

Guide: Battery Replacement



LMP BATTERY MACBOOK PRO 15" THUNDERBOLT 3

10/16 - 7/18, built-in, Li-Ion Polymer, A1820, 11.4V, 76Wh

P/N 23190

SUPPORTED APPLE DEVICES:

MacBook Pro (15-inch, 2016) / MacBookPro13,3
MacBook Pro (15-inch, 2017) / MacBookPro14,3

LMP BATTERY MACBOOK PRO 15" THUNDERBOLT 3

7/18 - 11/19, built-in, Li-Ion Polymer, A1953, 11.4V, 83.6Wh

P/N 23191

SUPPORTED APPLE DEVICES:

MacBook Pro (15-inch, 2018) / MacBookPro15,1
MacBook Pro (15-inch, 2019) / MacBookPro15,3

Introduction

It is highly recommended that this procedure is carried out by an experienced technician.

LMP accepts no responsibility or liability in the event of any damage or injury caused while performing this procedure.



It is the responsibility of the person performing the procedure to ensure that they have the requisite technical skills to competently carry out the battery replacement.

If in doubt do not begin. Instead employ an experienced technician to perform the repair on your behalf.



Tools required for this procedure:

Pentalobe P5 screwdriver

Pentalobe P2 screwdriver (MacBook 15" 2018 and 2019 models)

Torx T8, T5 and T3 screwdriver

Spudger with flat and pointed ends.

Suction cup

Prying pick (Guitar pick)

Tweezers



All of the above tools are included in the LMP Toolkit (P/N 16262), available separately.



Additional equipment:

A book of around 4cm thickness or a foam wedge of the same thickness

Protective eye goggles

Thick protective gloves

Nitrile gloves



Before performing the procedure discharge the MacBooks battery to at least 20% or under if possible. This will ensure that the battery does not contain enough energy to initiate a thermal event.



This procedure requires the removal of a large number of small screws and parts. It is vitally important that you have a method of organizing these screws and parts to avoid loss and to ensure the use of the correct screws when reassembling the MacBook - using an ice cube tray or similar to store the screws and small parts is a good method of organization.



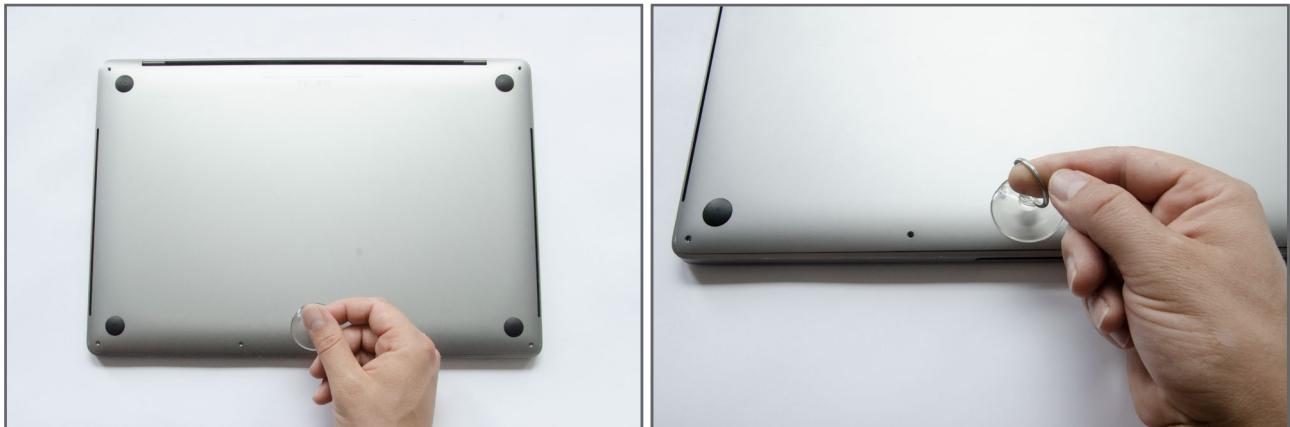
Be aware that while a lot of the screws appear to be the same they can vary slightly in length. Therefore it's important that the screws are returned to their original positions to avoid damage during reassembly.

Step 1



- ⚠** Before you start ensure that the MacBook is completely turned off. Close the display and place the MacBook upside down on a soft cloth or similar to protect the display housing.
- 🔨** Remove the 6 screws securing the bottom case using a Pentalobe P5 screwdriver. The position and lengths of the screws are as follows:
Four 4.7 mm screws at the front and **two 6.6 mm screws** at the rear.
- ℹ** It's important to note the position of the screws so that they can be returned to the same location. This will avoid damaging the MacBook.

Step 2



- 👉 Place a suction cup on the front middle position of the bottom case between the screw holes and press down.
- 👉 Lift gently on the suction cup until a small gap opens between the bottom case and the main housing.

Step 3



Insert a plastic prying pick into the gap. Be careful not to insert the pick further than one centimetre (0.4 of an inch).

Slide the pick carefully around the edge to halfway up the left side. You should hear and feel a pop as the left clip releases.

Repeat the process to release the clip on the right side.



Step 4



- Lift up the front edge of the bottom case enough to insert your fingertips underneath. Continue to carefully lift until the two central securing clips release.
- ⚠ Do not lift any further than is required to release the central securing clips, and do not attempt to remove the bottom case at this point.

Step 5



- ⚠ It is highly recommend that thick protective gloves are worn while performing this procedure as the bottom case has sharp metal edges.
- 🔨 Grasp the right front corner of the bottom case and firmly pull it towards you until the bottom case releases. This may require quite a bit of force.
- 🔨 Repeat the process for the left side if necessary.
- ⚠ Always pull parallel to the main housing, never pull upwards.

Step 6



Remove the bottom case.



To reinstall the bottom case:

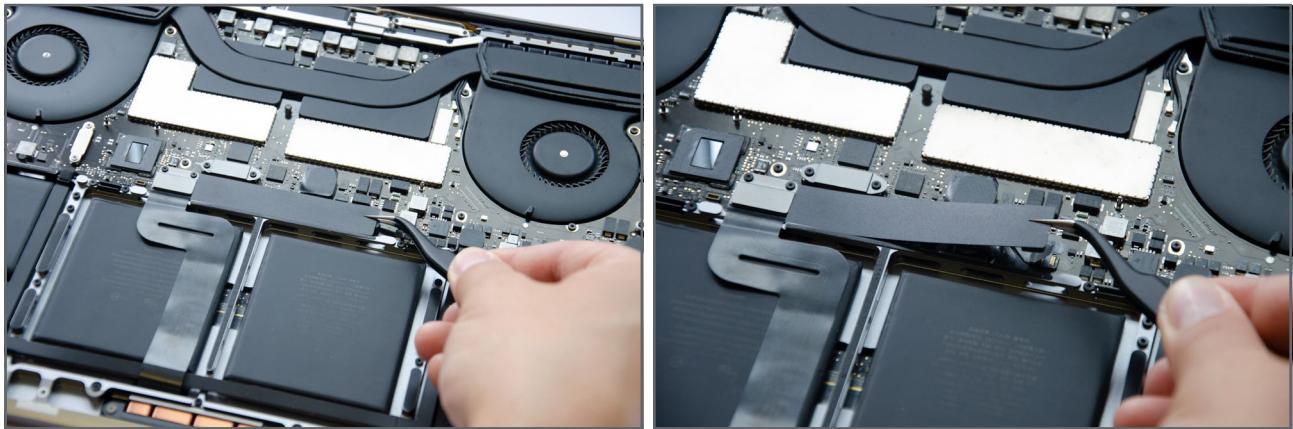
Carefully align the bottom case with the main housing leaving a gap of around 3mm at the rear. With one hand press down on the right rear corner and with the other hand slide the right side of the bottom case into the slide clip. Repeat the process for the left side.

Once the slide clips are engaged check the bottom case for correct alignment. If the bottom case is correctly aligned then press at the **very left middle** to engage the left clip, then in the middle at around **1/3 distance from the left**, then in the middle at **2/3 distance from the left**, and finally in the middle at the **very right hand side**. The clips will engage with an audible pop.

If the bottom case is not correctly aligned then remove it and repeat the installation process.

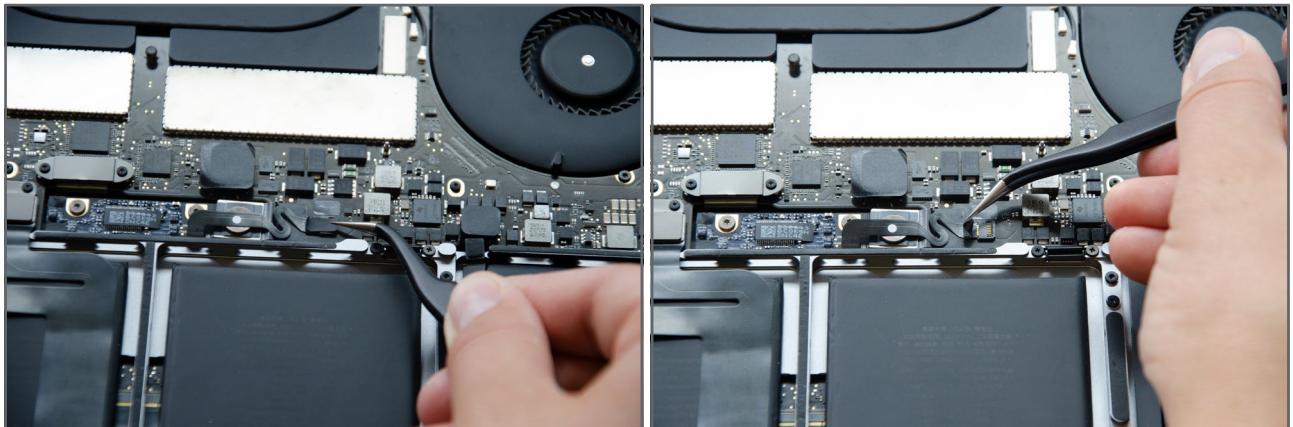


Step 7



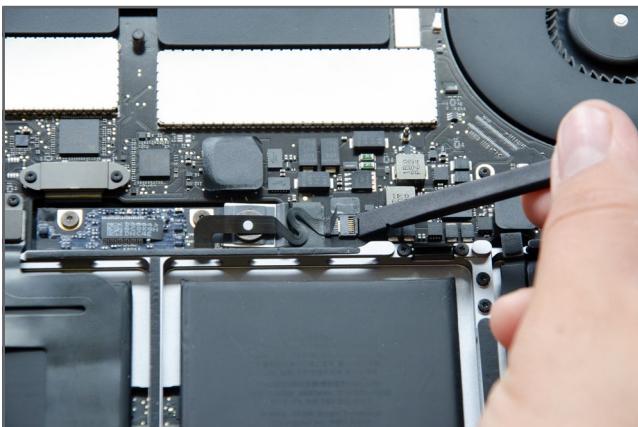
-  The battery board cover uses adhesive to hold it in place. Carefully lift the the cover from the right side while trying to ensure that the adhesive patches remain on the cover. If the adhesive patches don't remain attached to the cover they can be replaced with double sided adhesive available from most hardware stores.
-  The cover only fits correctly in one orientation. If the cover does not appear to fit correctly when reassembling then rotate the cover the other way around and try again.

Step 8

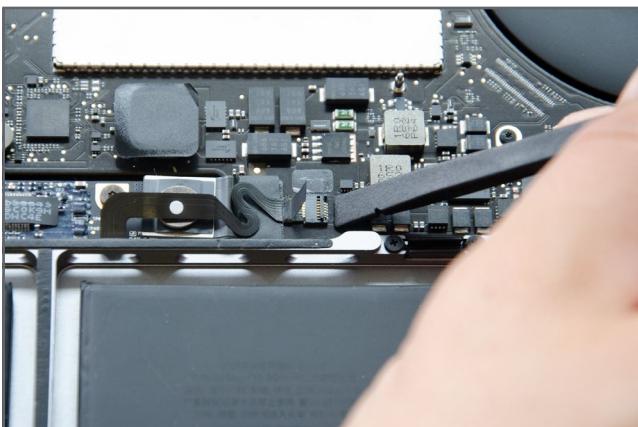
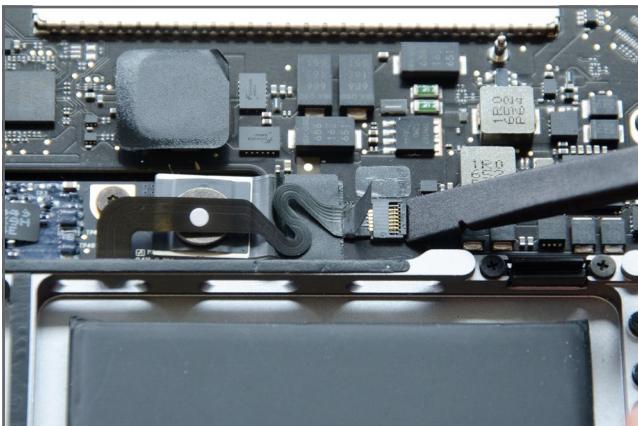


-  Carefully peel the black tape away from the battery cable connector.
-  Only peel the tape back far enough to release it from the connector.

