Questo manuale d’istruzione è fornito da trovaprezzi.it. Scopri tutte le offerte per Apple MacBook Pro M2 Max 16" (2023) M2 Max 12-Core 32GB 1TB Argento (MNWE3T/A) o cerca il tuo prodotto tra le migliori offerte di Notebook

MacBook Pro (16-inch, 2021)

Repair Manual

Contents

Introduction

This manual includes technical instructions for replacing genuine Apple parts in Mac and is intended for individual technicians with the knowledge, experience, and tools required to repair electronic devices.

Important

- Read the entire manual first. If you're not comfortable performing the repairs as instructed in this manual, don't proceed.
- Always use the latest version of this document available at support.apple.com/en_US/manuals/mac+repair+manual.

Warning

Failure to follow the repair instructions or to use genuine Apple parts or proper tools may cause fire or other safety issues and lead to personal injury or death.

Caution

Failure to follow the repair instructions or to use genuine Apple parts or proper tools may damage the Mac, parts, or other property, or compromise the device's functionality.

Warranty information

Damage caused by repairs performed outside of Apple or the Apple Authorized Service Provider network is not covered by Apple's warranty or AppleCare plans. Such damage may cause future repairs to be subject to out-of-warranty costs or render the device ineligible for future repairs by Apple or Apple Authorized Service Providers.

Tools and parts

Ordering tools and parts

You can learn how to order genuine Apple parts and tools at support.apple.com/self-service-repair. During the purchase process, enter the manual ID **HFXVCU** to indicate that you've read this manual in its entirety and agree that you have the knowledge and experience to perform your intended repair.

Software tools

Apple Diagnostics can check your Mac for hardware issues.

A System Configuration step may be required at the end of your repair. System Configuration is a postrepair software tool that completes the repair for genuine Apple parts. Running System Configuration has a number of purposes that vary based on the part replaced.

What System Configuration does	Why it's important
Updates replacement logic board with device serial number	Replacement logic boards must be updated with your device's serial number to ensure that Apple Pay, FaceTime, iMessage, and iCloud services, such as Find My, can communicate safely and securely with your device.
Transfers factory calibration values	Certain parts like displays, cameras, and ambient light sensors have calibration values that are customized to each individual part during manufacturing. Transferring these values ensures maximum performance and quality after a repair.
Links Secure Enclave and biometric authentication parts	After repair of a logic board or a biometric authentication part (Touch ID), linking the biometric sensors to the Secure Enclave on the logic board is required to ensure device security.
Ensures repair integrity	After a hardware repair, software checks are performed to ensure repair integrity. Repair integrity means that a genuine Apple part has been correctly installed.
Assigns wireless region	To comply with regional communications regulations, a wireless region must be assigned to your logic board.
Updates firmware	Keeping firmware up to date ensures that the device has all the latest security and performance features.

System Configuration requires a strong Wi-Fi network capable of 1.0 Mbps download and upload speeds, with less than 400 ms latency and less than 2% packet loss. Estimated data usage to run System Configuration is 6–22 MB.

The device must be running the latest version of macOS and not a beta version.

Learn how to initiate the System Configuration process at support.apple.com/self-service-repair.

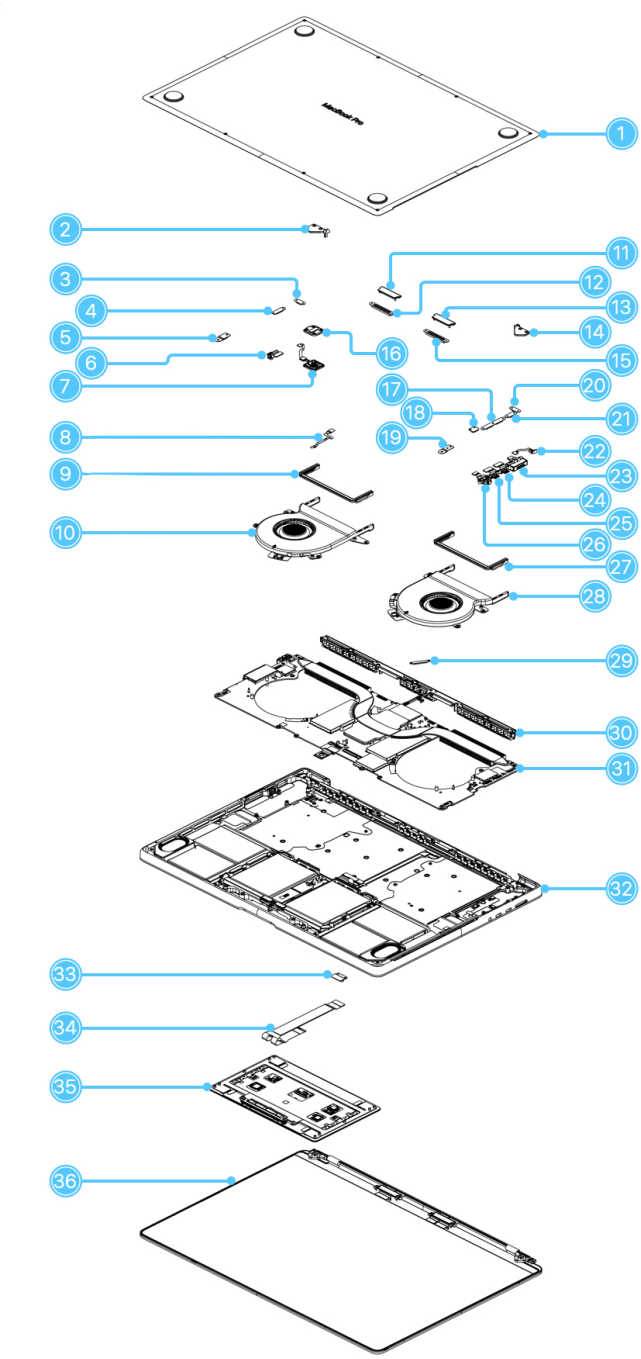
Alerts

Failure to follow alerts could result in fire, injury, data loss, or damage to the device, parts, or other property.

Danger	Instructions for reducing risk of electric shock and electrocution
Warning	Instructions for reducing risk of personal injury
Caution	Instructions for reducing risk of data loss or device hardware damage
Important	Supplemental information for successfully completing procedures; neither a Warning nor a Caution

Exploded View and Orderable Parts

This section shows parts, part names, and part numbers for MacBook Pro (16-inch, 2021).



Part Name	Number
1. Bottom case	923-06750, space gray 923-06751, silver
2. Right display hinge cover	923-07009, space gray 923-07011, silver
3. Touch ID board connector cowling	923-06888
4. Right USB-C board connector cowling	923-07050
5. Right speaker connector cowling	923-07016
6. USB-C board	923-06760
7. Touch ID board	661-23550
8. BMU flex cable	923-06794
9. Right fan duct	923-07044
10. Right fan	923-06789
11. Display cable bumper	923-06893
12. Display connector cowling	923-07017
13. Display cable bumper	923-06893
14. Left display hinge cover	923-07010, space gray 923-07012, silver
15. Display connector cowling	923-07017
16. Touch ID board flexible cowling	923-07048
17. Left USB-C board connector cowling	923-06892
18. Audio board connector cowling	923-07014
19. Left speaker connector cowling	923-07015
20. Lid angle sensor connector cowling	923-06888
21. MagSafe 3 board connector cowling	923-06889
22. Lid angle sensor	661-23648
23. MagSafe 3 board	923-06870, space gray 923-06871, silver
24. USB-C board	923-06760
25. USB-C board	923-06760
26. Audio board	923-06757
27. Left fan duct	923-07043
28. Left fan	923-06788

Part Name	Number
29. Antenna coaxial cable connector cowling	923-06890
30. Vent/antenna module	923-06790
31. Logic board	661-21305, 10-Core CPU, 16-Core GPU, 16 GB, 512 GB 661-21306, 10-Core CPU, 16-Core GPU, 16 GB, 1 TB 661-21307, 10-Core CPU, 16-Core GPU, 16 GB, 2 TB 661-21308, 10-Core CPU, 16-Core GPU, 16 GB, 4 TB 661-21309, 10-Core CPU, 16-Core GPU, 16 GB, 8 TB 661-21310, 10-Core CPU, 16-Core GPU, 32 GB, 512 GB 661-21311, 10-Core CPU, 16-Core GPU, 32 GB, 1 TB 661-21312, 10-Core CPU, 16-Core GPU, 32 GB, 2 TB 661-21313, 10-Core CPU, 16-Core GPU, 32 GB, 4 TB 661-21314, 10-Core CPU, 16-Core GPU, 32 GB, 8 TB 661-21315, 10-Core CPU, 24-Core GPU, 32 GB, 512 GB 661-21316, 10-Core CPU, 24-Core GPU, 32 GB, 1 TB 661-21317, 10-Core CPU, 24-Core GPU, 32 GB, 2 TB 661-21318, 10-Core CPU, 24-Core GPU, 32 GB, 4 TB 661-21319, 10-Core CPU, 24-Core GPU, 32 GB, 8 TB 661-21320, 10-Core CPU, 24-Core GPU, 64 GB, 512 GB 661-21321, 10-Core CPU, 24-Core GPU, 64 GB, 1 TB 661-21322, 10-Core CPU, 24-Core GPU, 64 GB, 2 TB 661-21323, 10-Core CPU, 24-Core GPU, 64 GB, 4 TB 661-21324, 10-Core CPU, 24-Core GPU, 64 GB, 8 TB 661-21325, 10-Core CPU, 32-Core GPU, 32 GB, 512 GB 661-21326, 10-Core CPU, 32-Core GPU, 32 GB, 1 TB 661-21327, 10-Core CPU, 32-Core GPU, 32 GB, 2 TB 661-21328, 10-Core CPU, 32-Core GPU, 32 GB, 4 TB 661-21329, 10-Core CPU, 32-Core GPU, 32 GB, 8 TB 661-21330, 10-Core CPU, 32-Core GPU, 64 GB, 512 GB 661-21331, 10-Core CPU, 32-Core GPU, 64 GB, 1 TB 661-21332, 10-Core CPU, 32-Core GPU, 64 GB, 2 TB 661-21333, 10-Core CPU, 32-Core GPU, 64 GB, 4 TB 661-21334, 10-Core CPU, 32-Core GPU, 64 GB, 8 TB
32. Top case with battery and keyboard Read the Important alert on the next page to ensure that you order the correct top case.	661-21974, space gray 661-21975, silver
33. Trackpad connector cowling	923-07018
34. Trackpad flex cable	included with a replacement trackpad
35. Trackpad	661-23673, space gray 661-23674, silver
36. Display	661-21968, space gray 661-21969, silver

Important

The English (US) top case part number begins with 661. Other regional top case part numbers also begin with 661, but they include a language prefix. For example, the Italian top case part number begins with T661. To determine the correct language prefix, identify your keyboard language by country or region. Then identify the correct country code from the language prefix list below:

AB	Arabic	GR	Greek	RS	Russian
B	British	H	Norwegian Bokmal	S	Swedish
BG	Bulgarian	HB	Israeli	SF	Swiss French
C	Canadian French	IS	Icelandic	SL	Slovak
CH	Chinese (Pinyin)	J	Japanese	T	Italian
CR	Croatian	KH	Korean	TA	Chinese (Zhuyin)
CZ	Czech	LA	Latin America	TH	Thai
D	German	MG	Hungarian	TQ	Turkish-Q
DK	Danish	N	Dutch	TU	Turkish-F
E	Western Spanish	PO	Portuguese	Z	English International
F	French	RO	Romanian		

Screws

Caution

- Save undamaged screws and cowlings for reassembly.
- Note the location of screws and cowlings during removal. Then organize them to ensure that you reinstall them in the correct location.
- Both overtightened screws and loose screws can damage parts.

923-06849
Torx® T5

BMU (1)

923-06850
Torx T5

Vent/antenna module, corners (2)

923-06851
Torx T3

Antenna coaxial cable cowling (2)

Antenna coaxial cable grounding clip (1)

Trackpad connector cowling (2)

923-06852
1IPR

Lid angle sensor (1)

923-06853
Torx T5

Display hinge covers (4)

923-06854
Torx T3

Audio board connector cowling (2)

Display connector cowlings (4)

Lid angle sensor connector cowling (2)

MagSafe 3 board connector cowling (2)

USB-C boards connector cowlings (5)

Touch ID board connector cowling (2)

923-06855
Torx T5

Vent/antenna module, middle (4)

923-06856
1IPR

Vent/antenna module (9)

923-06857
4 mm hex nut

Logic board, lower corners (2)

923-06858
Torx T6

Logic board, upper corners (2)

923-06859
Torx T5

Logic board, lower middle (4)

923-06861
Torx T5

Logic board, fans (6)

923-06862
Torx T8

Display hinges (6)

923-06864
Torx T3

Speaker connector cowling (2)

923-06865
Torx T3

Speaker connector cowling (2)

923-06866
Pentalobe

Bottom case, front, silver (4)

923-06867
Pentalobe

Bottom case, rear, silver (4)

923-06868
Pentalobe

Bottom case, front, space gray (4)

923-06869
Pentalobe

Bottom case, rear, space gray (4)

923-06929
Torx T5

Fans, outer (4)

923-06936
Torx T5

Audio board, short (1)

923-06937
Torx T5

Audio board, long (1)

923-06938
Torx T5

USB-C boards (6)

923-06942
Torx T3

Touch ID board flexible cowling, middle (2)

923-06953
Torx T5

Trackpad, outer (10)

923-06954
Torx T5

Trackpad, middle (3)

923-06955
Torx T3

Touch ID board flexible cowling, outer (4)

923-06958
Torx Plus 2IP

MagSafe 3 board set screws (2)

923-06959
Torx T5

MagSafe 3 board (2)

923-06960
Torx T3

Fans, middle (4)

Tools

Tools with part numbers are available for purchase from the Self Service Repair Store. Tools without part numbers can be purchased from electronics supply retailers.

#00 Philips screwdriver

923-07179
4 mm hex nut driver

923-02995
Adjustable torque driver (10–34 Ncm)

923-01322
Antenna tool

923-06087
Battery cover

Compressed air

923-01368
Cut-resistant gloves

EarPods with 3.5 mm headphone plug

ESD mat

ESD-safe cleaning solution

ESD-safe tweezers

ESD wrist strap with clip or plug

Fireproof enclosure

923-02998
Gap offset kit

Heat-resistant gloves

922-1731
Kapton tape

923- 01803
Keycap lever

Magnetizer

Microterry polishing cloth

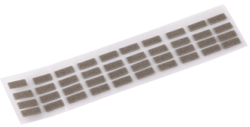
Needle-nose pliers

922-5065
Nylon probe (black stick)

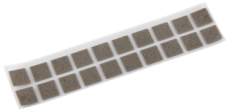
923-0731
Pentalobe screwdriver

Permanent marker

923-01800
Precut adhesive strips (1x0.5)



923-01801
Precut adhesive strips (1x1)



Safety glasses with side shields

Sand[1]

Sand container[2]

Sticky notes (3 by 3 inches)

922-8252
Suction cups

923-0448
Torque driver (blue, 0.65 kgf cm)

923-06752
Torx Plus 2IP 44 mm half-moon bit

923-0247
Torx security bit

923-02996
Torx T5 bit

Torx T3 screwdriver

Torx T5 screwdriver

Torx T6 screwdriver

Torx T8 screwdriver

923-03032
Touch ID alignment kit

661-06670
USB-C charge cable

661-23656
USB-C to MagSafe 3 cable

[1] Clean, dry, untreated sand (8–10 cups)
[2] Sand container (wide-mouthed, quick pour, nonbreakable plastic container with a flip-top lid)

Battery Safety

Warning

- This device contains a built-in lithium-ion rechargeable battery with soft battery cells. Battery safety is the number one concern when repairing a device with a built-in lithium-ion battery.
- Only technicians with the knowledge, experience, and tools required to repair electronic devices should replace a battery.
- Improper battery replacement, improper handling of parts, failure to discharge the battery before repair, or failure to follow the provided instructions could cause battery overheating, swelling, venting, leaking, or a battery thermal event. These events could result in fire, injury, death, data loss, or damage to the device, parts, or other property.
- To avoid these potentially harmful events, follow the battery safety guidelines and work in a safety-focused workspace with the tools listed below. It's important to be prepared for all possible outcomes.

How to set up a workspace for battery safety

Tools

- Clean, dry, untreated sand (8–10 cups)
- Sand container (wide-mouthed, quick pour, nonbreakable plastic container with a flip-top lid)
- Heat-resistant gloves
- Safety glasses with side shields
- ESD-safe cleaning solution
- Fireproof enclosure

Workspaces used to repair Apple devices should meet the following criteria:

- Nonflammable and electrostatic discharge (ESD)-safe work bench
- At least 2 feet away from paper and other combustible materials
- Sand container within reach (2 feet) on one side of the workspace, not above the workspace
- Adequate ventilation
- Within 20 feet of a fireproof safety enclosure. Don't store combustible or flammable materials in the enclosure. Ensure that the enclosure remains empty.

Warning

How to handle a battery thermal event

A battery thermal event is a rapid chemical chain reaction that occurs inside a battery cell. The energy stored in the battery is released suddenly, which can cause outgassing and fire. A battery thermal event can be triggered by physical damage to the battery, improper replacement or repair, or temperatures outside the battery's operating range.

Act immediately if you notice any of the following signs of a battery thermal event:

- The lithium-ion battery or a device that contains one begins to smoke or emit sparks or soot.
- The battery pouch suddenly and quickly puffs out.
- The lithium-ion battery or a device that contains one begins to emit hissing or popping sounds.

Do smother the battery or device immediately with plenty of clean, dry sand. Dump the sand all at once. Timing is critical — the faster you pour all the sand, the sooner the reaction will be contained.

Do contact local fire authorities if further assistance is needed.

Do leave the room for 30 minutes after the reaction is contained. Ventilate the area. Don't return until the area is clear of smoke.

Do wait 30 minutes before touching the device. Wear the heat-resistant gloves and safety glasses with side shields to remove the device from the sand. Then place the device into the fireproof safety enclosure. Leave it in the enclosure for at least 2 hours.

Do wipe the affected area with water first. Then wipe the area with an ESD-safe cleaning solution.

Do dispose of the damaged battery or device (including any debris removed from the sand) according to local environmental laws and guidelines.

How to handle batteries

Discharge the battery

Warning

Fully discharge the battery before you begin a repair. A discharged battery is less susceptible to a battery thermal event. If you can't determine the battery level, don't repair the device.

The following actions will help to discharge the battery:

- Disconnect the power cable.
- Increase display brightness to the highest setting.
- Turn on Wi-Fi and Bluetooth.
- Open the FaceTime app or Photo Booth app to turn on the camera.
- Play a video from the local drive or a streaming service.

Use a battery cover

Avoid damaging the battery by performing the following actions:

- Immediately after removing the bottom case, follow the instructions to attach the battery cover and disconnect the battery from the logic board.
- Always keep the battery cover on the battery when it's exposed.
- Only remove the battery cover immediately before you install the bottom case, unless otherwise instructed.

Best practices

- To avoid noxious fumes or a battery thermal event, don't puncture, strike, or crush a lithium-ion battery or a device that contains one.
- Keep your workspace clear of foreign objects and sharp materials.
- Be careful when using sharp tools near the battery.
- Don't leave loose screws, extra screws, or small parts inside the device.
- Don't use tools that conduct electricity.
- Don't throw or drop the battery.
- Don't expose the battery to excessive heat or sunlight, or temperatures outside the battery's operating range.
- Handle and dispose of waste batteries in accordance with local laws and regulations.

First Steps

Always perform the following steps before starting a repair:

- Back up the Mac.
- If replacing the logic board or Touch ID board, turn off Find My Mac. Choose Apple Menu > System Preferences > Apple ID. Select iCloud in the sidebar. Then deselect the Find My Mac checkbox. If you're unable to access the Apple menu, continue performing the following steps.
- Discharge the battery fully.
- Turn off the Mac.
- If you were unable to turn off Find My Mac from the Apple menu, go to iCloud.com/find on a different device. Select All Devices. Select the device you want to remove. Then select Remove from Account.
- Unplug the power cable from the electrical outlet. Keep the power cable unplugged while the device is being repaired.
- Disconnect all cables.
- Remove all cases and covers.
- Clear and clean your workspace.
- Put on an ESD wrist strap and attach it to a properly grounded ESD mat.

Caution

ESD (electrostatic discharge, or the release of static electricity) can damage electronic components.

Be aware of the following while performing a repair:

- The manual for this model may show images of other models, but the procedures are the same. Ensure that you use the correct tools for the model you're repairing.
- Take your time. Thoroughly read all instructions and alerts.
- Magnetizing the screwdrivers will make it easier to work with small screws.
- Use only Kapton tape to secure cables and keep them out of the way when removing and reinstalling parts.
- The end of each flex cable must align with its connector. Press the end of each flex cable to its connector until it clicks to ensure that it's secure.

Warning

Avoid damaging the battery by performing the following actions:

- Immediately after removing the bottom case, follow the instructions to attach the battery cover and disconnect the battery from the logic board.
- Always keep the battery cover on the battery when it's exposed.
- Set aside all parts and screws removed during the repair and account for them at the end of the repair.
- Only remove the battery cover immediately before you install the bottom case, unless otherwise instructed.

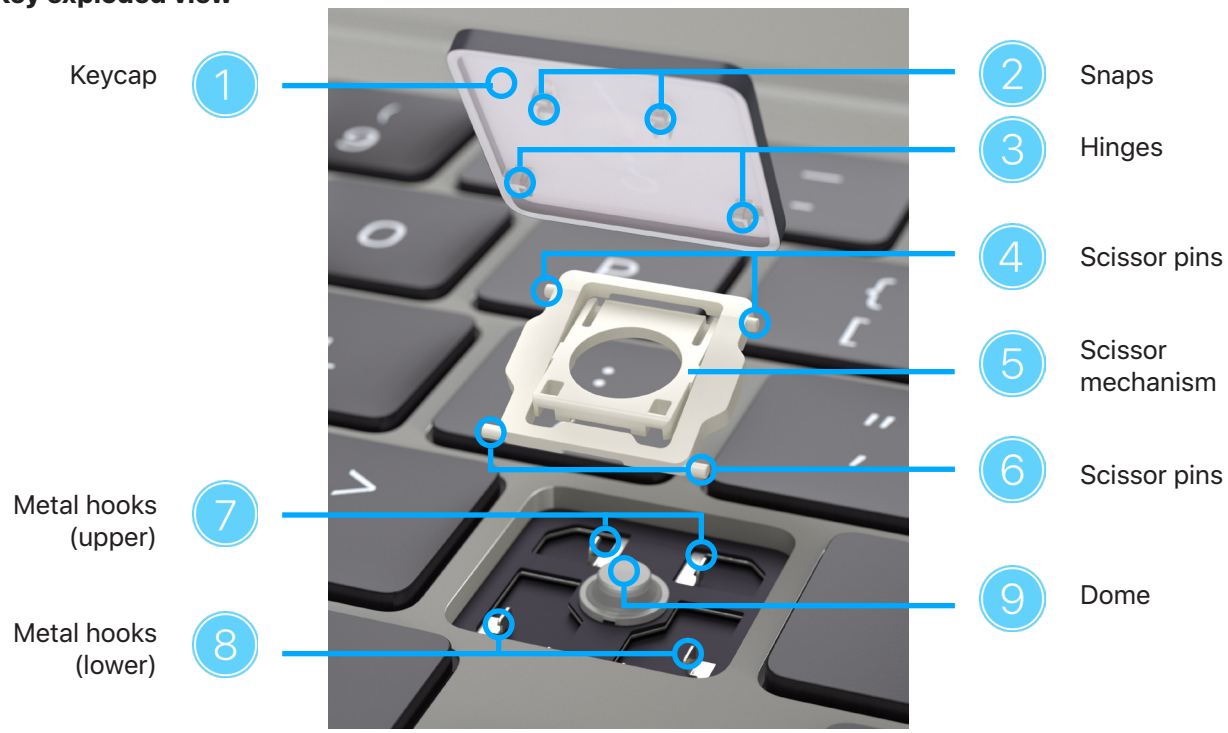
Keys

Before You Begin

Before you repair or replace a key, you need to:

- Know the different key parts — review the exploded view on this page.
- Identify your keyboard design.
- Identify which type of key you're replacing.
- Determine during the keycap removal procedure whether you need to also replace the key's scissor mechanism.

Key exploded view



Tools

- Compressed air
- ESD-safe tweezers
- Keycap levers (Some link bar keycaps require two keycap levers for removal)
- Microterry polishing cloth
- Needle-nose pliers
- Nylon probe (black stick)
- Precut adhesive strips (1x0.5)
- Precut adhesive strips (1x1)

Clean the keyboard thoroughly with compressed air before you replace a missing keycap or a keycap on an unresponsive key.

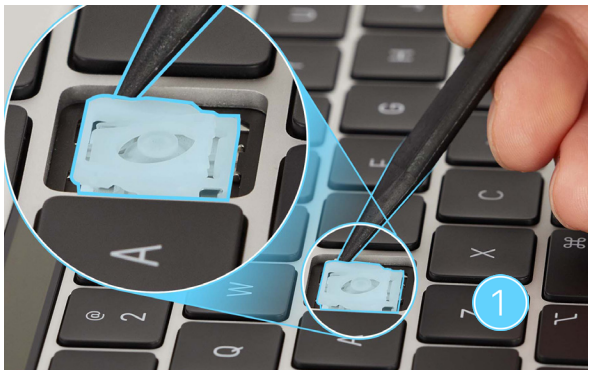
Caution

- The adhesive on the precut adhesive strips that you'll use to remove keycaps is very strong. If you accidentally place the keycap lever on the wrong keycap, you must remove and replace that keycap.
- An adhesive strip can be used only once. You must replace the adhesive strip for every keycap removal.
- Always replace a keycap that you removed with a new one. Don't reuse keycaps.
- Use gentle pressure on the keycap to activate the adhesive. Do not bend the top case when you press the keycap lever onto the keycap.
- If a keycap replacement doesn't resolve the issue, replace the top case.

Important

Before you replace a keycap, inspect the scissor mechanism, the dome, and the metal hooks inside the well of the keycap:

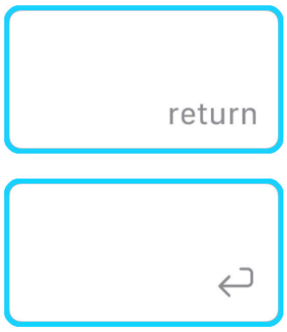
- Ensure that the scissor mechanism is installed in the well of the keycap. If not, install a replacement scissor mechanism.
- Use the black stick to gently move the scissor mechanism up and down (1). Verify that the scissor mechanism moves easily and lies flat when released. If it does not, replace the scissor mechanism.
- Press and release the dome (2) — it should spring back upright. If the dome is damaged or not centered, replace the top case.
- If a lower hook is bent (3), try to bend it back to a 90-degree angle.
- If an upper hook is bent (4), use needle-nose pliers to straighten it.
- If any lower hook or upper hook is broken or bent beyond repair, replace the top case.



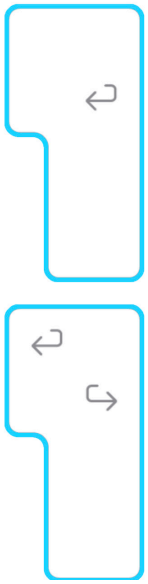
Keyboard Identification

Determine your keyboard design by comparing your Return key to the images:

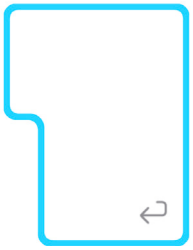
ANSI



ISO



JIS

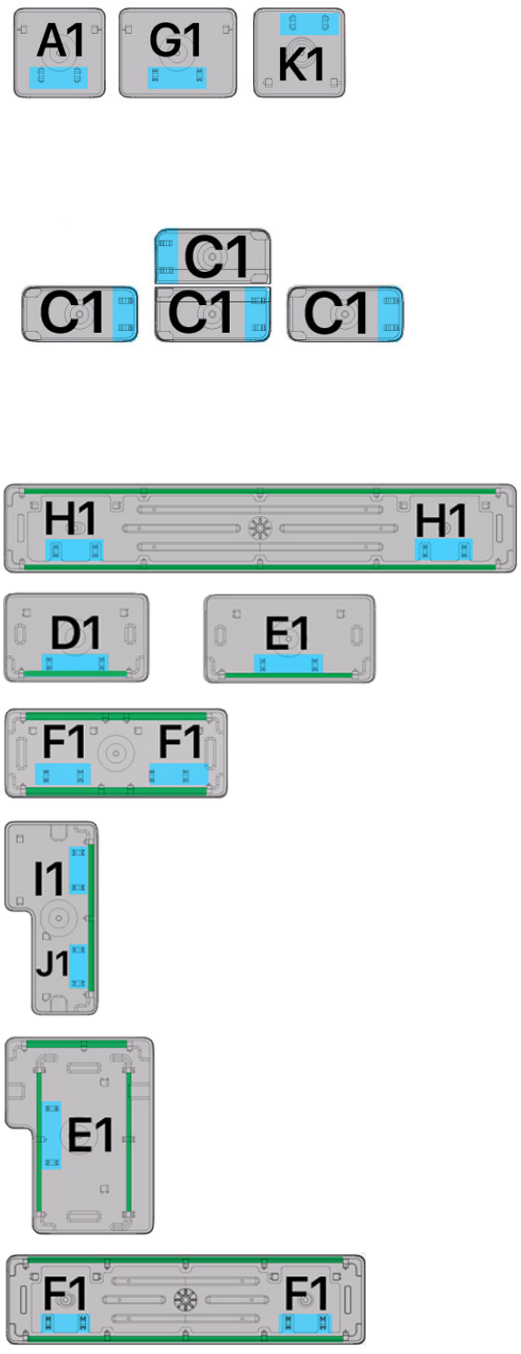


Key Identification

[1x1 Keys](#)

[1x0.5 Keys](#)

[Link Bar Keys](#)



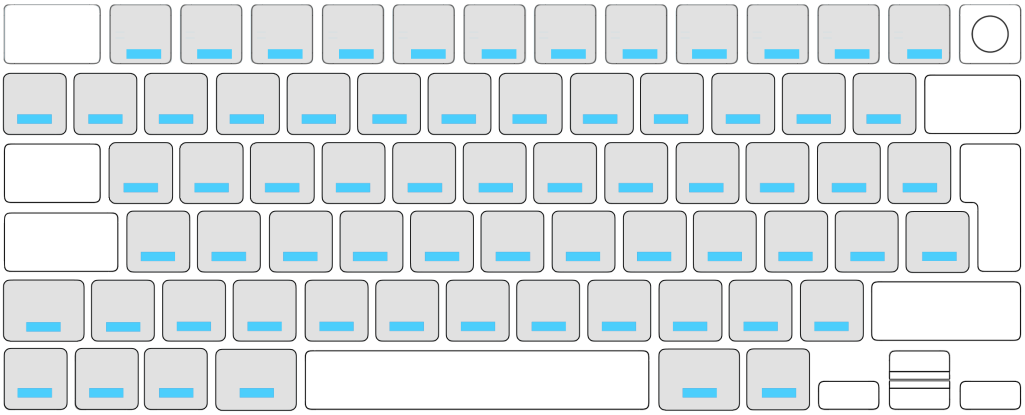
1x1 Keys

Maps

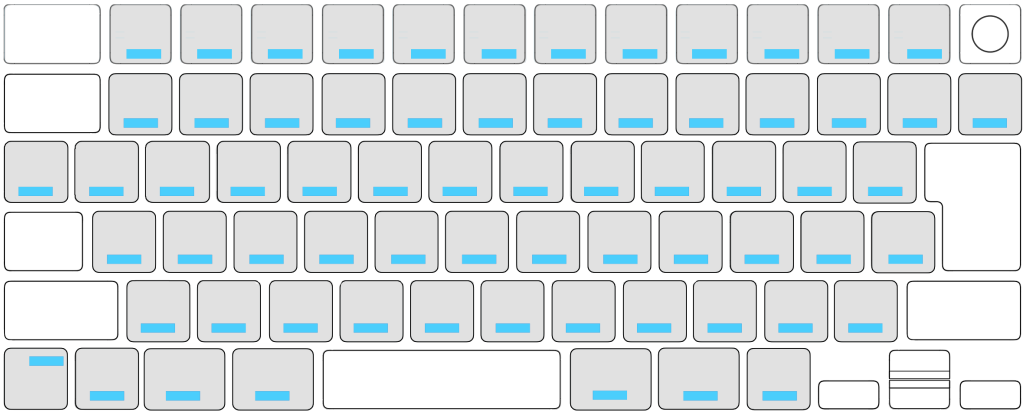
The 1x1 keys are highlighted, and the blue bars show the location of snaps.

ANSI

ISO

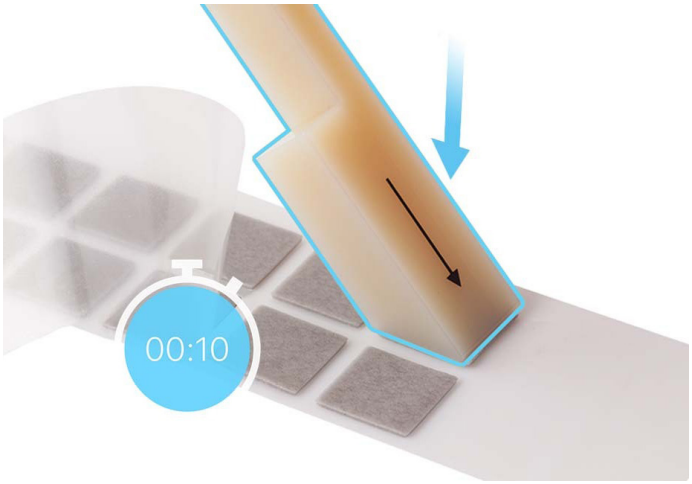


JIS



Removal

1. Peel the frosted liner from one side of the 1x1 precut adhesive strips. Press and hold the large end of the keycap lever on the adhesive for 10 seconds.



2. Lift the keycap lever and the adhesive to separate them from the white liner.

3. Lightly press the large end of the keycap lever and the adhesive onto the key.

Important

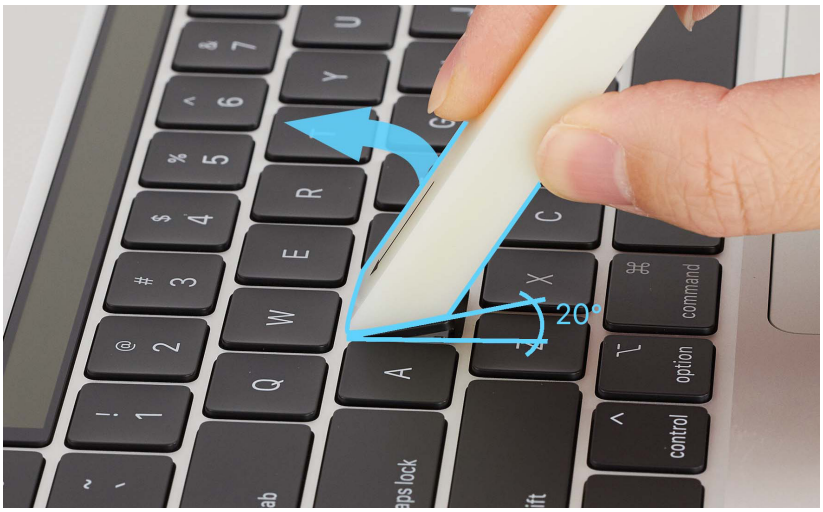
- The arrow on the lever must point to the hinged side of the keycap, which is opposite of the side that snaps onto the keyboard.
- Use the map for the 1x1 keys to identify the location of each snap.
- On the JIS keyboard, the snaps for the 1x1 Caps Lock key are on the display side of the keycap.

