

Guide: Battery Replacement



LMP BATTERY MACBOOK PRO 13" THUNDERBOLT 3

From 10/16, built-in, Li-Ion Polymer, A1713 & A2171, 11.4V, 54.5Wh

P/N 23194

SUPPORTED APPLE DEVICES:

- MacBook Pro (13-inch, 2016, Two TB 3 Ports)
- MacBook Pro (13-inch, 2017, Two TB 3 Ports)
- MacBook Pro (13-inch, 2019, Two TB 3 Ports)*
- MacBook Pro (13-inch, 2020, two TB 3 Ports)*
- MacBook Pro (13-inch, M1, 2020)*

*The instructions for these MacBooks will follow in the next manual revision.

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

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.
-  Using a Pentalobe P5 screwdriver remove the 6 screws securing the the bottom case:
Two 6.2 mm screws, two 5.3 mm screws and two 3.4 mm screws.
-  Note the location of each screw as they will need to be returned to the same position otherwise damage may occur.

Step 2



-  There are 4 securing clips that need to be released before the bottom case can be removed.
-  Press the suction cup in the front middle between the screw holes and lift just enough to insert the prying pick. Do not insert the pick further than 10mm (0.4 of an inch).

Step 3



- Move the pick around the edge and up to the middle of the left side. You should hear and feel a pop as the first securing clip is released.






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



- Lift up the front edge of the bottom case just 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 clips, and do not attempt to remove the bottom case at this point.



Step 4



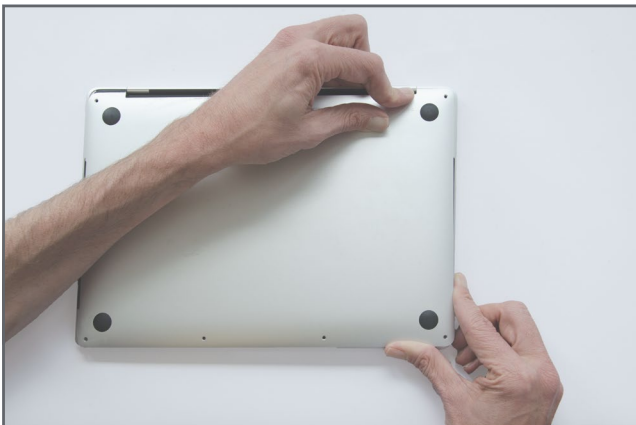
-  It is highly recommended that thick protective gloves are worn while performing this procedure as the bottom case has sharp metal edges.
-  Grasp the right front corner of the bottom case and firmly pull it towards you until the bottom case releases. This may require quite a bit of force.
-  Repeat the process for the left side in necessary.

Step 5



-  Always pull parallel to the main housing, never pull upwards.
-  It should now be possible to remove the bottom case.

Step 6



To reinstall the bottom case:

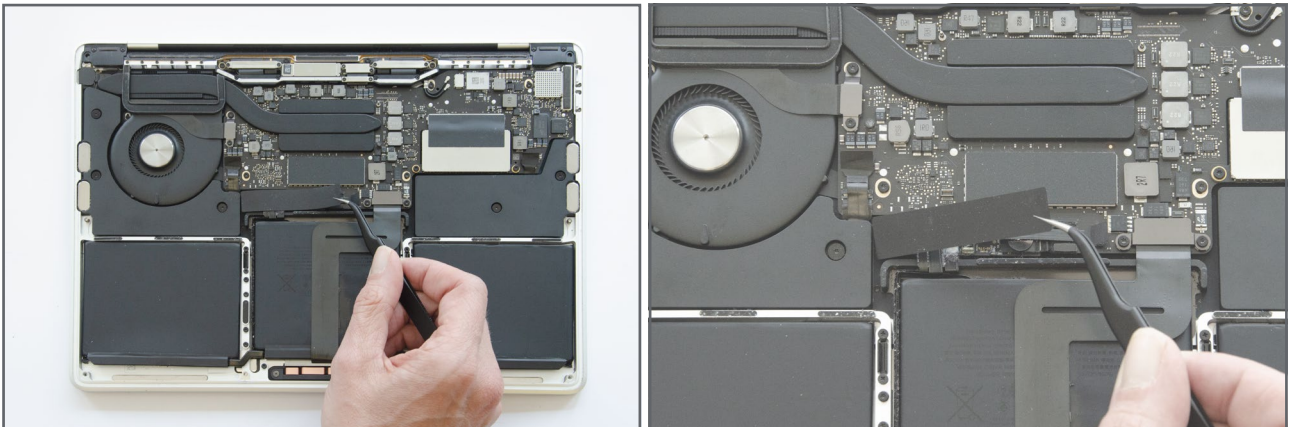
Carefully align the bottom case with the main housing leaving a gap of around 3mm at the rear. With one hand press down on the right rear corner and with the other hand slide the right side of the bottom case into the slide clip. Repeat the process for the left side.



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.