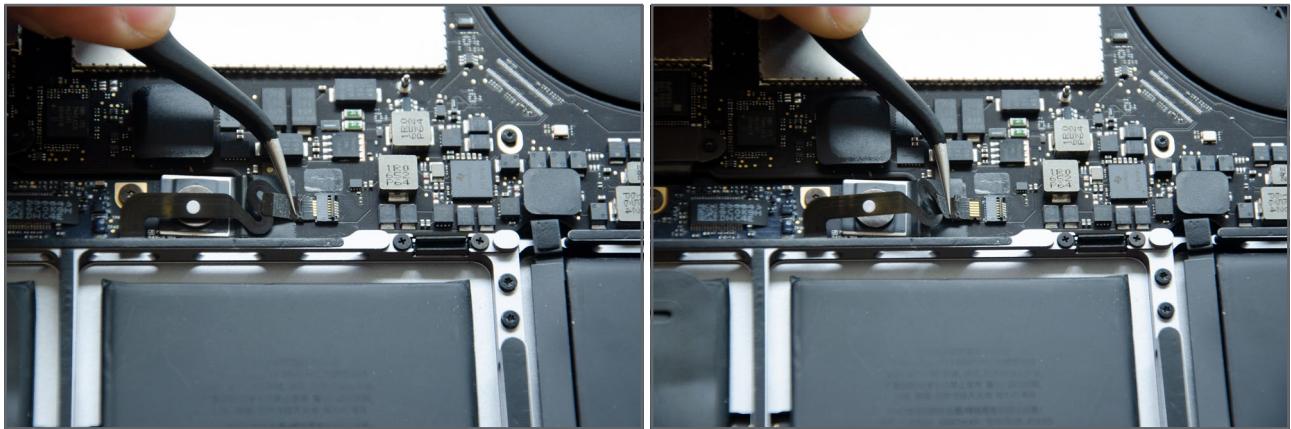
Step 9



Using the flat end of a spudger carefully lift the locking lever on the battery cable connector.

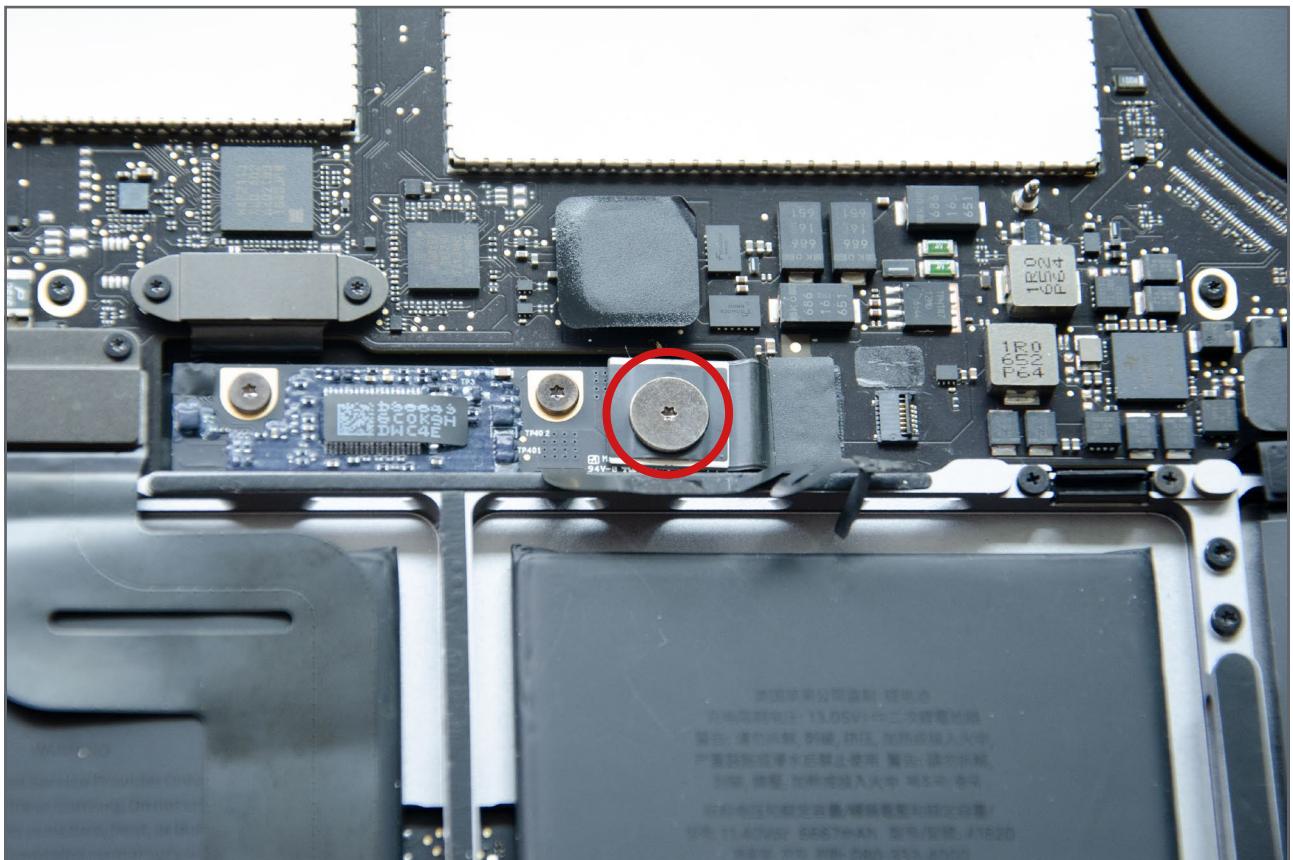


Step 10



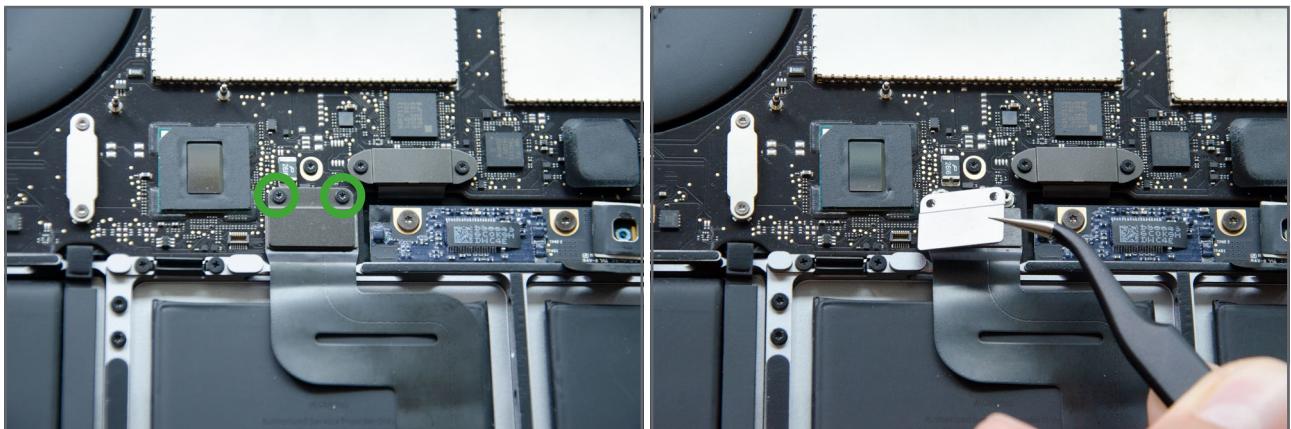
- ☞ Slide the battery cable out of the connector.
 - ☞ The battery cable slides parallel to the logic board. Do not lift the cable upwards.
-
- i** The following instructions apply only to 2018 and 2019 model MacBooks.
- ☞ If the MacBook is a 2018 or 2019 model then the battery cable is removable from the battery board.
 - ☞ Using pointed end of a spudger lift the locking lever of the small connector at the other end of the battery cable.
 - ☞ Slide the battery cable out of the connector and store it. The cable will be required for the new battery.

Step 11



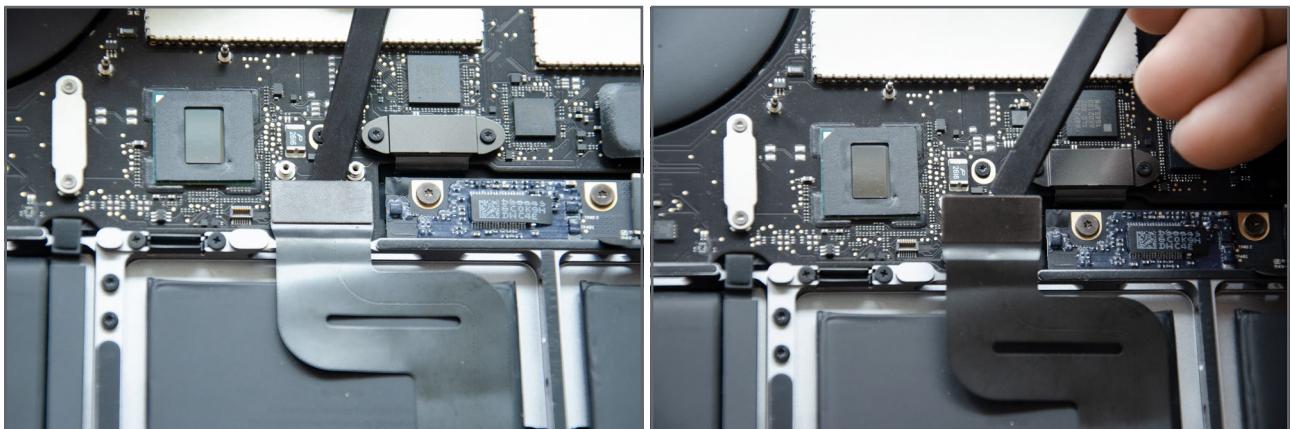
- 👉 Using a **Torx T5 screwdriver** remove the large flat screw from the main battery power connector.

Step 12



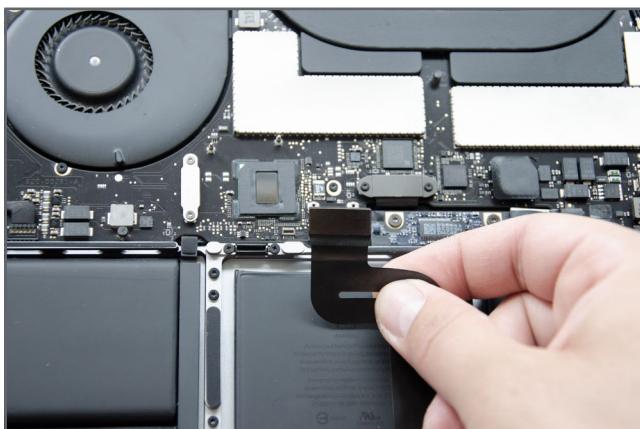
- 👉 Using a [Torx T3 scredriver](#) remove the two screws holding the trackpad connector securing bracket, then remove the bracket.

Step 13



- 🔧 Using the flat end of a spudger disconnect the Trackpad connector. Carefully lever the connector directly up from the logic board.

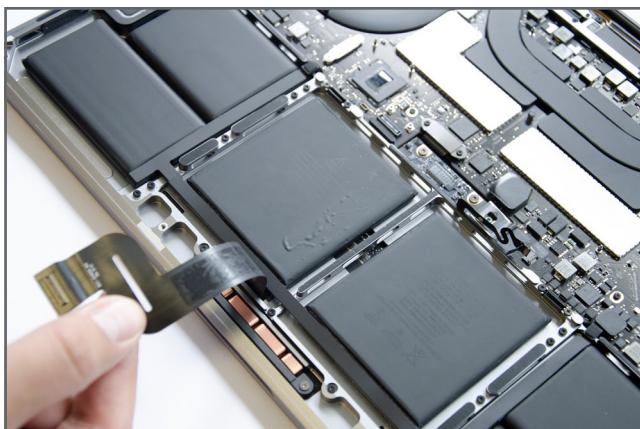
Step 14



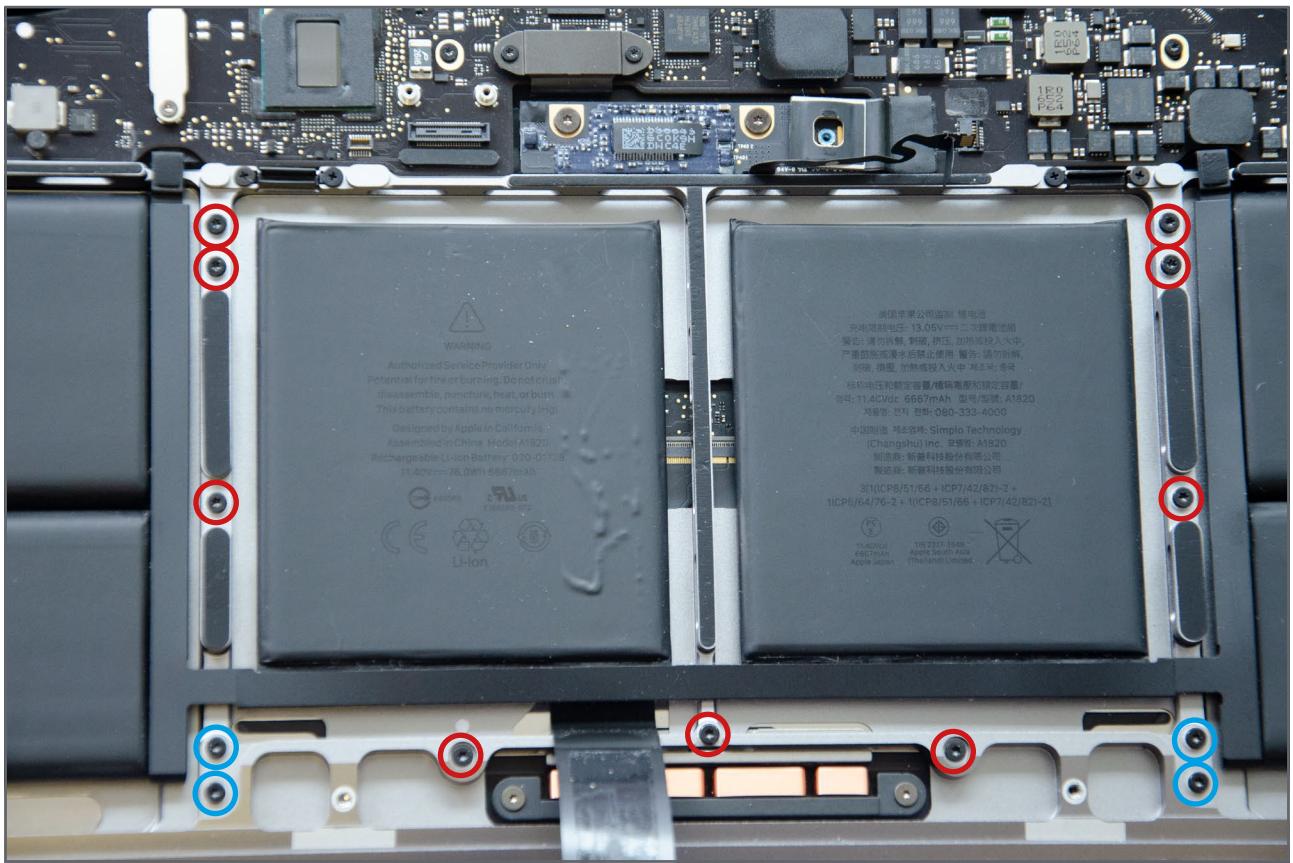
Carefully peel the trackpad flex cable away from the battery and move it out of the way.