4. Hold the keycap lever on the key for 10 seconds to activate the adhesive.

5. Tilt up the keycap lever in the direction of the arrow until you feel the snaps release.

Caution

To avoid damaging the scissor mechanism, don't tilt up the keycap more than 20 degrees.



6. Lift the keycap off the keyboard.

7. Use the black stick to gently move the scissor mechanism up and down. Ensure that the scissor mechanism moves easily and lies flat when released. If it does not, replace the scissor mechanism.

8. Inspect the well of the keycap:
    - Use the black stick to press and release the dome through the top of the scissor mechanism — the dome should spring back upright. If the dome is damaged or not centered, replace the top case.
    - If a lower hook is bent, try to bend it back to a 90-degree angle.
    - If an upper hook is bent, use needle-nose pliers to straighten it.
    - If any lower hook or upper hook is broken or bent beyond repair, replace the top case.
9. Use compressed air to clean the well of the keycap.

    Note: If compressed air doesn't dislodge visible debris, use the black stick to gently dislodge it.

10. Remove the keycap and adhesive from the keycap lever. Discard the keycap and adhesive.

Reassembly

1. Gently push the hinged side of the replacement keycap into the hinged side of the well at a 15-degree angle until the hinges engage.

2. Gently press the top of the keycap to engage the snaps.

3. Tap the key repeatedly to check that it springs back each time. Compare the response of the replacement keycap with the response of the keycaps around it.

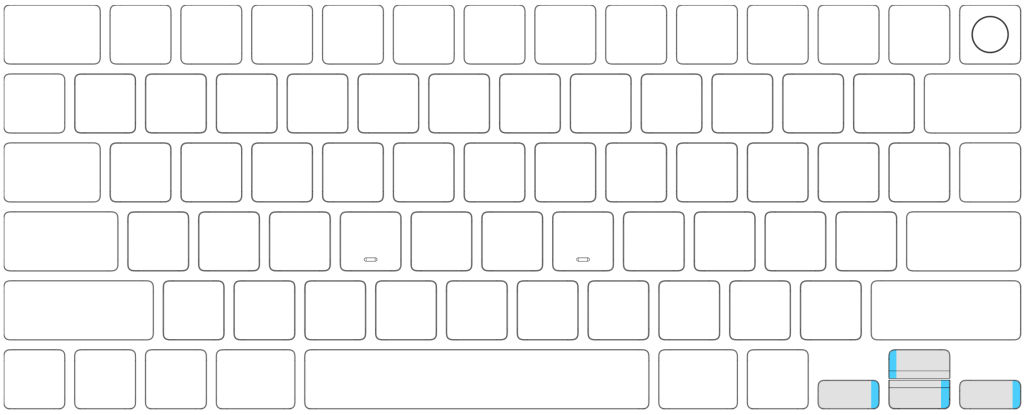
4. If the keycap doesn't appear to be correctly installed, repeat all removal and reassembly steps with a new keycap.

1x0.5 Keys

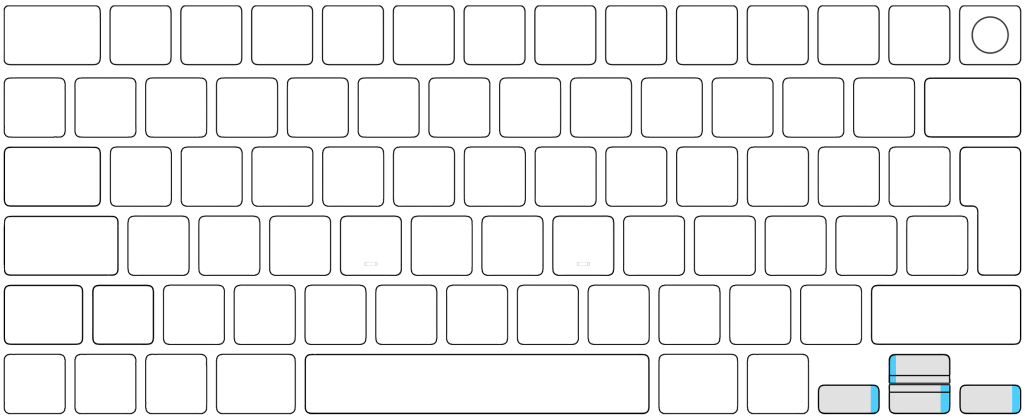
Maps

The Arrow keys are highlighted, and the blue bars show the location of snaps.

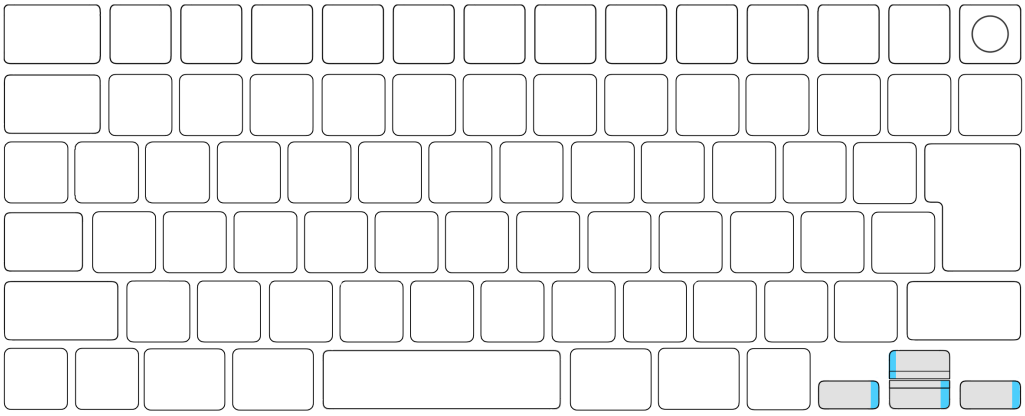
ANSI



ISO



JIS

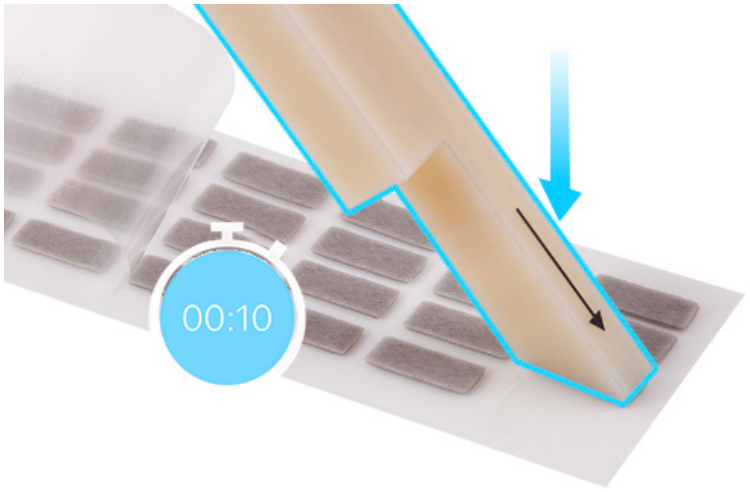


Removal

Important

- The hinges of the bottom-row arrow keys are on the left. Point the arrow on the keycap lever toward the left.
- The hinges of the Up Arrow key and Escape key are on the right. Point the keycap lever arrow toward the right.

1. Peel the frosted liner from one side of the 1x0.5 precut adhesive strips. Press and hold the small end of the keycap lever on the adhesive for 10 seconds.



2. Lift the keycap lever and the adhesive to separate them from the white liner.

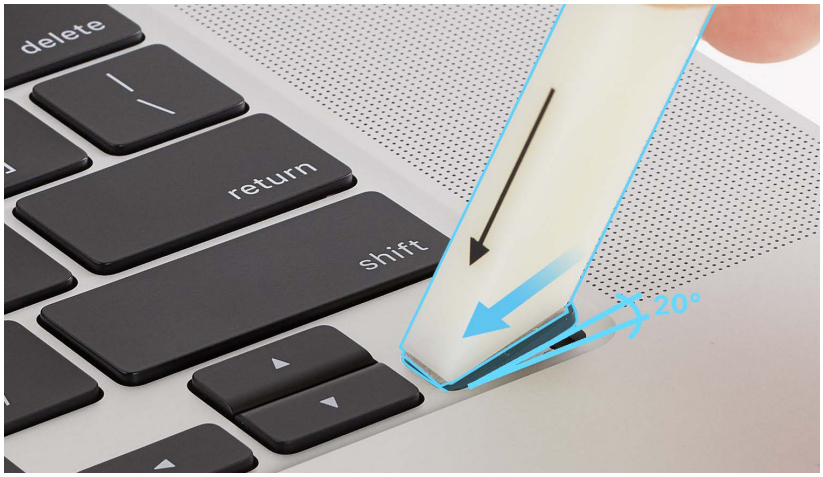
3. Lightly press the small end of the keycap lever and the adhesive onto the key.

Important

Point the arrow on the lever toward the hinged side of the keycap, which is opposite of the side that snaps onto the keyboard. You can find the location of the snaps at the 1x0.5 Key Maps.

4. Hold the keycap lever on the key for 10 seconds to activate the adhesive.

5. Push the keycap lever toward the arrow and tilt up the lever until you feel the snaps release.



Caution

To avoid damaging the scissor mechanism, don't tilt up the keycap more than 20 degrees.

6. Push the keycap lever toward the hinge to release the keycap (1). Lift up the keycap lever to release the keycap from the snaps (2).

7. Inspect the scissor mechanism and well of the keycap:
   - Use the black stick to gently move the scissor mechanism up and down (1). Verify that the scissor mechanism moves easily and lies flat when released. If it does not, replace the scissor mechanism.
   - Use the black stick to press and release the dome through the top of the scissor mechanism — the dome should spring back upright. If the dome is damaged or not centered, replace the top case.
   - If a lower hook is bent, try to bend it back to a 90-degree angle.
   - If an upper hook is bent, use needle-nose pliers to straighten it.
   - If any lower hook or upper hook is broken or bent beyond repair, replace the top case.

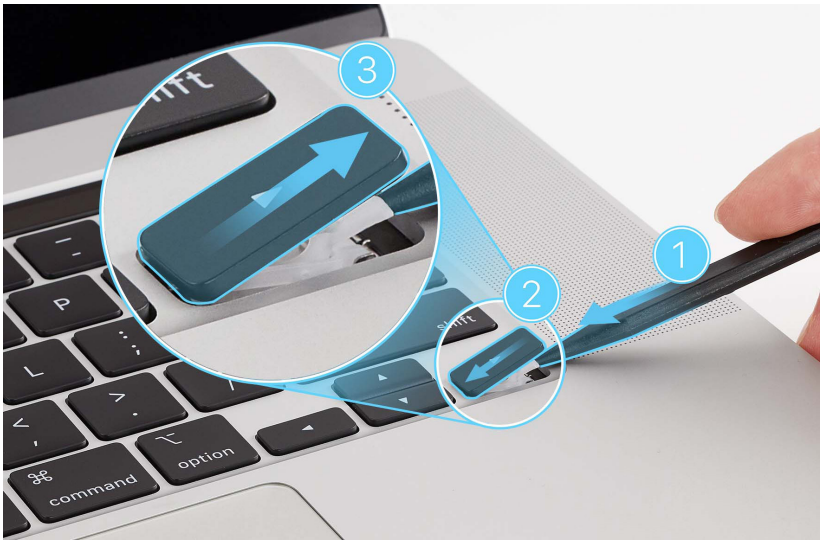
8. Use compressed air to clean the well of the keycap.

   Note: If compressed air doesn't dislodge visible debris, use the black stick to gently dislodge it.

9. Remove the keycap and adhesive from the keycap lever. Discard the keycap and adhesive.

Reassembly

1. Use the black stick to lift the scissor slightly (1). Insert the hinged side of the replacement keycap into the well at a 15-degree angle as shown (2). Slide the keycap back toward the snap to engage the hinge (3).



2. Remove the black stick and gently press the top of the keycap to engage the snaps.

3. Tap the key repeatedly to check that it springs back each time. Compare the response of the replacement keycap with the response of the keycaps around it.

4. If the keycap doesn't appear to be correctly installed, repeat all removal and reassembly steps with a new keycap.

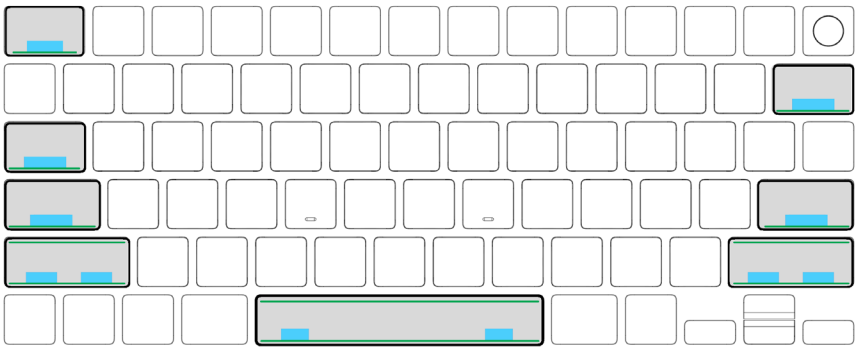
Link Bar Keys

Maps

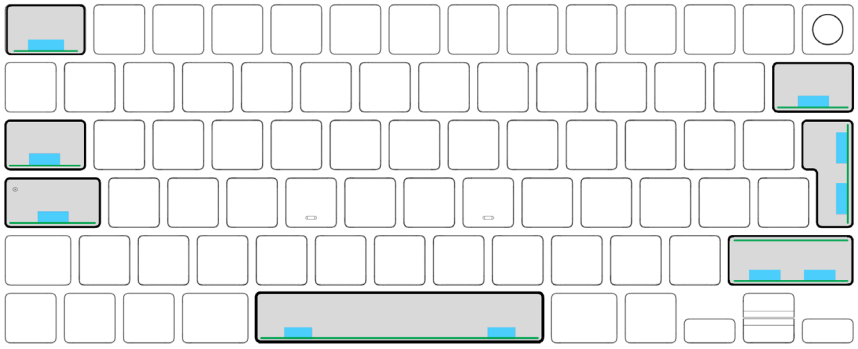
Link Bar keys are highlighted and include the following:

- Escape
- Shift
- Delete
- Return
- Space Bar
- Tab
- Caps Lock

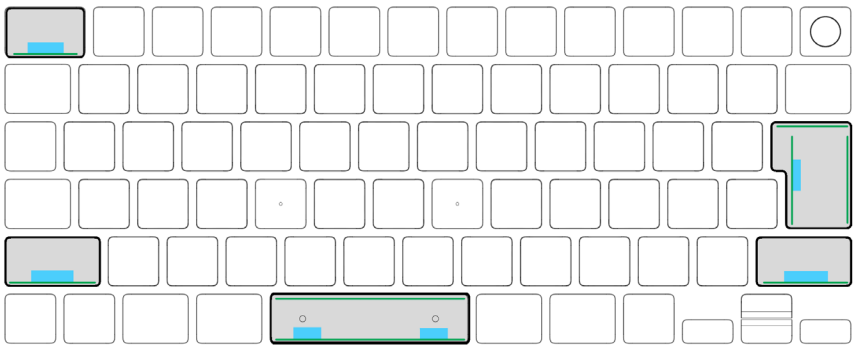
ANSI



ISO



JIS



Note:

- Blue bars show the location of snaps.
- Green lines show the location of link bars.

Removal

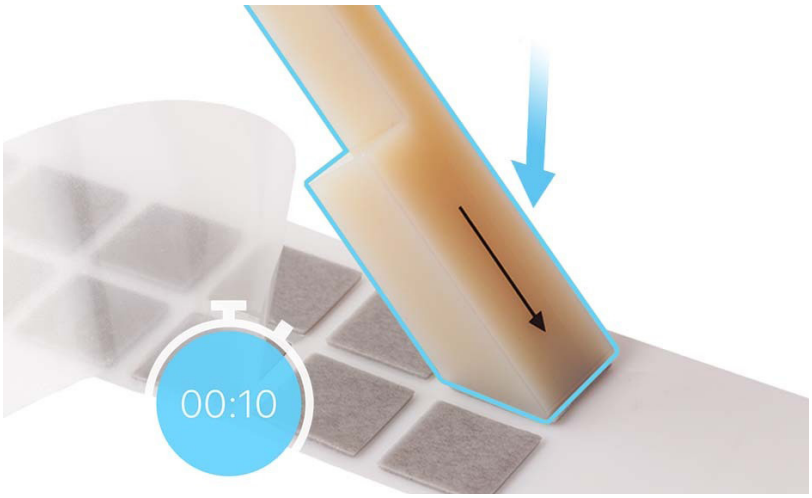
Important

Use two keycap levers for keys with two snaps. You can see these key types in the Link Bar Key Maps.

Note: This procedure shows the removal and reassembly of the Space bar, but the steps are the same whether a link bar key requires using one or two keycap levers. Notes and alerts describe how the procedures vary for the other types of link bar keys.

1. Identify the location of the snaps under the key that you need to replace using the Link Bar Key Maps.

2. Peel the frosted liner from one side of the 1x1 precut adhesive strips. Press and hold the large end of the keycap lever on the adhesive for 10 seconds. Lift the keycap lever and the adhesive to separate them from the white liner.



3. Place the keycap lever on its side. Repeat step 2 with the second keycap lever, then continue to step 4.

4. Align the keycap levers over the snaps.

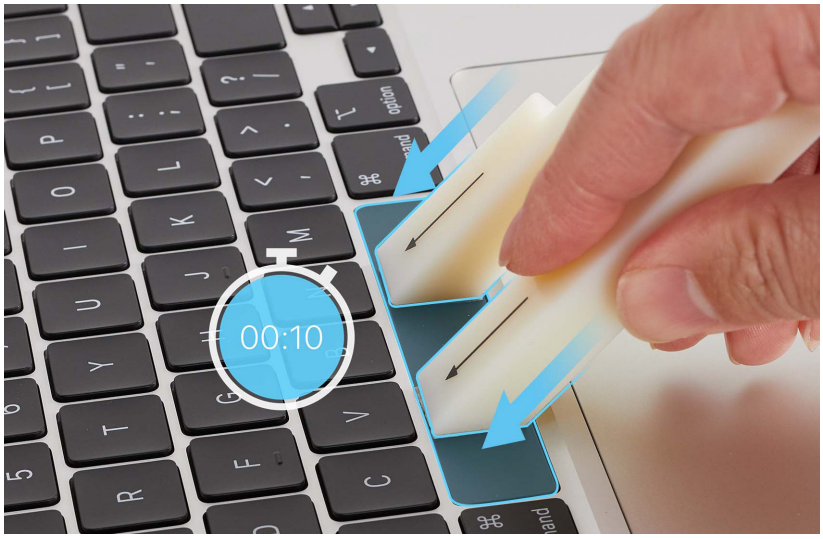
5. Lightly press the adhesive ends of the keycap levers onto the key.

Important

Point the arrow on a lever to the hinged side of the keycap, which is opposite of the side that snaps onto the keyboard. You can find the location of the snaps in the Link Bar Key Maps.

Note: The JIS Return key has three link bars and one side snap. Position the keycap lever so that the arrow points toward the link bar on the right side of the keyboard.

6. Hold the keycap levers and adhesive on the key for 10 seconds to activate the adhesive.



7. Tilt up the keycap levers in the direction of the arrows until you feel the snaps release.

Caution

For a key with one link bar, don't tilt up the keycap more than 20 degrees.

Important

The bottom link bar on larger keys might stick to the keycap during removal. If this happens, hold the two keycap levers and insert the black stick between the keycap and the bottom link bar. Use the black stick to release the link bar into the keycap well.

8. Remove the keycap.

9. Inspect the scissor mechanisms and keycap wells.
   - Use the black stick to gently move each scissor mechanism up and down. Verify that each scissor mechanism moves easily and lies flat when released. If it does not, replace the scissor mechanism.
   - Use the black stick to press and release each dome through the top of the scissor mechanism — a dome should spring back upright. If a dome is damaged or not centered, replace the top case.
   - If a lower hook is bent, try to bend it back to a 90-degree angle.
   - If an upper hook is bent, use needle-nose pliers to straighten it.
   - If any lower hook or upper hook is broken or bent beyond repair, replace the top case.

10. Use compressed air to clean the well of the keycap.

    Note: If compressed air doesn't dislodge visible debris, use a microterry polishing cloth to gently dislodge the debris.

11. Remove the keycap and adhesives from the keycap lever. Discard the keycap and adhesives.

Reassembly

Important

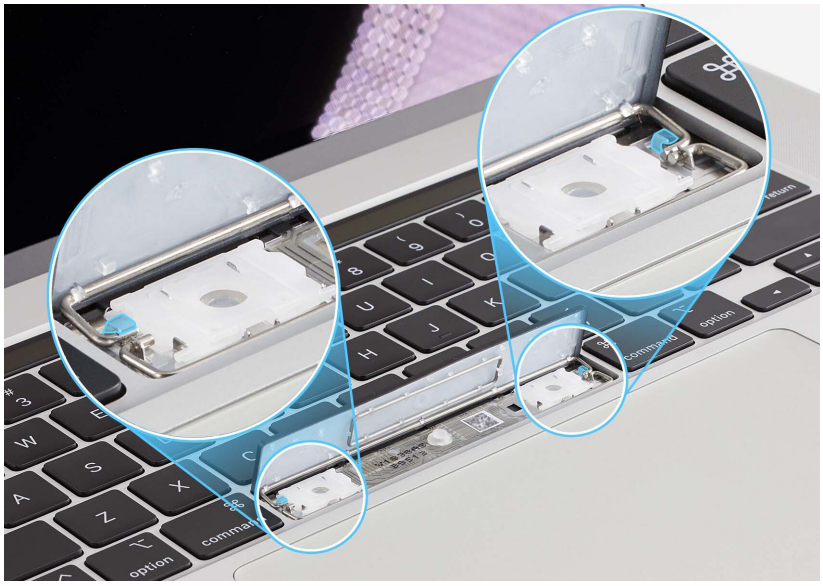
For the keycaps that have more than one link bar, check that the top link bar is preinstalled on the replacement keycap.

Note: On the JIS Return key, the link bar that fits into the right side of the keycap well is preinstalled.

1. Position the keycap in the well and insert the top link bar into the metal hooks that are on each side of the well.

Important

To reinstall the JIS Return key, insert the keycap into the right side of the well.



2. Push the keycap forward to set the top link bar in place.

3. Gently press the snaps and scissor mechanisms as shown to engage the keycap. You can find the snap locations in the Link Bar Key Maps.

   Note: For keys with one link bar, gently push the hinged side of the replacement keycap into the hinged side of the well at a 15-degree angle until the hinges engage. Then gently press the snap or snaps.

4. Tap the key repeatedly to verify that it springs back each time. If the keycap doesn't appear to be correctly installed, repeat all removal and reassembly steps with a new keycap.

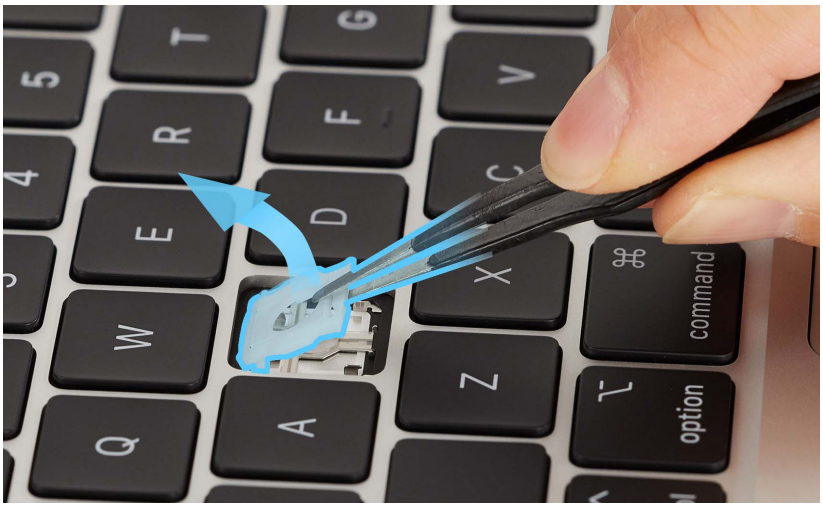
Scissor Mechanisms
Removal

Important

- Do not remove a scissor mechanism unless it is damaged. You can find the correct replacement in Scissor Mechanism Identification.
- Note the orientation of the scissor mechanism before you remove it.

1. Use the black stick to disengage the scissor pins from the lower hooks.

2. Use tweezers to lift the scissor mechanism out of the well.



3. Inspect the well of the keycap:
    - When you press and release the dome, it should spring back upright. If the dome is damaged or not centered, replace the top case.
    - If a lower hook is bent, try to bend it back to a 90-degree angle.
    - If an upper hook is bent, use needle-nose pliers to straighten it.
    - If any lower hook or upper hook is broken or bent beyond repair, replace the top case.

Reassembly

1. Use compressed air to clean the well of the keycap.

   Note: If compressed air doesn't dislodge visible debris, use the black stick to gently dislodge it.

2. Use ESD-safe tweezers to position the scissor in the well and engage the upper hooks.

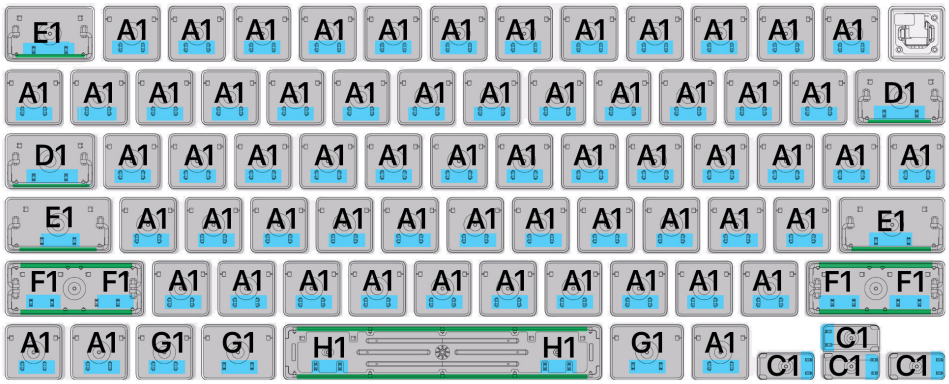
3. Use the black stick to engage the scissor pins with the lower hooks. The pin is engaged as shown (1). The pin is not engaged as shown (2).

4. Use the black stick to gently move the scissor mechanism up and down. Ensure that the scissor mechanism moves easily and lies flat when released.

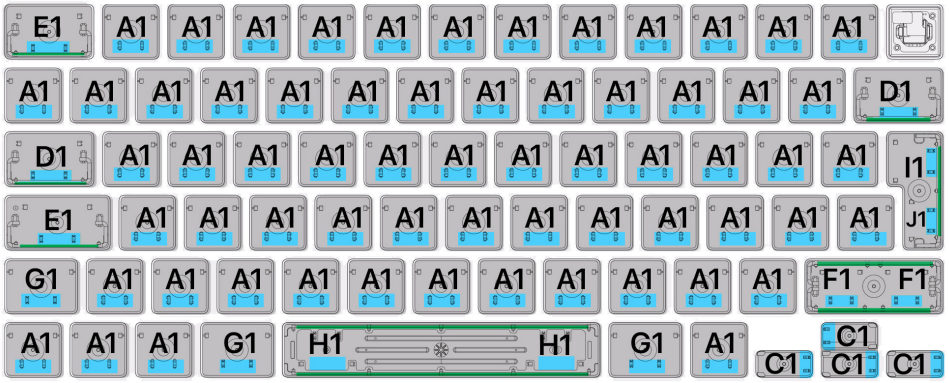
Keyboard Maps

Each symbol on the maps below corresponds to a symbol on the scissor mechanism identification chart and the scissor bag. Blue indicates where the snaps are located, and green indicates link bars.

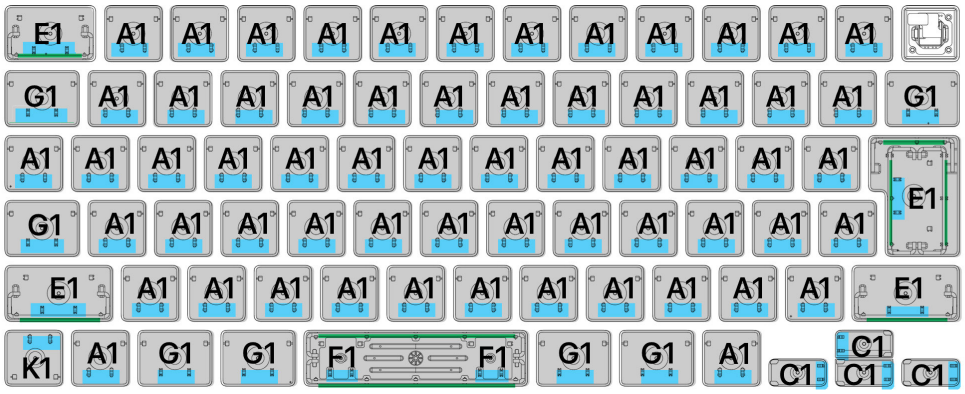
ANSI



ISO



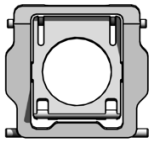
JIS



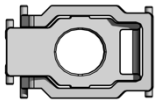
Scissor Mechanism Identification

Match the scissor mechanism to the label to identify the correct replacement. Don’t replace a scissor mechanism unless it is broken.

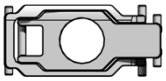
A1



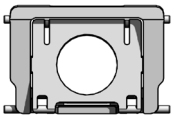
B1



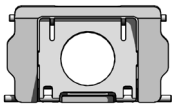
C1



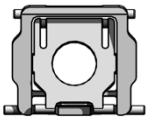
D1



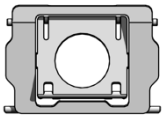
E1



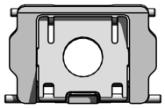
F1



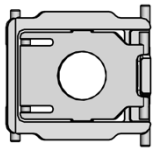
G1



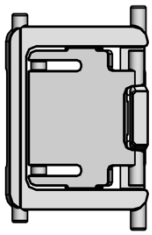
H1



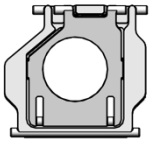
I1



J1



K1



Bottom Case

Before You Begin

Warning

Read Battery Safety and follow workspace and battery handling guidelines before you begin.

Tools

- Battery cover
- Cut-resistant gloves
- ESD-safe tweezers
- Microterry polishing cloth
- Nylon probe (black stick)
- Pentalobe screwdriver
- Permanent marker
- Suction cup
- Torx T3 screwdriver
- Torx T5 screwdriver

Removal

1. Place the computer on a clean, flat surface with the bottom faceup.

2. Use the pentalobe screwdriver to remove the four short pentalobe screws from the front of the bottom case.

   Note: The screw color is specific to the model.

   - Silver (923-06866)
   - Space gray (923-06868)

3. Use the pentalobe screwdriver to remove the four long pentalobe screws from the rear of the bottom case.

   Note: The screw color is specific to the model.

   - Silver (923-06867)
   - Space gray (923-06869)

4. Press the suction cup to attach it to the lower left corner of the bottom case.

5. Four internal clips attach the bottom case to the top case. Pull up the handle of the suction cup until you feel the two internal clips on the left release.

6. Squeeze the edges of the suction cup to release it.

7. Move the suction cup to the lower right corner and press the top to attach it to the bottom case.

8. Pull up the handle of the suction cup until you feel the two internal clips on the right release.

9. Squeeze the edges of the suction cup to release it.

10. Insert the flat end of the black stick into the vent/antenna module gap between the display and top case as shown (1). Then pull the black stick to disengage the spring fingers (2). Repeat the process on the other end of the gap.

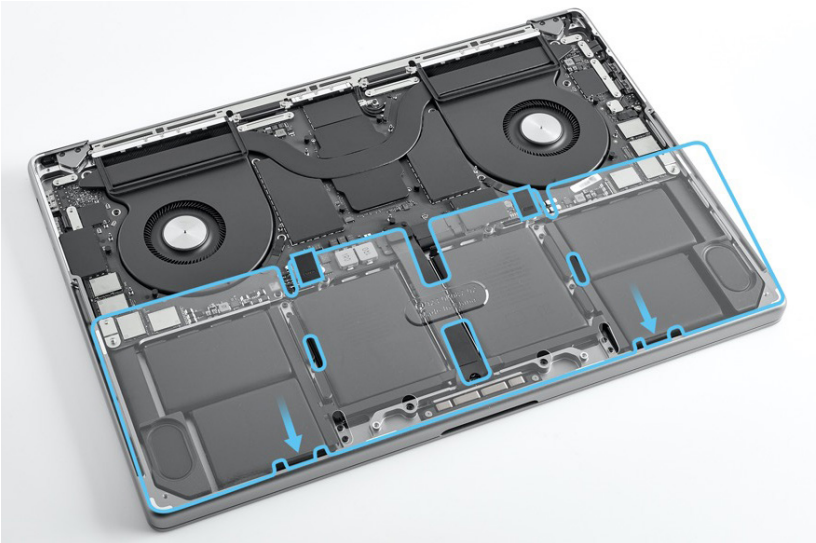
11. Remove the bottom case and set it faceup on a clean, flat surface.

Note: If you're replacing only the bottom case, proceed to reassembly step 8.

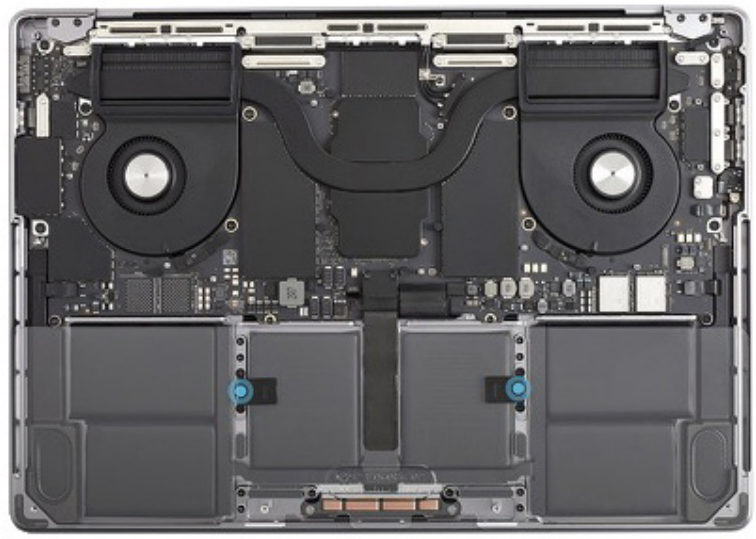
Important

- If you're replacing the bottom case, keep the existing bottom case until the repair is complete.
- Use a permanent marker to write the computer serial number on the inside of the replacement bottom case.