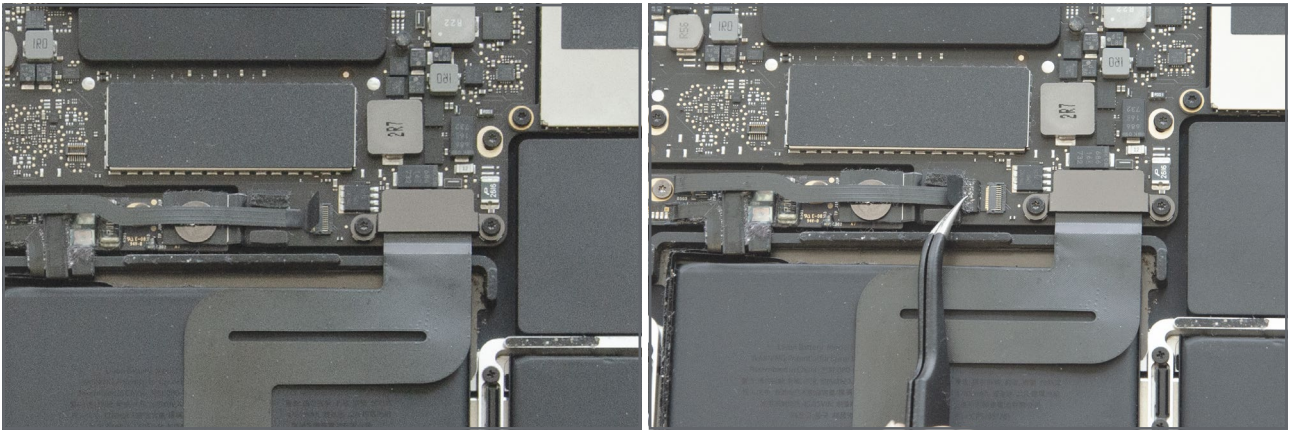
If the bottom case is not correctly aligned then remove it and repeat the installation process.



Step 7



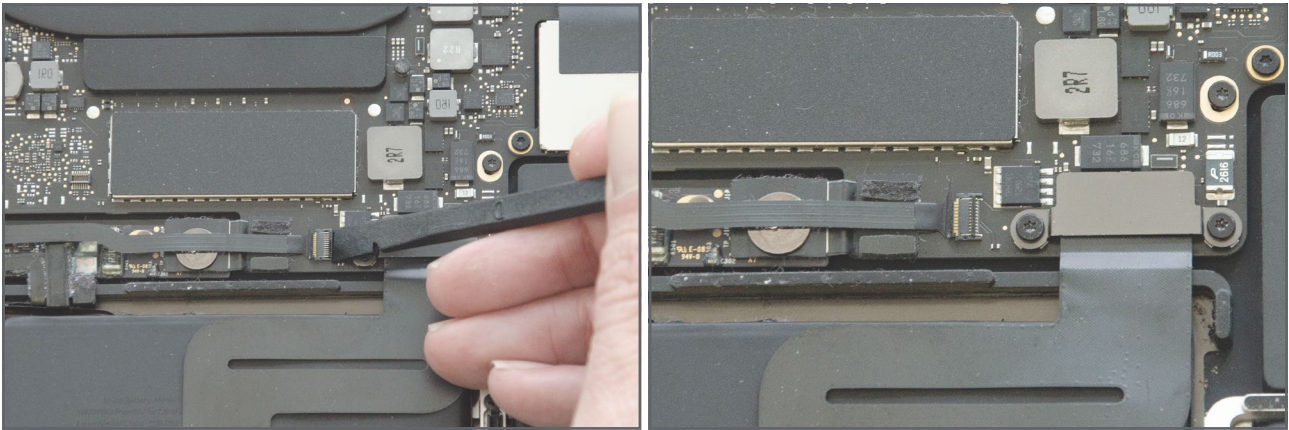
-  The battery board cover uses adhesive to hold it in place. Carefully lift the the cover from the right side while trying to ensure that the adhesive patches remain on the cover. If the adhesive patches don't remain attached to the cover they can be replaced with double sided adhesive available from 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



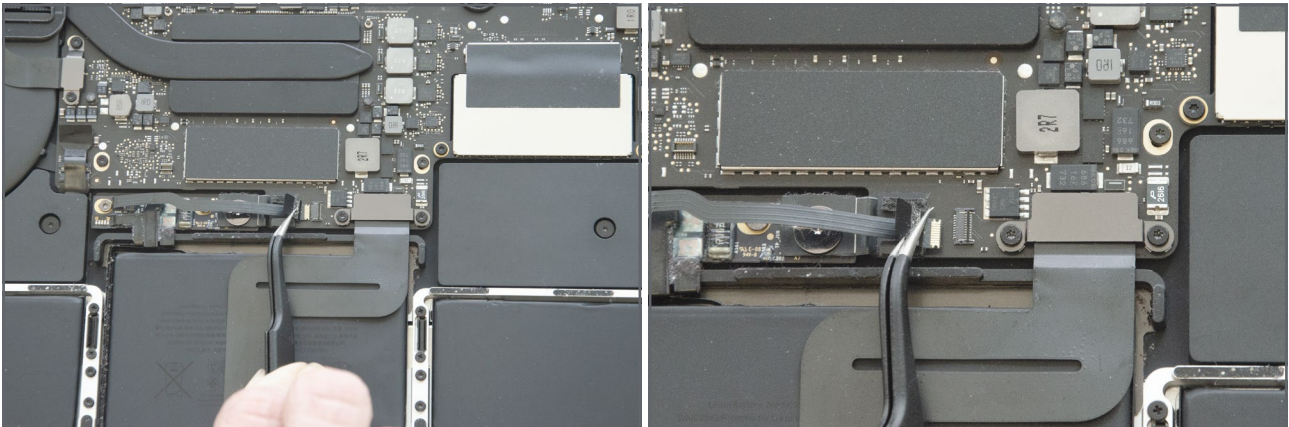
-  Carefully peel the black tape away from the battery cable connector.
-  Only peel the tape back far enough to release it from the connector.