Do not kink or break the cable. If you have difficulty removing the cable then apply heat with a hairdryer to soften the adhesive and then try again.

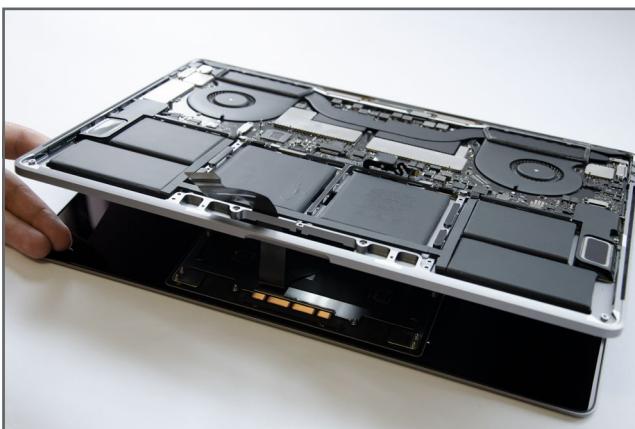


Step 15

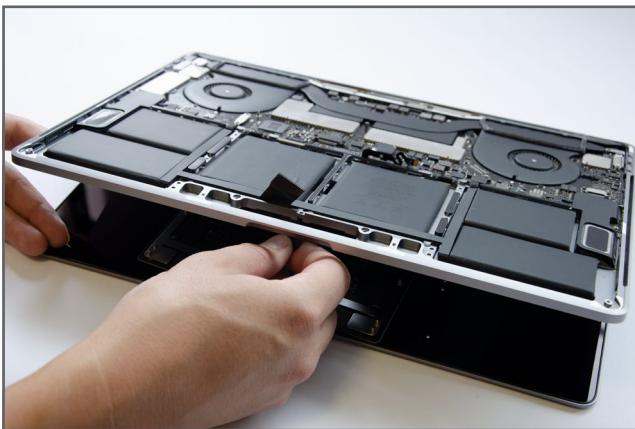


- Using a Torx T5 screwdriver** remove the following 13 screws to remove the trackpad.
- Nine **5.8 mm screws** - 3 Left top and middle, 3 right top and middle, and 3 bottom middle.
- Four **4.9 mm screws** - 2 bottom left, and 2 bottom right.
- It's very important to note the locations of the screws as installing a screw of the wrong size will damage the trackpad.**
- When reinstalling the trackpad do not fully tighten the screws. Install them loosely and then check the alignment of the trackpad. Once you are satisfied that the trackpad is aligned then you can proceed to fully tighten the screws.**

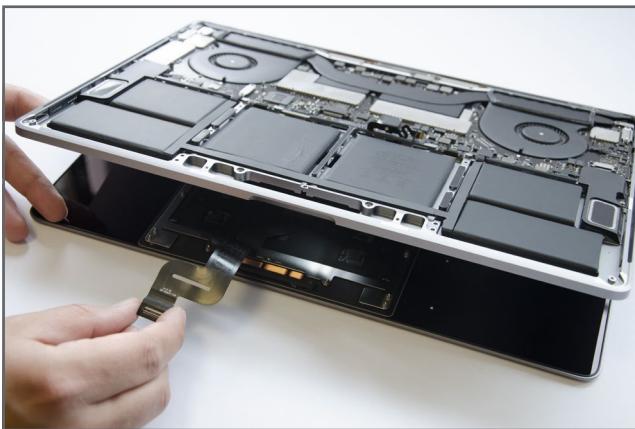
Step 16



With the MacBook upside down open the display slightly. The trackpad will detatch and lie flat on the display.

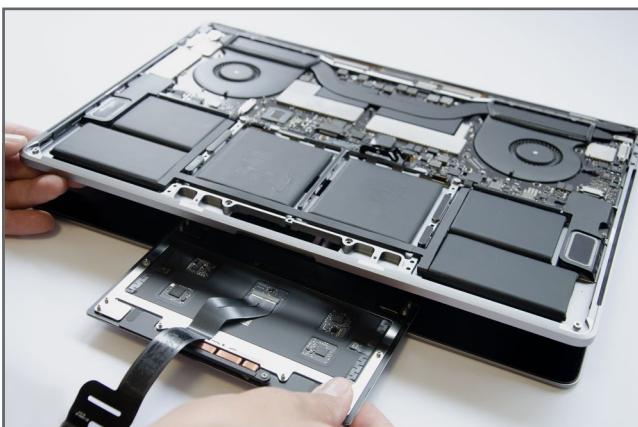


Carefully guide the trackpad flex cable through the slot in the top case.



When reassembling, ensure that you feed the trackpad flex cable through the narrower slot next to the battery and not through the larger slot.

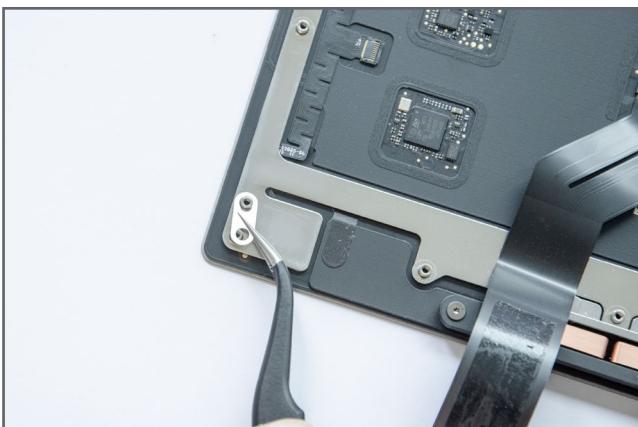
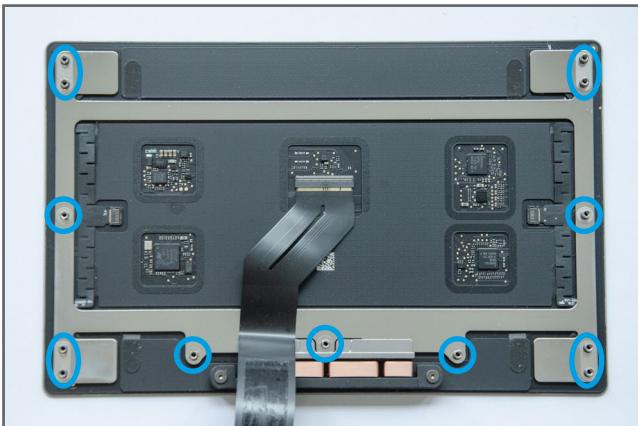
Step 17



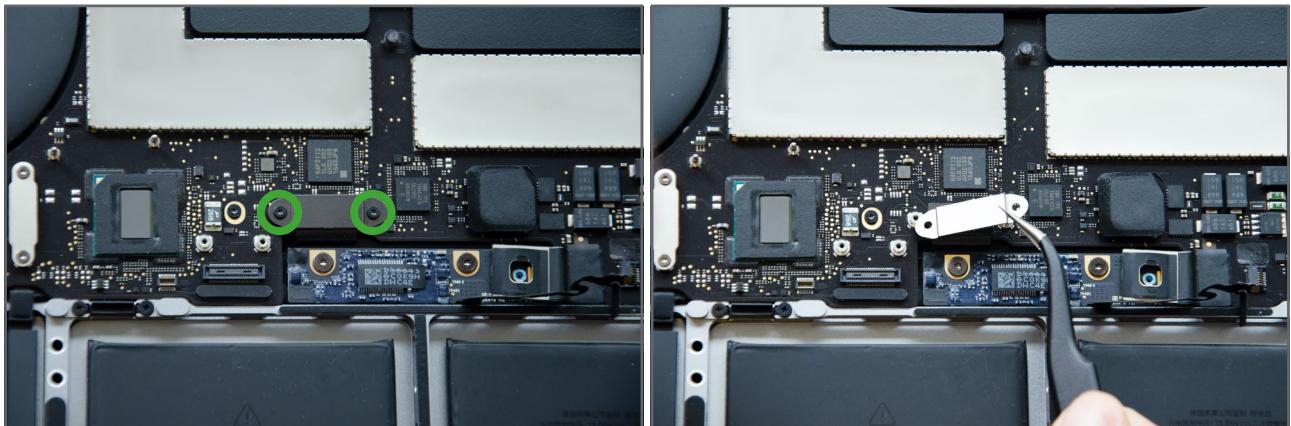
Remove the trackpad.

Be careful not to lose the small **metal shims** that sit on the screw posts as they can easily fall off. There are [9](#) of them.

If they do become detached then use tweezers to reinstall them as shown in the third image.

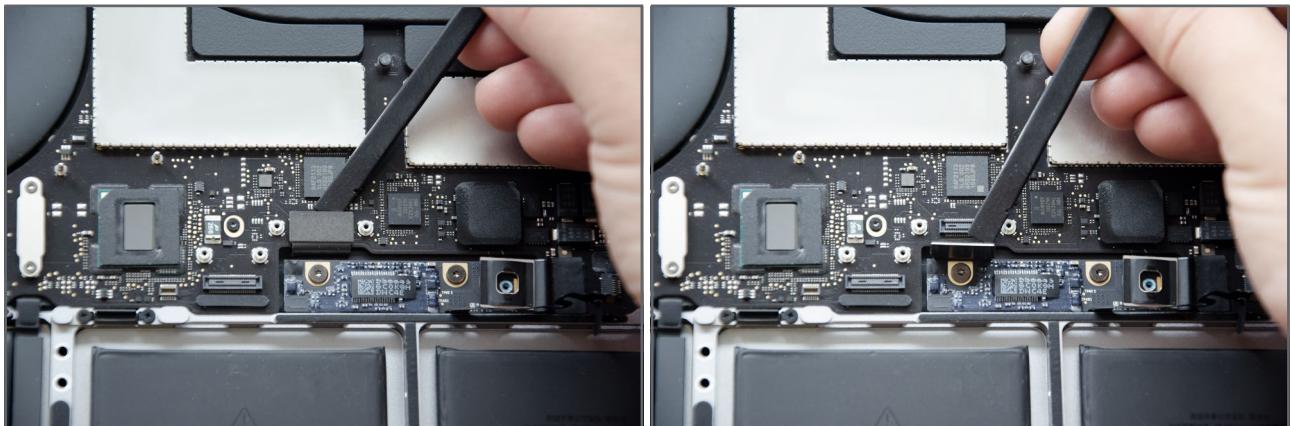


Step 18



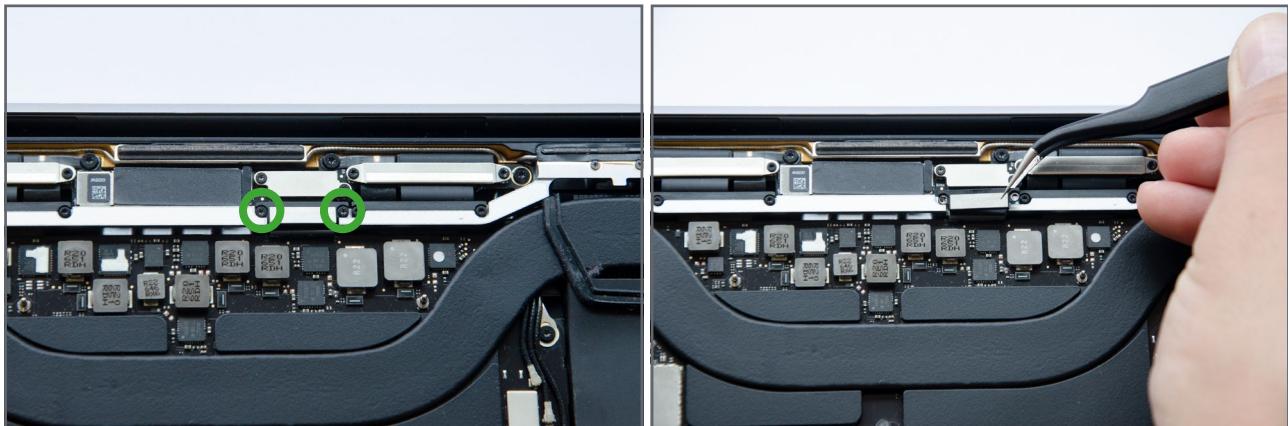
- 🔨 Using a [Torx T3 screwdriver](#), remove the two screws from the keyboard connector securing bracket, then remove it.

