamic backlight control.

Table 6. System setup options—Security menu

Security	
Admin Password	Set, change, or delete the administrator password.
System Password	Set, change, or delete the system password.
Internal HDD-0 Password	Set, change, or delete the internal hard-disk drive password.
Strong Password	Enable or disable strong passwords.
Password Configuration	Control the minimum and maximum number of characters allowed for Admin and System passwords.
Password Bypass	Bypass the System (Boot) Password and the internal HDD password prompts during a system restart.
Password Change	Enable or disable changes to the System and Hard Disk passwords when an administrator password is set.
Non-Admin Setup Changes	Determines whether changes to the setup option are permitted when an administrator password is set.
UEFI Capsule Firmware Updates	Enable or disable BIOS updates through UEFI capsule update packages.
PTT Security	Enable or disable Platform Trust Technology (PTT) visibility to the operating system.
Computrace(R)	Enable or disable the BIOS module interface of the optional Computrace(R) Service from Absolute Software.
Admin Setup Lockout	Enable to prevent users from entering Setup when an Admin Password is set.
Master Password Lockout	Disables the master password support. Hard Disk passwords need to be cleared before changing the setting.
SMM Security Mitigation	Enable or disable the SMM Security Mitigation.

Table 7. System setup options—Secure Boot menu

Secure Boot	
Secure Boot Enable	Enable or disable the secure boot feature.
Secure Boot Mode	Modifies the behavior of Secure Boot to allow evaluation or enforcement of UEFI driver signatures.
Expert Key Management	
Expert Key Management	Enable or disable Expert Key Management.
Custom Mode Key Management	Select the custom values for expert key management.

Table 8. System setup options—Intel Software Guard Extensions menu

Intel Software Guard Extensions	
Intel SGX Enable	Enable or disable Intel Software Guard Extensions.
Enclave Memory Size	Set the Intel Software Guard Extensions Enclave Reserve Memory Size.
Performance	
Multi Core Support	Enable multiple cores. Default: Enabled.
Intel SpeedStep	Enable or disable Intel Speedstep Technology. Default: Enabled.
	 NOTE: If enabled, the processor clock speed and core voltage are adjusted dynamically based on the processor load.
C-States Control	Enable or disable additional processor sleep states. Default: Enabled.
Intel TurboBoost	Enable or disable Intel TurboBoost mode of the processor. Default: Enabled.
HyperThread control	Enable or disable HyperThreading in the processor. Default: Enabled.
Power Management	
AC Behavior	Enables the system to turn on automatically, when AC power is supplied.
Enable Intel Speed Shift Technology	Enable or disable Intel Speed Shift Technology.
Auto On Time	Enable to set the computer to turn on automatically every day or on a preselected date and time. This option can be configured only if the Auto On Time is set to Everyday, Weekdays or Selected Days. Default: Disabled.
USB Wake Support	Enable the USB devices to wake the computer from Standby.
Block Sleep	Enable or disable Block Sleep.
Advanced Battery Charge Configuration	Enable Advanced Battery Charge Configuration from the beginning of the day to a specified work period.
Primary Battery Charge Configuration	Set the primary battery charge settings with a preselected custom charge start and stop. Default: Adaptive.
POST Behavior	
Adapter Warnings	Enable adapter warnings. Default: Enabled.
Numlock Enable	Enables the NumLock function when computer boots.

Intel Software Guard Extensions	
Fn Lock Options	Enable or disable the Fn lock mode.
Fastboot	Enable to set the speed of the boot process. Default: Thorough.
Extend BIOS POST Time	Configure additional pre-boot delay.
Full Screen Logo	Enable or disable to display full screen logo.
Warnings and Errors	Sets the boot process to pause when Warnings or Errors are detected.

Table 9. System setup options—Virtualization Support menu

Virtualization Support	
Virtualization	Specify whether a Virtual Machine Monitor (VMM) can utilize the additional hardware capabilities provided by Intel Virtualization Technology.
VT for Direct I/O	Specify whether a Virtual Machine Monitor (VMM) can utilize the additional hardware capabilities provided by Intel Virtualization Technology for Direct I/O.

Table 10. System setup options—Wireless menu

Wireless	
Wireless Switch	Determine which wireless devices can be controlled by the Wireless Switch.
Wireless Device Enable	Enable or disable internal wireless devices.