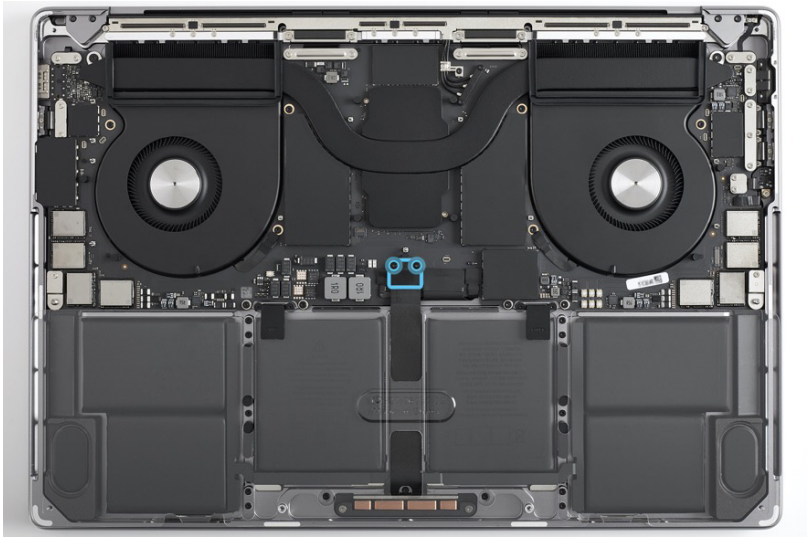
12. Place the battery cover on the battery.



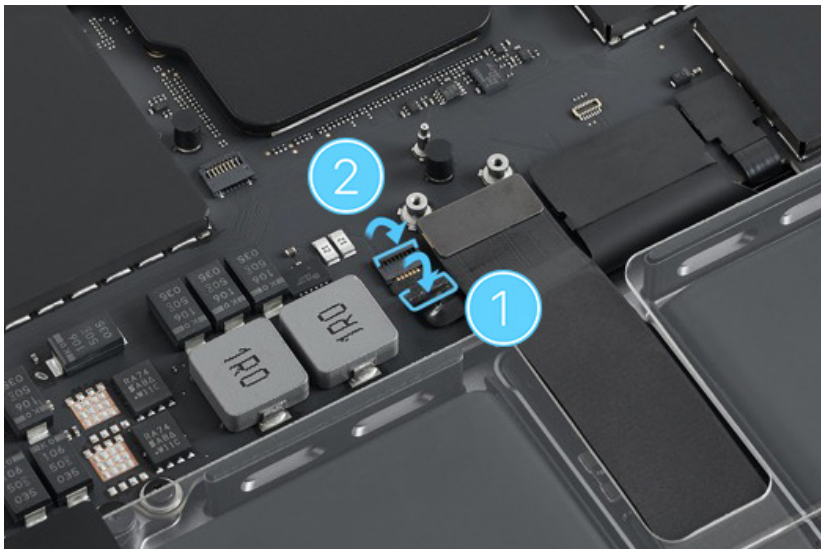
13. Press the black tabs on the battery cover into the clips on the top case until you feel a click.



14. Use the T3 screwdriver to remove the two T3 screws (923-06851) from the trackpad flex cable cowling. Remove the cowling and save it for reassembly.



15. Gently peel the polyester film tab off the locking lever of the battery management unit (BMU) flex cable (1). Then use the black stick to flip up the locking lever (2).

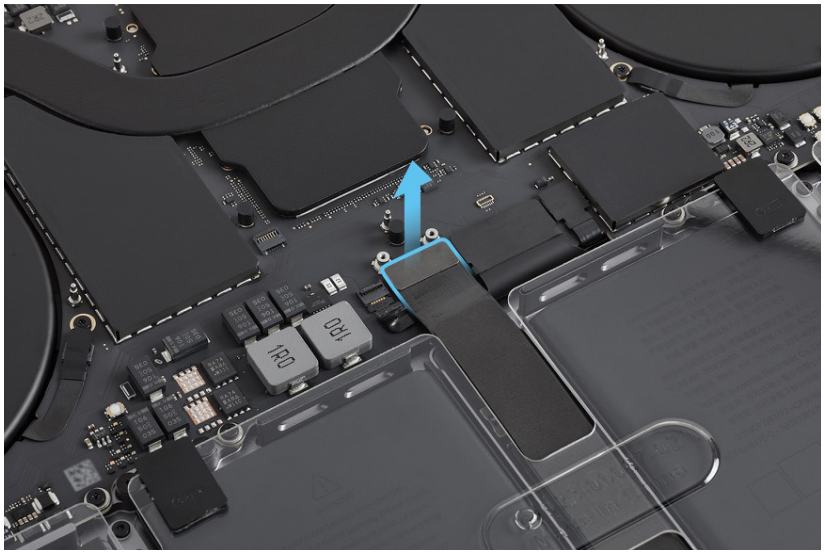


16. Use ESD-safe tweezers to gently grasp the end of the BMU flex cable and slide it out of the connector.

Caution

Don't crimp the BMU flex cable.

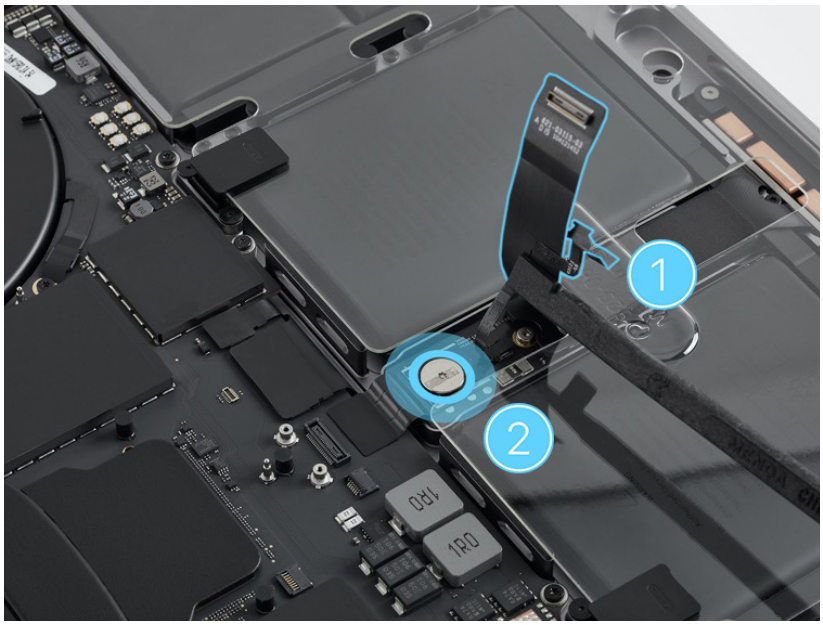
17. Lift the end of the trackpad flex cable off the connector on the logic board.



18. Use the black stick to gently peel the BMU flex cable off the logic board and the T5 screw (923-06849).

19. Use the black stick to gently fold back the BMU flex cable and trackpad flex cable (1).

20. Use the T5 screwdriver to remove the T5 screw (2).



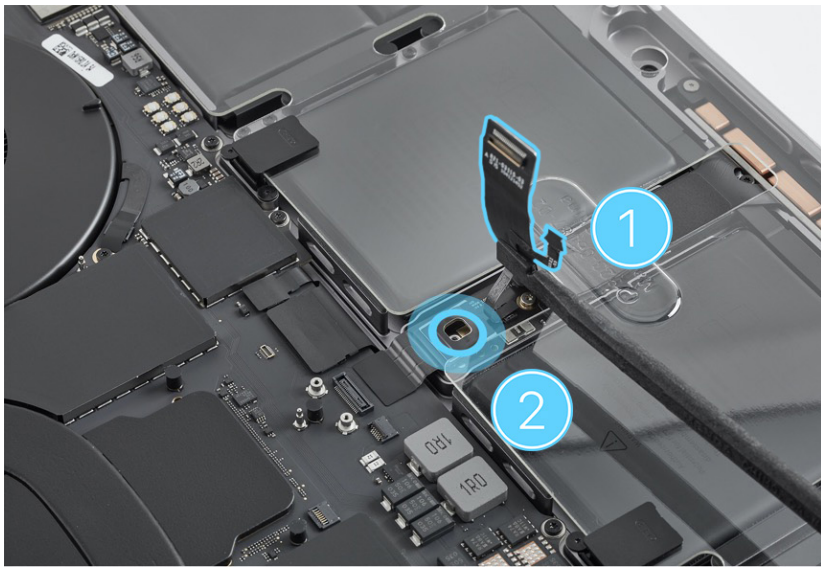
Reassembly

Important

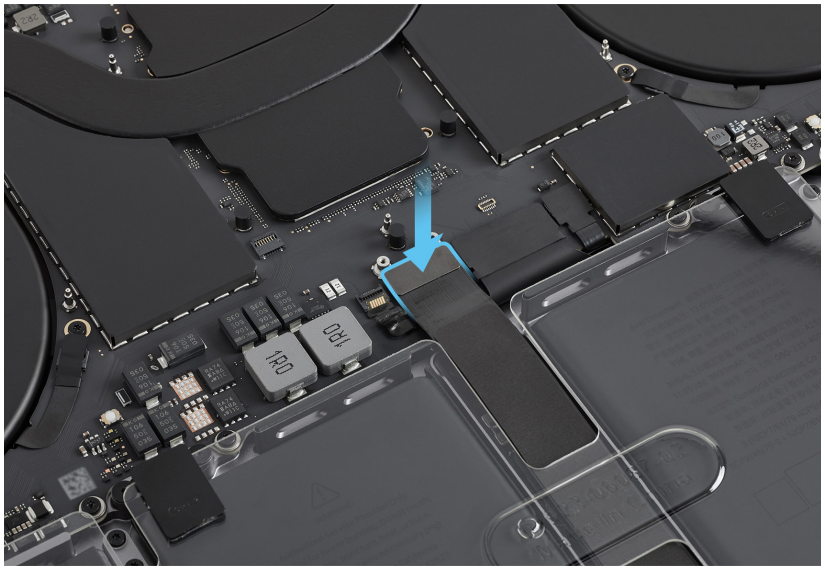
- If you're replacing the bottom case, keep the existing bottom case until the repair is complete.
- Use a permanent marker to write the computer serial number on the inside of the replacement bottom case.

1. Use the black stick to gently fold back the BMU and trackpad flex cables (1). Then use the T5 screwdriver to reinstall the T5 screw (923-06849) (2).

2. Gently press along the length of the BMU flex cable to adhere it to the T5 screw and logic board.



3. Press the end of the trackpad flex cable to the connector on the logic board.

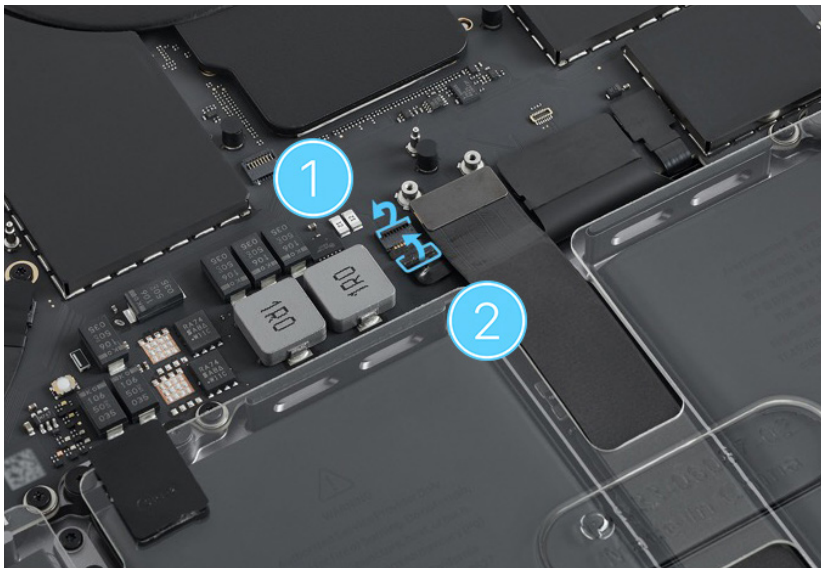


4. Use ESD-safe tweezers to slide the end of the BMU flex cable into the connector.

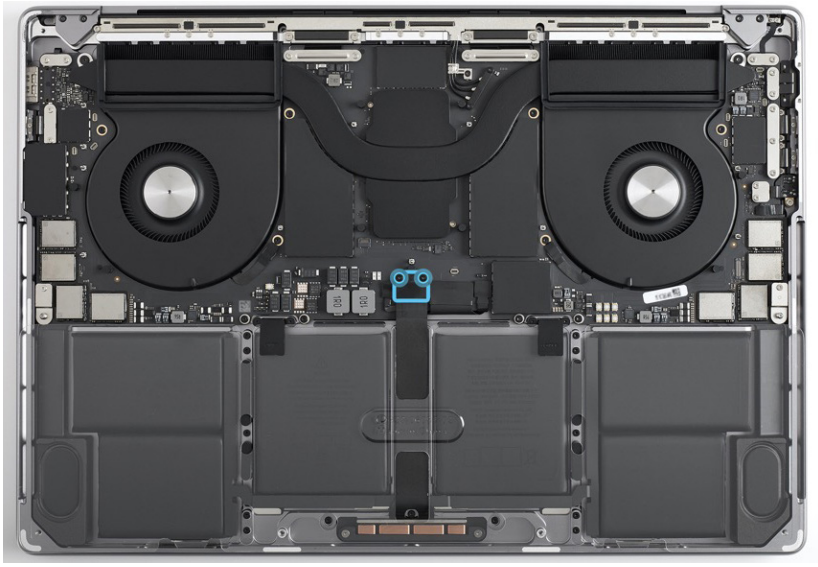
Caution

Don't crimp the BMU flex cable.

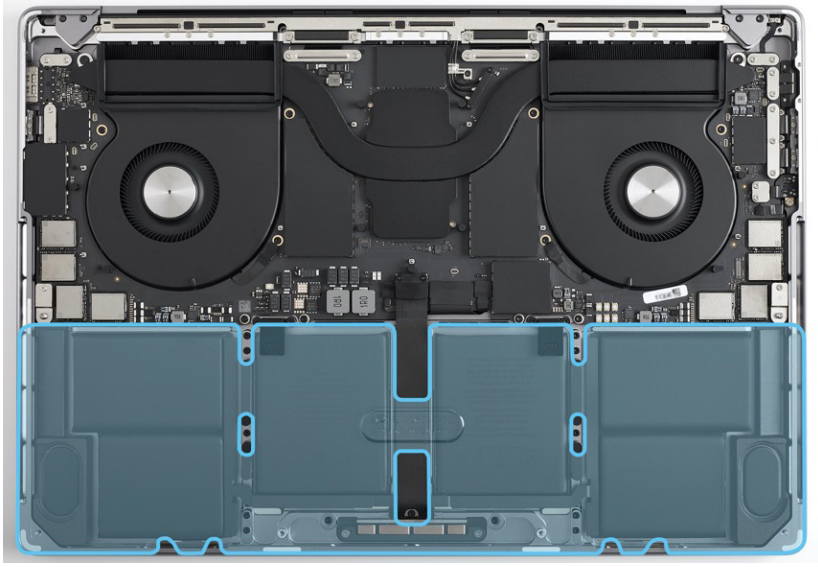
5. Flip down the locking lever of the BMU flex cable (1). Then press the polyester film tab to the locking lever (2).



6. Position the trackpad flex cable cowling over the end of the trackpad flex cable. Then use the T3 screwdriver to reinstall the two T3 screws (923-06851) into the cowling.



7. Hold the battery cover by the edges and lift it off the top case.



8. Use the microterry polishing cloth to ensure that the bottom case interior is clean and free of debris.

9. Position the bottom case over the top case. Align the back edge of the bottom case with the vent/antenna module. The long edge of the bottom case should be flush with the smooth plane of the vent/antenna module.

10. Put on gloves. Hold the bottom case by the front corners and slowly push it away from you to align it with the display hinge and top case.

11. Feel the spring fingers lock as you push the bottom case.

Important

If the bottom case doesn't align, pull it toward you to remove it. Then repeat steps 9 through 11. Then continue to step 12.

12. Lift the front edge of the bottom case no more than 1 inch (2.5 cm) to align the thermal fan ducts.

13. Press both sides of the bottom case simultaneously until you feel the two internal clips snap into place (1). Then simultaneously press the two areas in the middle (2) to attach the two remaining internal clips.

14. Ensure that all sides of the bottom case align with all sides of the top case. If the cases are misaligned, begin again at removal step 4.

15. Use the pentalobe screwdriver to reinstall the four short pentalobe screws into the front of the bottom case.

    Note: Use the correct screw color for your model.

    - Silver (923-06866)
    - Space gray (923-06868)

16. Use the pentalobe screwdriver to reinstall the four long pentalobe screws into the rear of the bottom case.

    Note: Use the correct screw color for your model.

    - Silver (923-06867)
    - Space gray (923-06869)

Important

- System Configuration is required if you've installed a replacement display, lid angle sensor, logic board, top case, or Touch ID board.
- If you replaced the logic board, the computer will start up in Diagnostics mode until you complete System Configuration.
- If you replaced the Touch ID board, it will function only as a power button until you complete System Configuration.
- After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.

Battery Management Unit Flex Cable

Before You Begin

Warning

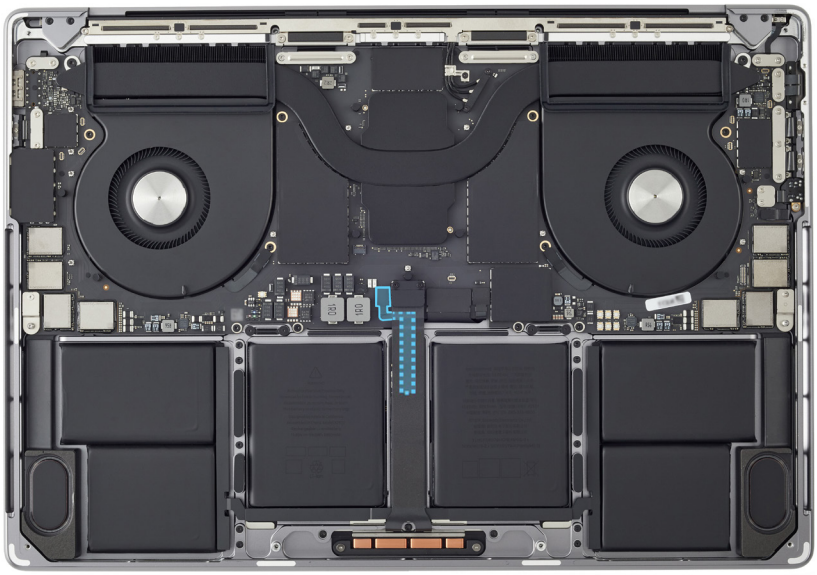
Read Battery Safety and follow workspace and battery handling guidelines before you begin.

Remove the following part before you begin:

- Bottom case

Tools

- ESD-safe tweezers



Removal

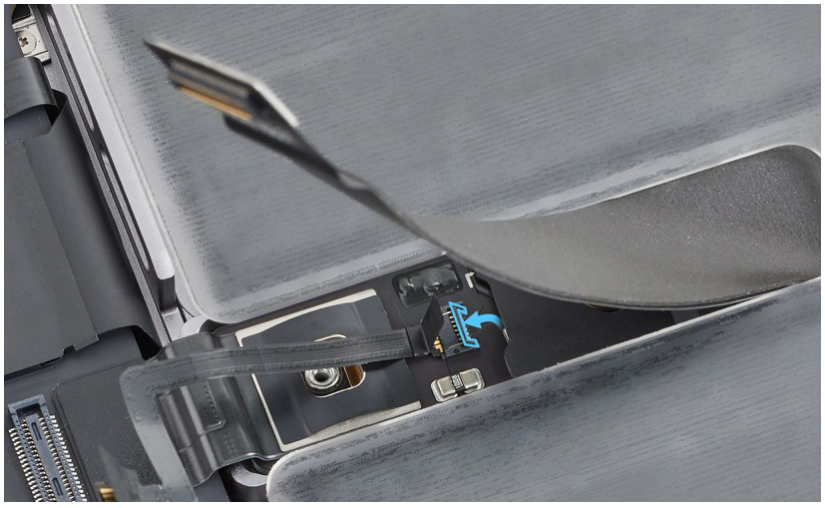
Important

Replace the BMU flex cable if it’s damaged.

1. Fold back the trackpad flex cable to access the BMU flex cable.

2. Peel back the polyester film tab from the locking lever of the BMU flex cable.

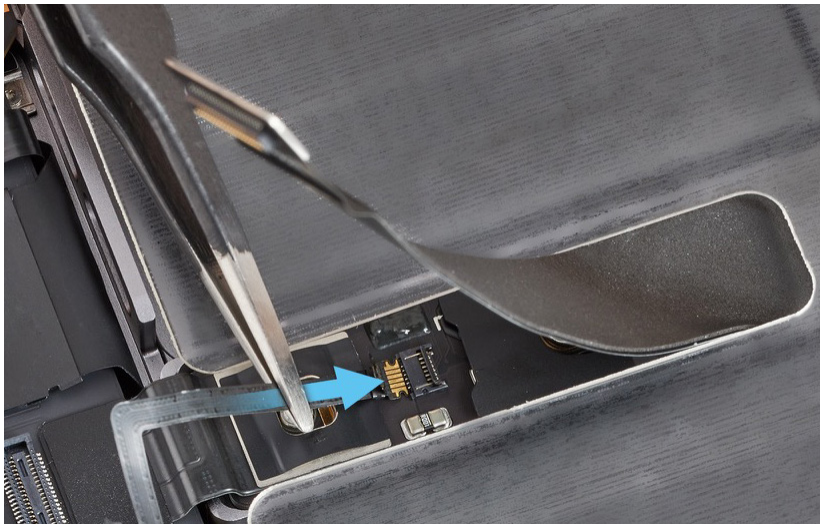
3. Use the black stick to flip up the locking lever of the BMU flex cable connector.



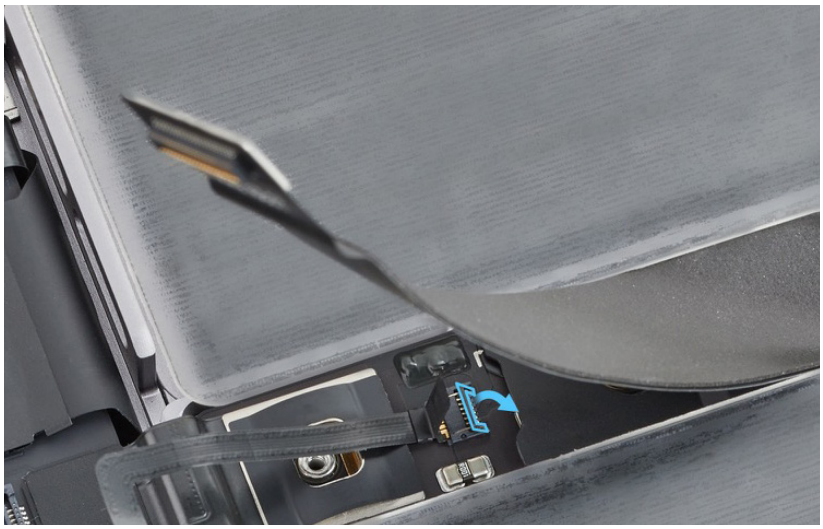
4. Use ESD-safe tweezers to gently slide the end of the BMU flex cable out of the connector.

Reassembly

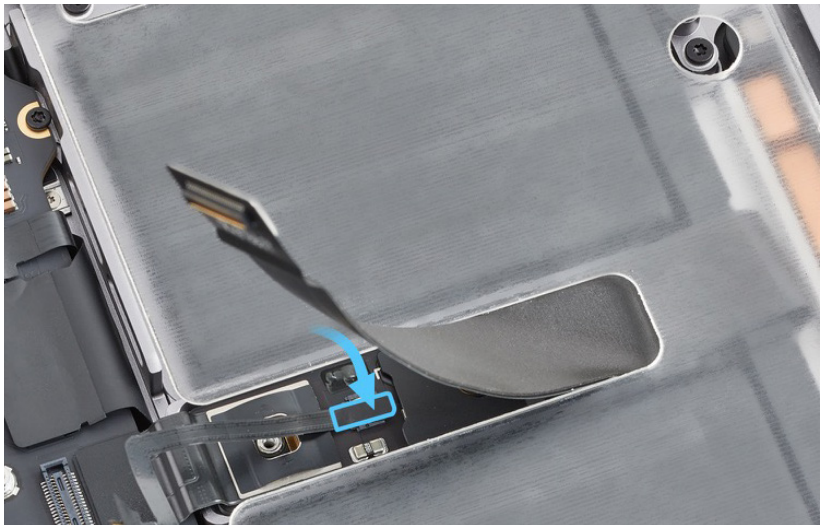
1. Use ESD-safe tweezers to slide the end of the BMU flex cable into the connector.



2. Use the black stick to flip down the locking lever on the BMU flex cable connector.



3. Press the polyester film tab over the connector.



Reinstall the following part to complete reassembly:

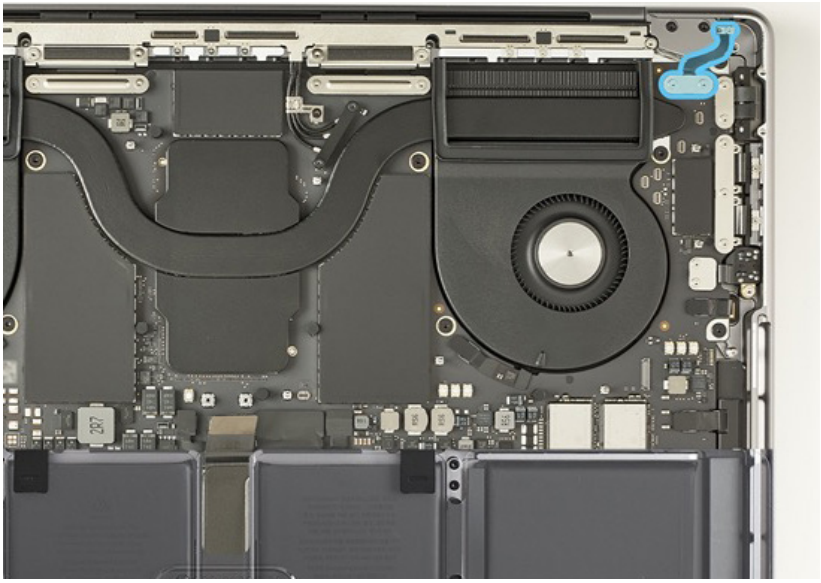
- Bottom case

Lid Angle Sensor

Before You Begin

Remove the following part before you begin:

- Bottom case



Tools

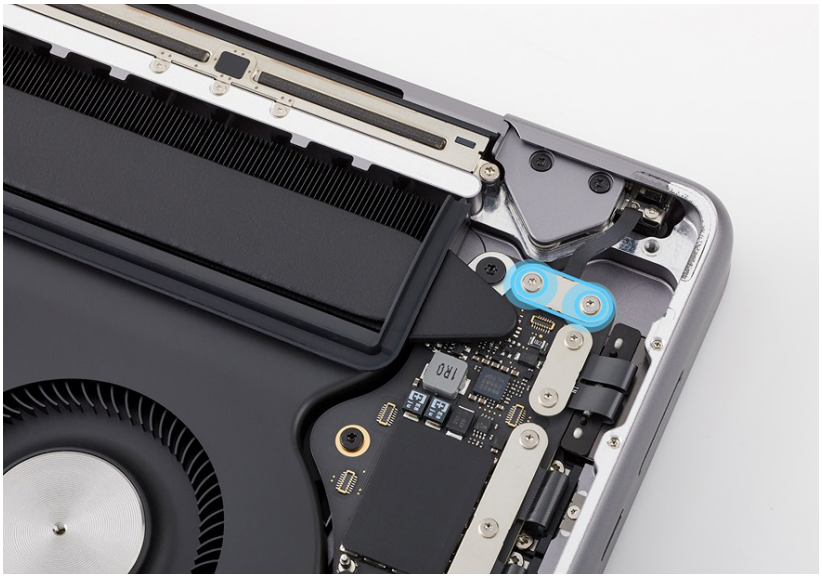
- Nylon probe (black stick)
- Torque driver (blue, 0.65 kgf cm)
- Torx security bit
- Torx T3 screwdriver

Important

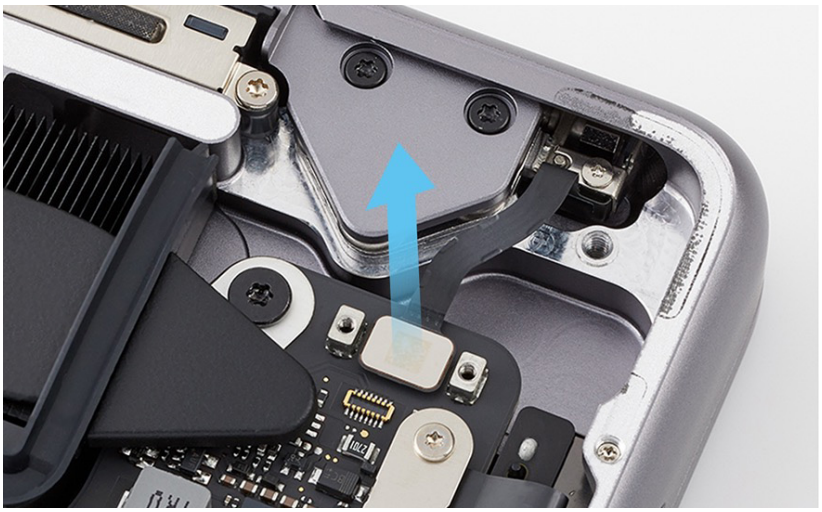
This procedure requires System Configuration. After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.

Removal

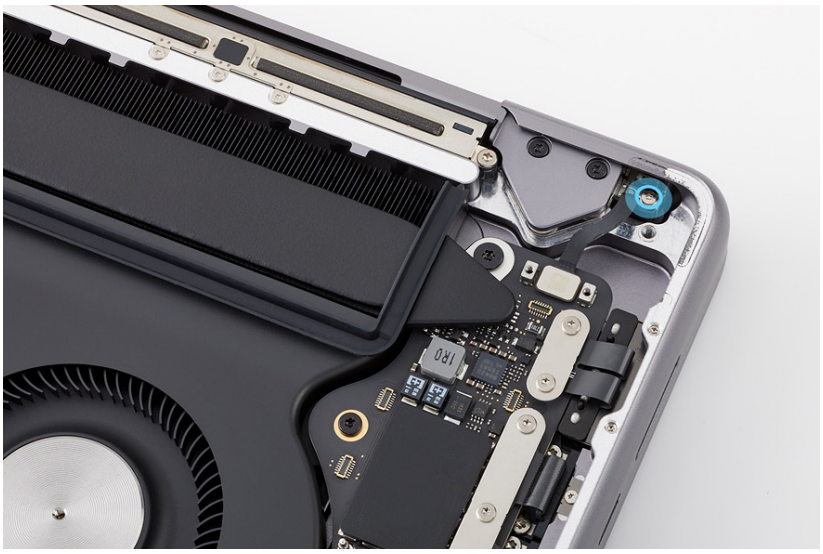
1. Use the T3 screwdriver to remove the two T3 screws (923-06854) from the lid angle sensor connector cowling. Remove the cowling and save it for reassembly.



2. Use the black stick to lift the end of the lid angle sensor flex cable off the connector.



3. Use a torque driver and the Torx security bit to remove the 1IPR screw (923-06852) from the lid angle sensor flex cable clip.



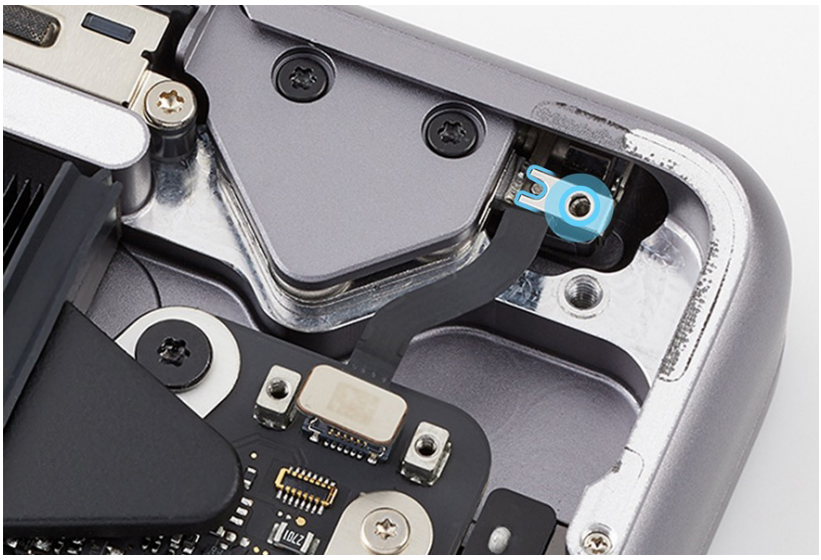
4. Remove the lid angle sensor from the top case.

Reassembly

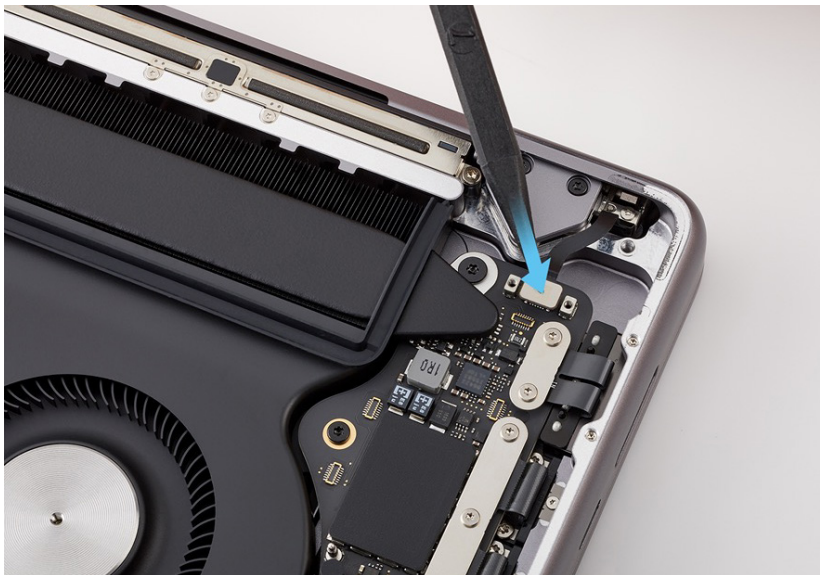
1. Position the lid angle sensor in the top case.