Step 19



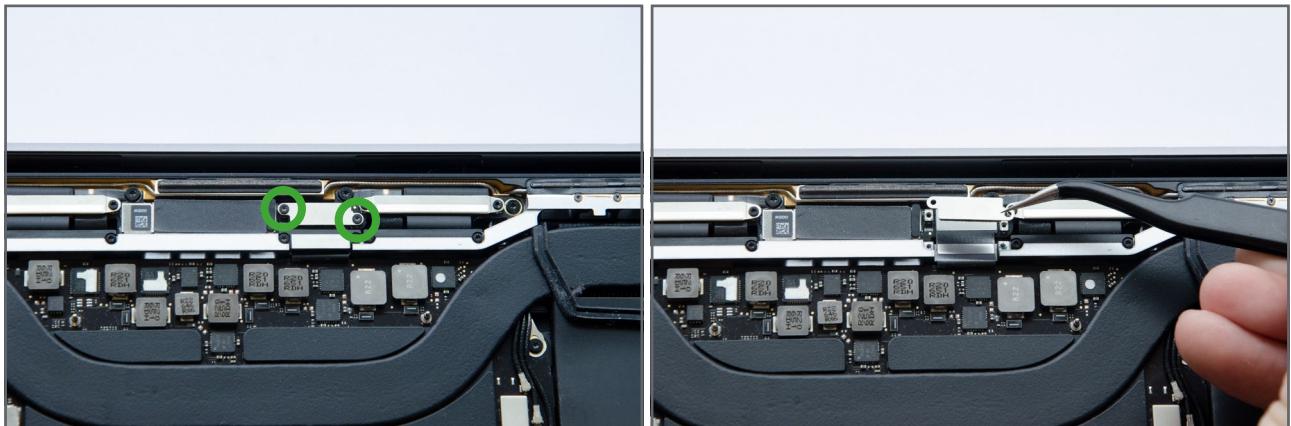
- ☞ Using the flat end of a spudger disconnect the keyboard cable connector by levering the connector directly up from the logic board.

Step 20



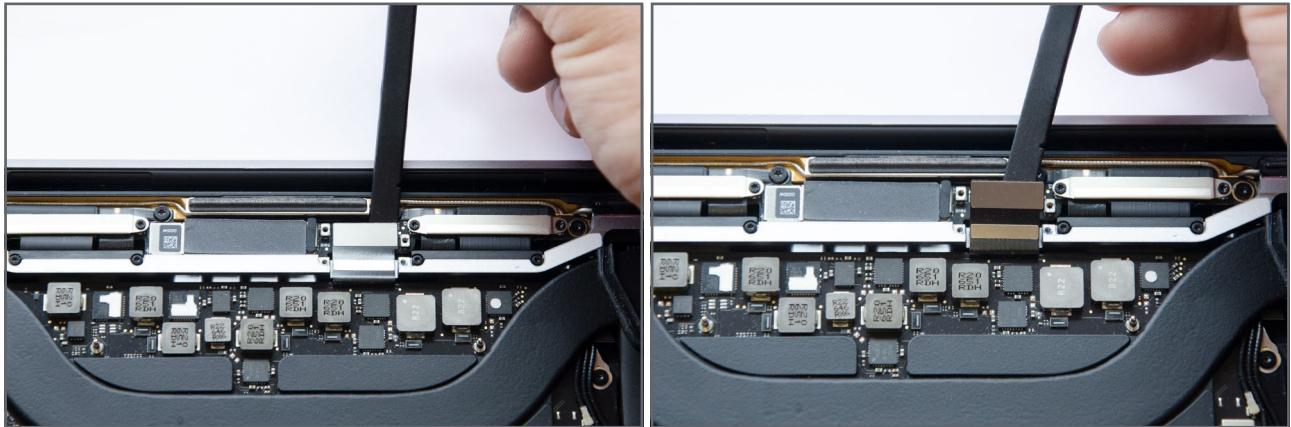
- 🔨 Using a [Torx T3 screwdriver](#) remove the two screws holding the display flex cable securing bracket, then remove it.

Step 21



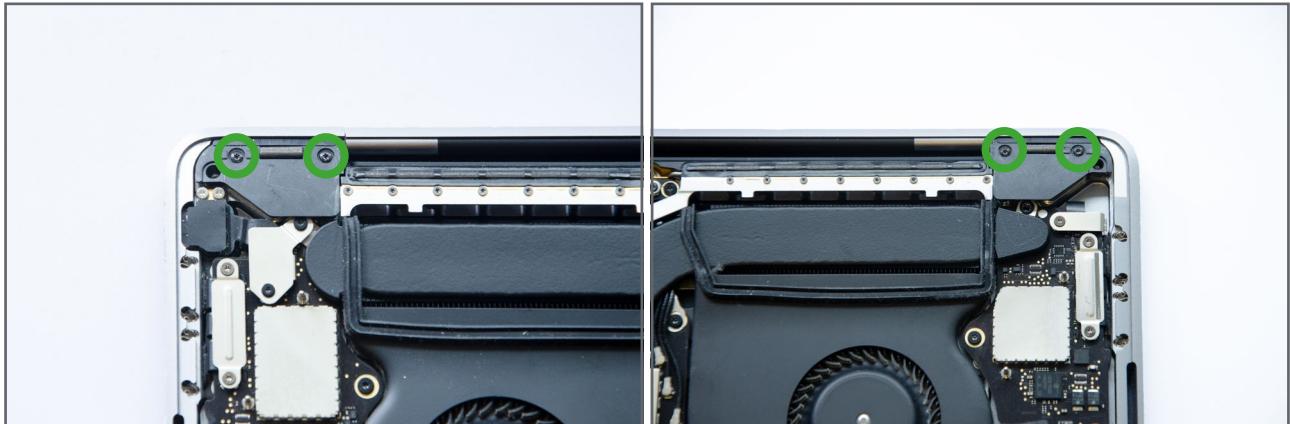
- 🔨 Using a [Torx T3 screwdriver](#) remove the two screws holding the securing bracket for the display flex cable connector, then remove the bracket.

Step 22



- ☞ Using the flat end of a spudger disconnect the display flex cable by levering the connector directly up from the display board.

Step 23

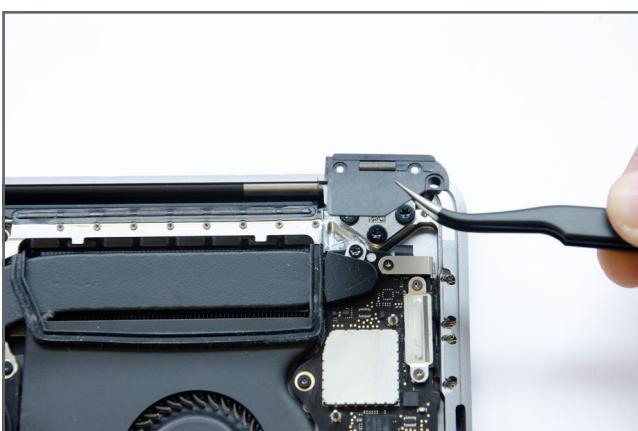
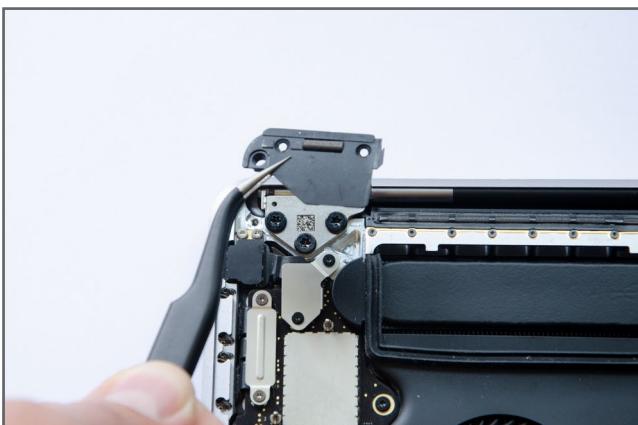


- 🔨 Using a [Torx T3 screwdriver](#) remove the two screws securing each hinge cover. 4 screws in total.

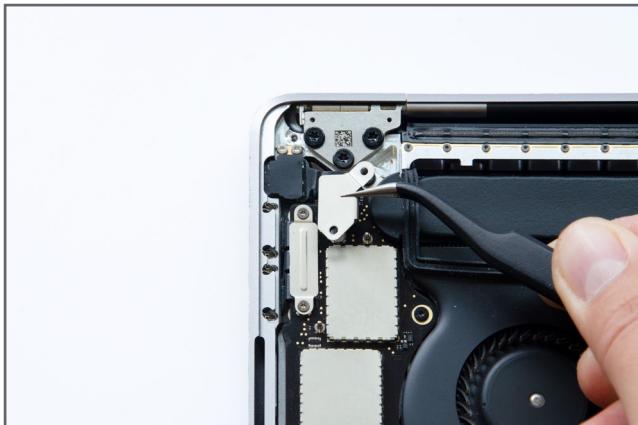
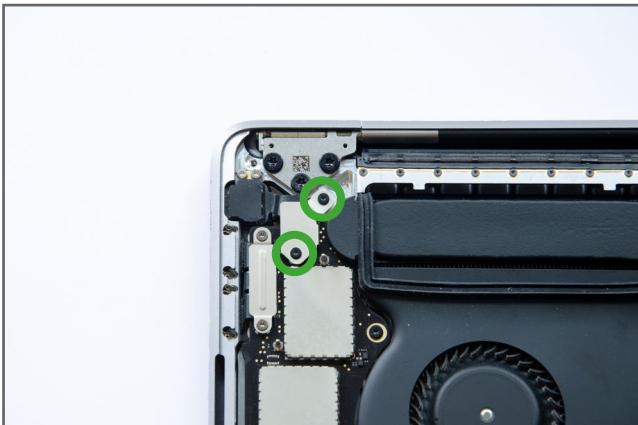
Step 24



Remove both of the hinge covers.

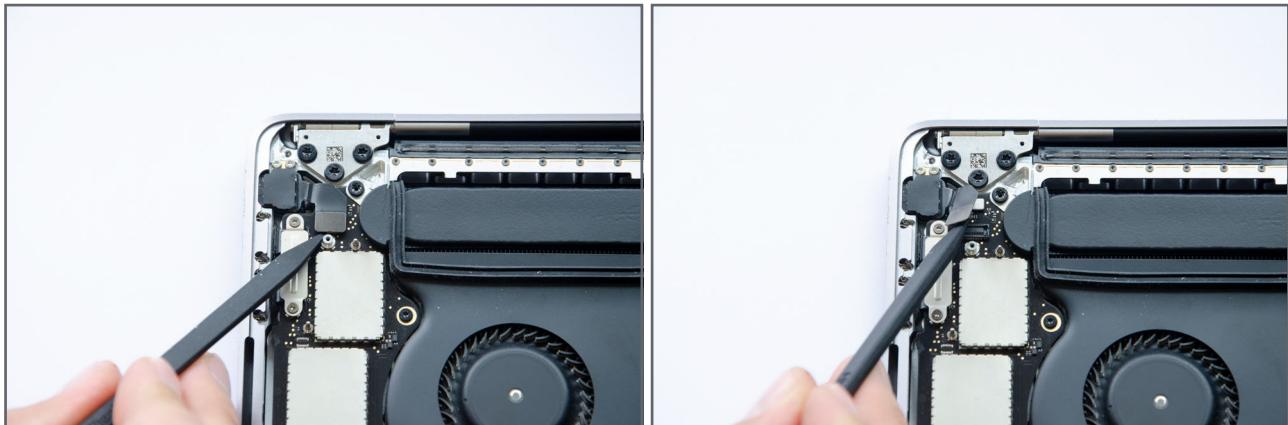


Step 25



- 👉 Using a [Torx T3 screwdriver](#) remove the two screws holding the securing bracket for the Touch ID and headphone jack cable connectors. Remove the securing bracket.