Step 9



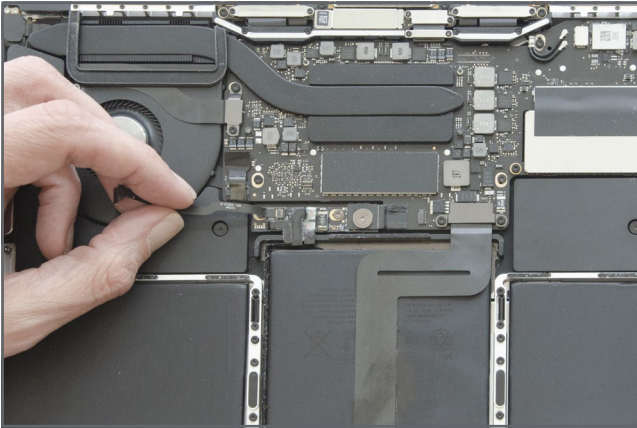
-  Using the flat end of a spudger carefully lift the locking lever on the battery cable connector.

Step 10

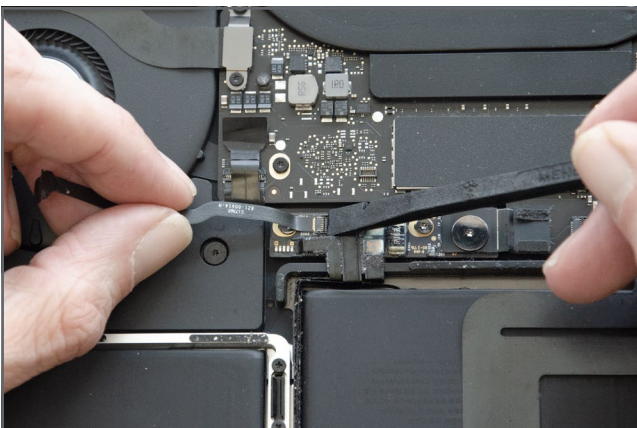
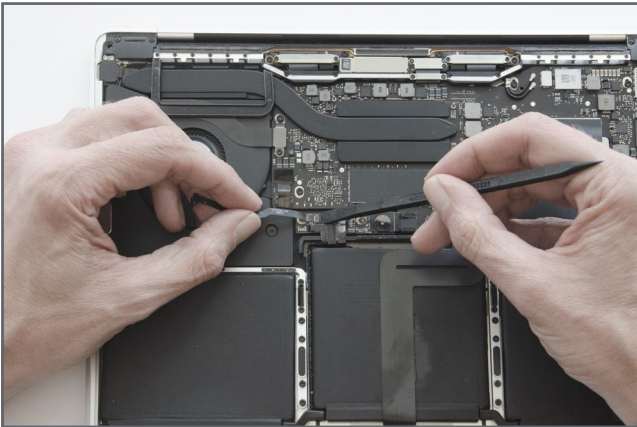


-  Slide the battery cable out of the connector.
-  The battery cable slides parallel to the logic board. Do not lift the cable upwards.

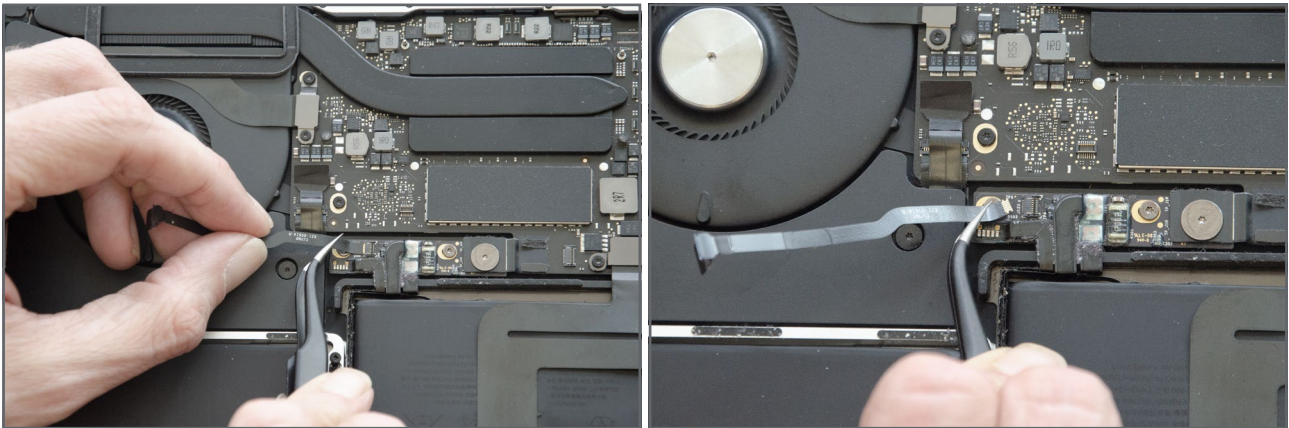
Step 11




Using pointed end of a spudger to lift the locking lever of the small connector at the other end of the battery cable.