2. Position the clip on the lid angle flex cable so the slot and screw hole on the clip are aligned with the pin and screw hole in the top case.

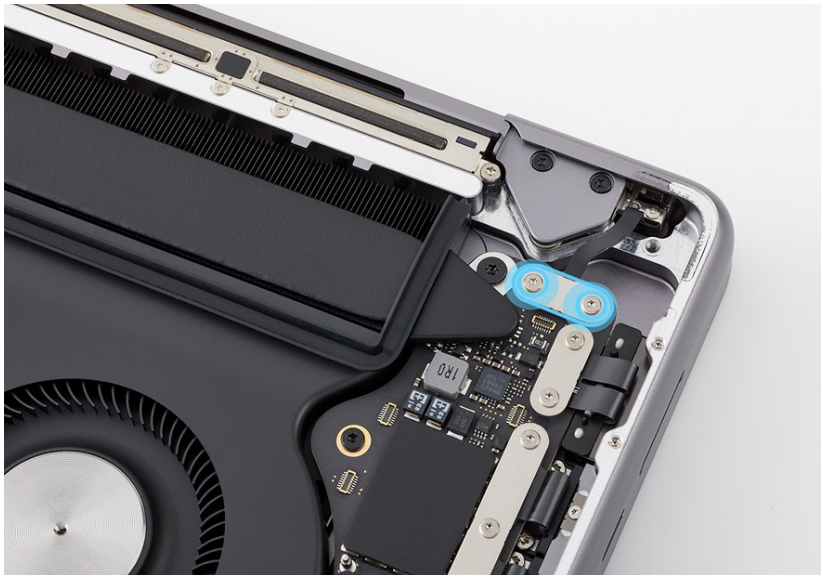
3. Use the blue torque driver and the Torx security bit to reinstall the 1IPR screw (923-06852) into the lid angle sensor flex cable clip.



4. Use the black stick to press the end of the lid angle sensor flex cable to the connector.



5. Position the lid angle sensor connector cowling over the end of the lid angle sensor flex cable. Then use the T3 screwdriver to reinstall the two T3 screws (923-06854) into the lid angle sensor connector cowling.



Reinstall the following part to complete reassembly:

- Bottom case

Important

- After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.
- Close the display when prompted while you run System Configuration. If the display isn't fully closed during the process, you'll need to replace the lid angle sensor. Ensure that you follow all System Configuration steps to complete the repair.

Trackpad and Trackpad Flex Cable

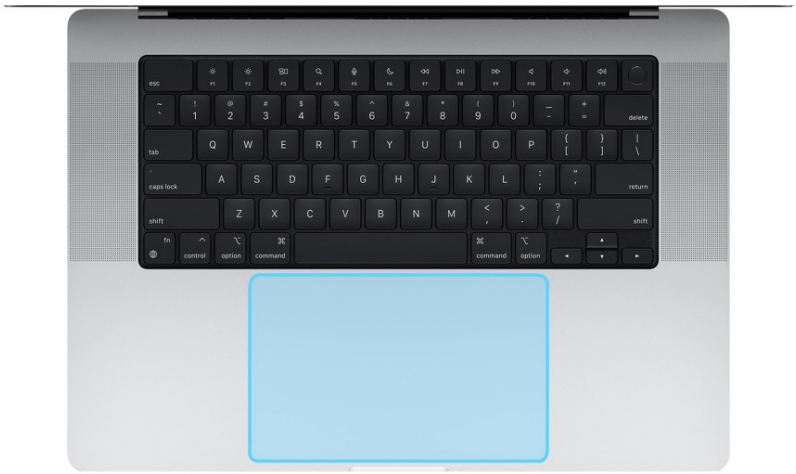
Before You Begin

Warning

Read Battery Safety and follow workspace and battery handling guidelines before you begin.

Remove the following part before you begin:

- Bottom case



Tools

- Adjustable torque driver (10–34 Ncm)
- ESD-safe tweezers
- Gap offset kit
- Kapton tape
- Nylon probe (black stick)
- Sticky notes (3 by 3 inches)
- Torx T5 bit
- Torx T5 screwdriver

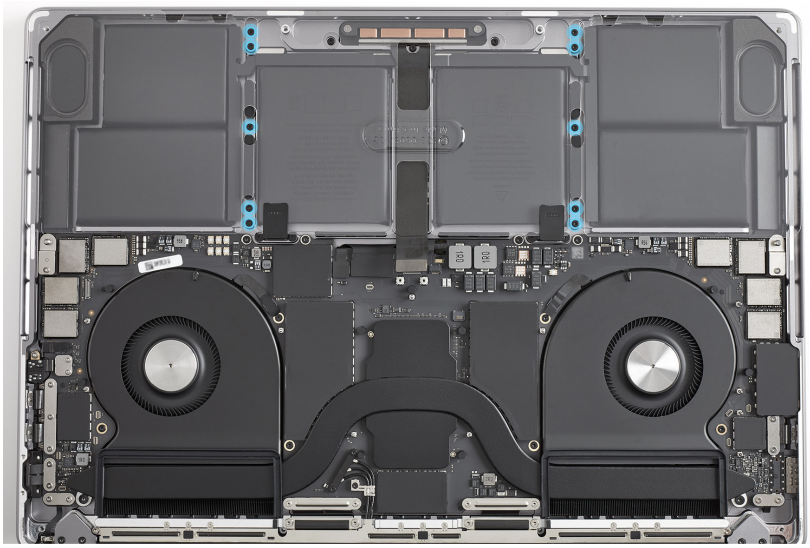
Important

This procedure may require a trackpad shim kit, which only comes with a replacement trackpad. It's not a separate orderable part.

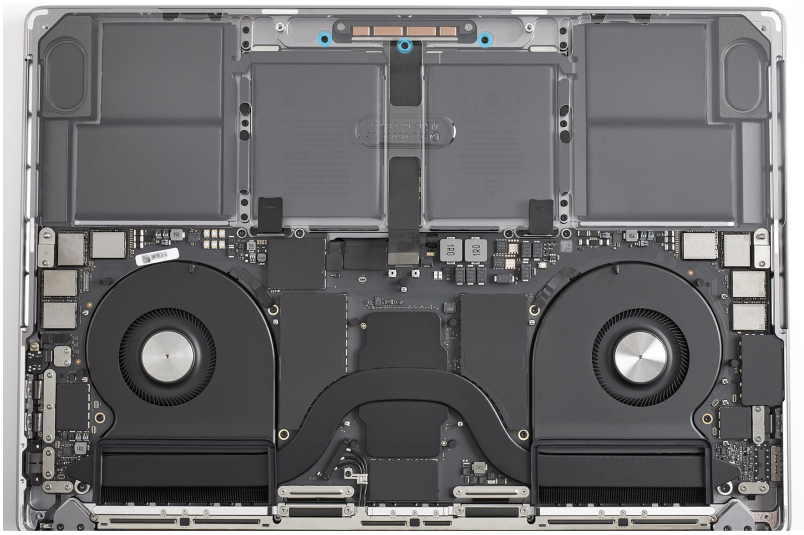
Removal

1. Open the display to a 90-degree angle. Then place the computer on the edge of the table with the display hanging down.

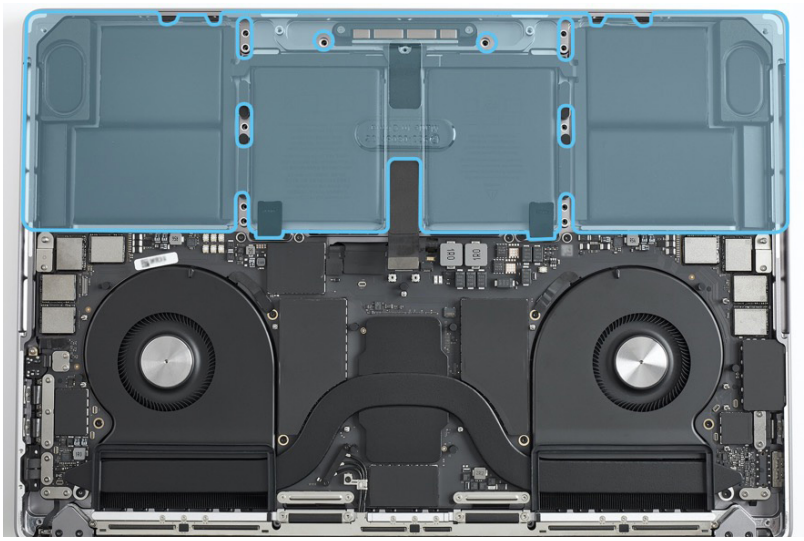
2. Use the T5 screwdriver to remove the ten outer T5 screws (923-06953).



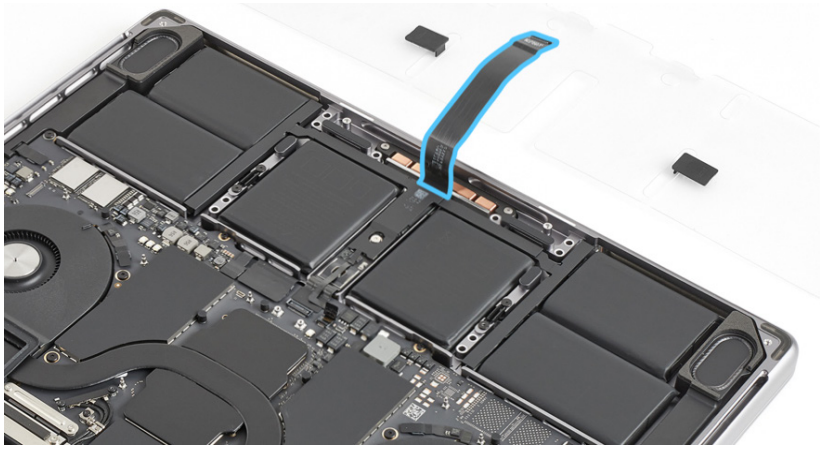
3. Use the T5 screwdriver to remove the three inner T5 screws (923-06954).



4. Hold the battery cover by the edges. Then lift it off the top case.



5. Gently peel the trackpad flex cable off the battery.



6. Lift the computer off the table and allow the trackpad flex cable to pass through the opening in the top case. Leave the trackpad flat on the table to keep the shims in place.

Important

- If the shims fall out, they must be reinstalled in their original locations. If you can't determine the shims' original locations, replace them. A replacement shim kit is available only with a replacement trackpad.
- The replacement shim kit provided may not contain enough round shims to replace all five. Retain the round shims from the removed trackpad for use during reassembly if necessary.

7. Place the computer on the edge of the table with the display hanging down.

8. Place the battery cover on the battery. Then press the black tabs into the clips on the top case until you feel a click.

Important

If you're reinstalling the existing trackpad but the trackpad flex cable is damaged, continue to step 9. If you're reinstalling the existing trackpad and trackpad flex cable or installing a replacement trackpad, skip to reassembly.

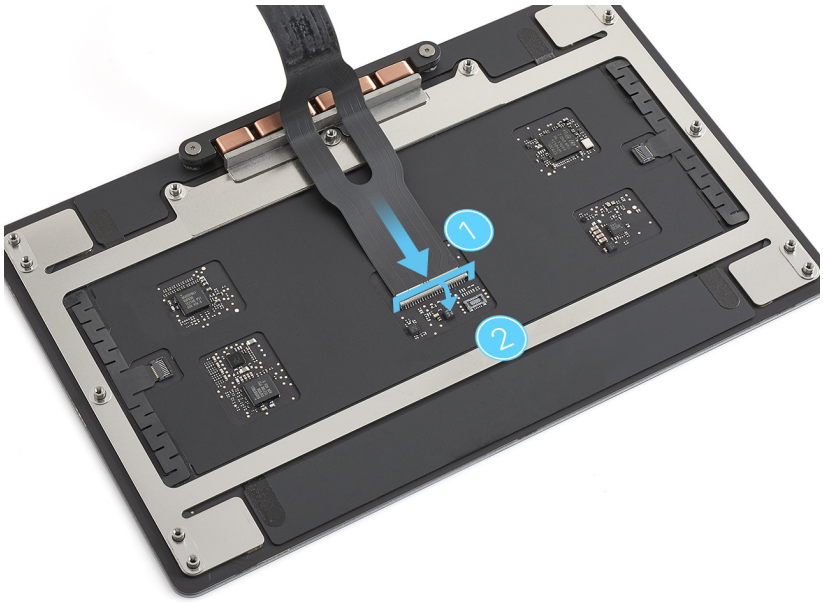
9. Flip up the locking lever on the trackpad flex cable connector (1). Then slide the end of the trackpad flex cable out of the connector (2).

Reassembly

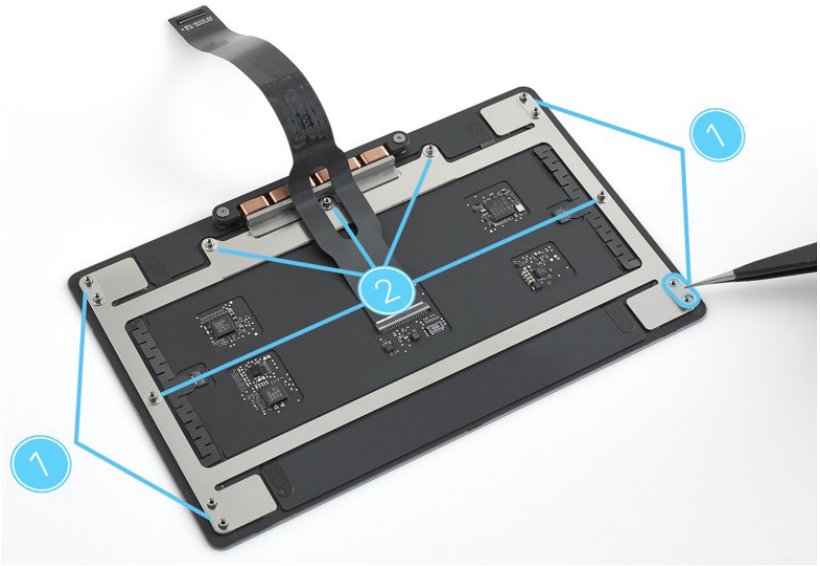
Important

- If you're reinstalling the existing trackpad but replacing the trackpad flex cable, complete step 1.
- If you're installing replacement trackpad shims, complete reassembly step 2. Otherwise, skip to step 3.

1. Slide the end of the replacement trackpad flex cable into the connector on the trackpad (1). Then flip down the locking lever (2).



2. Use ESD-safe tweezers to install replacement trackpad shims. Position four longer shims on the outer screw holes (1). Then position five smaller circular shims on the middle screw holes (2).



Important

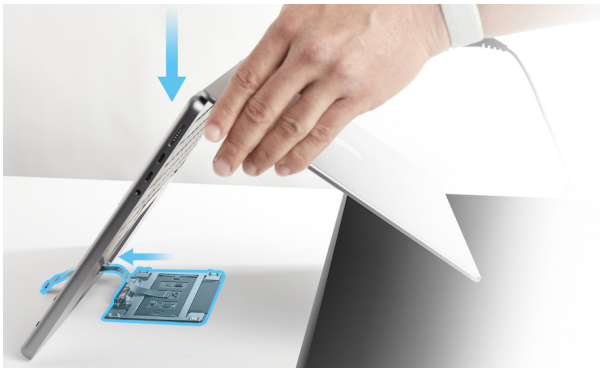
- A replacement trackpad comes with three sizes of shims (0.200 mm, 0.250 mm, and 0.300 mm). Start with the 0.250 mm shim. Use thinner or thicker shims to adjust alignment in step 14.
- If the replacement shim kit does not contain enough round shims to replace all five, reuse the three round center shims from the removed trackpad for this step. If the replacement shim kit contains full quantity, replace all round shims with new shims.

3. Hold the battery cover by the edges and lift it off the top case.

4. Ensure that the trackpad lies flat on the table with the trackpad flex cable extended away from you.

5. Route the trackpad flex cable back through the opening in the top case.

6. Slowly lower the computer over the trackpad and align the screw holes in the top case with the screw holes in the trackpad. Let the display hang over the table edge.



7. Lay the trackpad flex cable flat.

Important

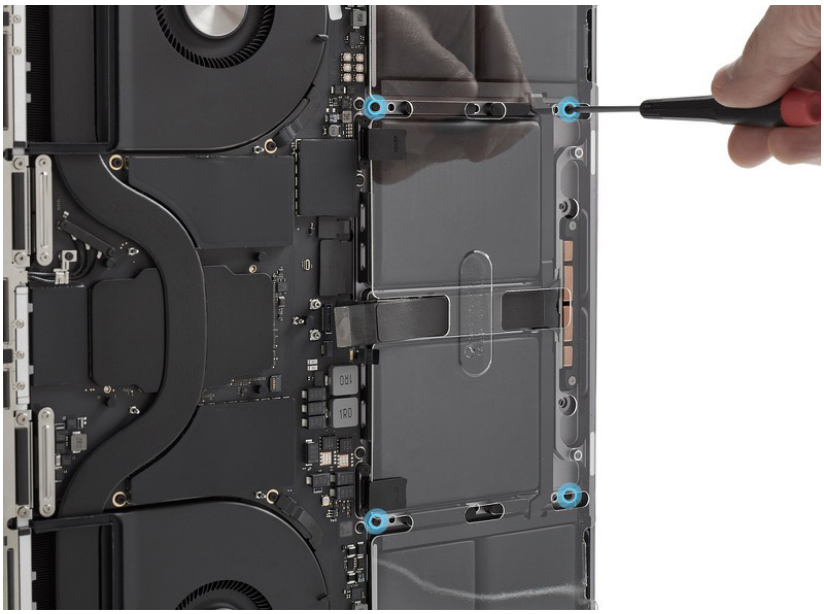
Don't adhere the trackpad flex cable to the battery yet.

8. Place the battery cover on the battery and press the black tabs into the clips on the top case until you feel a click.

9. Use the T5 screwdriver to partially reinstall the four outer T5 screws (923-06953) into the outer screw holes to align the trackpad.

10. Turn over the computer. Insert four gap offsets into the corners of the trackpad. Secure each gap offset with a piece of Kapton tape.

11. Stand the computer on its side with the display still open. Then use the T5 screwdriver to fully reinstall the four outer T5 screws.



12. Place the computer right side up. To verify the top of the trackpad is at the correct height, align one sticky note on the trackpad's top edge. Ensure that the sticky note is flush with the top case.

13. To verify the bottom of the trackpad is at the correct height, align a stack of two sticky notes on the trackpad's bottom edge. Ensure that the two sticky notes are flush with the top case.

14. If the trackpad is at the correct height, continue to step 15. If the trackpad edges are higher or lower than the top case, remove the sticky notes, gap offsets, and Kapton tape. Place the computer on the edge of the table with the display hanging down. Use the T5 screwdriver to remove the four outer side T5 screws and repeat removal steps 2 through 7. Then follow reassembly steps 1 through 13.

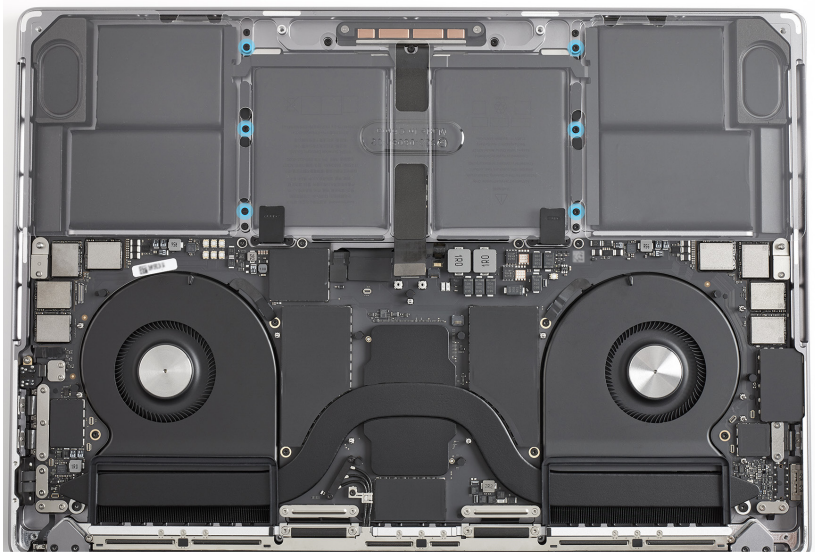
Important

- If the trackpad is higher than the top case, install the thinner 0.200 mm shims.
- If the trackpad is lower than the top case, install the thicker 0.300 mm shims.

15. Place the computer on the edge of the table with the display hanging down.

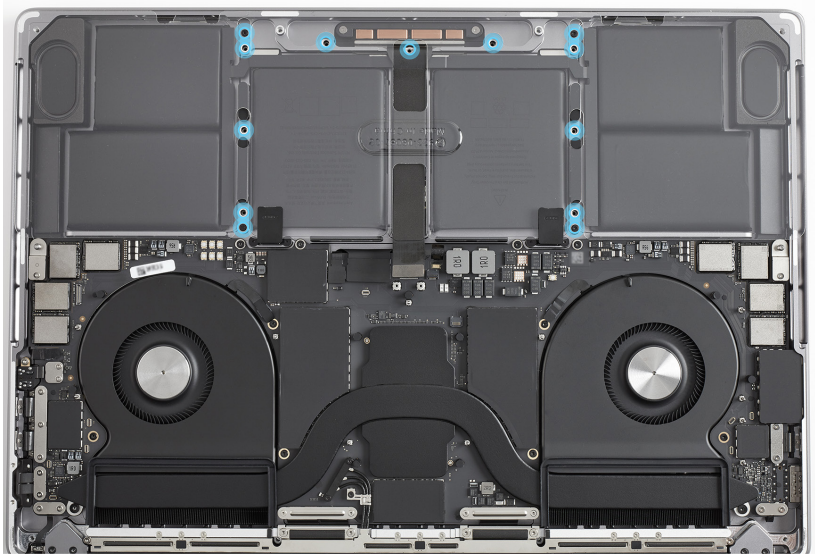
16. Insert the Torx T5 bit into the 10–34 Ncm adjustable torque driver. Set the torque value to 16 Ncm.

17. Use the 10–34 adjustable torque driver and T5 bit to partially reinstall the remaining six outer T5 screws (923-06953).



18. Use the 10–34 adjustable torque driver and T5 bit to partially reinstall the three inner T5 screws (923-06954).

19. Use the 10–34 adjustable torque driver and T5 bit to fully reinstall all 13 screws to 16 Ncm. Turn each screw until the adjustable torque driver clicks.



20. Hold the battery cover by the edges and lift it off the top case.

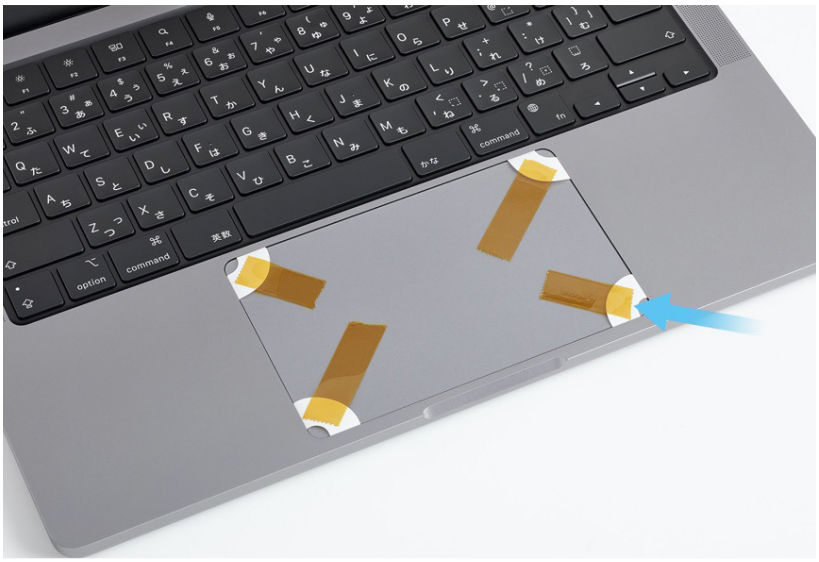
21. Gently press along the trackpad flex cable to adhere it to the battery.

Important

If installing a replacement trackpad flex cable, remove the adhesive backing before adhering the flex cable to the battery.

22. Place the battery cover on the battery and press the black tabs into the clips on the top case until you feel a click.

23. Turn over the computer. Then use the flat end of the black stick to lift the gap offsets and Kapton tape off the trackpad.



Reinstall the following part to complete reassembly:

- Bottom case

Vent/Antenna Module

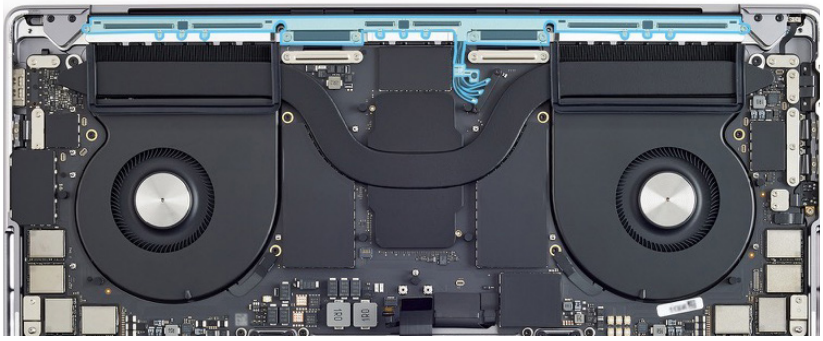
Before You Begin

Warning

Read Battery Safety and follow workspace and battery handling guidelines before you begin.

Remove the following part before you begin:

- Bottom case

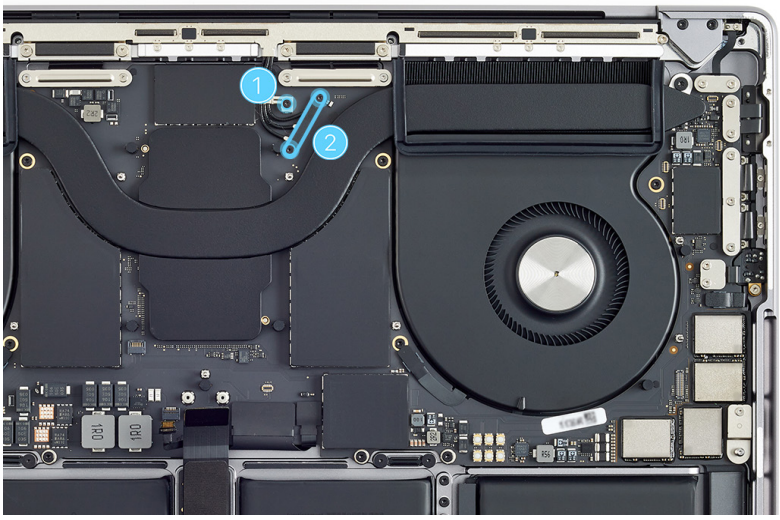


Tools

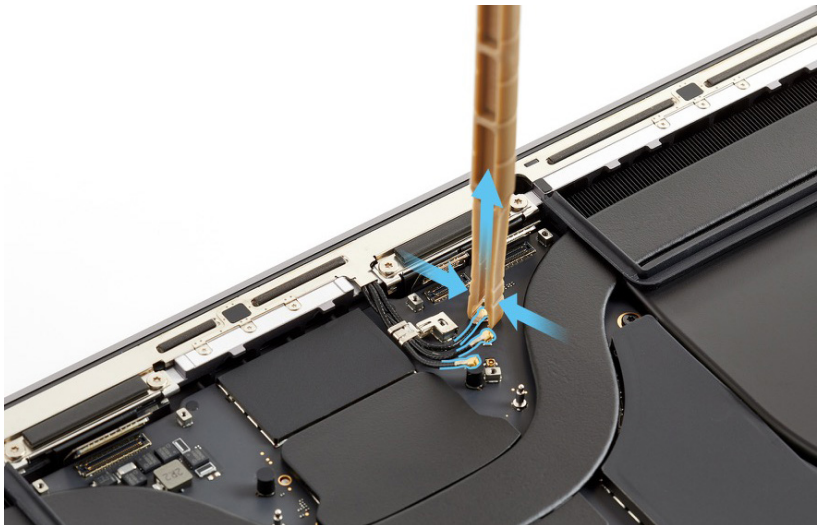
- Antenna tool
- ESD-safe tweezers
- Nylon probe (black stick)
- Torque driver (blue, 0.65 kgf cm)
- Torx security bit
- Torx T3 screwdriver
- Torx T5 screwdriver

Removal

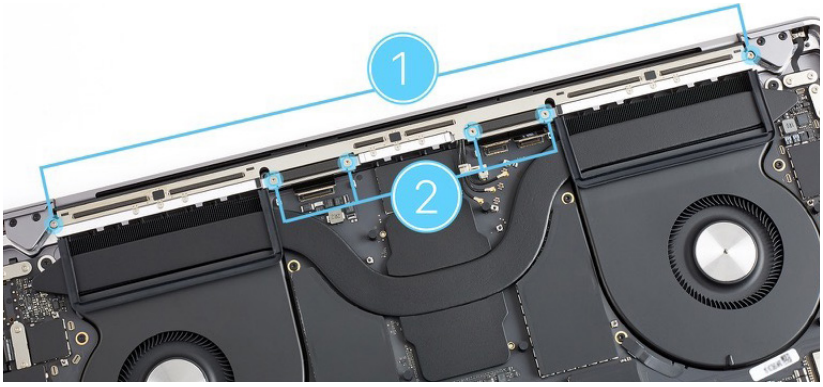
1. Use the T3 screwdriver to remove the T3 screw (923-06851) from the antenna coaxial cable grounding clip (1) and the two T3 screws (923-06851) from the antenna coaxial cable cowling (2). Remove the cowling and save it for reassembly.



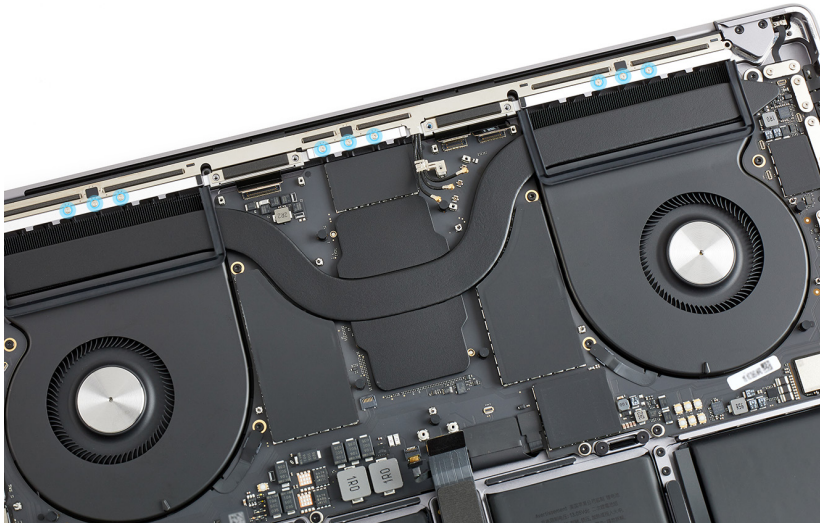
2. Use the antenna tool to lift the end of one antenna coaxial cable off the connector. Then repeat the process for the other two antenna coaxial cables.



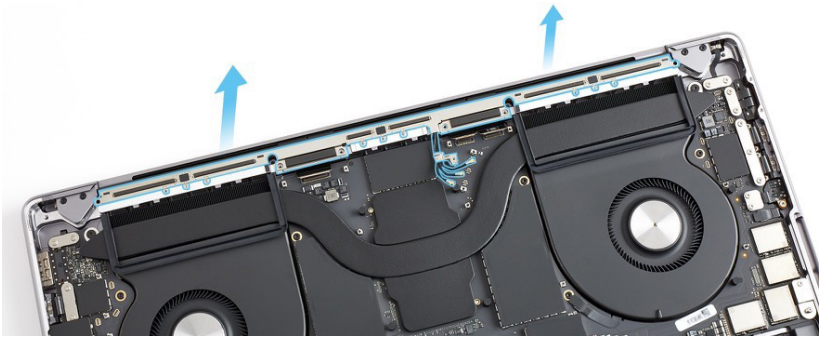
3. Use the T5 screwdriver to remove the two long T5 screws (923-06850) (1) and the four short T5 screws (923-06855) (2) from the vent/antenna module.



4. Use a torque driver and the Torx security bit to remove the nine 1IPR screws (923-06856) from the vent/antenna module.

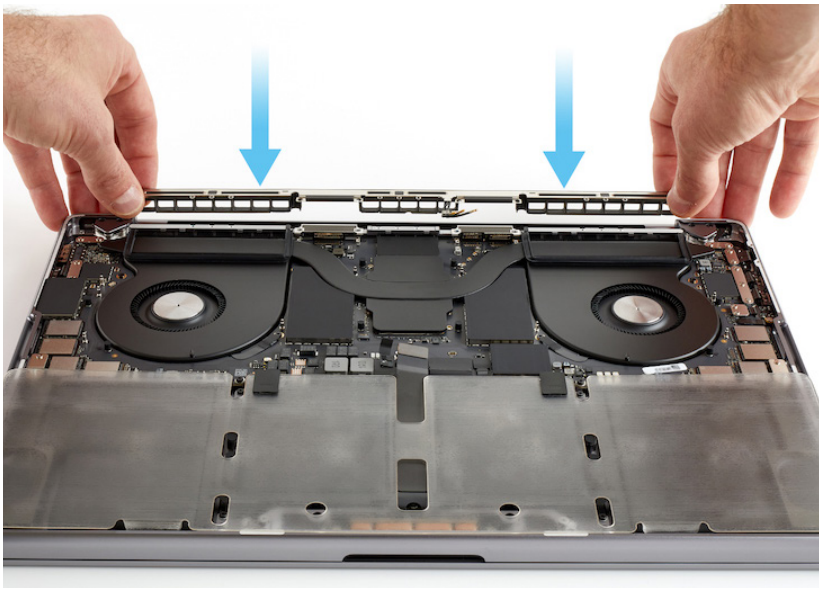


5. Lift the vent/antenna module out of the top case.

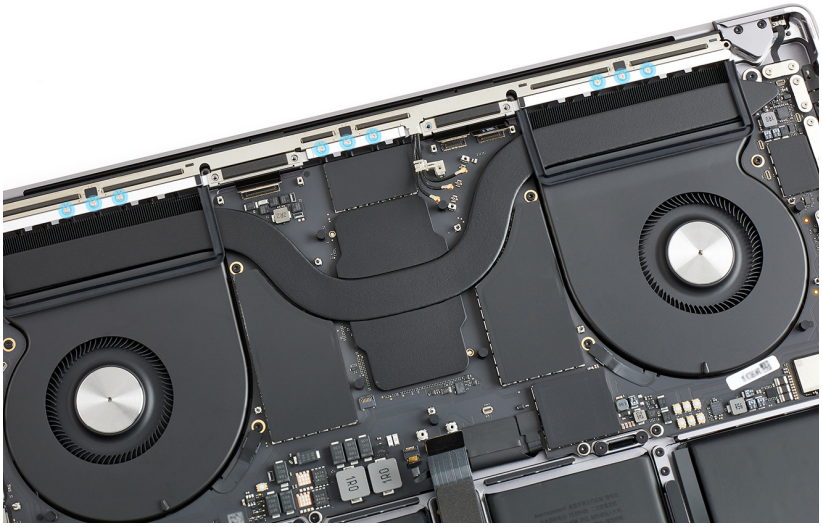


Reassembly

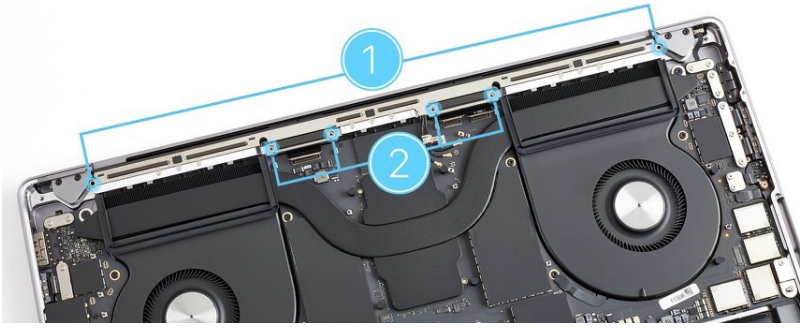
1. Position the vent/antenna module in the top case.