Step 26



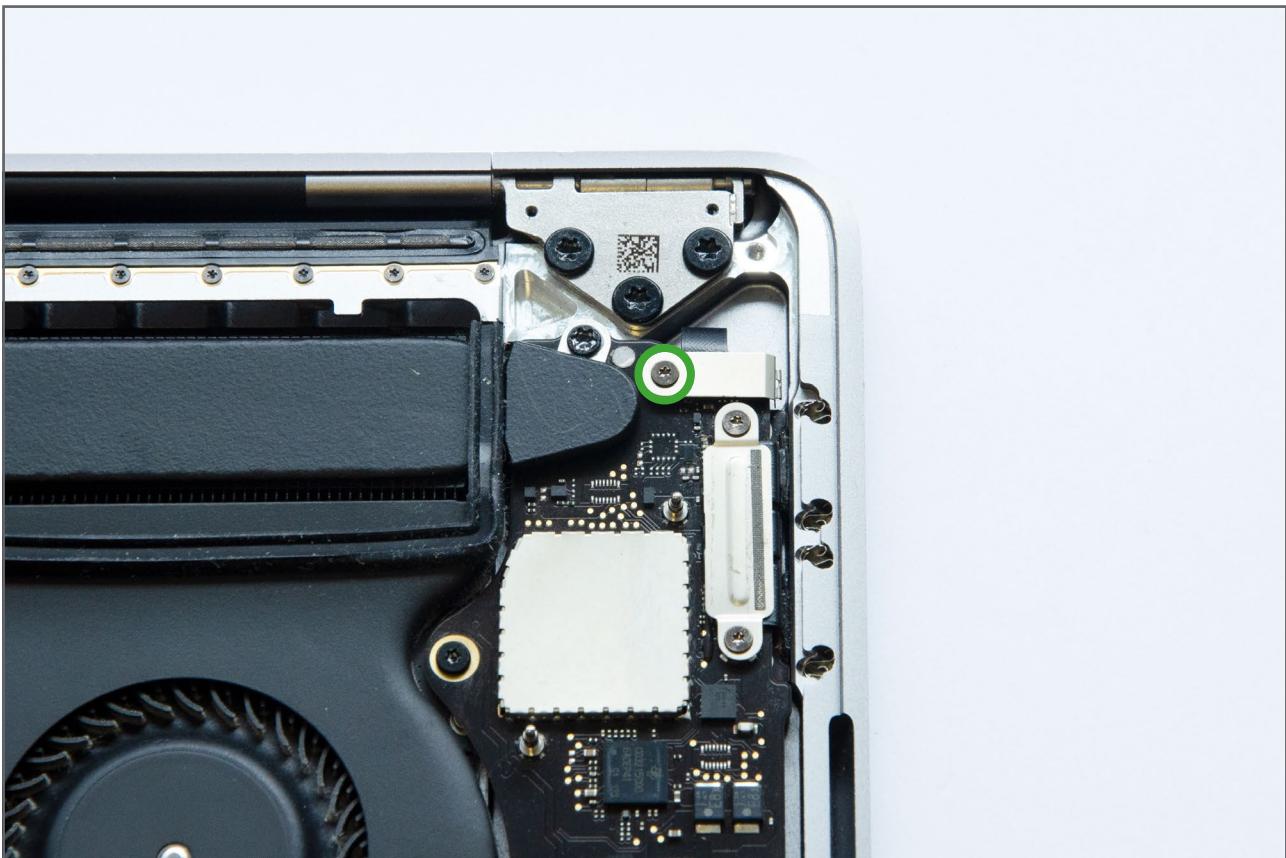
-  Using the pointed end of a spudger disconnect the headphone jack cable by levering the connector direct up from the logic board.

Step 27



-  Use the pointed end of a spudger to disconnect the Touch ID cable by levering the connector directly up from the logic board.

Step 28



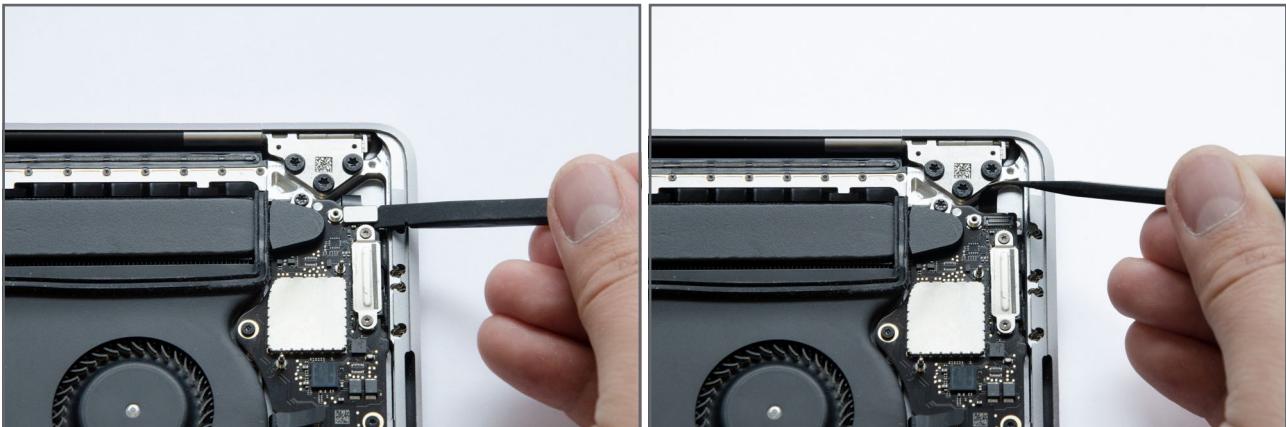
- 👉 Use a [Torx T3 screwdriver](#) to remove the screw holding the securing bracket for the Touch Bar connector.

Step 29



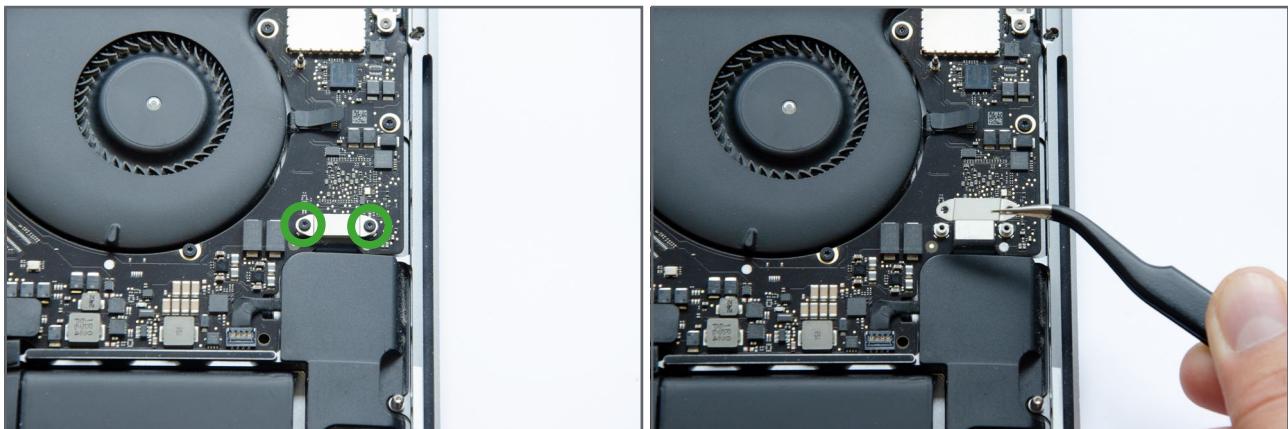
- 🔧 Using tweezers, lift the securing bracket slightly and move the securing bracket toward the edge of the logic board until it clears the retaining hook on the logic board.

Step 30



- 🔧 Using the flat end of a spudger disconnect the Touch Bar cable by levering it up from the Logic board.

Step 31



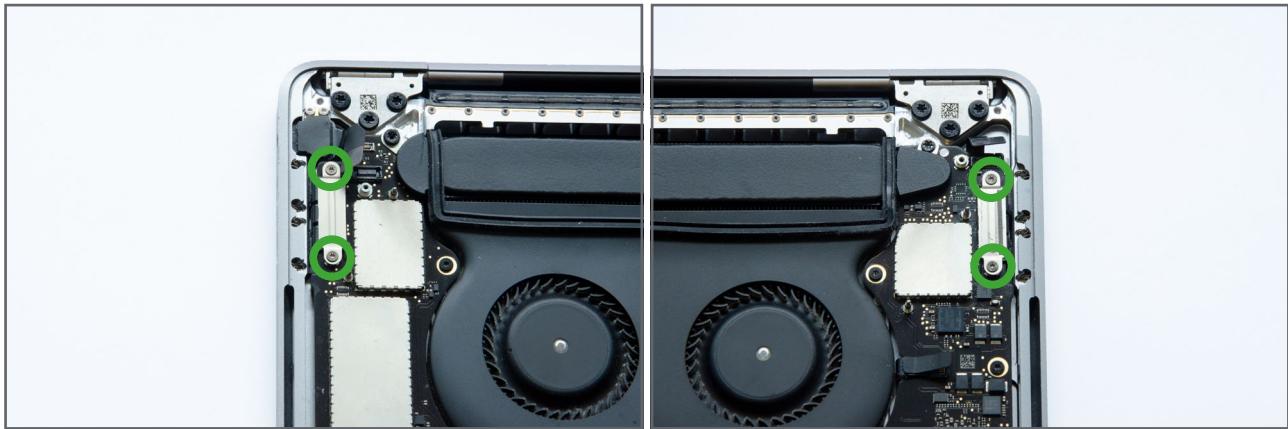
- 👉 Using a [Torx T3 screwdriver](#) driver remove the two screws holding the securing bracket for the second Touch Bar cable and remove the bracket.

Step 32



-  Using the flat end of a spudger disconnect the Touch Bar cable by levering the connector up from the logic board.

Step 33



 Using a [Torx T3 screwdriver](#) remove the four screws holding the USB-C board flex cable securing brackets:

Two screws on the left

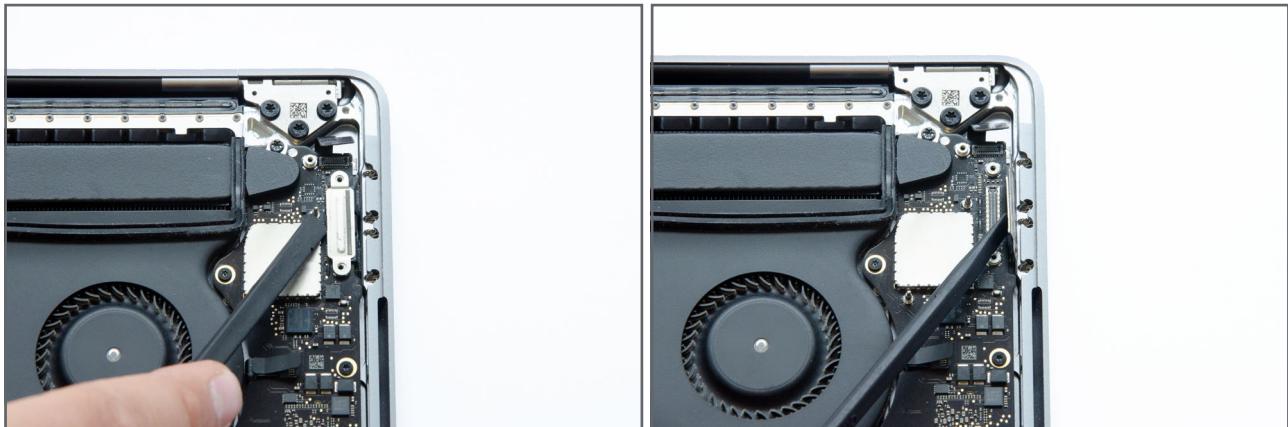
Two screws on the right

 Important information:

On 2016 and 2017 MacBooks the brackets are part of the connector. Do not attempt to separate the brackets from the connector. Move to the next step.

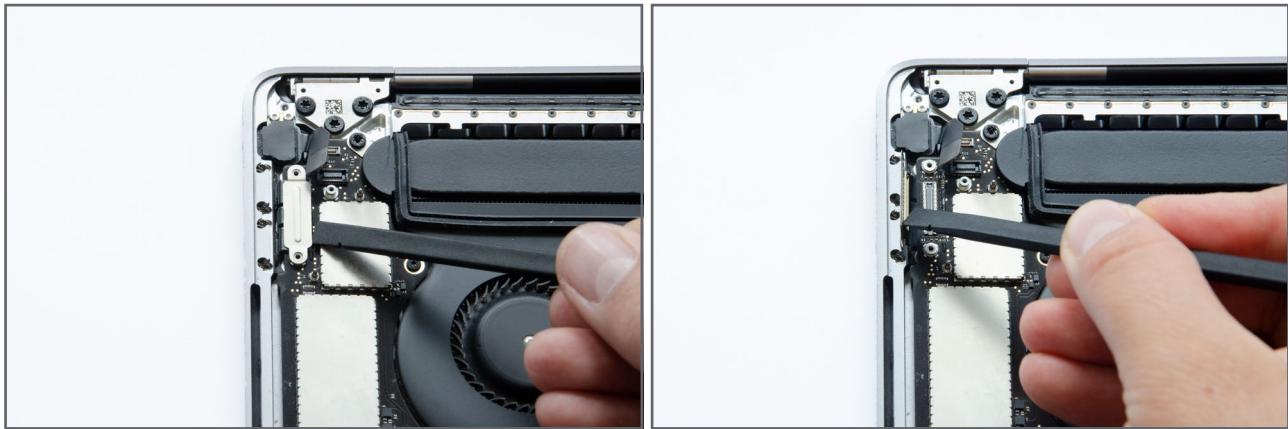
On 2018 and 2019 MacBooks the brackets are separate from the connector. Remove the brackets before moving to the next step.

Step 34



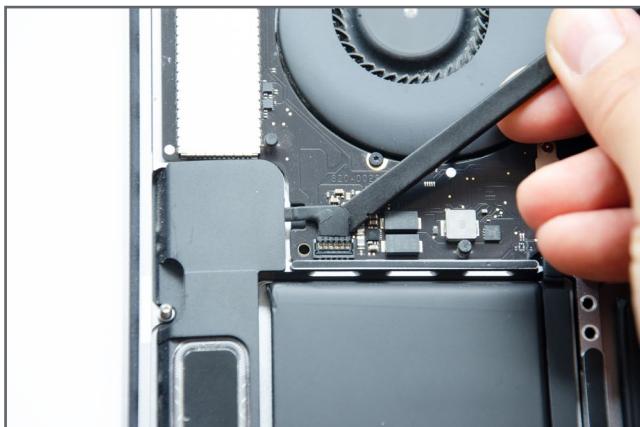
- 👉 Using the flat end of a spudger Disconnect the left-side USB-C board flex cable by levering it directly up from the logic board.
- 👉 Lever the connector from the left edge as pictured.
- 👉 Carefully move the connector out of the way so that it doesn't hinder removal of the logic board. Do not bend the cable more than 90°.
- ℹ️ Carefully move the connector out of the way so that it doesn't hinder removal of the logic board. Do not bend the cable more than 90°.