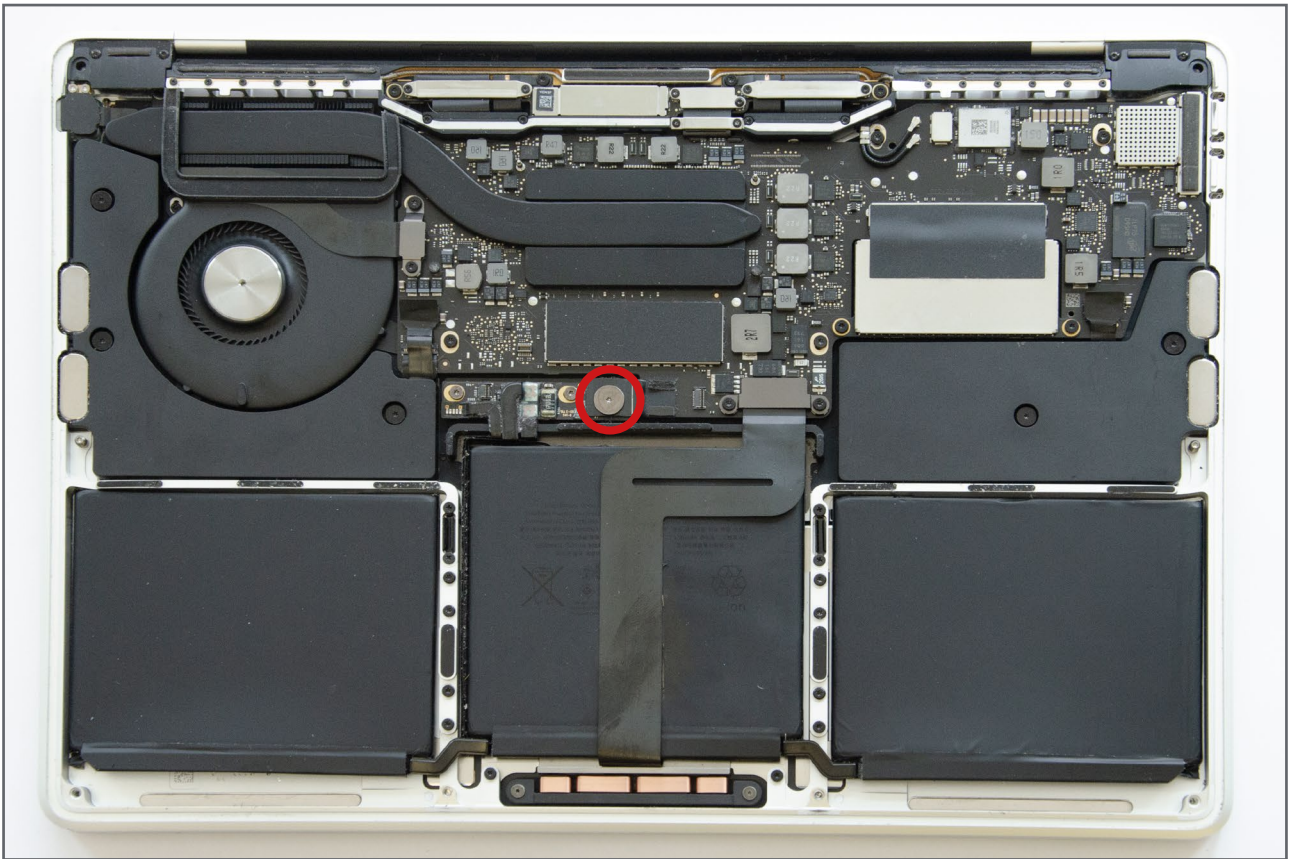


Step 12



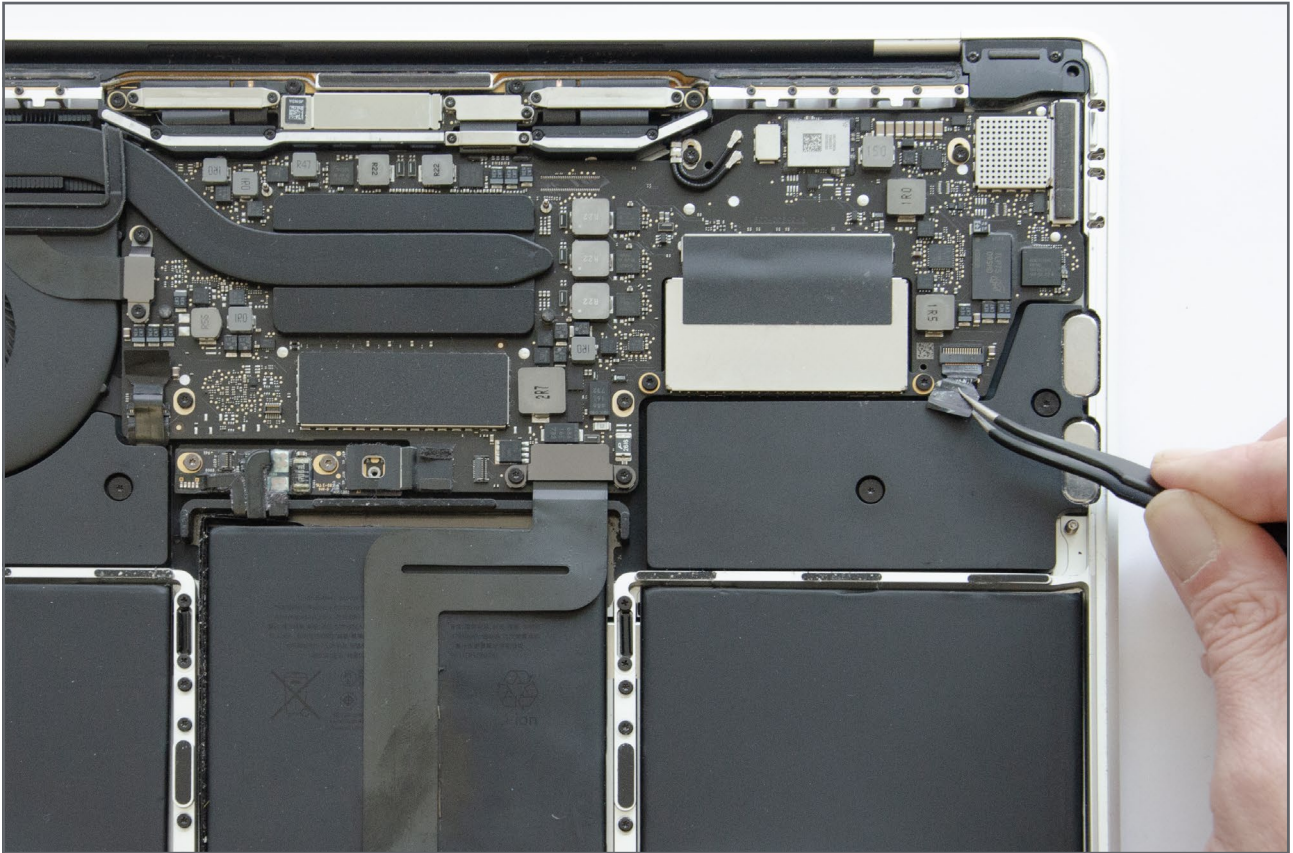
-  Slide the battery cable out of the connector and store it. The cable will be required for the new battery.



Step 13



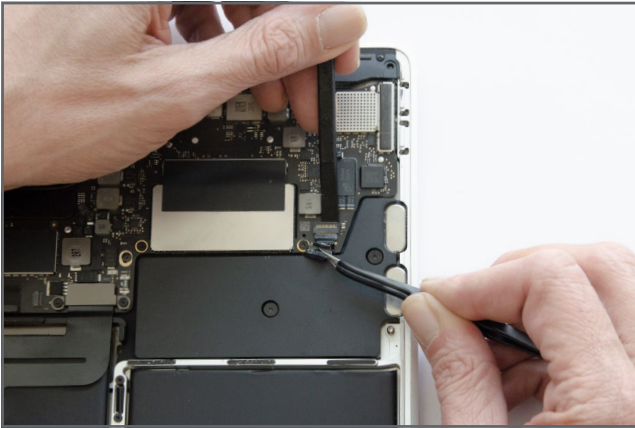