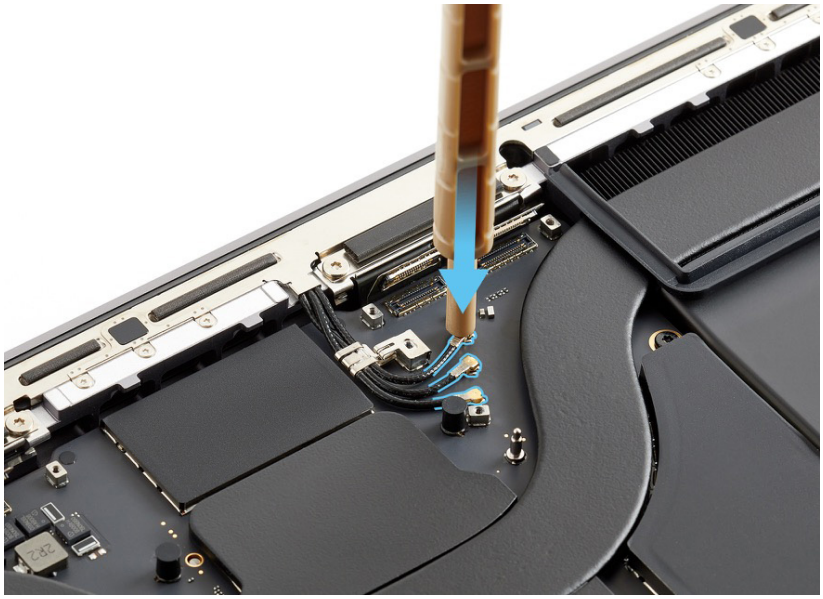
2. Use the blue torque driver and the Torx security bit to reinstall the nine Torx 1IPR screws (923-06856) into the vent/antenna module. Turn each screw until the torque driver clicks.



3. Use the T5 screwdriver to reinstall the two long T5 screws (923-06850) (1) and (923-06855) the four short T5 screws (2) into the vent/antenna module.

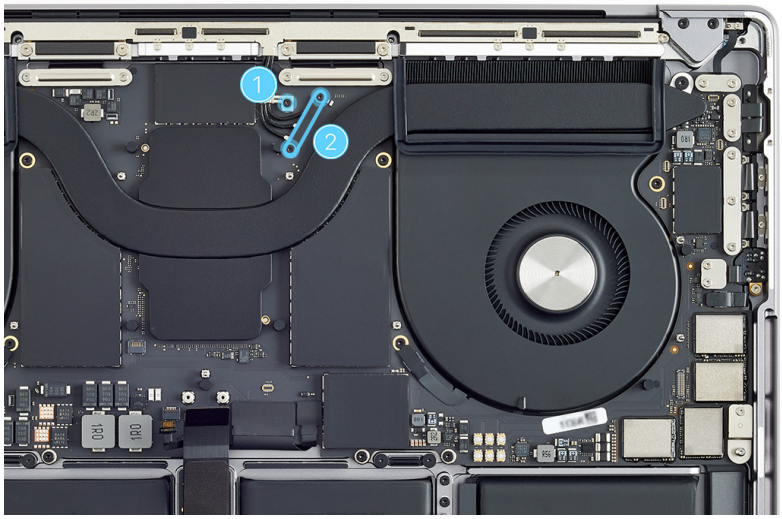


4. Position the ends of the antenna coaxial cables over the three connectors. Then use the blunt end of the antenna tool to press the ends of the antenna coaxial cables to the connectors.



5. Position the antenna coaxial cable cowling over the ends of the cables (2).

6. Use the T3 screwdriver to reinstall the T3 screw (923-06851) into the antenna coaxial cable grounding clip (1) and the two T3 screws (923-06851) into the antenna coaxial cable cowling (2).



Reinstall the following part to complete reassembly:

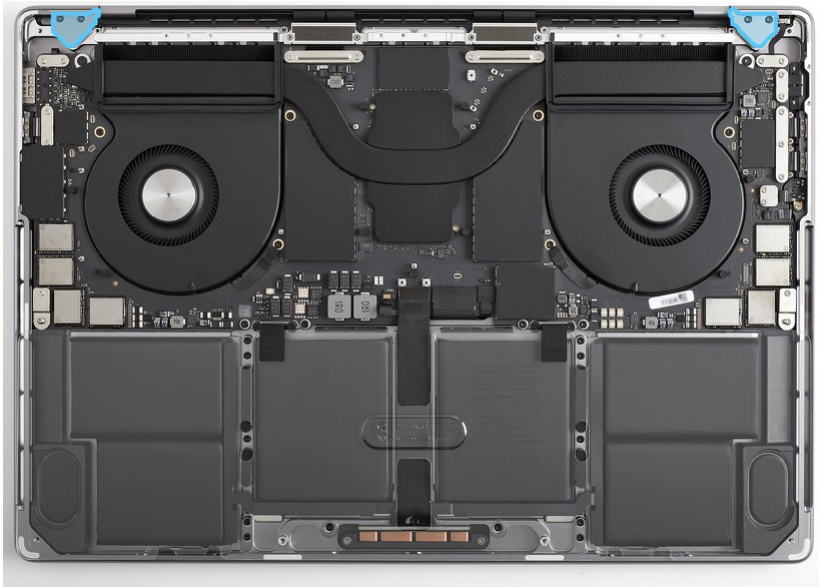
- Bottom case

Display Hinge Covers

Before You Begin

Remove the following parts before you begin:

- Bottom case
- Vent/antenna module

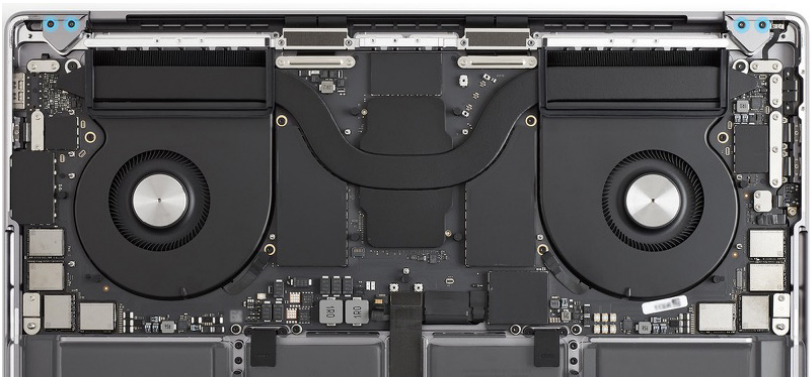


Tools

- ESD-safe tweezers
- Torx T5 screwdriver

Removal

1. Use the T5 screwdriver to remove the two T5 screws (923-06853) from each display hinge cover.



2. Use ESD-safe tweezers to remove the two display hinge covers from the top case.

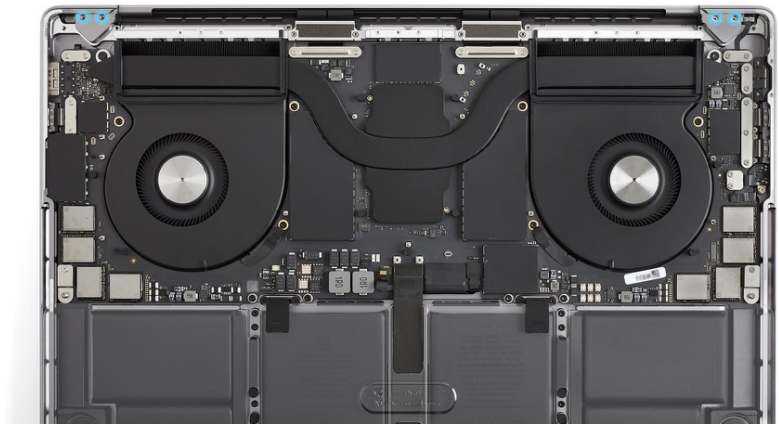
Reassembly

1. Use ESD-safe tweezers to position the two display hinge covers in the top case.

Important

Ensure that the top edge of each display hinge cover sits under the top edge of the top case.

2. Use the T5 screwdriver to reinstall the two T5 screws (923-06853) into each display hinge cover.



Reinstall the following parts to complete reassembly:

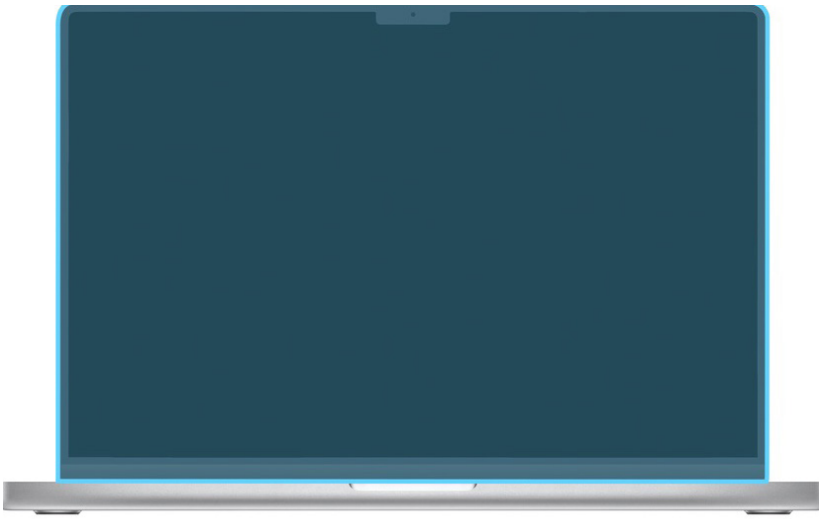
- Vent/antenna module
- Bottom case

Display

Before You Begin

Remove the following parts before you begin:

- Bottom case
- Vent/antenna module
- Display hinge covers
- Lid angle sensor



Tools

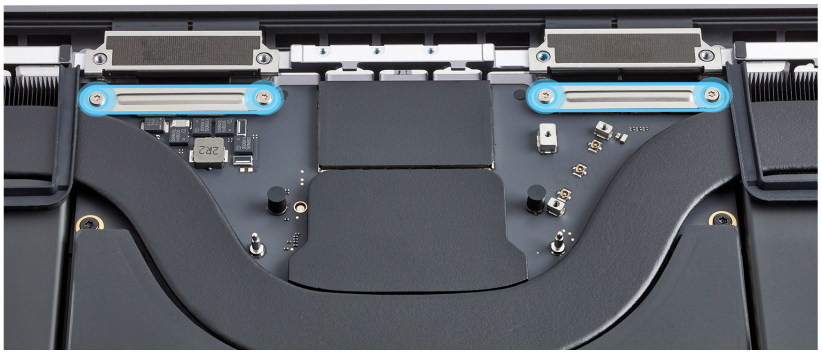
- Nylon probe (black stick)
- Torx T3 screwdriver
- Torx T8 screwdriver

Important

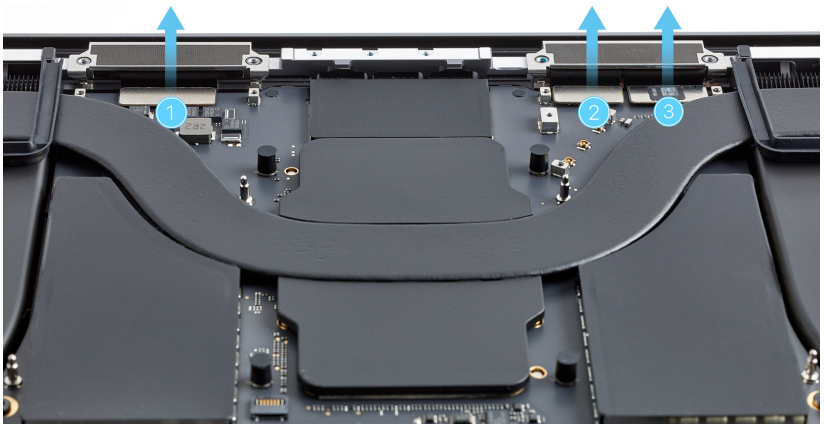
- If you're installing a replacement display, begin at step 1. Ensure that you remove all protective liners and tape from the replacement display.
- If you're reinstalling the existing display, skip to reassembly step 2.

Removal

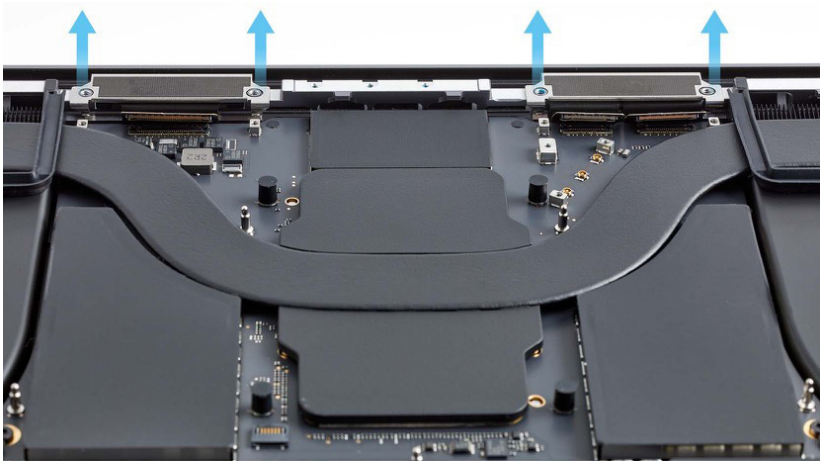
1. Use the T3 screwdriver to remove the four T3 screws (923-06854) from the two display connector cowlings. Remove the cowlings and same them for reassembly.



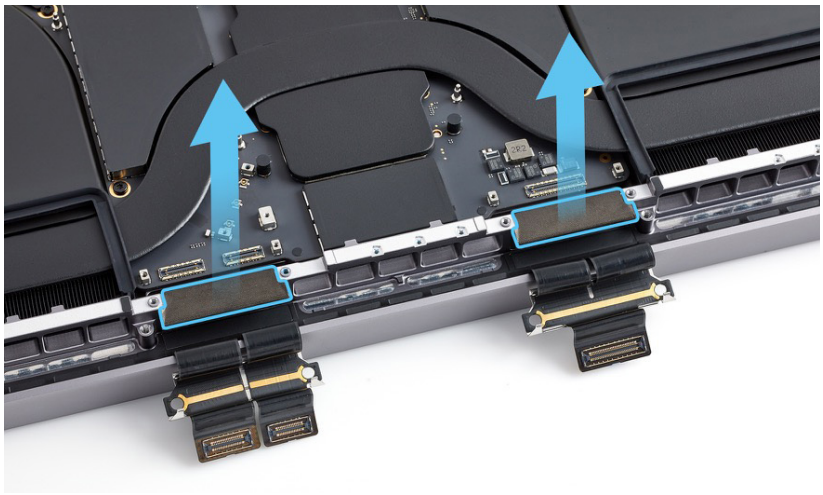
2. Lift the ends of the display backlight power flex cable (1), FaceTime HD camera flex cable (2), and eDP flex cable (3) off the connectors on the logic board.



3. Lift the display cable clips off the internal frame of the top case. Gently fold them back over the edge of the top case to reveal the display cable bumpers underneath.



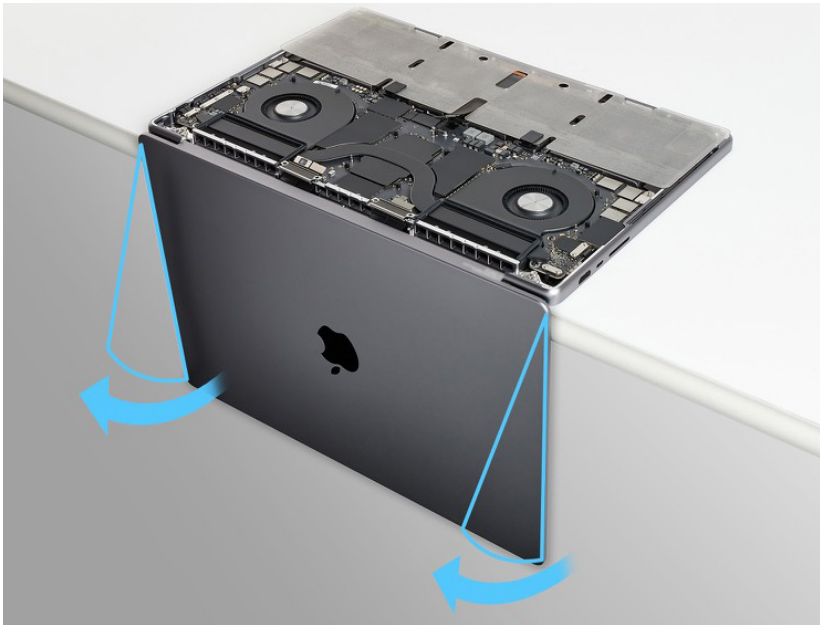
4. Lift the display cable bumpers out of the internal frame and save them for reassembly.



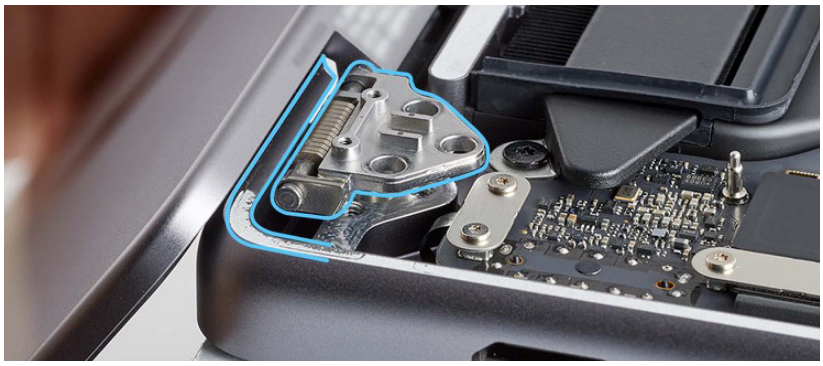
5. Open the computer and place it facedown on a clean surface with the display hanging down over the edge of the table.

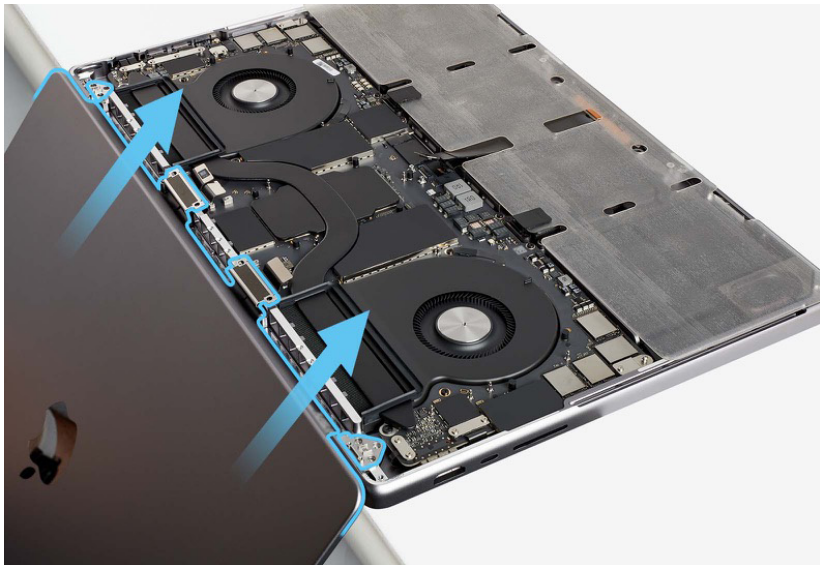
6. Use the T8 screwdriver to remove the six T8 screws (923-06862) (1–6) from the display hinges in the order shown.

7. Pull the display toward you about 30 degrees.



8. Lift the display and ensure that the hinges clear the edge of the top case.





9. Remove the display from the top case.

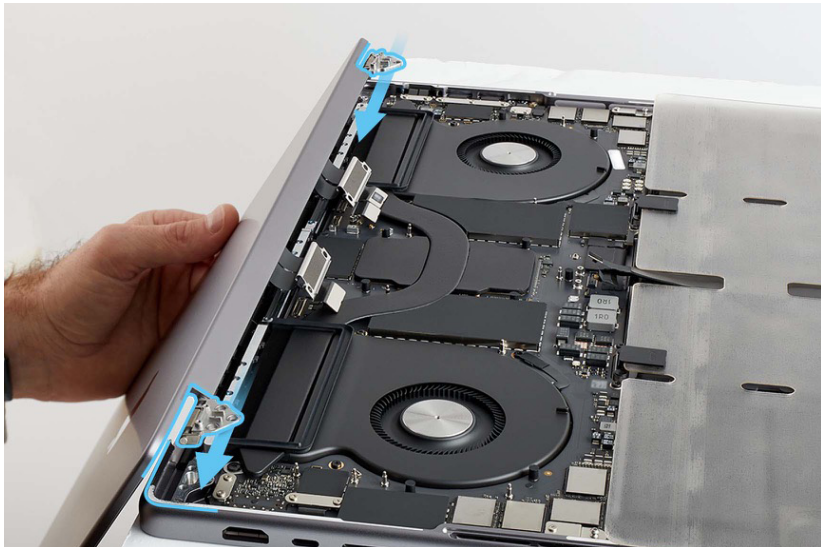
Reassembly

Important

- If you're installing a replacement display, begin at step 1. Ensure that you remove all protective liners and tape from a replacement display.
- If you're reinstalling the existing display, skip to reassembly step 2.

1. Remove the existing lid angle sensor and install a replacement lid angle sensor.

2. Position the display in the top case. Ensure that the hinges slide under the edge of the top case.



3. Ensure the display backlight power flex cable, FaceTime HD camera flex cable, and eDP flex cable are inside the top case.

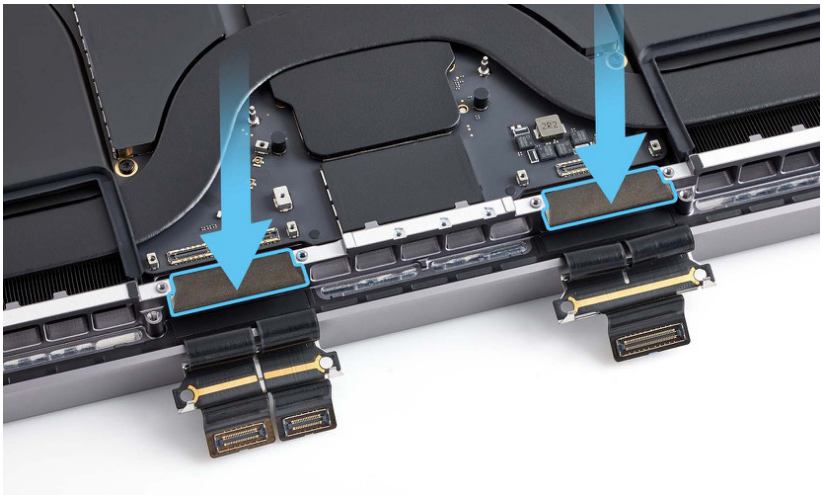
4. Use the T8 screwdriver to partially reinstall the six T8 screws (923-06862) (1–6) into the display hinges in the order shown.

5. Close the display and stand the computer on its edge. Adjust the display until it's flush with the top case.

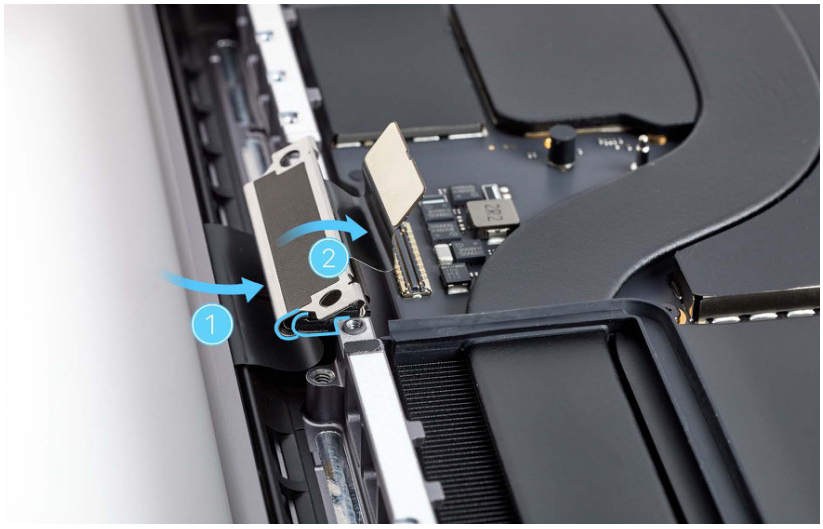
6. Place the computer facedown with the rear edge closest to you.

7. Use the T8 screwdriver to fully reinstall the six T8 screws into the display hinges.

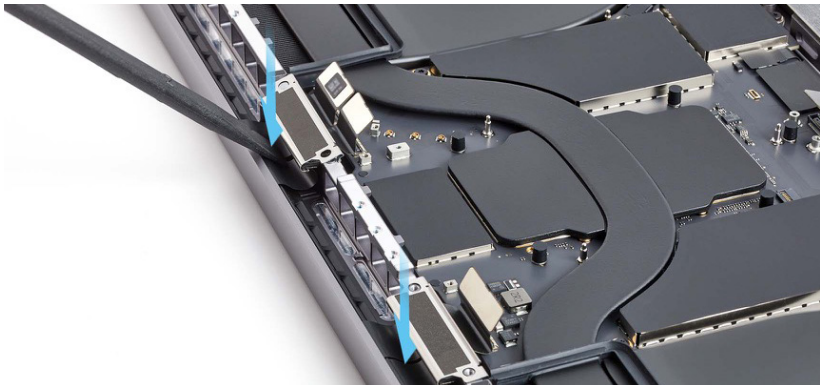
8. Position the display cable bumpers in the internal frame in the top case.



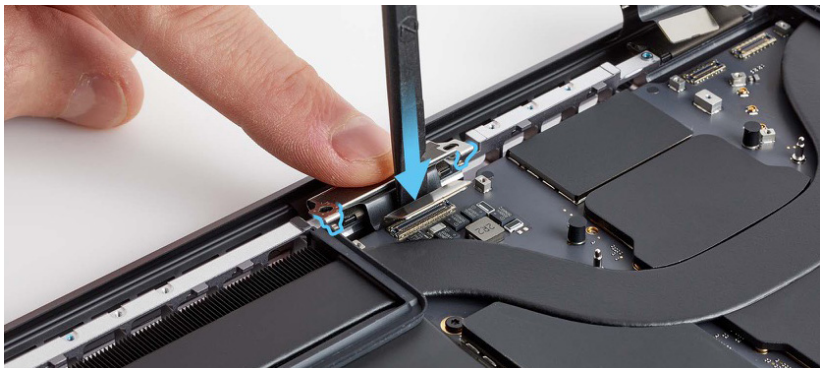
9. Align the display flex cables around the edge of the bumpers (1). Then press the display flex cable clips down over the bumpers and onto the internal frame (2).

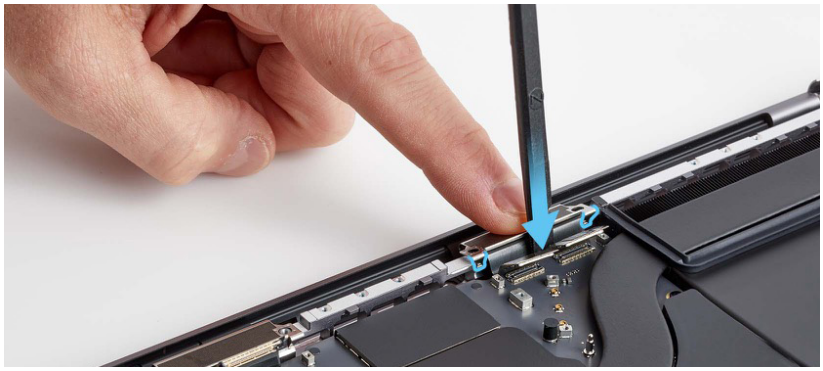


10. Use the flat end of the black stick to tuck the display cables into the gap between the display and internal frame.

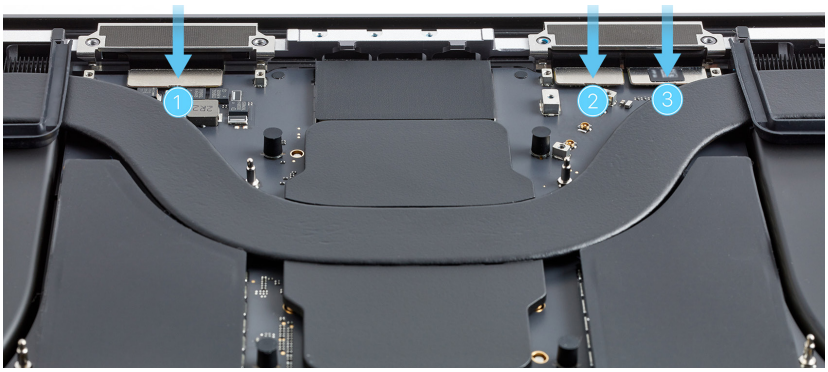


11. Use the flat end of the black stick to tuck each display flex cable into the gap between the logic board and internal frame. Ensure that the display flex cable clips are fully clipped onto the internal frame.

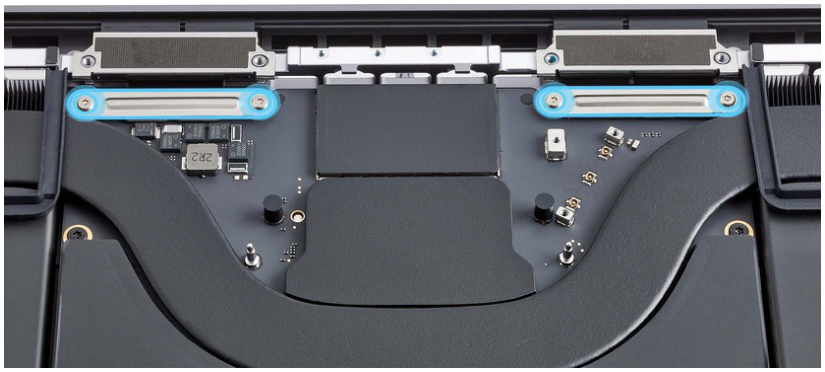




12. Press the ends of the display backlight power flex cable (1), FaceTime HD camera flex cable (2), and eDP flex cable (3) to their connectors on the logic board.



13. Position the two display connector cowlings over the display backlight power flex cable, FaceTime HD camera flex cable, and eDP flex cable connectors. Then use the T3 screwdriver to reinstall the two T3 screws (923-06854) into each of the cowlings.



Reinstall the following parts to complete reassembly:

- Lid angle sensor
- Display hinge covers
- Vent/antenna module
- Bottom case

Important

- After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.
- Close the display when prompted while you run System Configuration. If the display isn't fully closed during the process, you'll need to replace the lid angle sensor. Ensure that you follow all System Configuration steps to complete the repair.

Logic Board

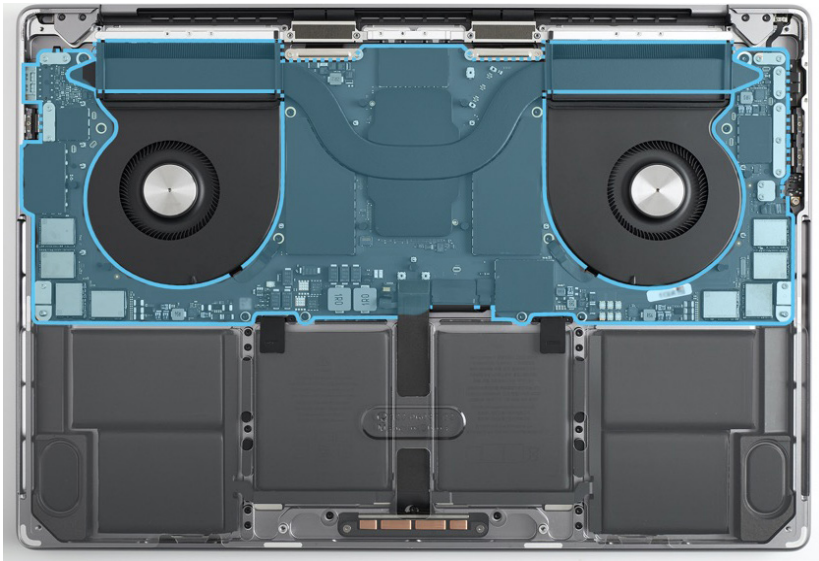
Before You Begin

Warning

Read Battery Safety and follow workspace and battery handling guidelines before you begin.