Step 35

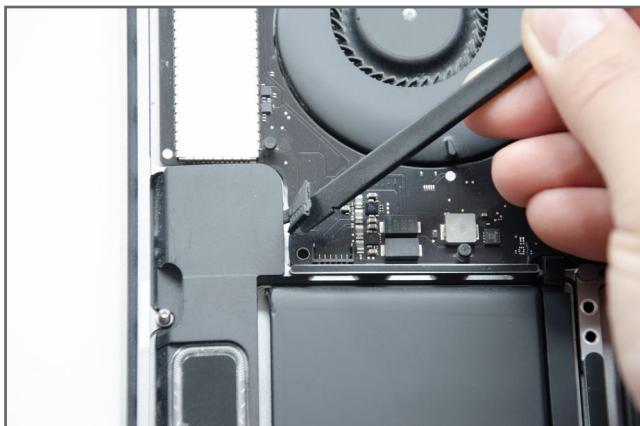


- 👉 Repeat the process to disconnect the right side USB-C board connector.
- 👉 This time lever the connector from the right edge as pictured.
- 👉 Again carefully move the connector out of the way so that it doesn't hinder removal of the logic board. Do not bend the cable more than 90°.

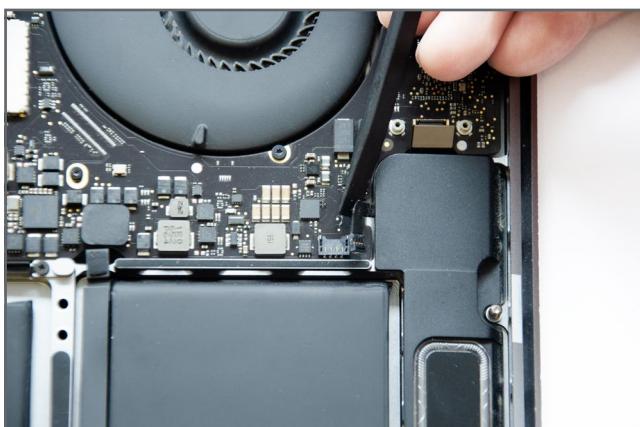
Step 36



To disconnect the left speaker cable connector carefully slide the flat end of a spudger underneath each cable. The cable has a light adhesive securing it to the logic board so you may need to gradually work the spudger underneath the cable.



When the spudger is close to the connector carefully twist the spudger to release the connector.



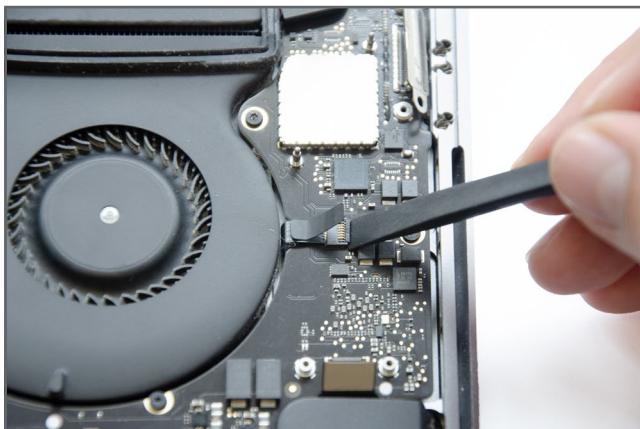
Repeat the process for the right speaker cable connector.

Step 37

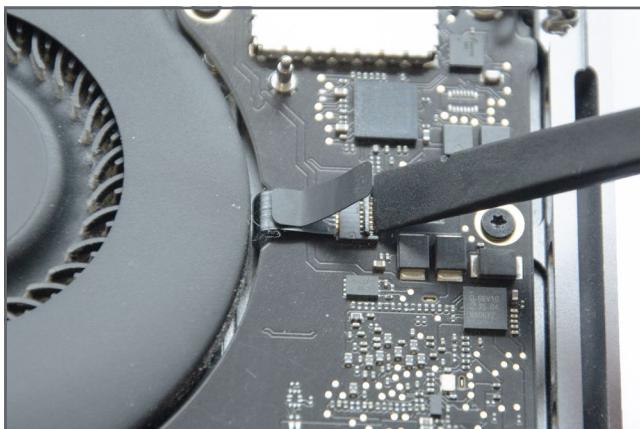
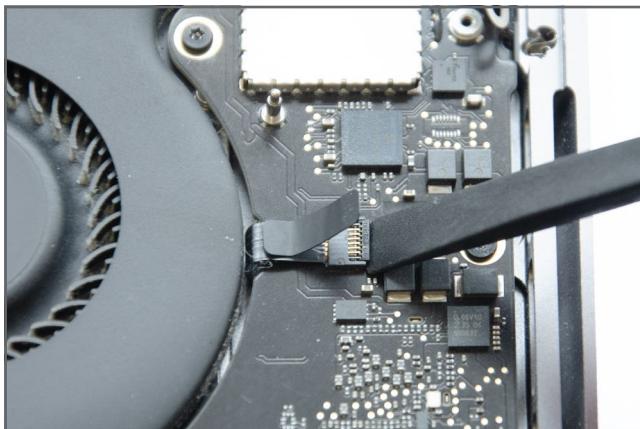


-  Carefully peel the black tape away from the microphone cable connector.
-  Only peel the tape back far enough to release it from the connector.

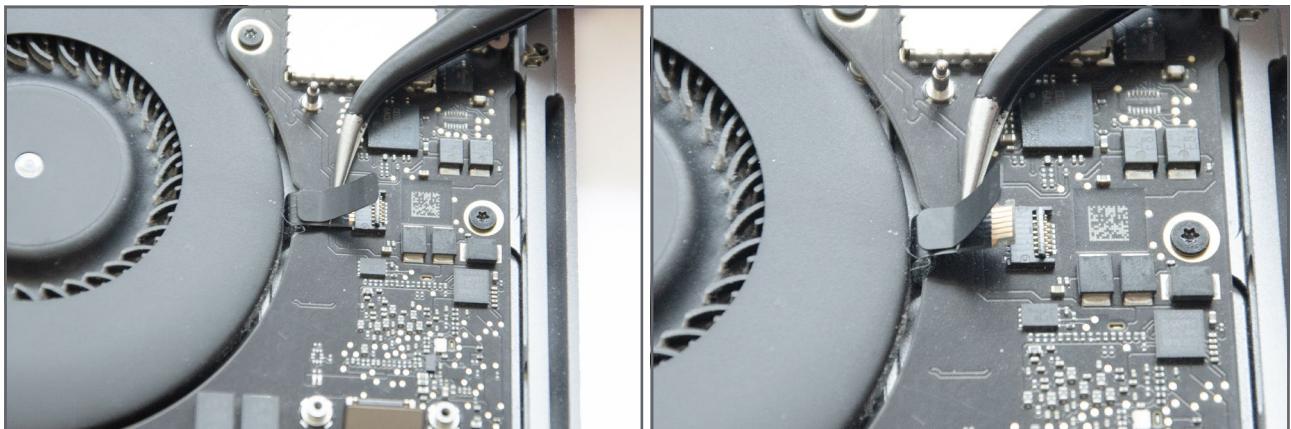
Step 38



Using the flat end of a spudger carefully lift the locking lever of the microphone cable connector.

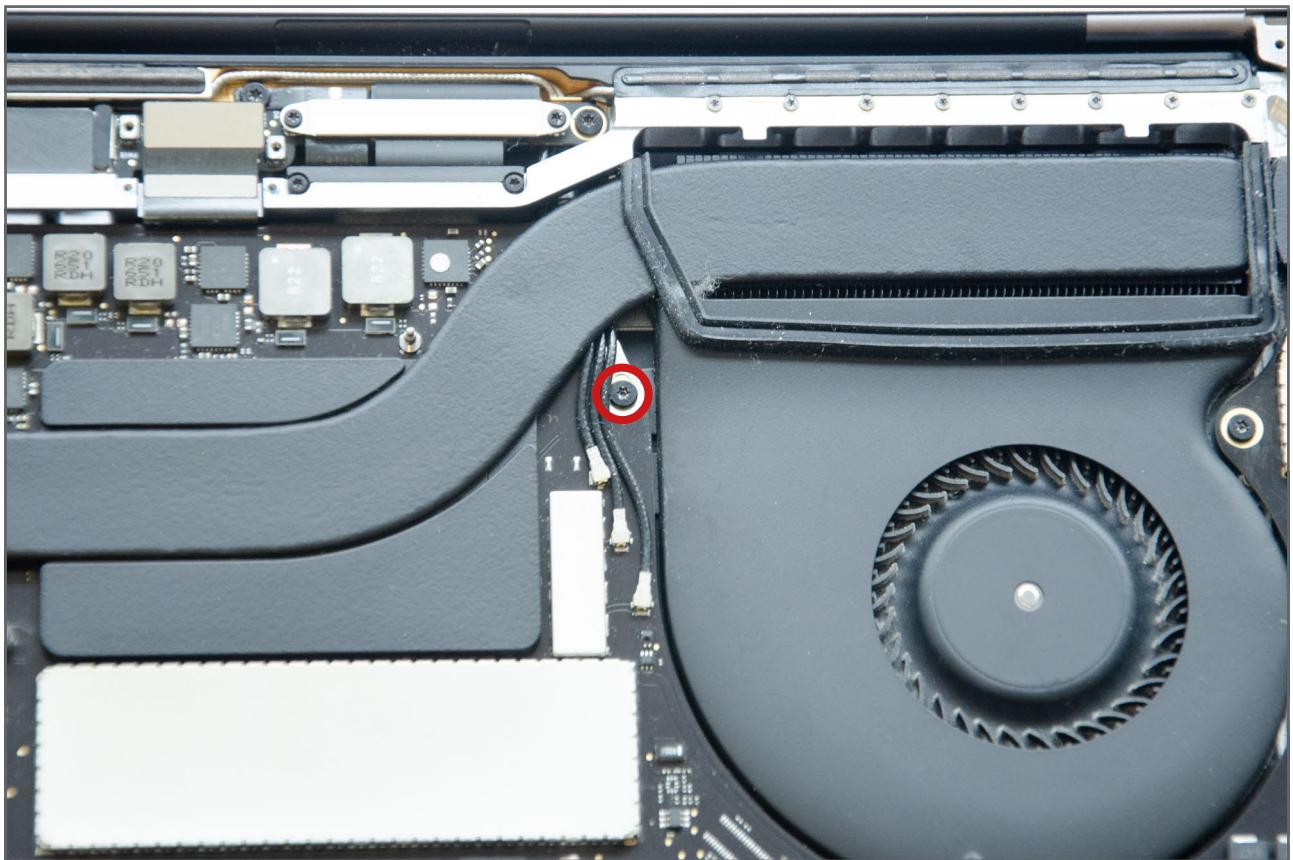


Step 39



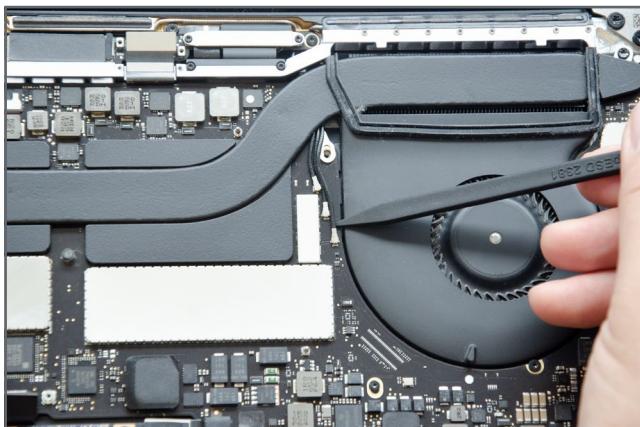
-  Using tweezers grip the tape attached to the cable and pull the cable towards the fan to release the cable from the connector. If the tape becomes detached then carefully use the tweezers to grasp the cable instead.
-  Use sticky tape to secure the cable to the fan as this will prevent the cable from becoming trapped when the logic board is reinstalled.

Step 40

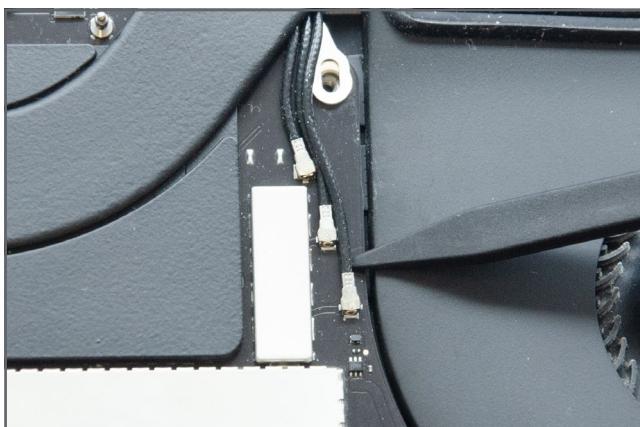


- 👉 Using a **Torx T5 screwdriver** remove the single screw holding the antenna cables securing tab.