-  Using a **Torx T5 screwdriver** remove the large flat screw from the main battery power connector.

Step 14

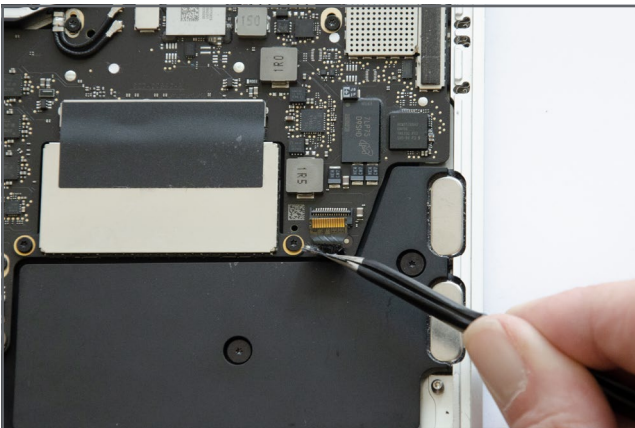
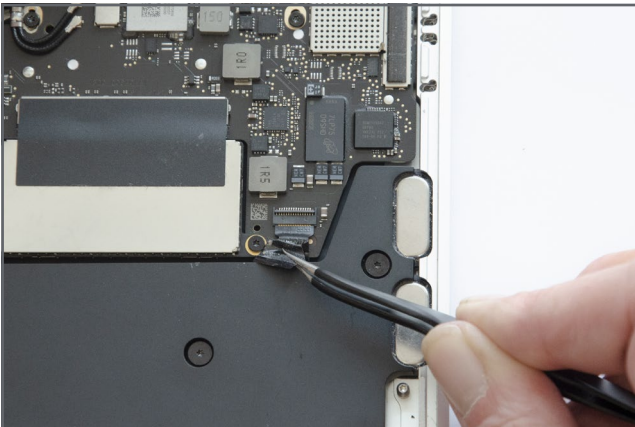


-  Carefully peel the black tape away from the right speaker cable connector.
-  Only peel the tape back far enough to release it from the connector.