Remove the following parts before you begin:

- Bottom case
- Vent/antenna module



Tools

- #00 Phillips screwdriver
- 4 mm hex nut driver
- ESD-safe tweezers
- Kapton tape
- Nylon probe (black stick)
- Torx T3 screwdriver
- Torx T5 screwdriver
- Torx T6 screwdriver

Important

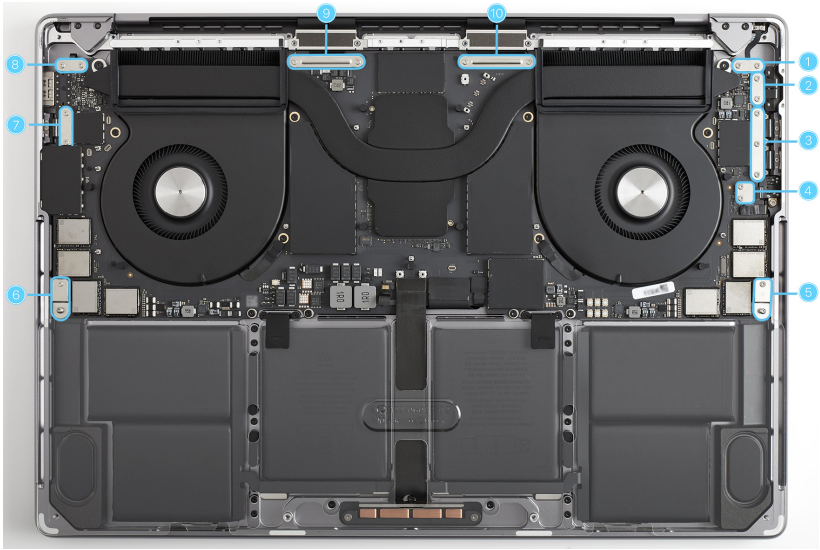
- This procedure requires System Configuration. After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.
- If you're installing a replacement logic board, you must also install a replacement Touch ID board.

Note: Your logic board and heat sink may look slightly different, but the instructions are the same.

Removal

1. Use the T3 screwdriver to remove the 21 T3 screws from the following 10 cowlings:

    - Two T3 screws from the lid angle sensor connector cowling (923-06854) (1)
    - Two T3 screws from the MagSafe 3 connector cowling (923-06854) (2)
    - Three T3 screws from the left USB-C boards connector cowling (923-06854) (3)
    - Two T3 screws from the audio board connector cowling (923-06854) (4)
    - Two T3 screws from the left speaker connector cowling (923-06864, 923-06865) (5)
    - Two T3 screws from the right speaker connector cowling (923- 06864, 923-06865) (6)
    - Two T3 screws from the right USB-C board connector cowling (923-06854) (7)
    - Two T3 screws from the Touch ID board connector cowling (923-06854) (8)
    - Two T3 screws from the display connector cowling (923-06854) (9)
    - Two T3 screws from the display connector cowling (923-06854) (10)



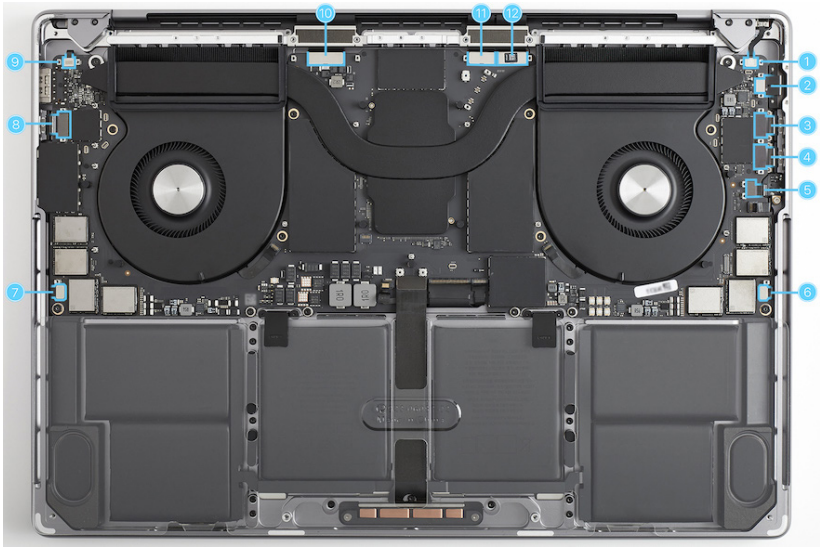
2. Remove the 10 cowlings and save them for reassembly.

Important

- The left and right speaker connector cowlings have a deeper bend where the screw hole is closest to the battery cover. Note the orientation of the cowlings for reassembly.
- The left speaker connector cowling has a circular etching in the middle.

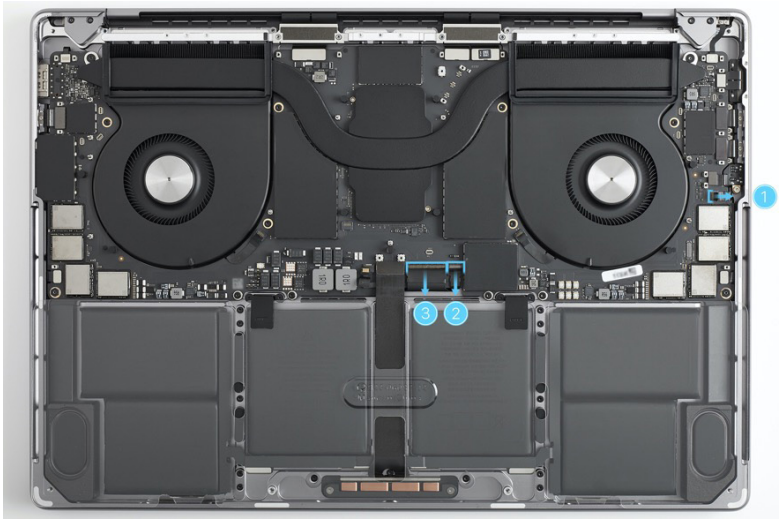
3. Lift the ends of the following 12 flex cables (1–12) off the connectors on the logic board:
   - Lid angle sensor flex cable (1)
   - MagSafe 3 flex cable (2)
   - Left USB-C boards flex cables (3 and 4)
   - Audio board flex cable (5)
   - Left speaker flex cable (6)
   - Right speaker flex cable (7)
   - Right USB-C board flex cable (8)
   - Touch ID board flex cable (9)
   - Display backlight flex cable (10)
   - FaceTime HD camera flex cable (11)
   - eDP flex cable (12)

   Note: The image orientation for steps 8 and 9 differs from the other removal steps, but the instructions are the same. You don't need to rotate the device for these steps.

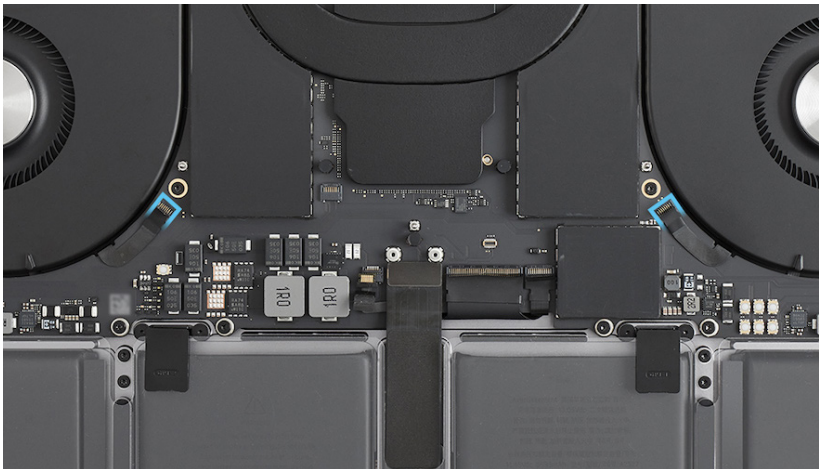


4. Peel back the polyester film tabs from the locking levers of the microphones (1), keyboard backlight (2), and keyboard (3) flex cables.

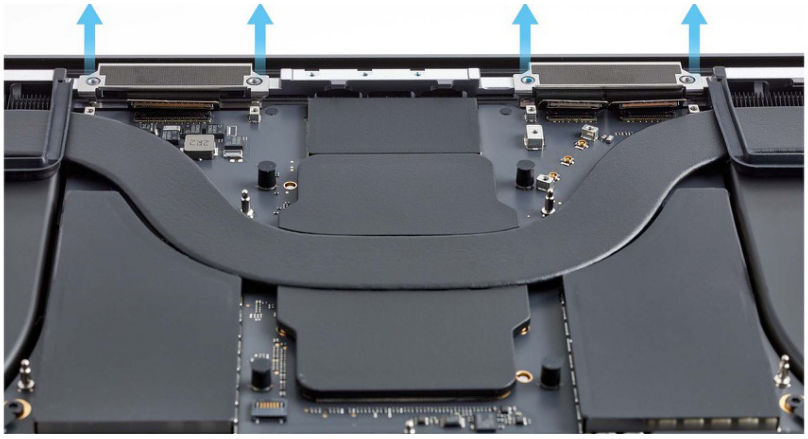
5. Use the black stick to flip up the three locking levers (1–3). Then slide the ends of the three flex cables from their connectors.



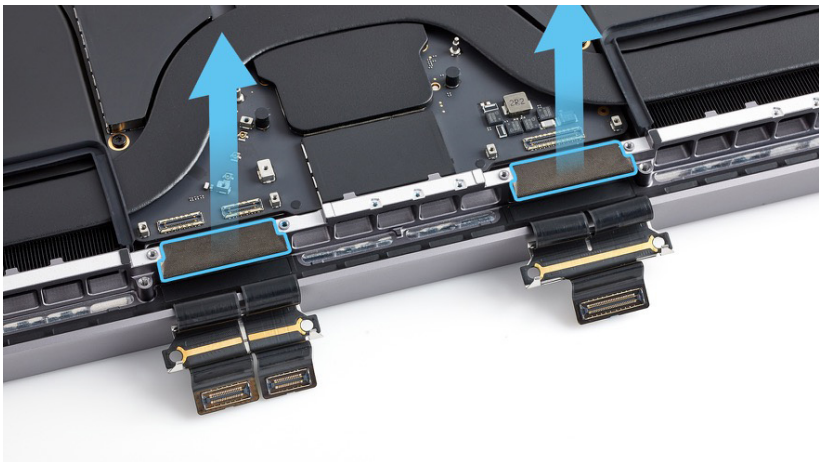
6. Peel back the polyester film tabs from the locking levers of the two fan flex cables. Then use the black stick to flip up the two locking levers.



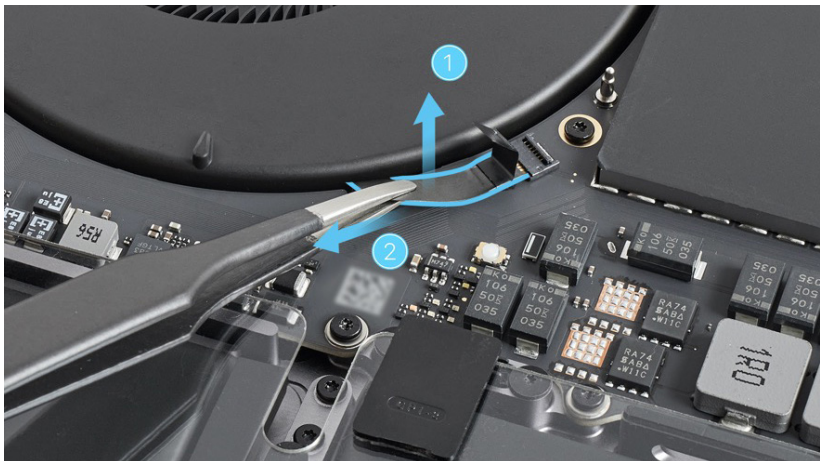
7. Lift the display flex cable clips off the internal frame of the top case. Gently fold them back to reveal the display cable bumpers underneath.



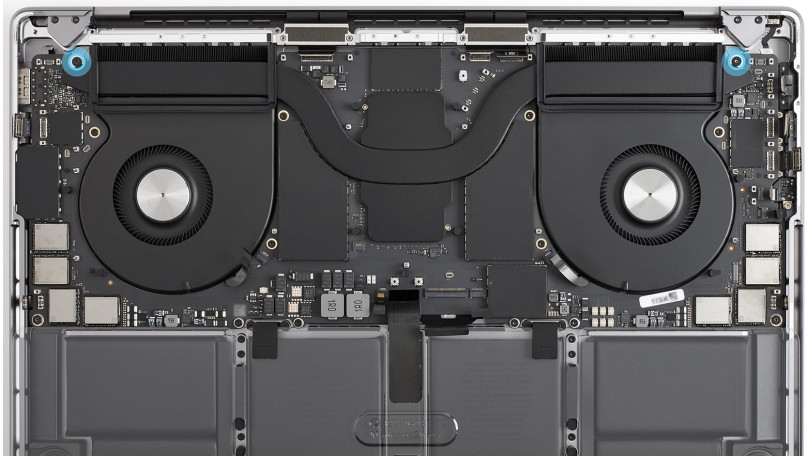
8. Lift the display cable bumpers out of the internal frame and save them for reassembly.



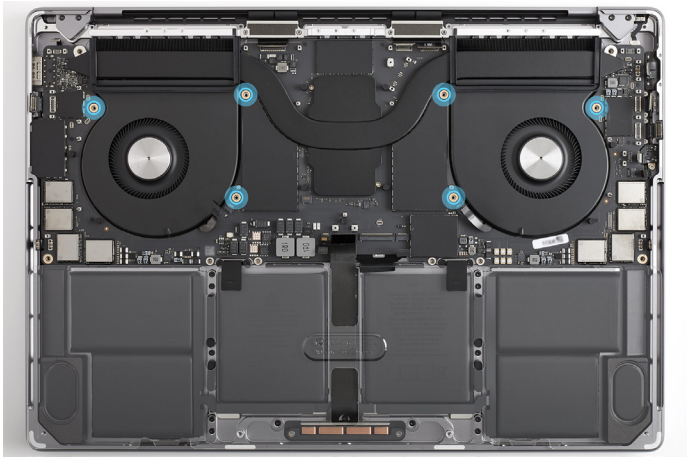
9. Use ESD-safe tweezers to peel one fan flex cable from the logic board (1). Then slide the fan flex cable out of the connector (2). Repeat the process for the other fan flex cable.



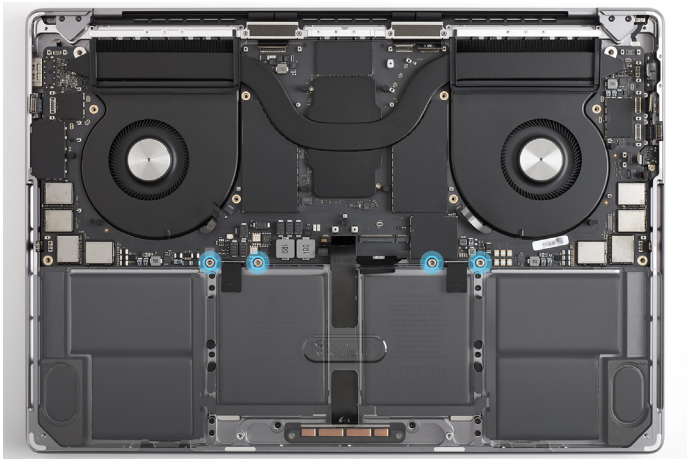
10. Use the T6 screwdriver to remove the two T6 screws (923-06858) from the upper corners.



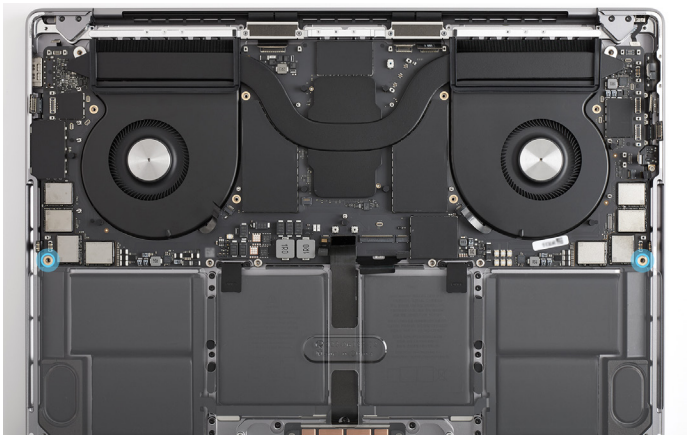
11. Use the T5 screwdriver to remove the six long T5 screws (923-06859).



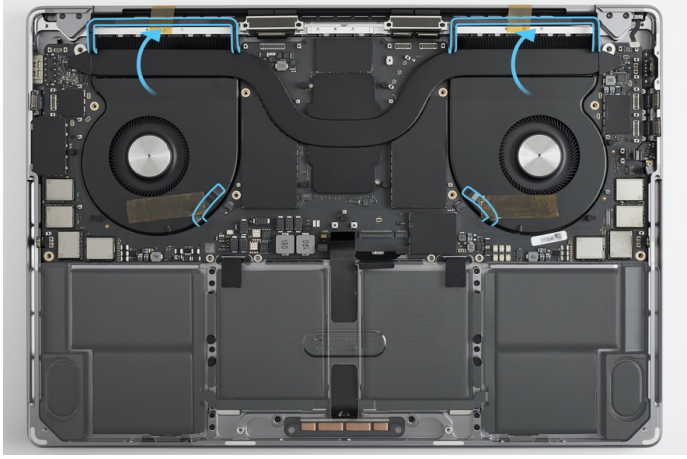
12. Use the T5 screwdriver to remove the four short T5 screws (923-06861).



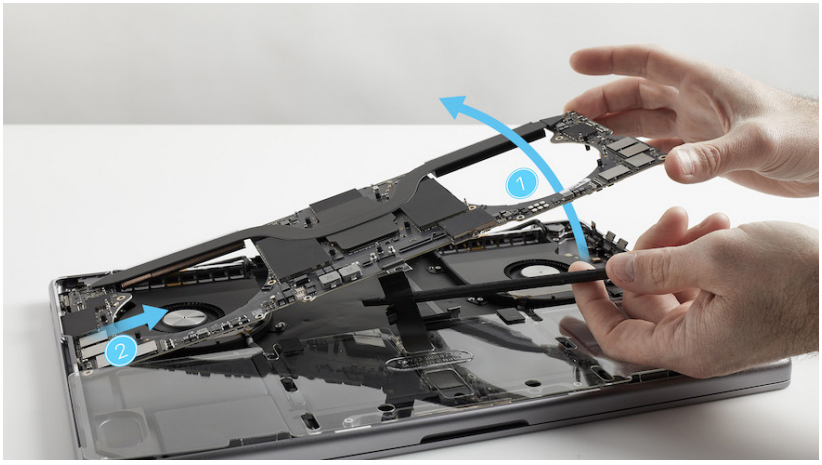
13. Use the 4 mm hex nut driver to remove the two 4 mm hex nut screws (923-06857) from the lower corners.



14. Fold back the thermal duct gaskets and fan flex cables. Use Kapton tape to hold them back as shown.



15. Gently lift the logic board as shown (1), then slide the logic board out of the top case (2). Use the black stick to fold back the trackpad and BMU flex cables as you remove the logic board.



Important

Do not remove the heat sink from the logic board. A replacement logic board comes with the heat sink installed.

Reassembly

Important

If you are installing the existing logic board, skip to reassembly step 15. If you are installing a replacement logic board, continue to reassembly step 1.

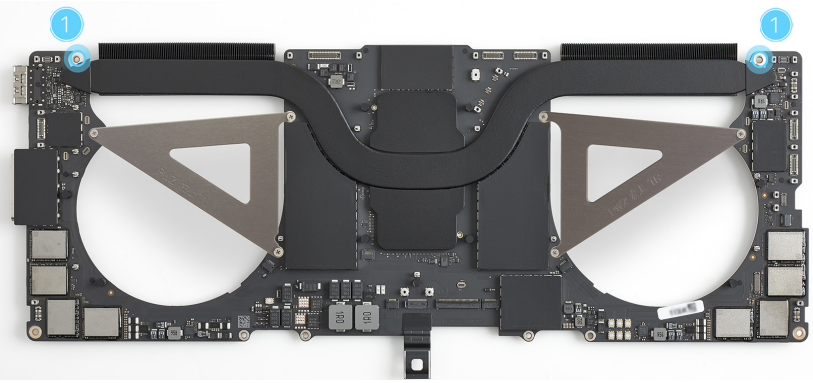
Caution

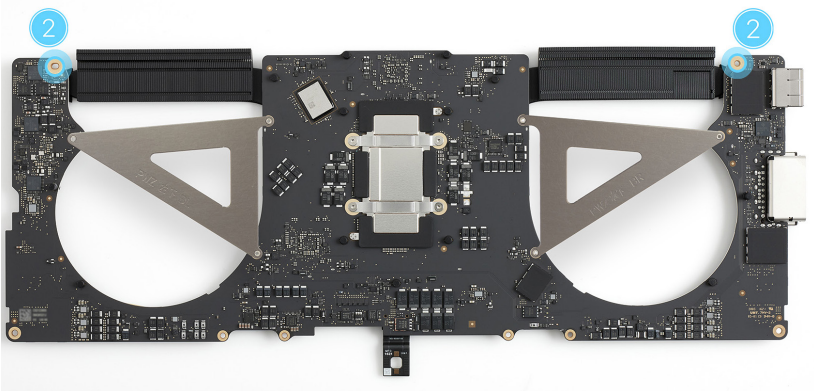
If you are installing a replacement logic board, the heat sink packaging screws and stiffeners must be transferred to the existing logic board before returning to Apple Service or the logic board may be damaged during shipping.

1. Remove the existing Touch ID board and install a replacement Touch ID board.

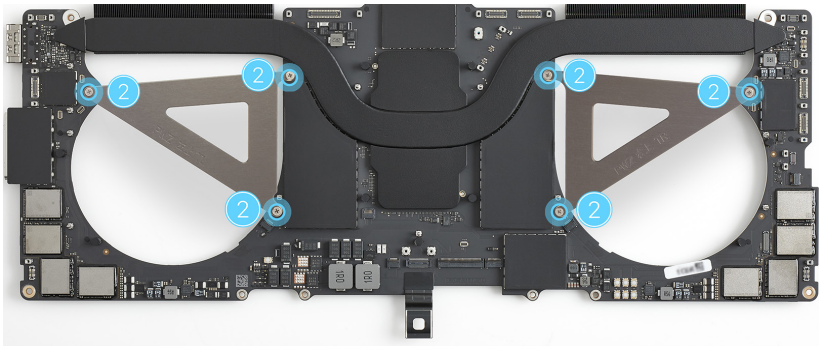
2. Use the #00 Phillips screwdriver to remove the two #00 Phillips screws (1) from the heat sink on the replacement logic board.

   Note: The two #00 Phillips screws are secured by two removable hex nuts (2) on the bottom of the logic board.





3. Use the #00 Phillips screwdriver to fully loosen the six captive #00 Phillips screws (2) from the top stiffeners on the replacement logic board. Lift the top stiffeners off the replacement logic board and set them aside.



Note: The top stiffeners are marked with the following:

- TL - Top left
- TR - Top right

Note: The bottom stiffeners are marked with the following:

- BL - Bottom left
- BR - Bottom right

4. Lift the replacement logic board off the bottom stiffeners and set it aside.

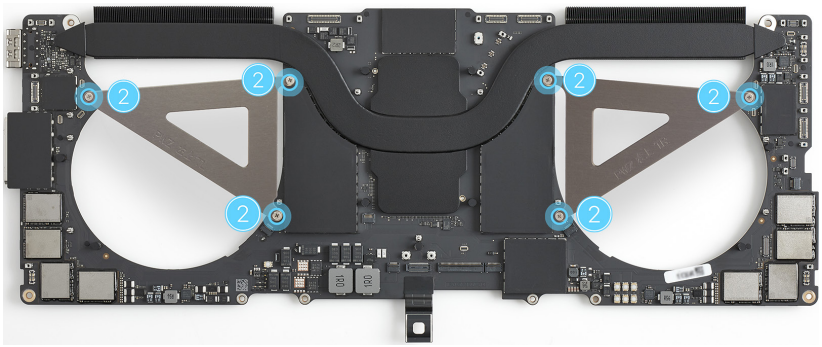
5. Position the existing logic board over the bottom stiffeners. Align the screw holes in the existing logic board with the screw holes in the bottom stiffeners.

6. Position the top stiffeners on the existing logic board. Align the screw holes in the top stiffeners with the screw holes in the existing logic board.

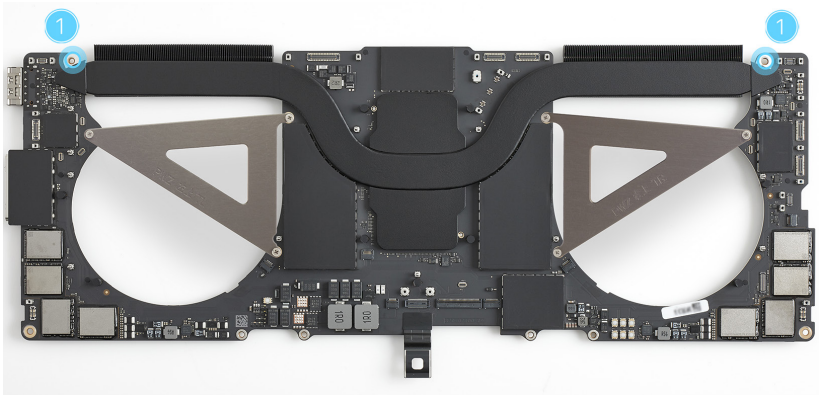
Important

The captive screws in the top stiffeners install through the screw holes of the logic board and into the screw holes in the bottom stiffeners.

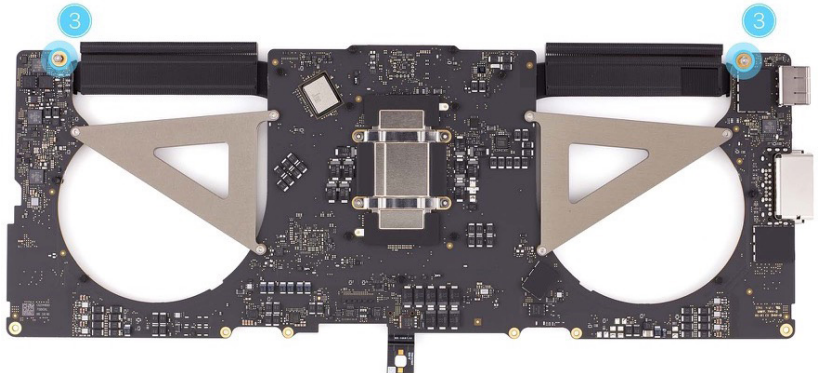
7. Use the #00 Phillips screwdriver to fully reinstall the six captive #00 Phillips screws (2) in the stiffeners.



8. Insert one #00 Phillips screw through the screw hole in the heat sink and logic board (1).

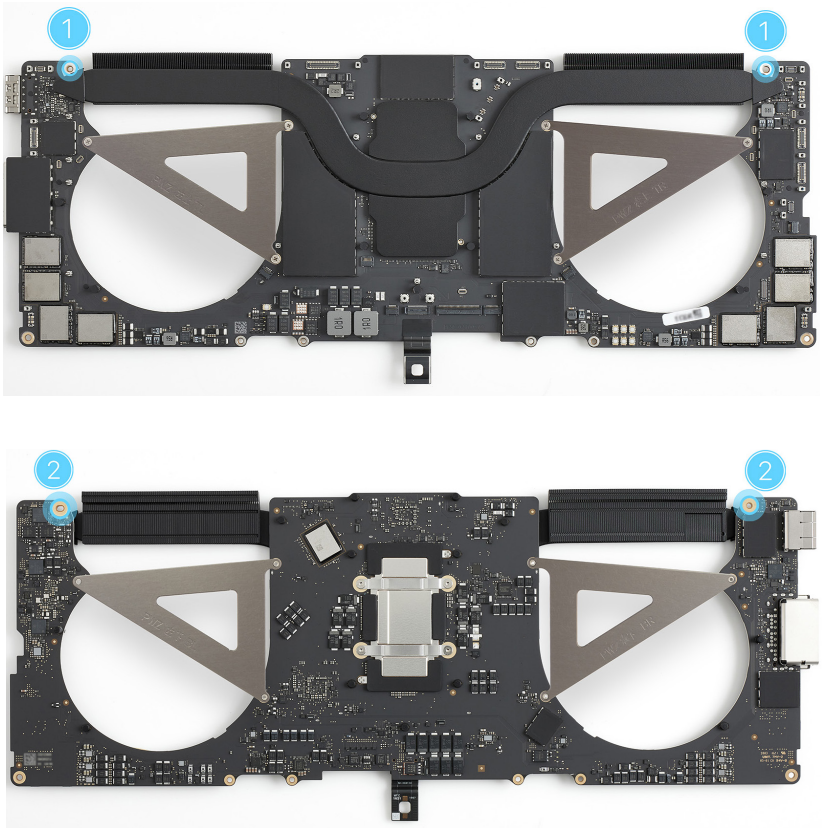


9. Hold the hex nut in place and turn over the logic board. Partially install the hex nut (3) over the end of the #00 Phillips screw. Then hold the hex nut in place and turn over the logic board.



10. Use the #00 Phillips screwdriver to fully reinstall the #00 Phillips screw.

11. Repeat steps 8 through 10 to install the other #00 Phillips screw (1) and hex nut (2). Then continue to step 12.

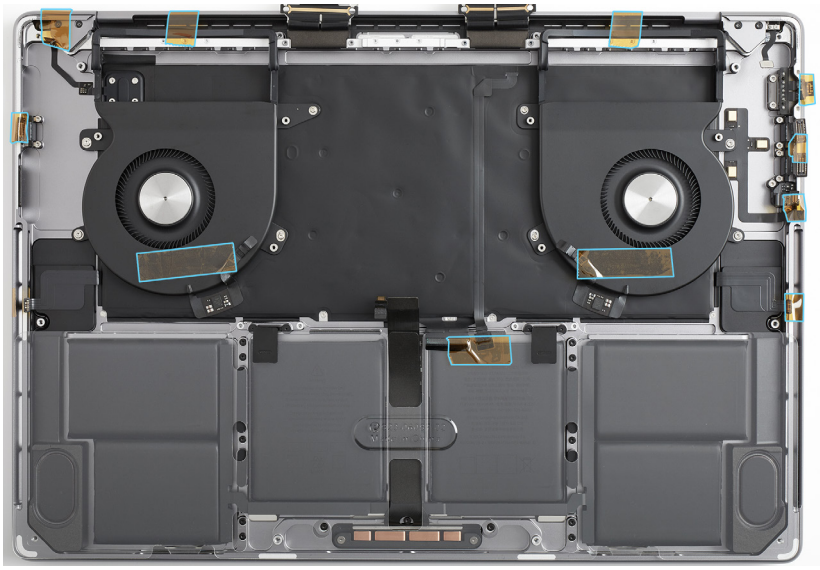


12. Place the existing logic board inside the reused ESD-safe packaging.

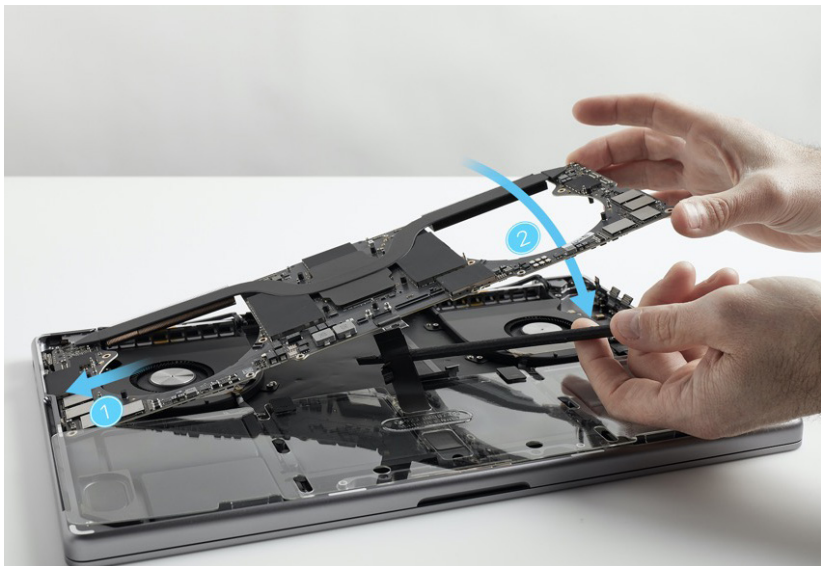
13. Position the packaged board in the foam frame.

14. Close and seal the box. Ship the box to Apple Service.

15. Fold back the thermal duct covers and flex cables and secure them to the top case with Kapton tape as shown.



16. Hold the logic board by the edges. Lower one edge of the logic board into the top case as shown (1). Then lower the other edge of the logic board into the top case (2). Move any loose cables out of the way as you install the logic board.

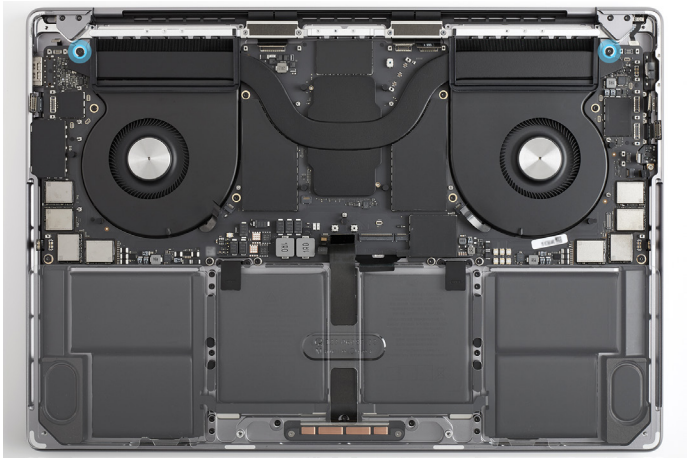


Caution

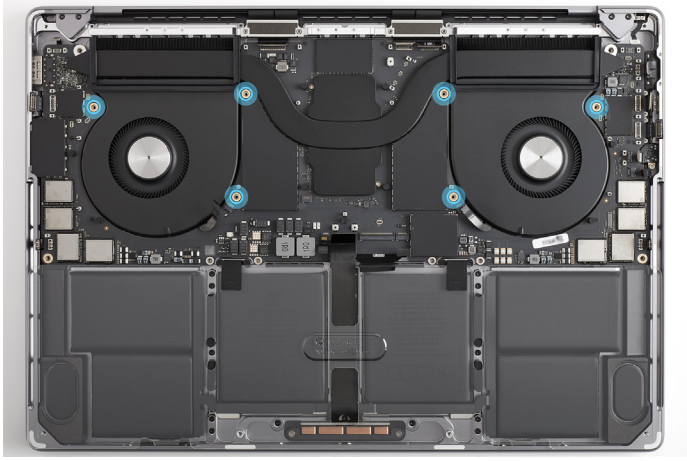
Ensure that no cables are caught under the logic board.