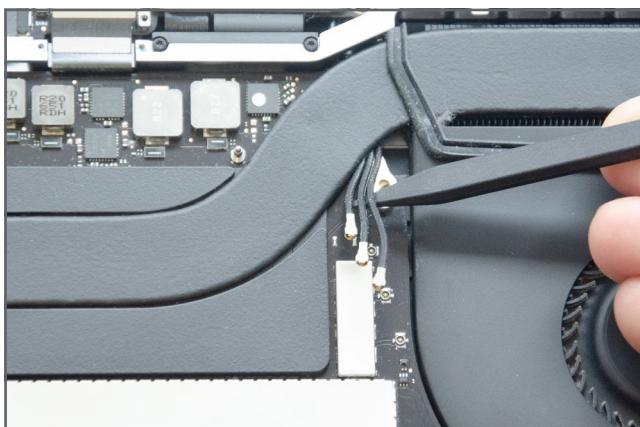
Step 41



Using the pointed end of a spudger disconnect all three antenna cables.

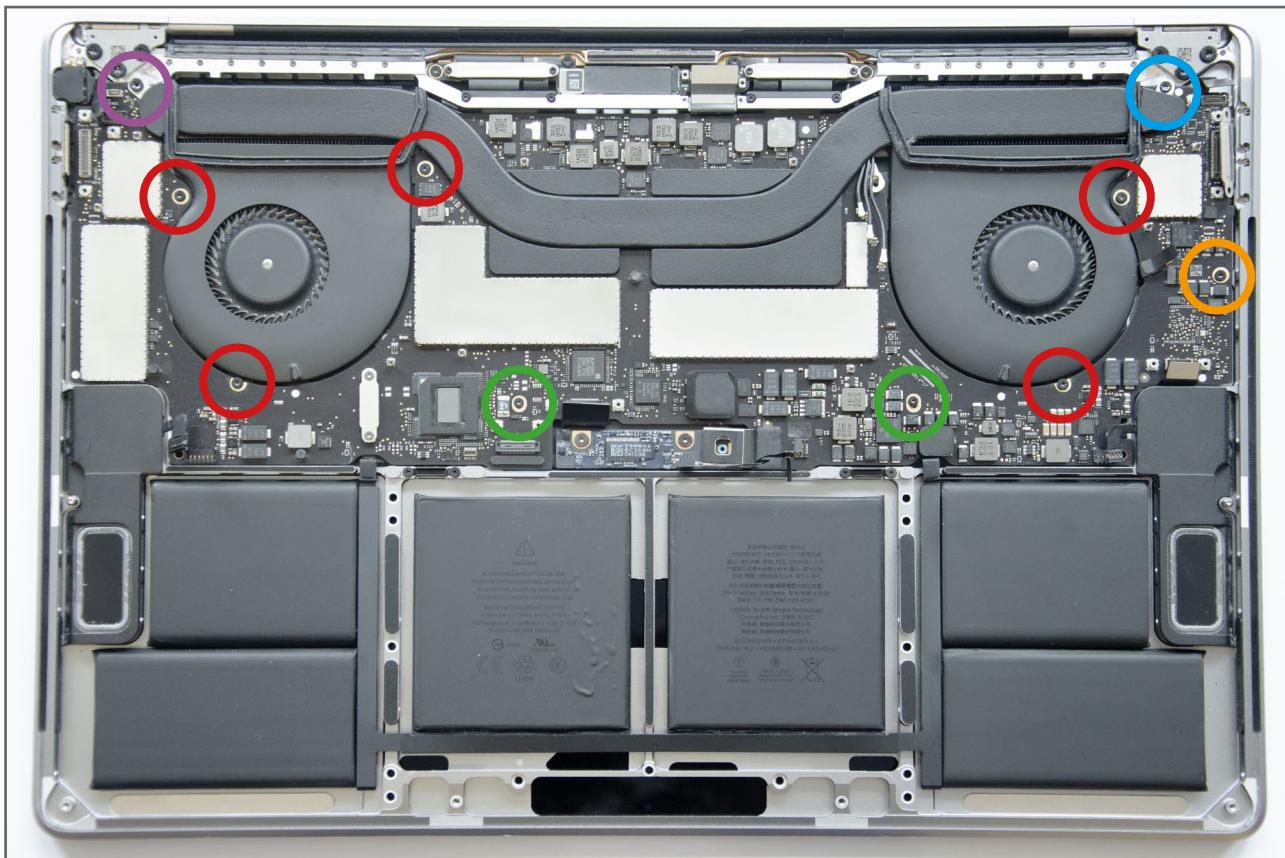


Slide the pointed end of a spudger underneath the cable close to the connector and carefully use a levering motion to release the connector.



To reconnect the cables position the connector directly on the socket and carefully press down. You should feel a slight pop as the connector clicks into place.

Step 42



 There are 10 screws securing the logic board. Remove them in the following order:

One 3.9 mm T8 Torx screw securing the heatsink at the very left.

One 3.8 mm T8 Torx screw securing the heatsink at the very right.

Five 2.9 mm T5 Torx screws

One 3.7 mm T5 Torx screw

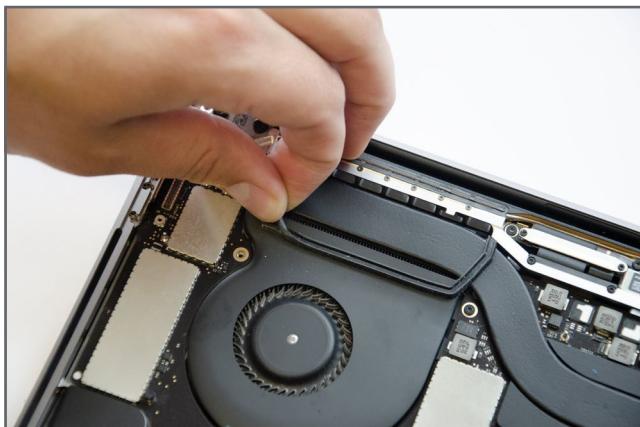
Two 2.8 mm T3 Torx screws

 Do not mix the T5 screws together as using the 3.7mm screw in the wrong position could result in damage to the keyboard and housing.

When reinstalling the logic board it's critical that these T8 screws are returned to their original positions as the 3.9mm screw contains a thread used for one of the screws securing the Touch ID and audio board bracket.

 During reassembly, install the two T8 screws first as this will help to correctly align the logic board. Do not fully tighten any of the other screws until all have been loosely installed and the alignment of the logic board has been checked.

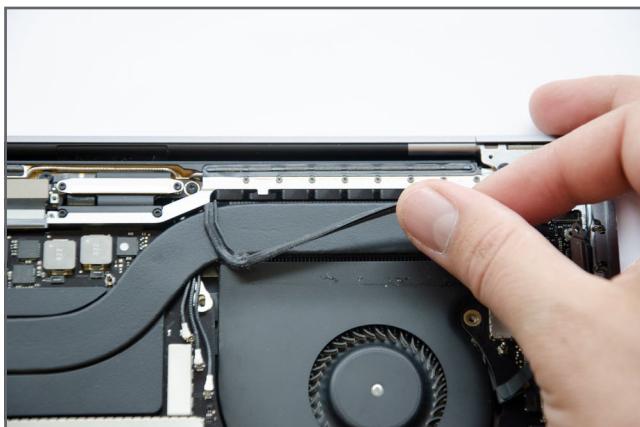
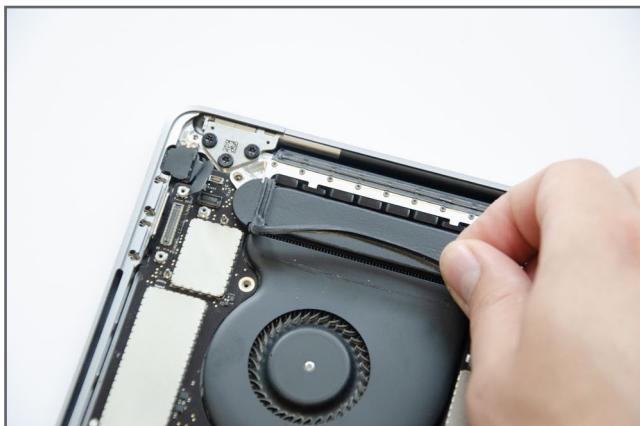
Step 43



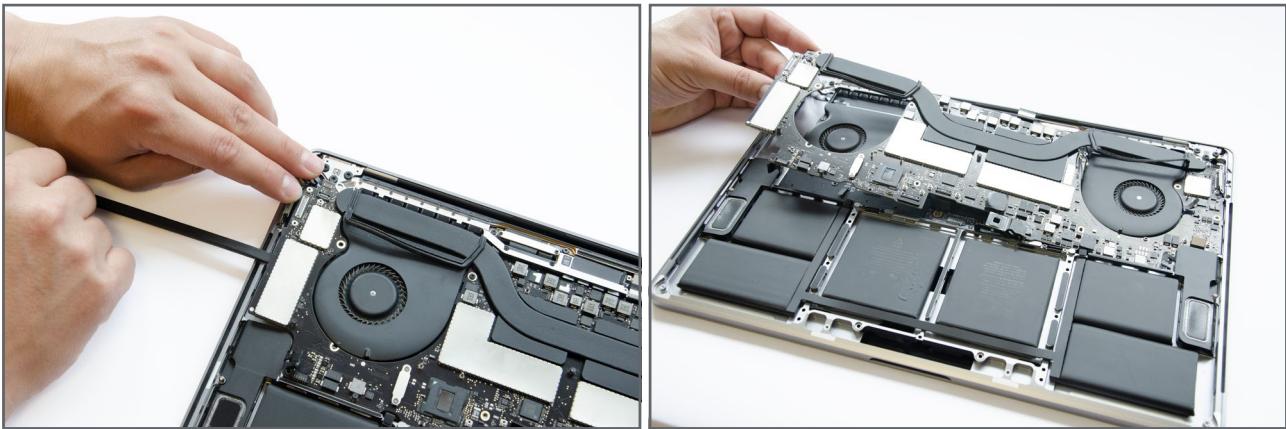
Carefull peel the rubber strips from the fans, but do not remove them from the heatsink.



if necessary the adhesive can be loosened by applying heat from a hair dryer.

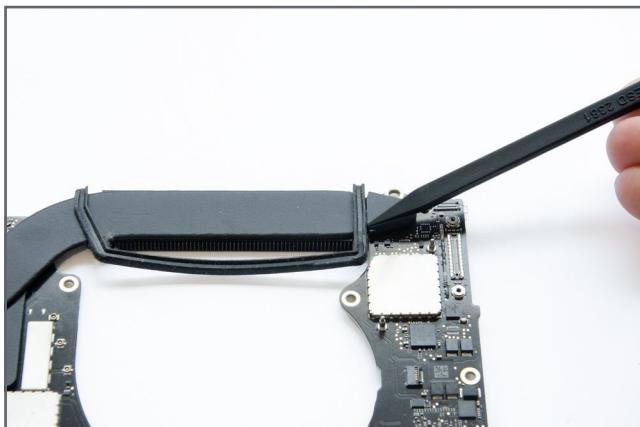


Step 44



- ☛ Use the flat end of a spudger to carefully lift up the left side of the logic board while keeping the USB-C board, audio board, and touch ID flex cables out of the way.
- ☛ Once the logic board is high enough take hold of it at the left side with your fingers and move the antenna cables and securing tab to the right so that they clear the logic board. Continue to lift from the left side while checking for snagged cables. Once the logic board is free of all cables you can proceed to remove the logic board.
- ⚠ If you encounter any resistance when lifting stop and check for any cables that may have snagged on the logic board. If there is still resistance to lifting then review step 43 to ensure that all screws have been removed, and then review step 44 to ensure the rubber strips have not rebonded to the fans.

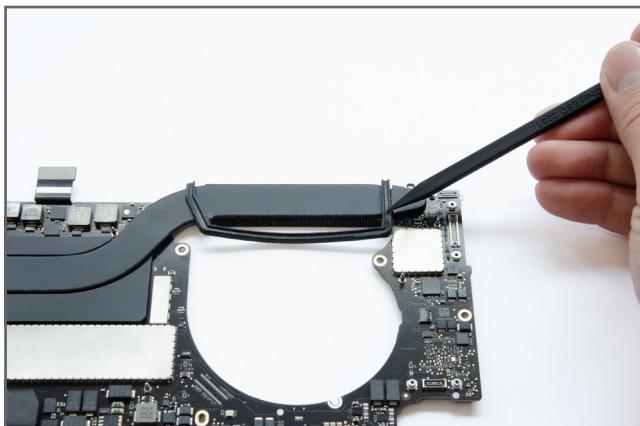
Step 45



Reinstalling the logic board is the reverse of the previous procedure.



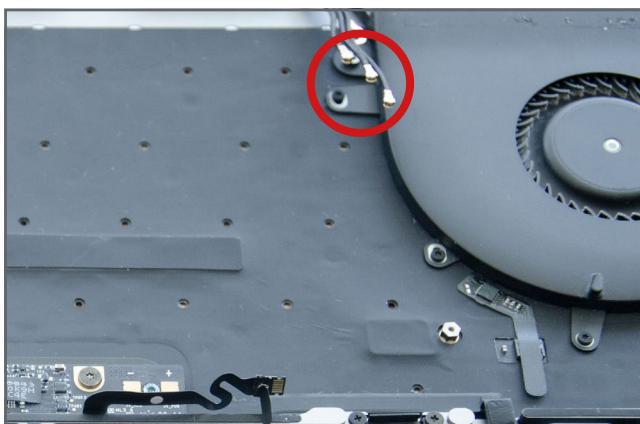
Ensure that the rubber gaskets on the heatsink are correctly installed and aligned.