Step 15

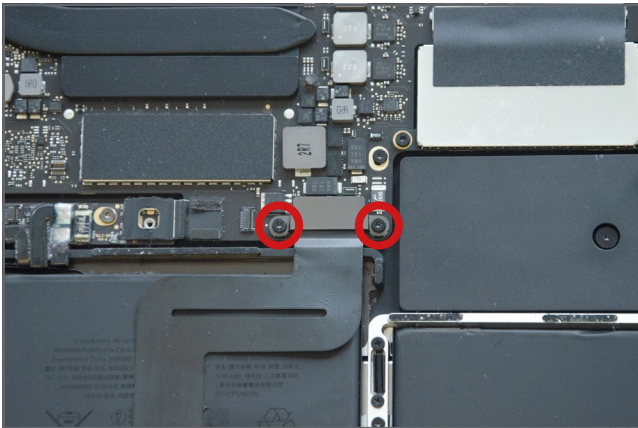


- Using the flat end of a spudger carefully lift the locking lever on the speaker cable connector.



- Slide the speaker cable out of the connector.

Step 16



- Using a **Torx T5 screwdriver** remove the 2 screws holding the track pad cable securing bracket.

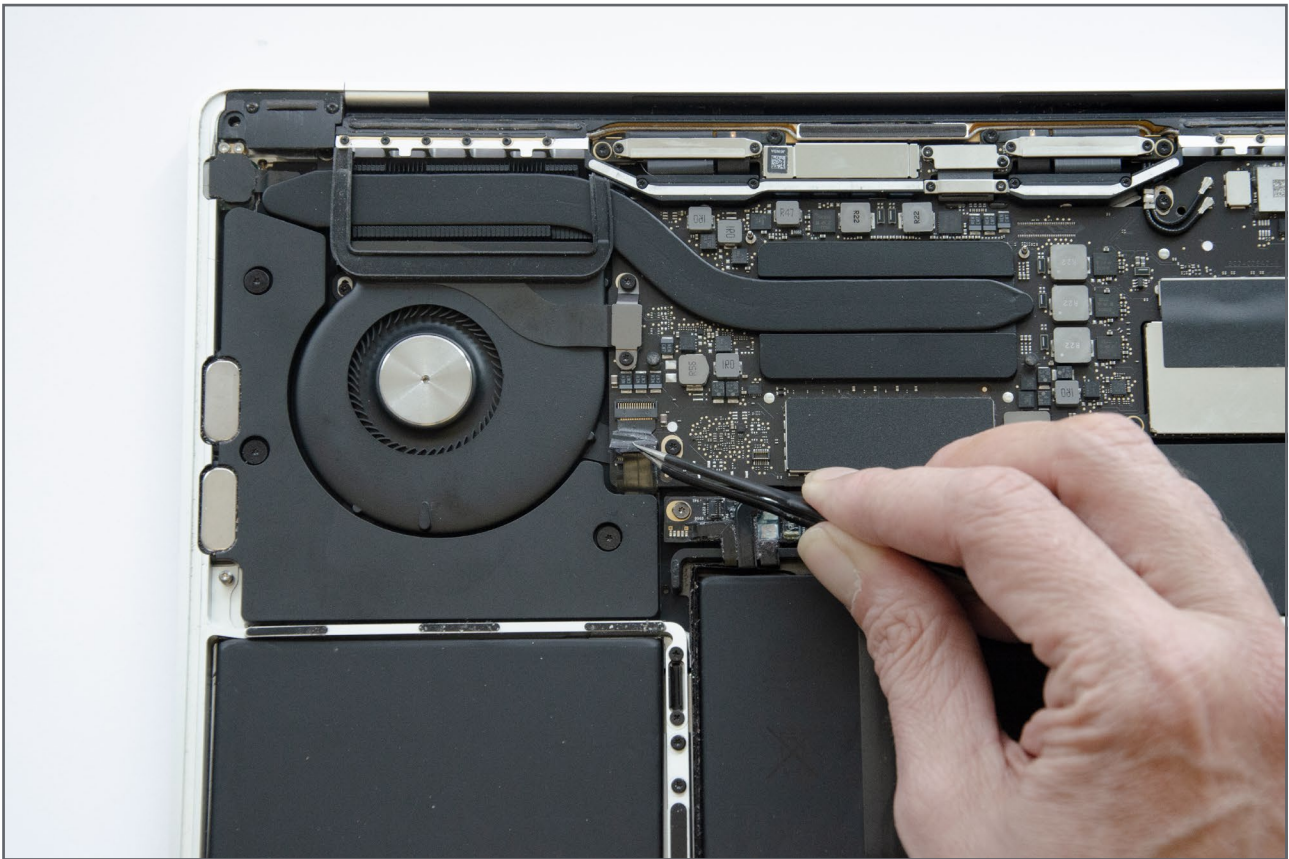



- Remove the securing bracket.