17. Carefully remove the Kapton tape from the thermal duct gaskets and flex cables.

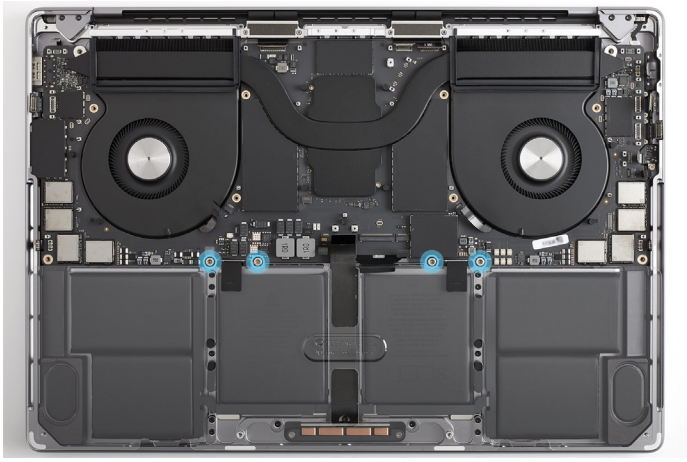
18. Use the T6 screwdriver to partially reinstall the two T6 screws (923-06858) into the upper corners.



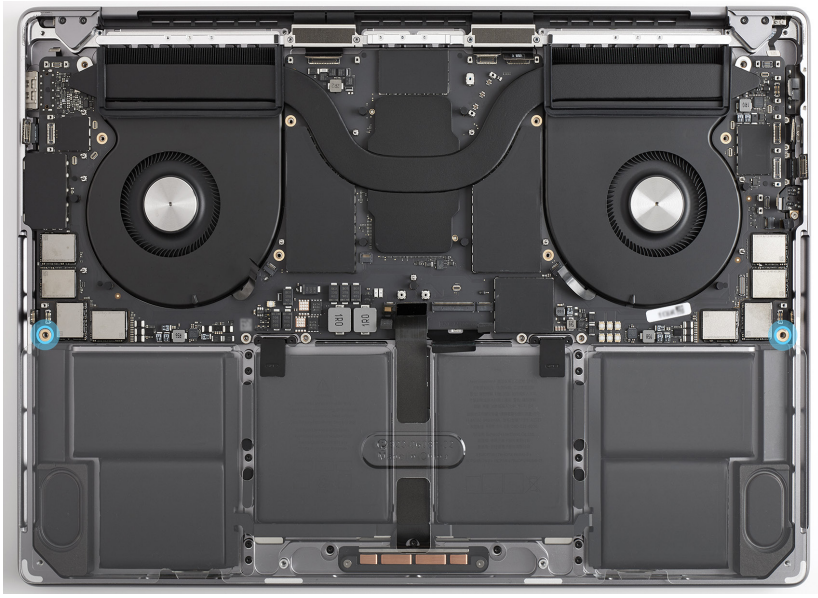
19. Use the T5 screwdriver to partially reinstall the six long T5 screws (923-06859).



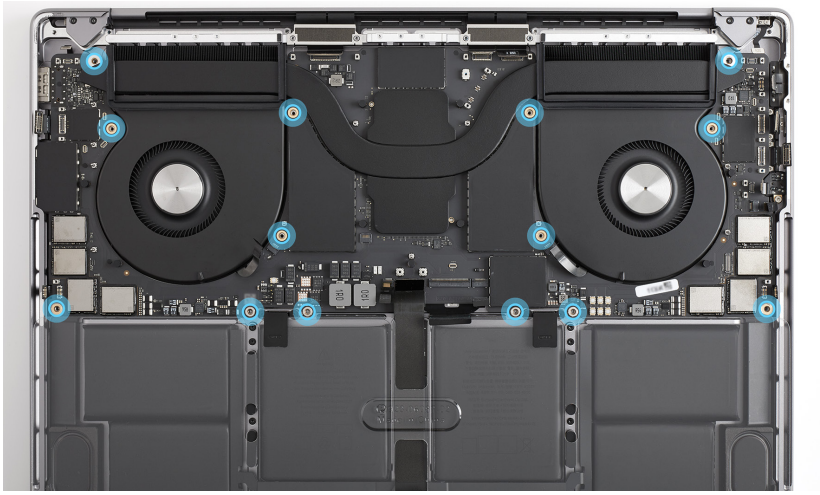
20. Use the T5 screwdriver to partially reinstall the four short T5 screws (923-06861).



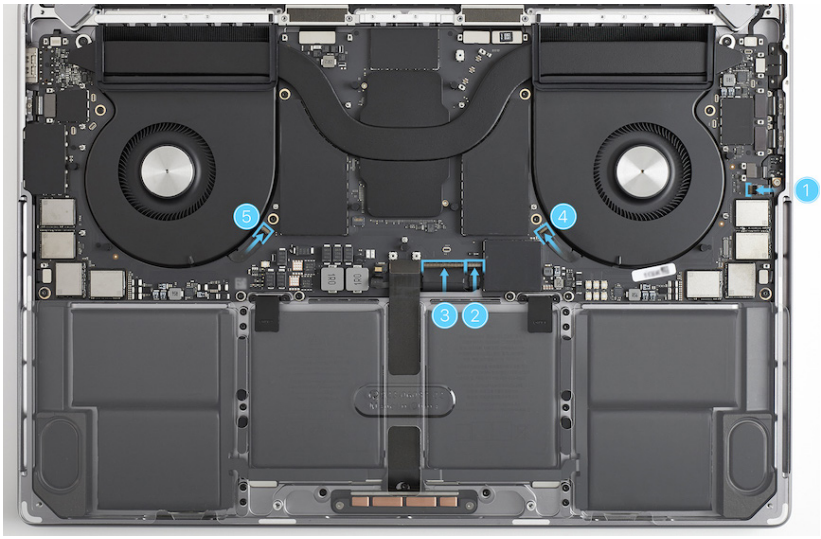
21. Use your fingers to thread the 4 mm hex nut screws (923-06857) into the lower corners. Then use the 4 mm hex nut driver to partially reinstall the two 4 mm hex nut screws into the lower corners.



22. Ensure the logic board sits flush inside the top case. Then fully reinstall all 14 screws.

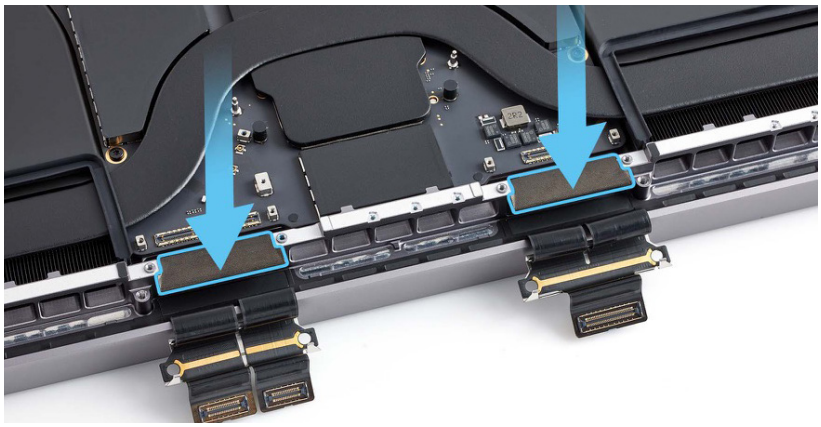


23. Slide the ends of the following five flex cables into their connectors:
    - Microphones (1)
    - Keyboard backlight (2)
    - Keyboard (3)
    - Left fan (4)
    - Right fan (5)

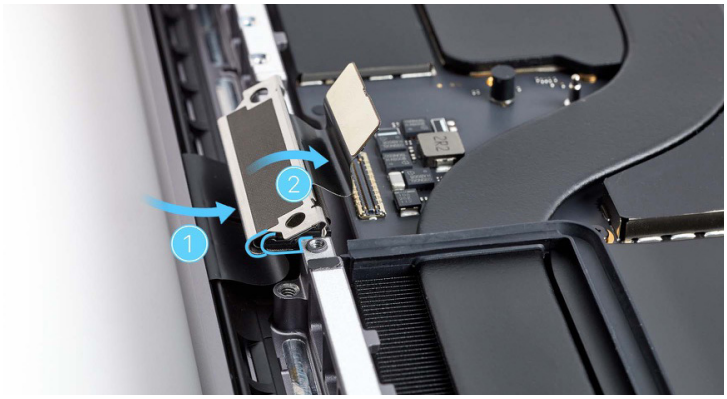


24. Use the flat end of the black stick to flip down the five locking levers. Then press the polyester film tabs to the five locking levers.

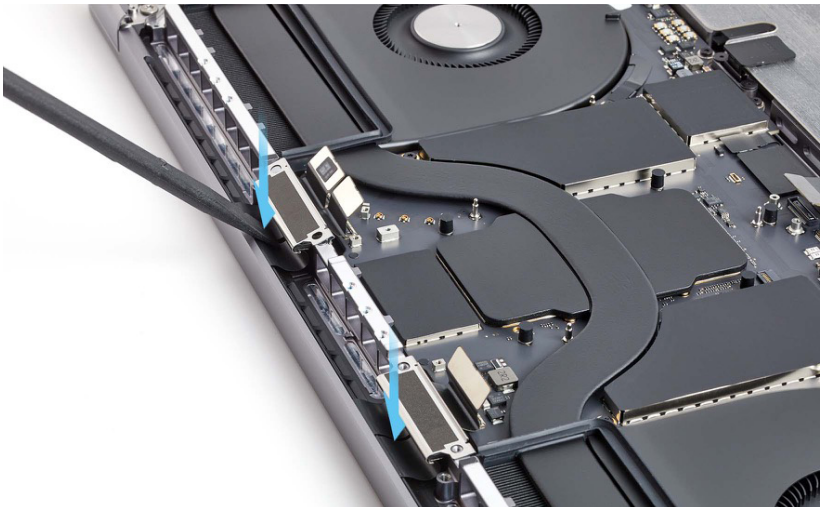
25. Rotate the top case as shown. Then position the black bumpers on the internal frame.



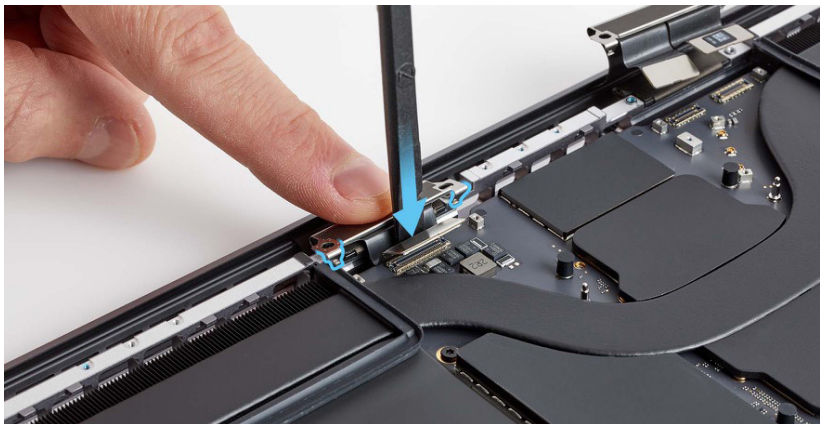
26. Align the display cables around the edge of the bumpers (1), then press the display cable clips to the bumpers and onto the internal frame (2).

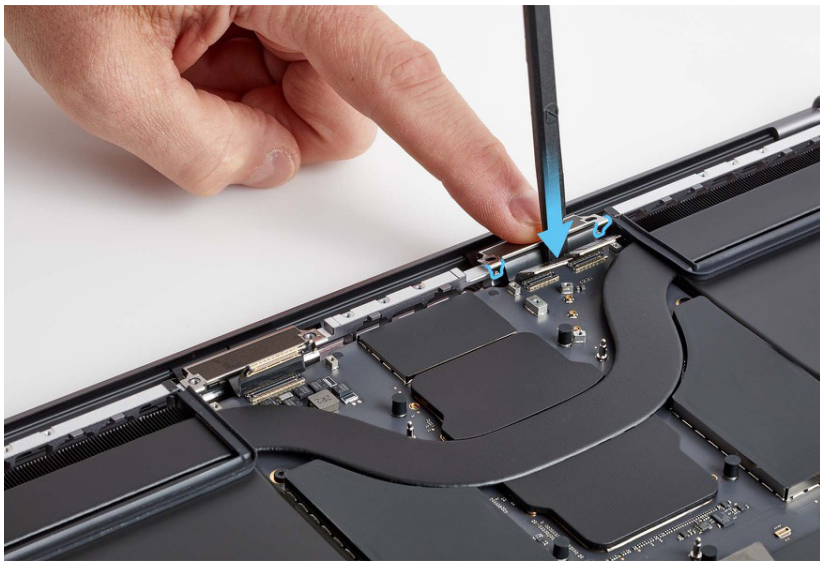


27. Use the flat end of the black stick to tuck the display cables into the gap between the display and internal frame.



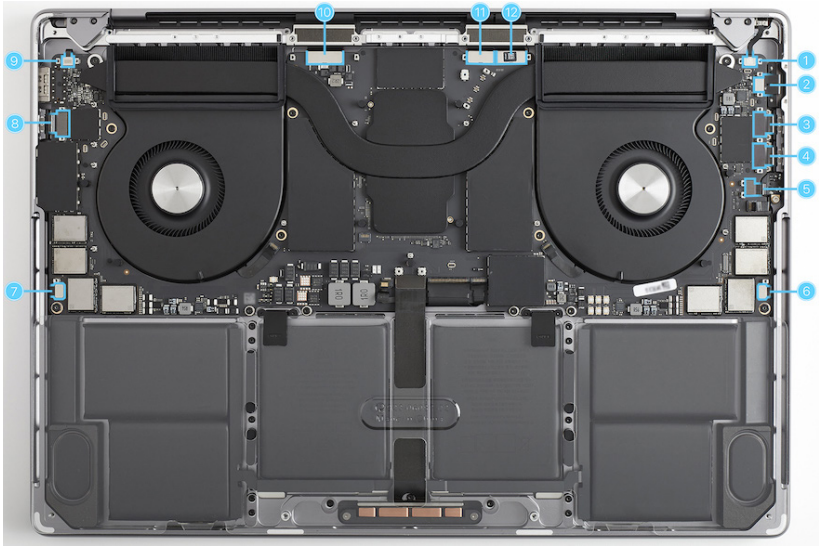
28. Use the flat end of the black stick to tuck the display flex cables into the gap between the logic board and internal frame. Ensure that the display cable clips are fully clipped onto the internal frame.



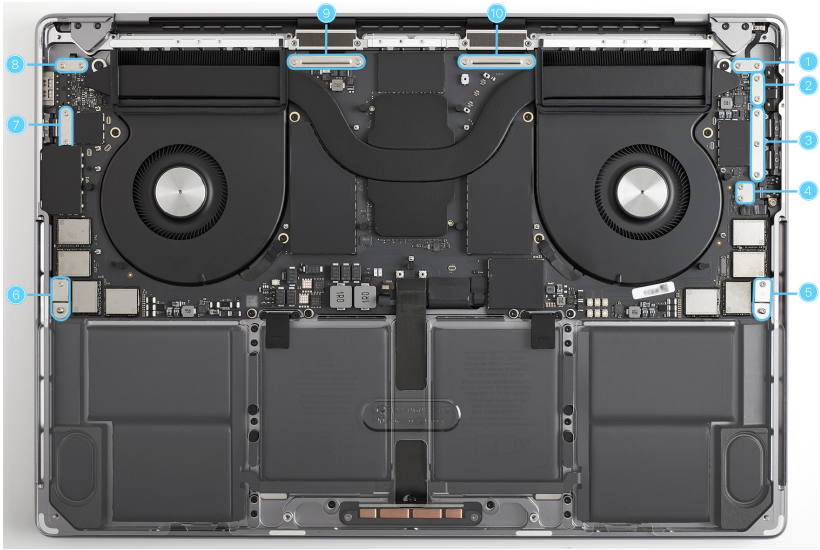


29. Press the ends of the following 12 flex cables to the connectors on the logic board:

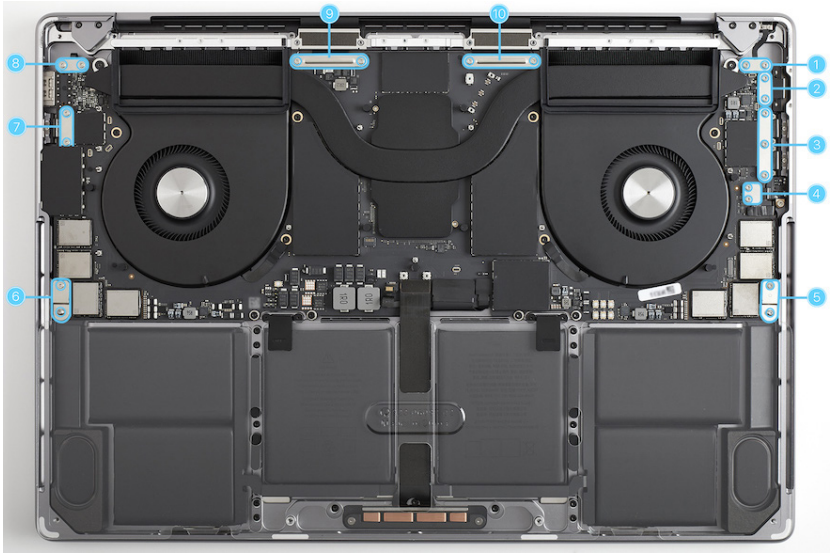
    - Lid angle sensor flex cable (1)
    - MagSafe 3 flex cable (2)
    - Left USB-C boards flex cables (3–4)
    - Audio board flex cable (5)
    - Left speaker flex cable (6)
    - Right speaker flex cable (7)
    - Right USB-C board flex cable (8)
    - Touch ID board flex cable (9)
    - Display backlight flex cable (10)
    - FaceTime HD camera flex cable (11)
    - eDP flex cable (12)



30. Use ESD-safe tweezers to position the following 10 cowlings (1–10) in the top case:
    - Lid angle sensor connector cowling (1)
    - MagSafe 3 connector cowling (2)
    - Left USB-C boards connector cowling (3)
    - Audio board connector cowling (4)
    - Left speaker connector cowling (5)
    - Right speaker connector cowling (6)
    - Right USB-C board connector cowling (7)
    - Touch ID board connector cowling (8)
    - Display connector cowling (9)
    - Display connector cowling (10)



31. Use the T3 screwdriver to reinstall the following 21 screws into the 10 cowlings:
    - Two T3 screws into the lid angle sensor connector cowling (923-06854) (1)
    - Two T3 screws into the MagSafe 3 connector cowling (923-06854) (2)
    - Three T3 screws into the left USB-C boards connector cowling (923-06854) (3)
    - Two T3 screws into the audio board connector cowling (923-06854) (4)
    - Two T3 screws into the left speaker connector cowling (923-06864, 923-06865) (5)
    - Two T3 screws into the right speaker connector cowling (923-06864, 923-06865) (6)
    - Two T3 screws into the right USB-C board connector cowling (923-06854) (7)
    - Two T3 screws into the Touch ID board connector cowling (923-06854) (8)
    - Two T3 screws into the display connector cowling (923-06854) (9)
    - Two T3 screws into the display connector cowling (923-06854) (10)



Reinstall the following parts to complete reassembly:

- Vent/antenna module
- Bottom case

Important

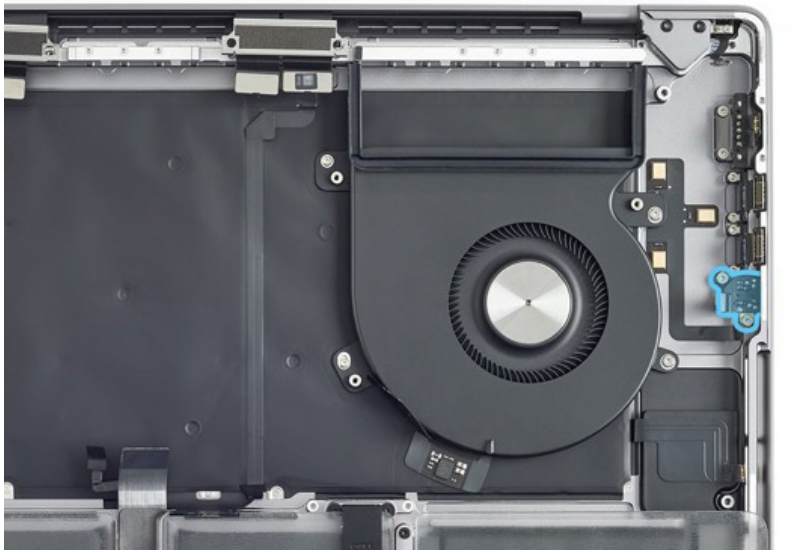
After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.

Audio Board

Before You Begin

Remove the following parts before you begin:

- Bottom case
- Vent/antenna module
- Logic board

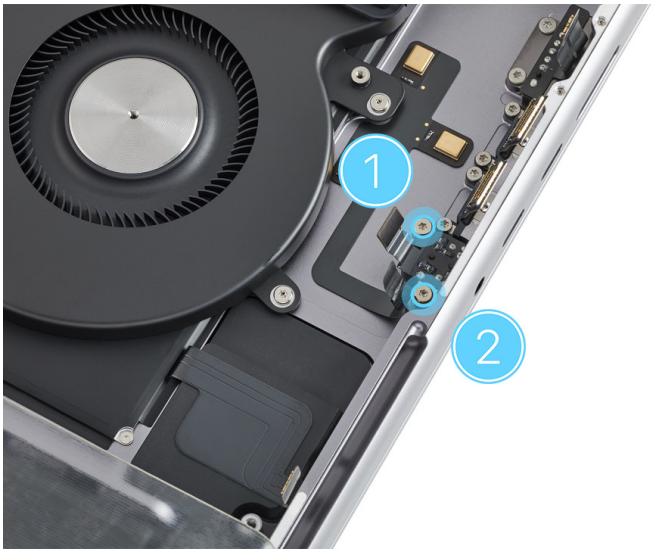


Tools

- EarPods with 3.5 mm headphone plug
- Torx T5 screwdriver

Removal

1. Use the T5 screwdriver to remove the short T5 screw (923-06936) (1) and the long T5 screw (923-06937) (2) from the audio board.

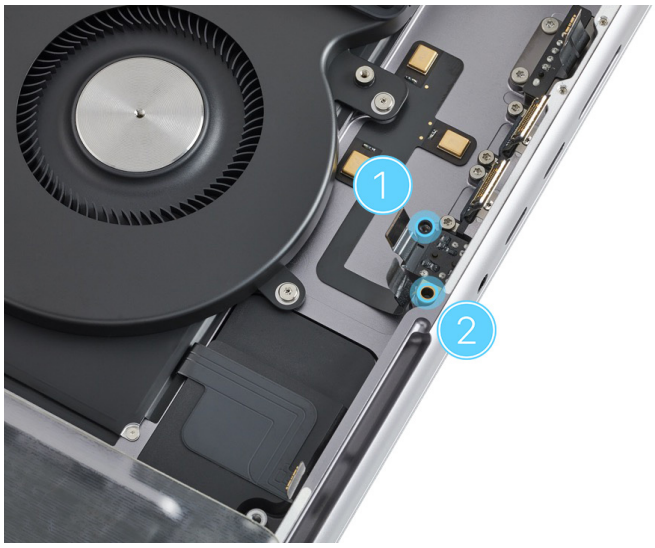


2. Lift the audio board out of the top case.

Reassembly

1. Position the audio board in the top case.

2. Use the T5 screwdriver to partially reinstall the short T5 screw (923-06936) (1) and the long T5 screw (923-06937) (2) into the audio board.



3. Plug the EarPods into the 3.5 mm headphone jack to ensure audio board alignment. Adjust the alignment of the audio board until the plug is easy to insert and remove.

4. Use the T5 screwdriver to fully reinstall the two T5 screws. Then unplug the EarPods.

Reinstall the following parts to complete reassembly:

- Logic board
- Vent/antenna module
- Bottom case

Fans

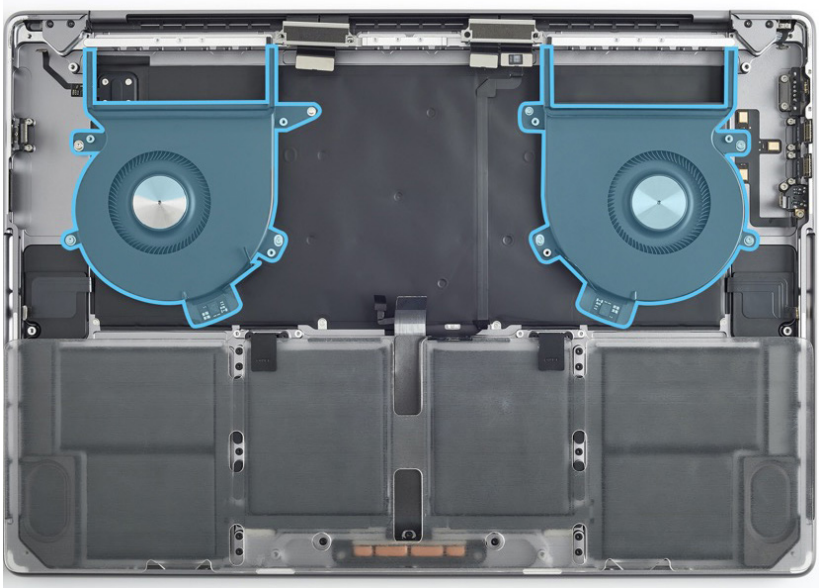
Before You Begin

Remove the following parts before you begin:

- Bottom case
- Vent/antenna module
- Logic board

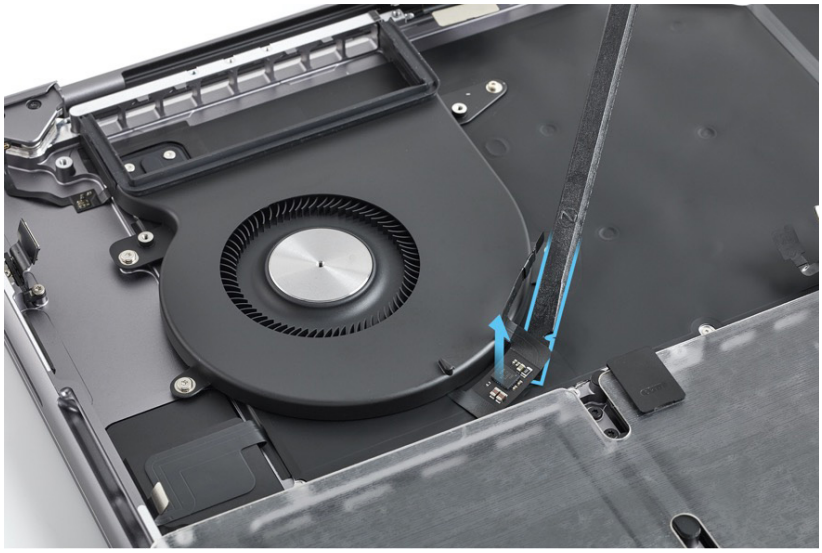
Tools

- Nylon probe (black stick)
- Torx T3 screwdriver
- Torx T5 screwdriver

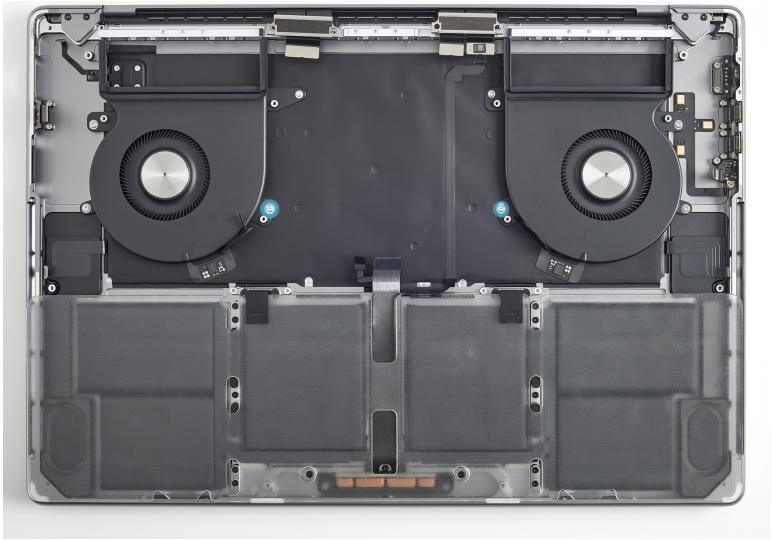


Removal

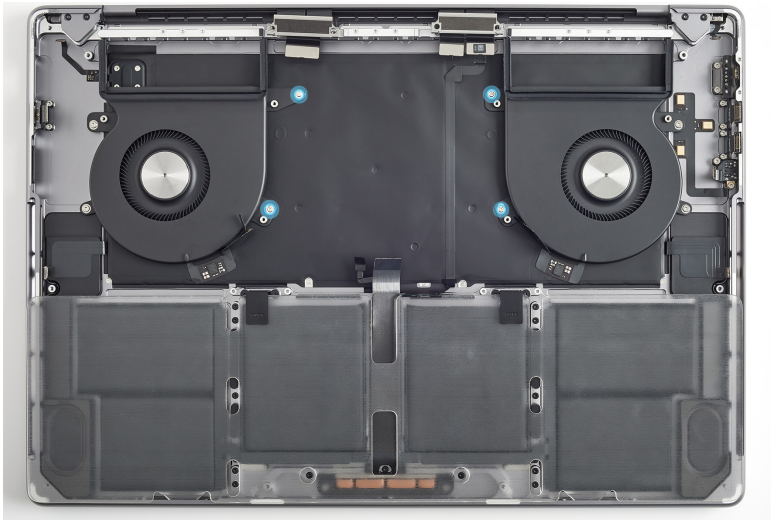
1. Use the flat end of the black stick to gently peel the fan flex cables off the top case.



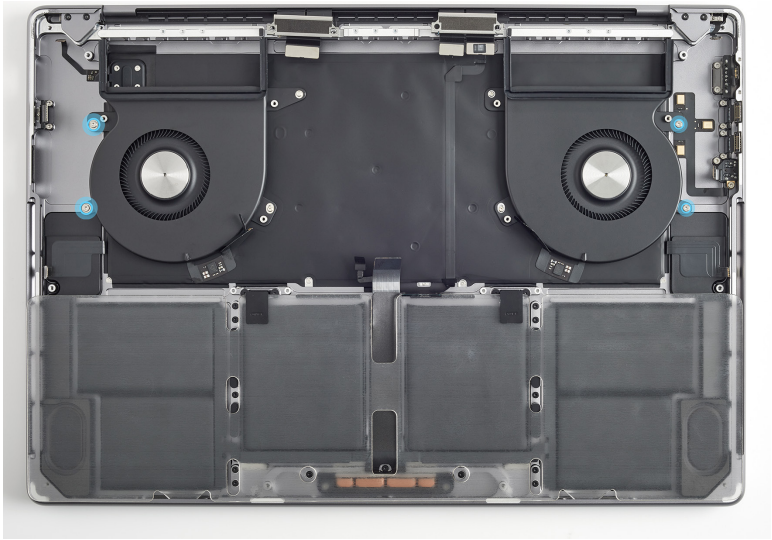
2. Use ESD-safe tweezers to peel the screw covers off the two lower T3 screws. Save the screw covers for reassembly.



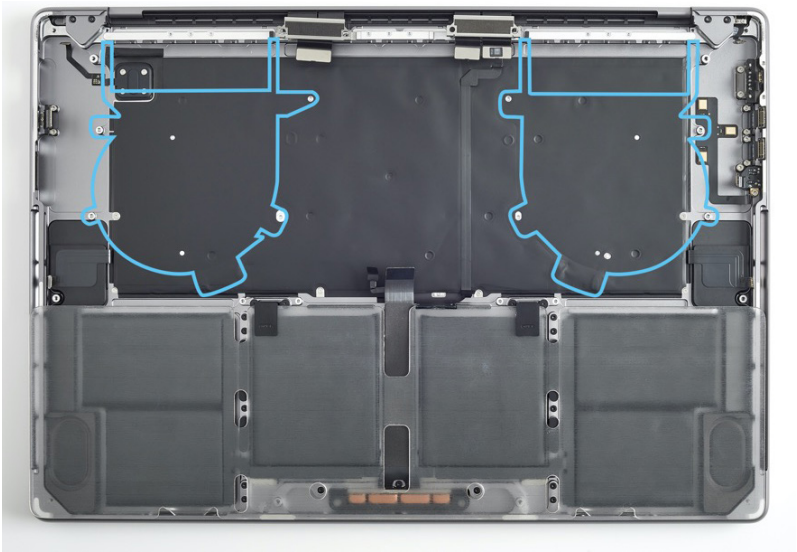
3. Use the T3 screwdriver to remove the four T3 screws (923-06960) from the fans.



4. Use the T5 screwdriver to remove the four T5 screws (923-06929) from the fans.

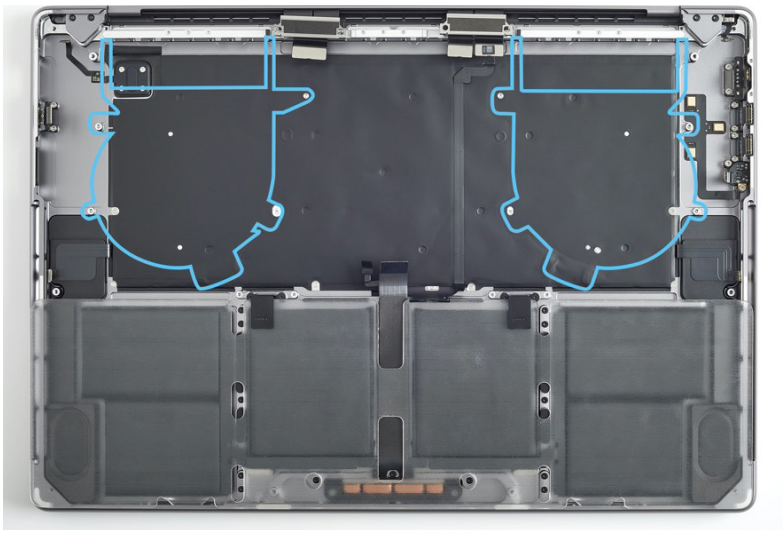


5. Remove the fans from the top case.



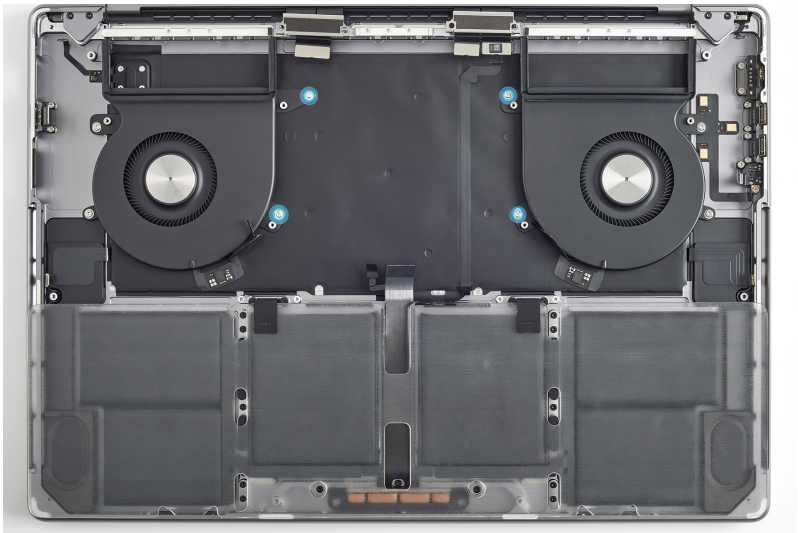
Reassembly

1. Position the fans in the top case.



2. Use the T5 screwdriver to reinstall the four T5 screws (923-06929) into the fans.

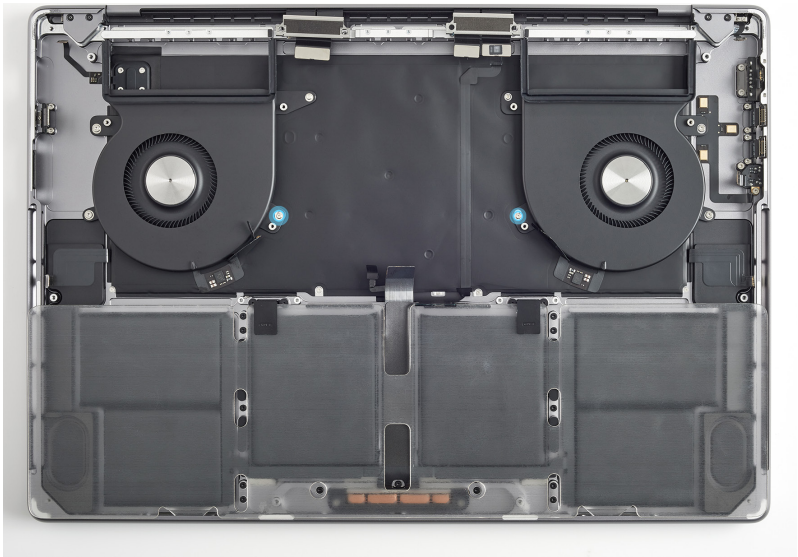
3. Use the T3 screwdriver to reinstall the four T3 screws (923-06960) into the fans.