Table 11. System setup options—Maintenance menu

Maintenance	
Service Tag	Display the system's Service Tag.
Asset Tag	Create a system Asset Tag.
BIOS Downgrade	Control flashing of the system firmware to previous revisions.
Data Wipe	Enable to securely erase data from all internal storage devices.
BIOS Recovery	Enable the user to recover from certain corrupted BIOS conditions from a recovery file on the user primary hard drive or an external USB key.
First Power On Date	Disable the First Power On Date

Table 12. System setup options—System Logs menu

System Logs	
BIOS Events	Display BIOS events.
Thermal Events	Display Thermal events.
Power Events	Display Power events.

Table 13. System setup options—SupportAssist System Resolution menu

SupportAssist System Resolution	
Auto OS Recovery Threshold	Control the automatic boot flow for SupportAssist System Resolution Console and for Dell OS Recovery tool.
SupportAssist OS Recovery	Enable or disable the boot flow for SupportAssist OS Recovery tool in the even of certain system errors.

Clearing CMOS settings

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

- 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

To clear the system or BIOS passwords, contact Dell technical support as described at 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

Flashing the BIOS

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:

- 1 Turn on your computer.
- 2 Go to 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.

Flashing BIOS (USB key)

- 1 Follow the procedure from step 1 to step 7 in "[Flashing the BIOS](#)" to download the latest BIOS setup program file.
- 2 Create a bootable USB drive. For more information see the knowledge base article [Sln143196](#) at www.dell.com/support.
- 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.

Enhanced Pre-Boot System Assessment (ePSA) diagnostics

 **CAUTION: Use the ePSA diagnostics to test only your computer. Using this program with other computers may cause invalid results or error messages.**

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.**

For more information, see [Dell EPSA Diagnostic 3.0](#).

Running the ePSA diagnostics

- 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

Power and battery-status light/hard-drive activity light

Indicates the battery-charge status or the hard-drive activity.

 **NOTE:** Press Fn+H to toggle this light between power and battery-status light and hard-drive activity light.

Hard-drive activity light

Turns on when the computer reads from or writes to the hard drive.

 **NOTE:** Hard-drive activity light is supported only on computers shipped with hard drive.

Power and 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

 **NOTE:** Hard-drive activity light is supported only on computers shipped with hard drive.

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 light patterns and describes what they indicate.

Table 14. Diagnostics

Light pattern	Problem description
2,1	CPU failure
2,2	System board: BIOS and ROM failure
2,3	No memory or RAM detected
2,4	Memory or RAM failure
2,5	Invalid memory installed

Light pattern	Problem description
2,6	System board or chipset error
2,7	LCD failure
3,1	CMOS battery failure
3,2	PCI or video card or chip failure
3,3	Recovery image not found
3,4	Recovery image found but invalid
3,5	Power rail failure
3,6	SBIOS flash corruption
3,7	Timeout waiting on ME to reply to HECI message

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.

Enabling Intel Optane memory

- 1 On the taskbar, click the search box, and then type Intel Rapid Storage Technology.
- 2 Click **Intel Rapid Storage Technology**.
The **Intel Rapid Storage Technology** window is displayed.
- 3 On the **Status** tab, click **Enable** to enable the Intel Optane memory.
- 4 On the warning screen, select a compatible fast drive, and then click **Yes** to continue enabling Intel Optane memory.
- 5 Click **Intel Optane memory** → **Reboot** to complete enabling your Intel Optane memory.

 **NOTE:** Applications may take up to three subsequent launches after enablement to see the full performance benefits.

Disabling Intel Optane memory

 **CAUTION:** After disabling Intel Optane memory, do not uninstall the driver for Intel Rapid Storage Technology as it will result in a blue screen error. The Intel Rapid Storage Technology user interface can be removed without uninstalling the driver.

 **NOTE:** Disabling Intel Optane memory is required before removing the SATA storage device accelerated by the Intel Optane memory module from the computer.

- 1 On the taskbar, click the search box, and then type Intel Rapid Storage Technology.
- 2 Click **Intel Rapid Storage Technology**.
The **Intel Rapid Storage Technology** window is displayed.
- 3 On the **Intel Optane memory** tab, click **Disable** to disable the Intel Optane memory.
 **NOTE:** For computers in which Intel Optane memory acts as a primary storage, do not disable the Intel Optane memory. The Disable option will be grayed out.
- 4 Click **Yes** if you accept the warning.
The disabling progress is displayed.

- 5 Click **Reboot** to complete disabling your Intel Optane memory and restart your computer.

WiFi power cycle

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

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

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

Flea power release

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:

- 1 Turn off your computer.
- 2 Disconnect the power adapter from your computer.
- 3 Press and hold the power button for 15 seconds to drain the flea power.
- 4 Connect the power adapter to your computer.
- 5 Turn on your computer.