- Using the flat end of a spudger lever the trackpad cable directly up from the logic board.

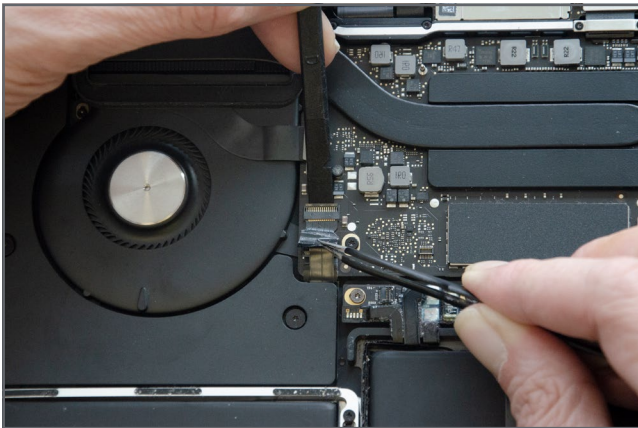
Step 17



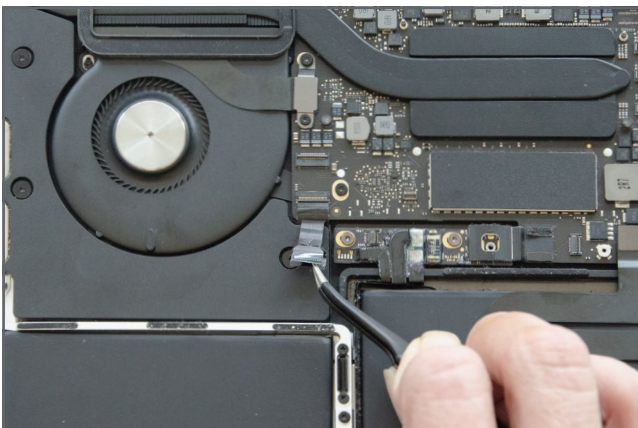
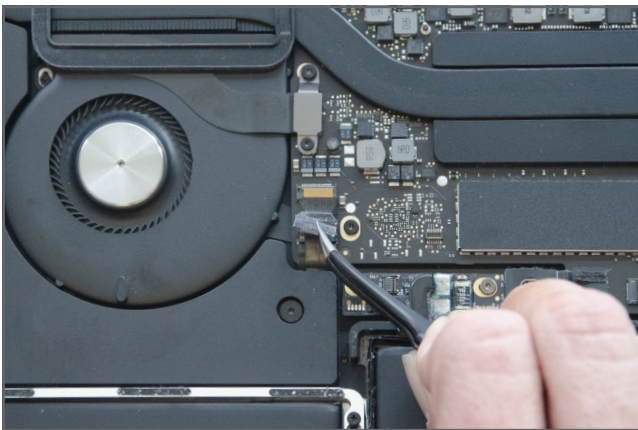
 Carefully peel the black tape away from the left speaker cable connector.

 Only peel the tape back far enough to release it from the connector.

Step 18

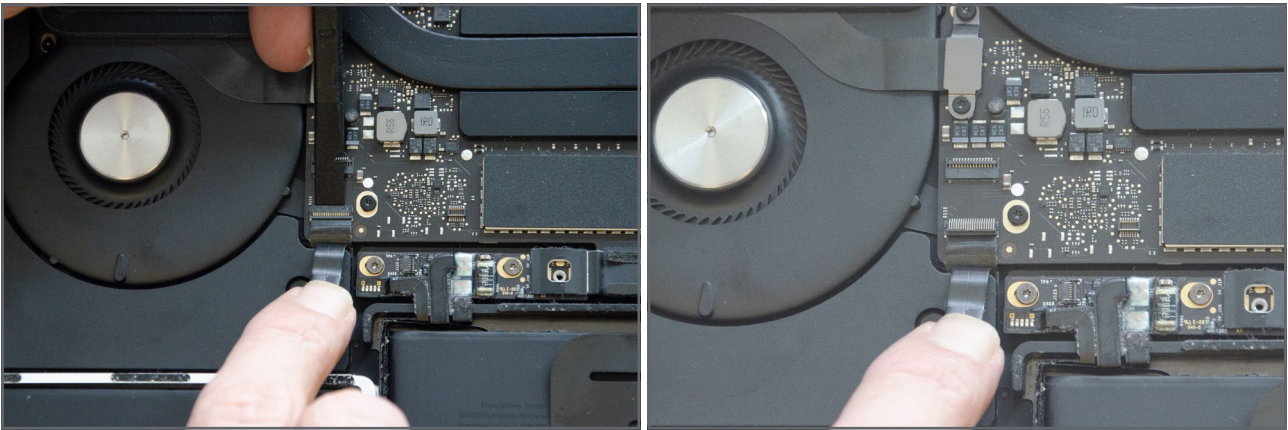



- Using the flat end of a spudger carefully lift the locking lever on the speaker cable connector.