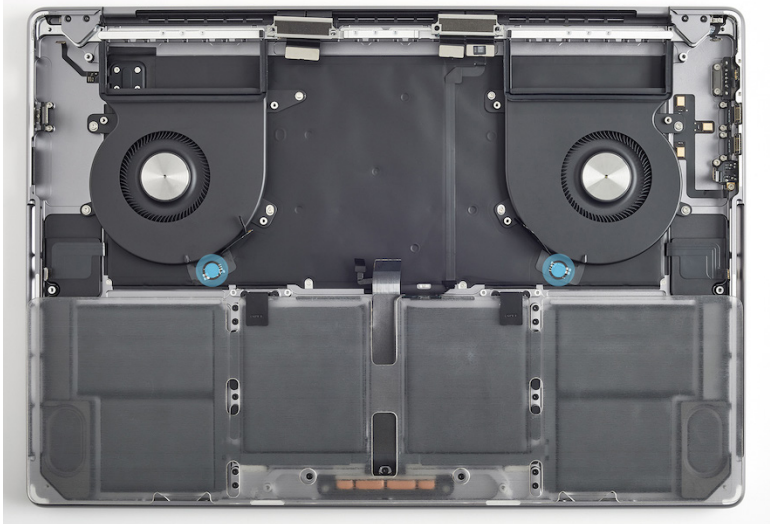
4. Press the screw covers onto the two lower T3 screws.

Important

A replacement part may include replacement screw covers. If so, install the replacement screw covers.



5. Press the fan flex cables to adhere them to the top case.



Reinstall the following parts to complete reassembly:

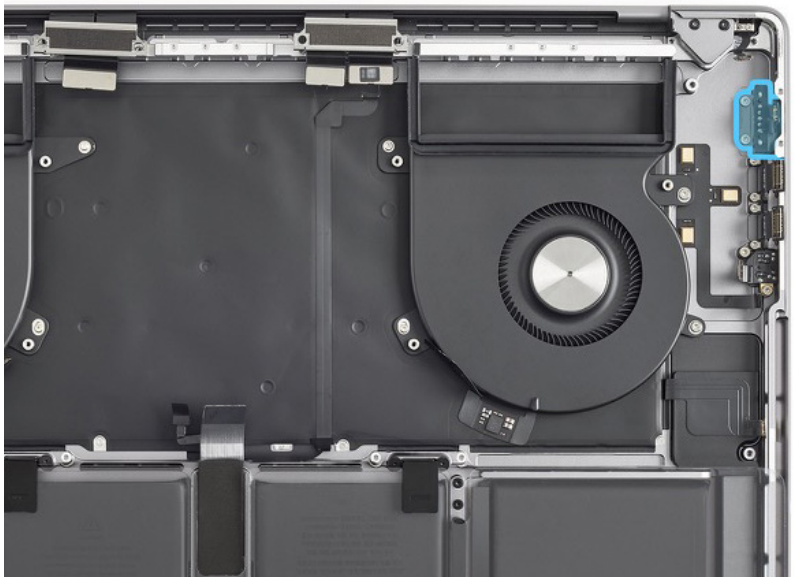
- Logic board
- Vent/antenna module
- Bottom case

MagSafe 3 Board

Before You Begin

Remove the following parts before you begin:

- Bottom case
- Vent/antenna module
- Logic board



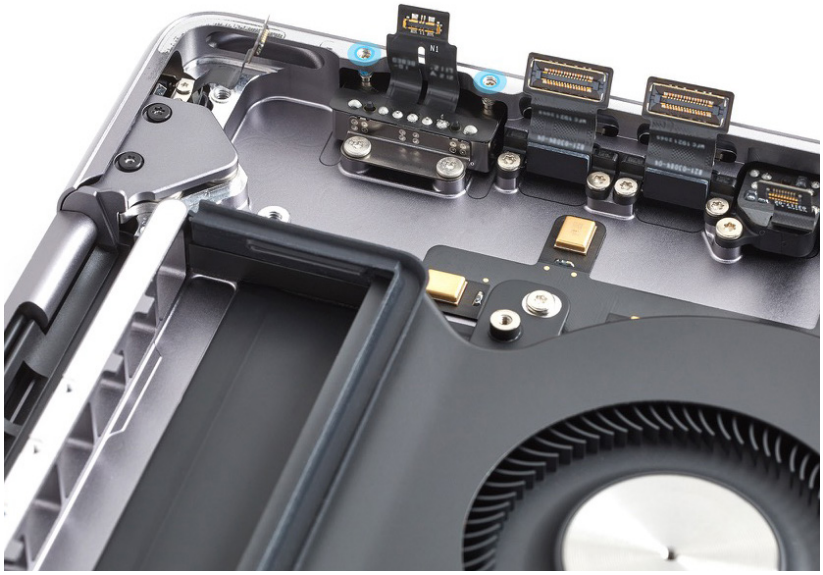
Tools

- Torque driver (blue, 0.65 kgf cm)
- Torx Plus 2IP 44 mm half-moon bit
- Torx T5 screwdriver
- USB-C to MagSafe 3 cable

Removal

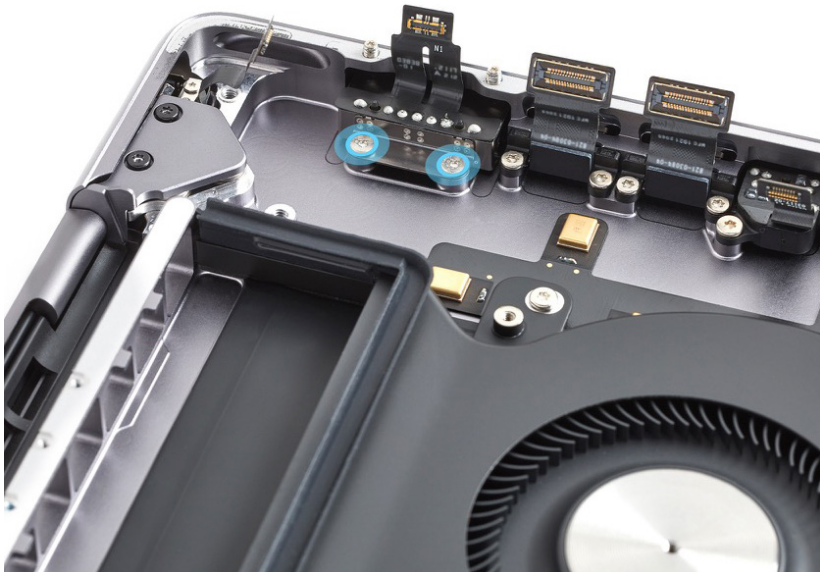
1. Use a torque driver and the Torx Plus 2IP bit to fully loosen the two 2IP set screws (923-06958) in the top case.

   Note: Partially reinstall the set screws if they fall out.

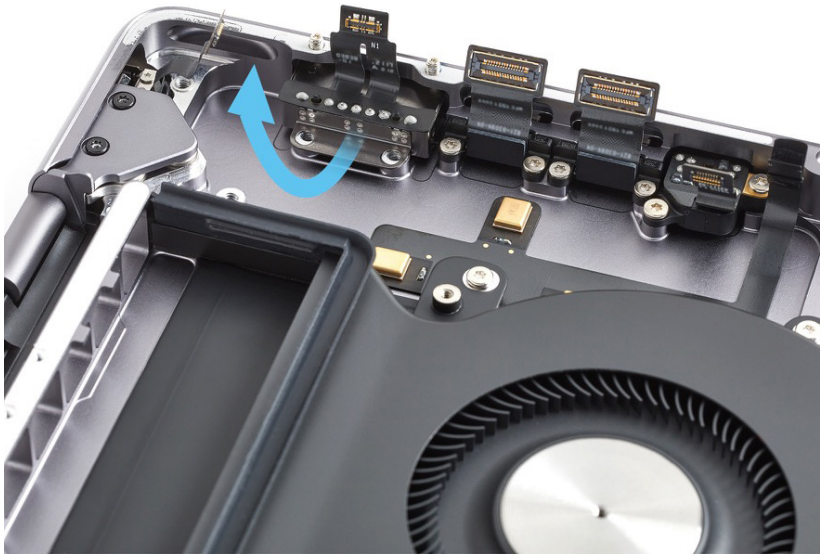


2. Use the T5 screwdriver to remove the two T5 screws (923-06959) from the MagSafe 3 board.

   Note: The screws are non-magnetic.

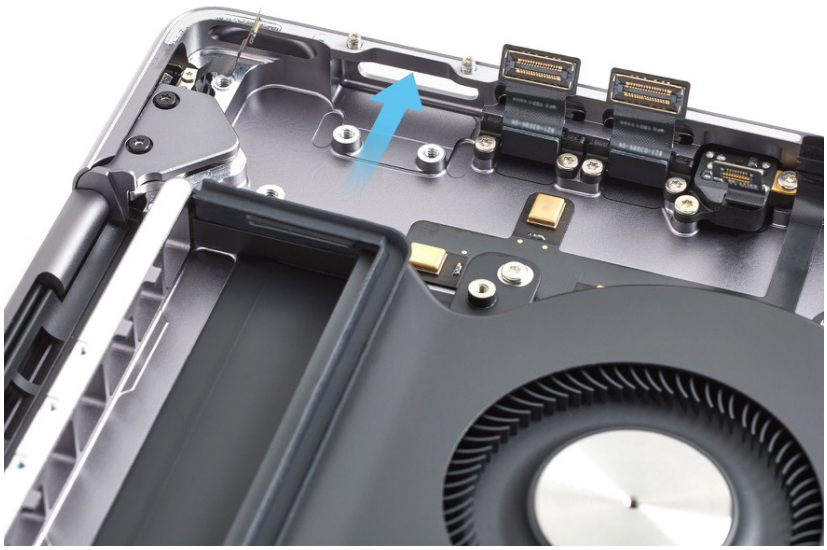


3. Lift the MagSafe 3 board out of the top case.



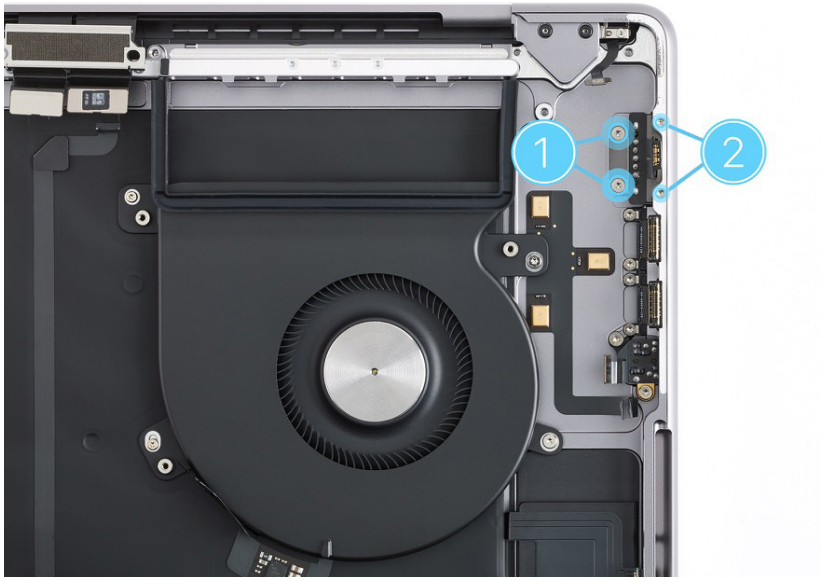
Reassembly

1. Position the MagSafe 3 board in the top case.



2. Use the T5 screwdriver to partially reinstall the two T5 screws (923-06959) (1).

3. Use the blue torque driver and the Torx Plus 2IP bit to partially reinstall the two 2IP set screws (923-06958) into the top case (2).



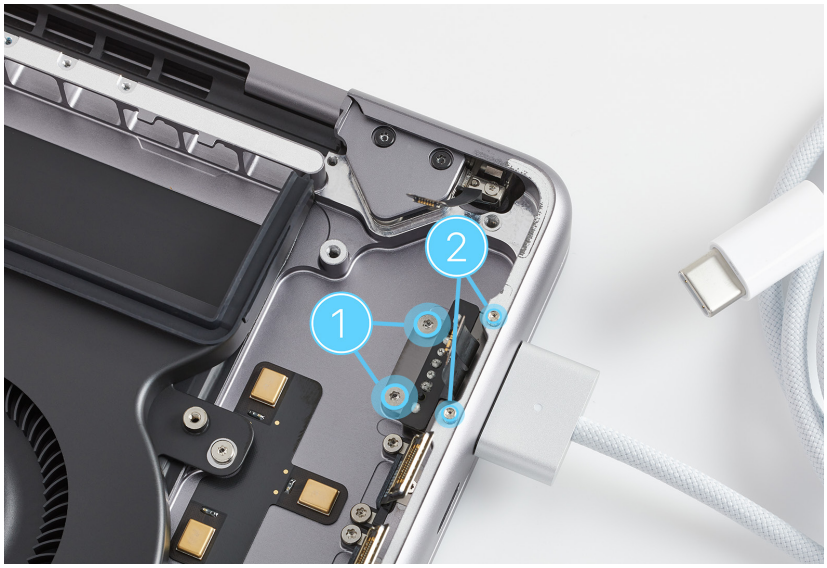
4. Plug the MagSafe 3 end of the USB-C to MagSafe 3 cable into the MagSafe 3 port to ensure MagSafe 3 board alignment. Use the flat end of the black stick to hold the MagSafe 3 board in place to create an even gap between the MagSafe 3 connector and top case.

Danger

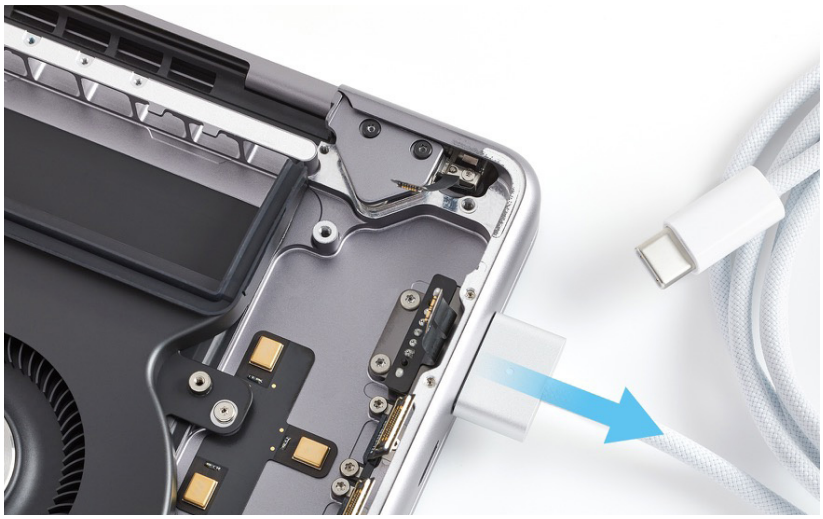
Ensure that the USB-C to MagSafe 3 cable is not plugged into power.

5. Use the T5 screwdriver to fully reinstall the two T5 screws (1).

6. Use the blue torque driver and the Torx Plus 2IP bit to fully reinstall the two 2IP set screws (2).



7. Unplug the USB-C to MagSafe 3 cable from the MagSafe 3 port.



Reinstall the following parts to complete reassembly:

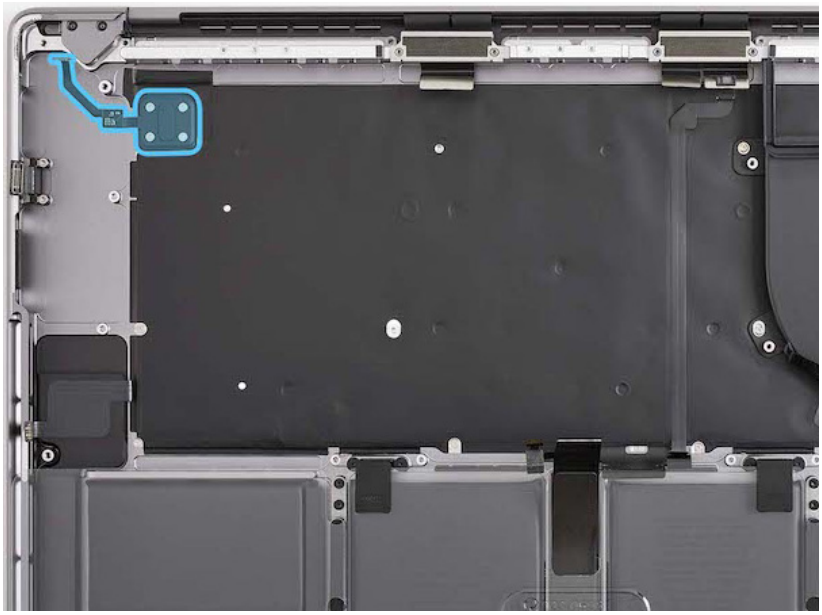
- Logic board
- Vent/antenna module
- Bottom case

Touch ID Board

Before You Begin

Remove the following parts before you begin:

- Bottom case
- Vent/antenna module
- Logic board
- Fans (right only)



Tools

- ESD-safe tweezers
- Kapton tape
- Nylon probe (black stick)
- Torx T3 screwdriver
- Touch ID alignment kit

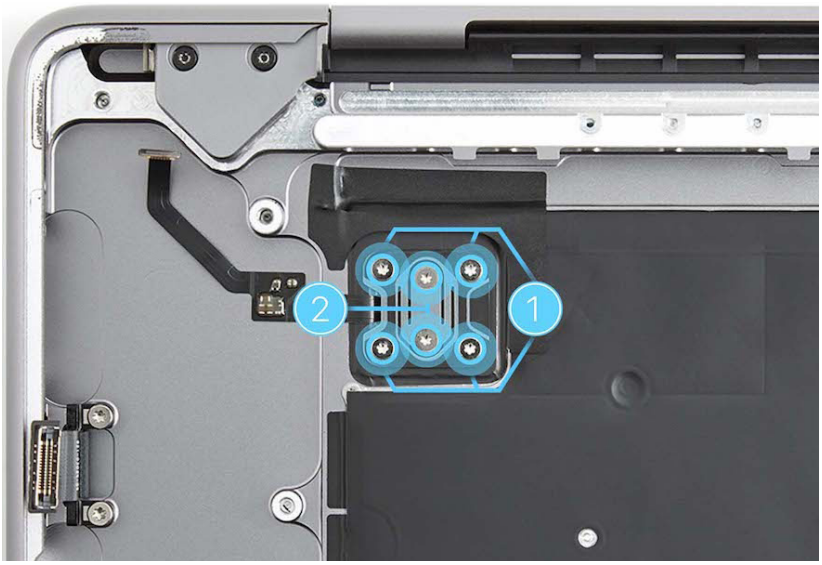
Important

This procedure requires System Configuration. After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.

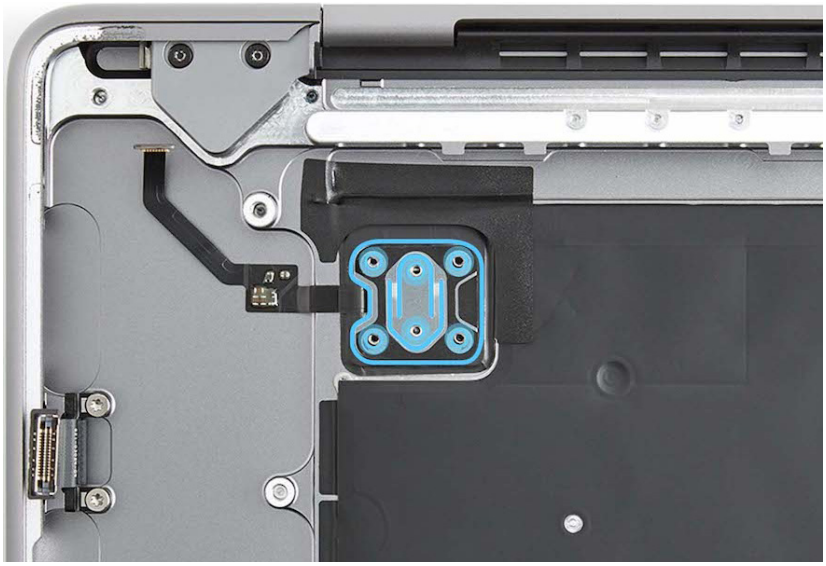
Removal

1. Remove the rubber cover from the Touch ID board flexible cowling and save it for reassembly.

2. Use the T3 screwdriver to remove the four outer corner T3 screws (923-06955) (1) and the two middle T3 screws (923-06942) (2) from the Touch ID board flexible cowling.



3. Use ESD-safe tweezers to remove the Touch ID board flexible cowling from the top case. Save the cowling for reassembly.



4. Use ESD-safe tweezers to peel the Touch ID board flex cable from the top case.

5. Open the display to a 90-degree angle. Then place the computer on the table with the keyboard upright as shown.

6. Support the Touch ID board as you route the Touch ID flex cable through the slot in the top case. Remove the Touch ID board from the keyboard side of the top case.

Important

- If the Touch ID board wasn't clicking properly before removal or the Touch ID shim falls out when you remove the Touch ID board, continue to removal step 7 to replace the Touch ID shim.
- Ensure that your work surface is clean. Under the Touch ID board is the Touch ID shim, which is a small circular part. If it falls, you can more easily find it on a clean surface.
- If you're using the existing Touch ID shim, skip to reassembly step 1.

7. Place the computer right side up. Spread the tips of the ESD-safe tweezers and use one tip to remove the shim from the circular recess under the Touch ID board.

   Note: The shim has a small amount of adhesive and may stick to the top case.

Reassembly

1. Place the computer right side up with the display still open.

> **Caution**
>
> Ensure that you place the computer on a clean surface to avoid damaging internal parts.

2. Set two Y-shaped alignment tools in the Touch ID opening in the top case as shown. Secure the Y-shaped tools in the corner edges with Kapton tape.

> **Important**
>
> Ensure that the Touch ID shim is aligned in the recessed circle in the top case. If you are replacing the Touch ID shim, follow reassembly steps 2 through 4. If you're using the existing shim, skip to reassembly step 5.

3. Use ESD-safe tweezers to remove the medium Touch ID shim from the shim kit.

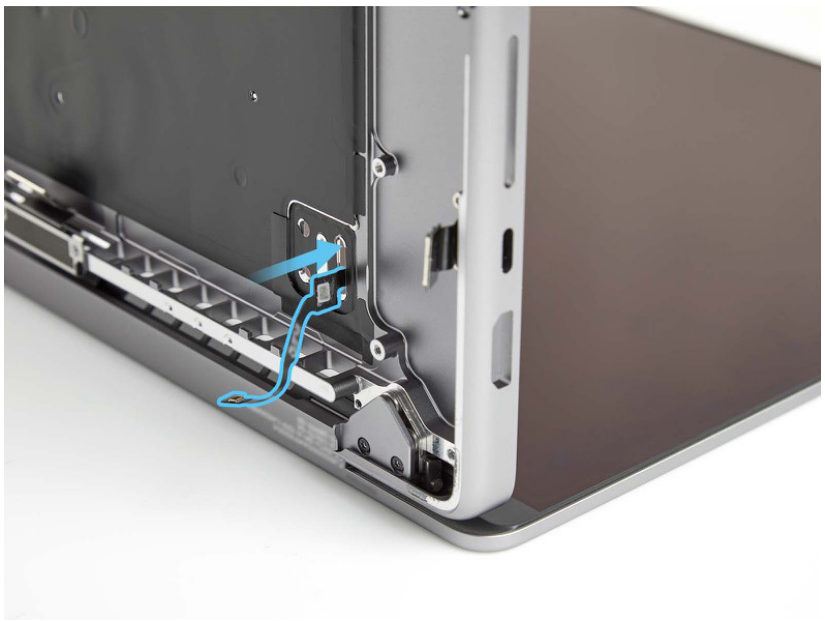
   Note: The shim is black on the adhesive side and silver on the opposite side.

4. Align the Touch ID shim in the recessed circle in the top case with the adhesive side down.

5. Gently press the Touch ID shim to adhere it to the top case.

6. Open the display to a 90-degree angle. Then place the computer on the table display-side down.

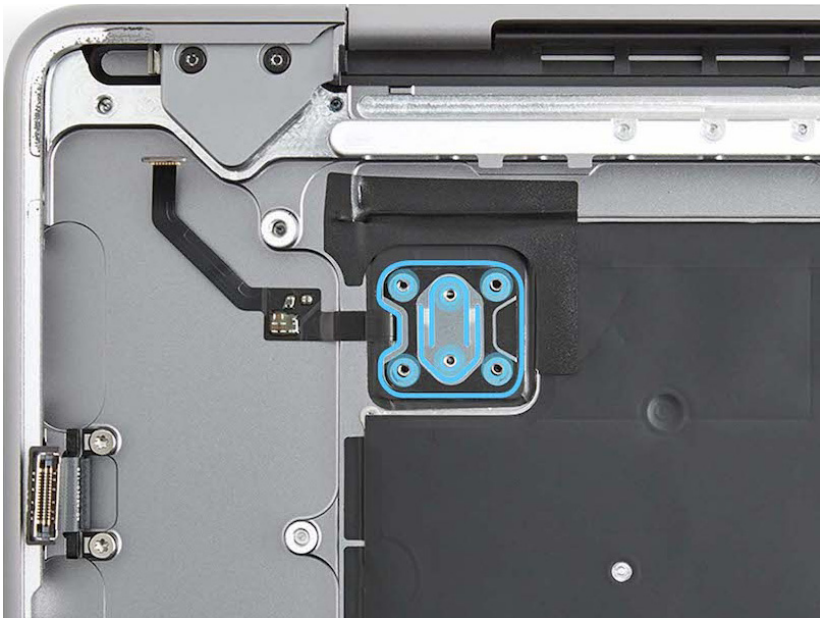
7. Route the Touch ID board flex cable through the slot in the top case. Then position the Touch ID board in the opening in the top case.



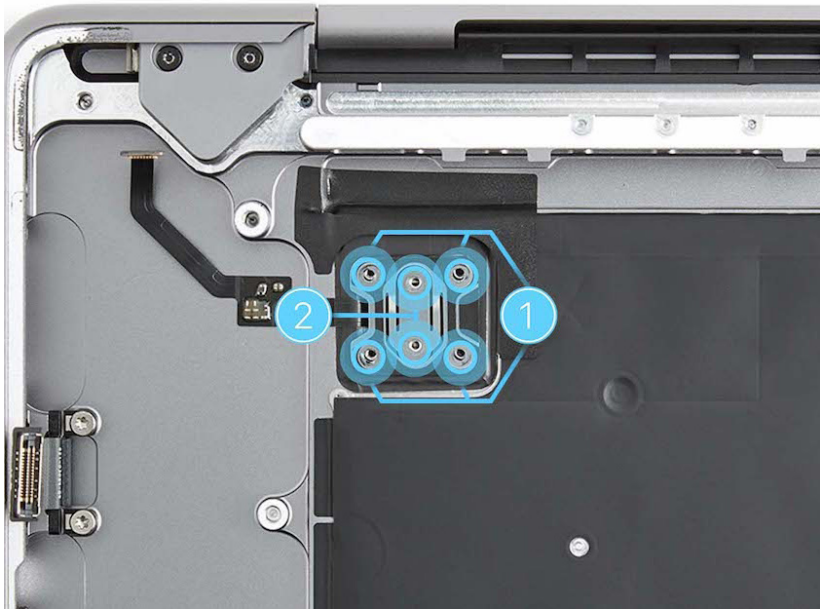
8. Ensure that the Touch ID button is held in place by the Y-shaped tools as you close the display.

   Note: If you're installing a replacement Touch ID board, remove the protective film from the glass surface.

9. Place the computer display-side down. Then position the Touch ID board flexible cowling as shown.



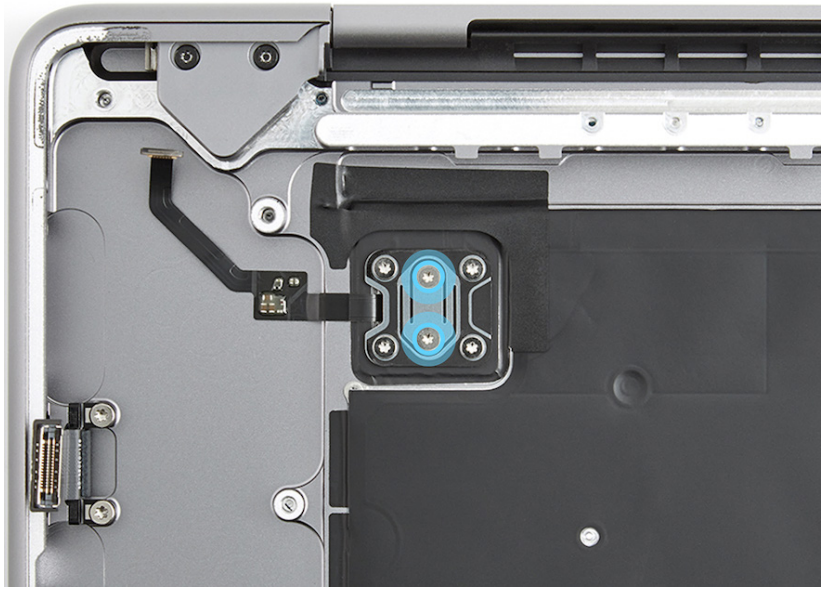
10. Use the T3 screwdriver to fully reinstall the four outer T3 screws (923-06955) (1). Then partially reinstall the two middle T3 screws (923-06942) (2).



11. Place the computer right side up and remove the Y-shaped alignment tools.

12. Close the display and place the computer display-side down.

13. Use the T3 screwdriver to fully reinstall the two middle T3 screws.



14. Press the Touch ID board flex cable to adhere it to the top case.

15. Turn the top case right side up.

16. Remove the Kapton tape and Y-shaped alignment tools. Then ensure that the Touch ID button still clicks when pressed.

Important

- If the Touch ID button feels too loose or doesn't click, repeat removal steps 2 through 6. Then repeat reassembly steps 1 through 16 with a larger Touch ID shim.
- If the Touch ID button feels too stiff or doesn't move, repeat removal steps 2 through 6. Then repeat reassembly steps 1 through 16 with a smaller Touch ID shim.

17. Look directly over the Touch ID sensor. The spaces on each side should appear equal, and the Touch ID sensor should align with the function keys. If the gaps around the sides are unequal, repeat reassembly steps 2–16.

18. Close the display and place the computer display-side down.

19. Reinstall the rubber cover over the Touch ID board flexible cowling.

Reinstall the following parts to complete reassembly:

- Fans (right only)
- Logic board
- Vent/antenna module
- Bottom case

Important

After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.

USB-C Boards

Before You Begin

Warning

Read Battery Safety and follow workspace and battery handling guidelines before you begin.

Remove the following parts before you begin:

- Bottom case
- Vent/antenna module
- Logic board

Tools

- ESD-safe tweezers
- Torx T5 screwdriver
- USB-C charge cable

Removal

Note: The images in this procedure show the removal and reinstallation of only one USB-C board. However, the procedure is the same for all three USB-C boards.

1. Use the T5 screwdriver to remove the two T5 screws (923-06938) from the USB-C board.

2. Slide the USB-C board out of the top case.

Reassembly

1. Use ESD-safe tweezers to position the USB-C board in the top case.

2. Use the T5 screwdriver to partially reinstall the two T5 screws (923-06938).

3. Plug one end of the USB-C charge cable into the port to ensure USB-C board alignment. Adjust the alignment of the USB-C board until the end of the cable is easy to insert and remove.

Danger

Ensure that the USB-C charge cable is not plugged into power.

4. Use the T5 screwdriver to fully reinstall the two T5 screws with the USB-C charge cable still in the port.

5. Unplug the USB-C charge cable from the port.

Reinstall the following parts to complete reassembly:

- Logic board
- Vent/antenna module
- Bottom case

Top Case with Battery and Keyboard

Before You Begin

Remove the following parts before you begin:

- Bottom case
- Battery management unit flex cable
- Lid angle sensor
- Trackpad and trackpad flex cable
- Vent/antenna module
- Display hinge covers
- Display
- Logic board
- Audio board
- Fans
- MagSafe 3 board
- Touch ID board
- USB-C boards

Tools

- No tools are required for this procedure.

Important

- System Configuration is required if you've installed a replacement display, lid angle sensor, logic board, top case, or Touch ID board.
- After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.

Removal

Warning

The battery is part of the top case. Don’t attempt to remove the battery from the top case.

There are no additional removal steps. The top case includes the following nonremovable parts:

- Battery
- Battery management unit board
- Keyboard and keyboard flex cable
- Microphone
- Speakers

Reassembly

Reinstall the following parts to complete reassembly:

- USB-C boards
- Touch ID board
- MagSafe 3 board
- Fans
- Audio board
- Logic board
- Display
- Display hinge covers
- Vent/antenna module
- Trackpad and trackpad flex cable
- Lid angle sensor
- Battery management unit flex cable
- Bottom case

Important

After you've completed all removal and reassembly steps, learn how to initiate the System Configuration process at support.apple.com/self-service-repair.