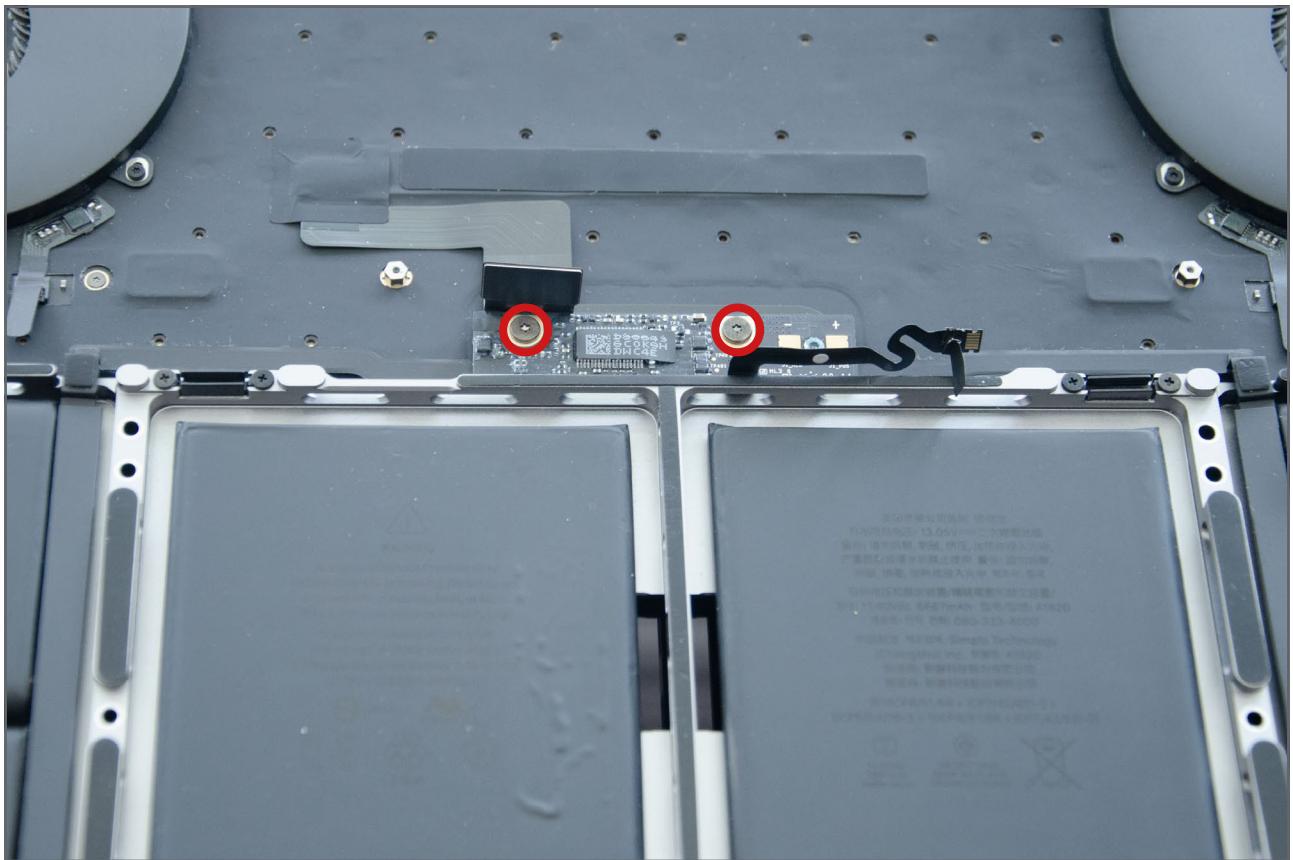
Move the **antenna cables** and securing tab to the right to ensure they clear the logic board. As you lower the logic board into position lift and move the antenna cables and securing tab up and to left so that they are above the logic board.



Before proceeding further do a final check to ensure that no cables are trapped underneath the logic board.



Step 46



 There are two screws securing the battery board.

For 2016 and 2017 models use a [T5 Torx screwdriver](#) to remove the screws.

 For 2018 and 2019 models use a P2 Pentalobe screwdriver to remove the screws.

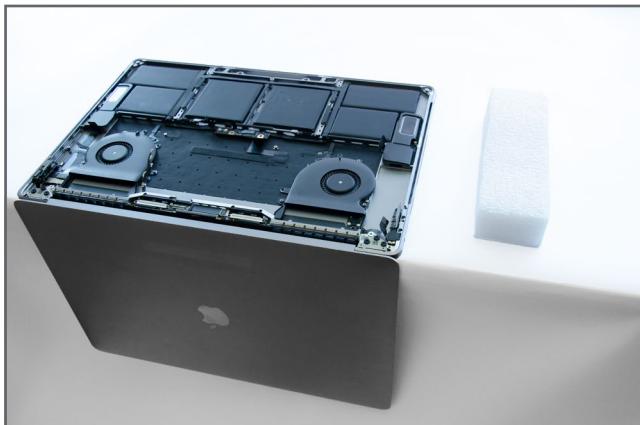
Step 47



The adhesive solvent included in the kit can damage the display's anti-glare coating and also the keys on the keyboard.



Open the MacBook's display to 90° and place upside down on a table/desk so that the display hangs over the edge.



Step 48



-  Prop up the right side of the Macbook using a book or foam wedge. This will allow the adhesive solvent to flow underneath the battery cells.

Step 49

- !** Below is important safety information that we highly recommend is followed.
- !** The LMP adhesive solvent is a mild skin and eye irritant.
- !** Always wear eye protection when handling and applying the adhesive solvent. (Eye protection is not included in your kit.)
- !** DO NOT perform this procedure if you wear contact lenses and do not have eye protection. The adhesive solvent can dissolve some types of contact lenses should it come into contact with them, and may cause eye injuries as a result of the reaction.
- i** Protective gloves are highly advisable but are not included in the kit.



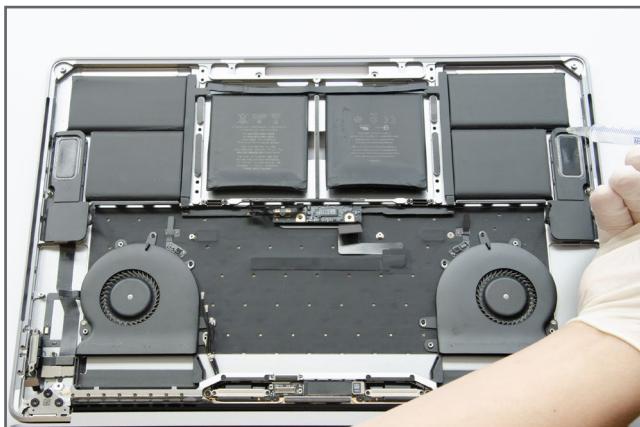
- !** Use a small flat screwdriver or tweezers to remove the centre part of the bottle cap. This will reveal a rubber seal.

Step 50



- ☛ Insert the needle through the rubber seal and draw the solvent into the syringe as shown.
- ☛ With the needle still inserted into the bottle push the plunger just enough to expel any air that is in the syringe.

Step 51



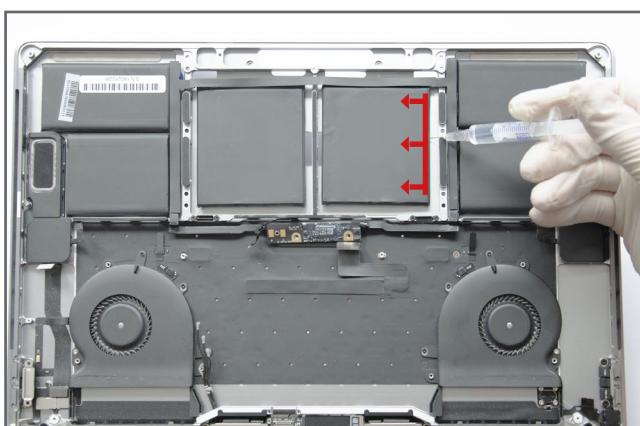
With the support under the right side of the MacBook, as shown in step 49, apply the solvent along the right edges of the two rightmost battery cells and then along the right edge of the middle right cell.



You do not need to use a lot of solvent. The bottle contains more than sufficient to remove all of the cells.



Do not rush the following steps. You will need to work slowly and patiently to avoid damage.



Step 52



After around 2 minutes insert the sharp end of the included spatula under the longer of the two rightmost cells starting from the rear edge.



If this is difficult to do then add some more solvent and wait a further 3 or 4 minutes before proceeding.



Be careful not to deform the cell. A damaged or punctured cell can leak toxic electrolyte, and possibly ignite if the battery hasn't been sufficiently discharged before beginning this procedure.



Work the spatula under the cell with a wiggling motion along the entire length of the cell to release the adhesive.



Lift the cell, but don't remove it. This will give you the space needed to work the spatula under the smaller rightmost cell. Use the same method as before to release the adhesive.



Repeat the process for the right middle cell starting at the right side of the cell but again do not remove it.

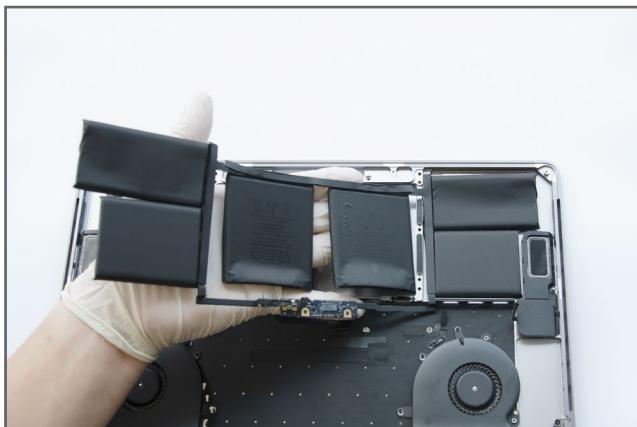


Step 53

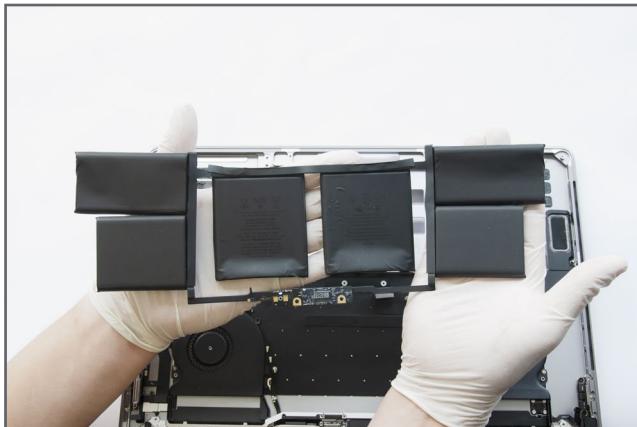


- Move the support to the left side of the MacBook and apply the solvent as described in step 52 but this time along the left side of the three lefthand cells.
- Repeat the removal process as described in step 54, but this time work from the rear and left side of the cells.

Step 54



Once all the cells have been released from the adhesive the battey can be lifted out from the MacBook.



Any remaining adhesive still attached to the MacBook housing needs to be removed before the new battery can be installed.



Large strips can be peeled away using tweezers.

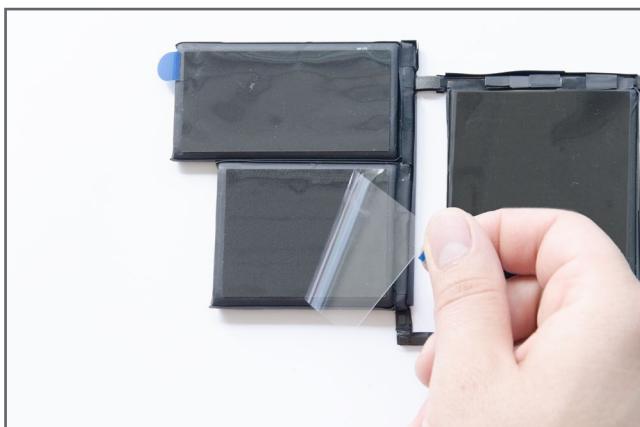


Any remaining bits of adhesive need to be scraped away using the supplied spudger.



This can take quite a bit of work, so be patient. Also using more solvent on the remaining adhesive can help with the removal.

Step 55



Before removing the adhesive covers on the battery place the battery in the housing and check the alignment of the battery and especially the alignment of the battery board screw holes.



Batteries for 2016 and 2017 MacBook models have an attached battery cable. Ensure that this cable does not get trapped under the battery board.



Carefully peel away the plastic adhesive covers away from the bottom of the battery.



Carefully place the battery into the housing paying while particular attention to the alignment of the battery board screw holes.



When you are satisfied that everything is correctly fitted and aligned apply light pressure to each of the cells to fully activate the adhesive.



Carefully peel off the plastic cover on the top side of the battery.



Step 56

- ⚠** Follow the disassembly steps in reverse order to reassemble the MacBook.
- ⚠** It is highly recommended that the battery is fully calibrated after being replaced. To do this charge the MacBook fully to 100% and then keep it charged for a further 2 to 3 hours. Then use the MacBook on battery power only until the MacBook enters sleep mode due to low battery charge. Leave overnight or for at least 5 hours and then charge the battery to 100%.
- i** Should you notice any issues or strange behavior with the MacBook after completing the battery replacement it is recommended that you reset the PRAM and the SMC.