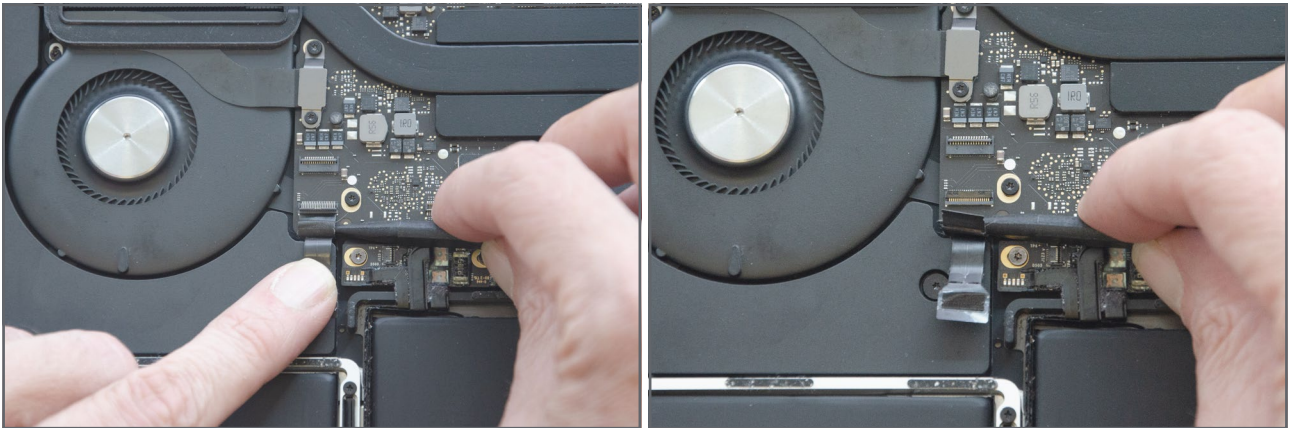
- Slide the speaker cable out of the connector and move upwards to reveal the keyboard cable and connector.


Step 19



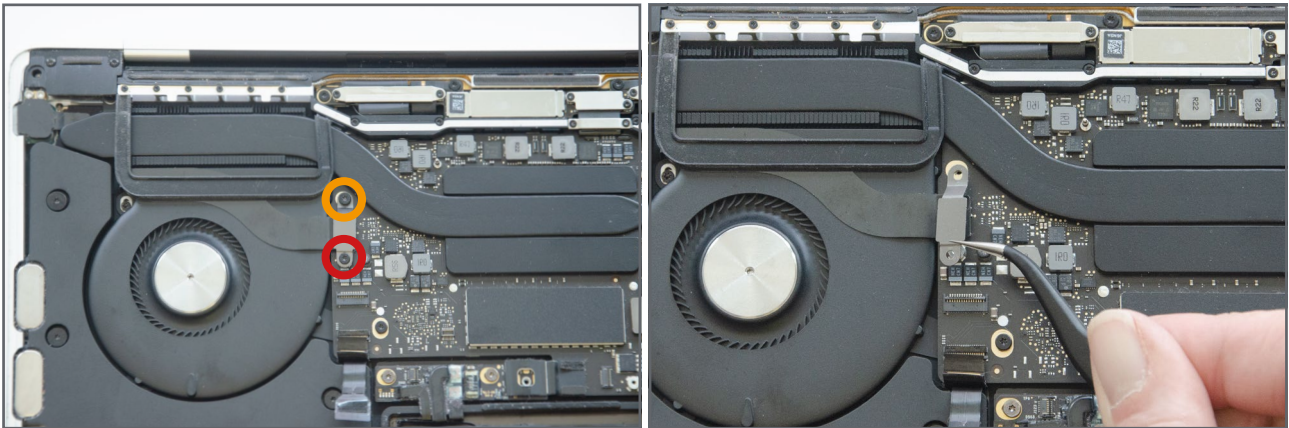
-  Using the flat end of a spudger carefully lift the locking lever on the keyboard cable connector.

Step 20




-  Carefully slide the keyboard cable out of the connector. It may help to slide the pointed end of a spudger under the cable and use this to carefully slide the cable out.

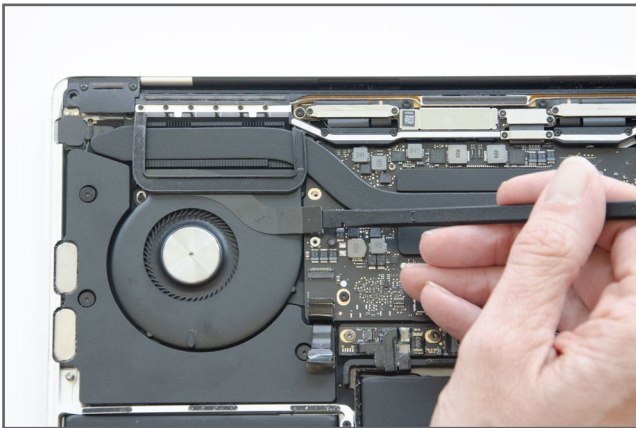
Step 21



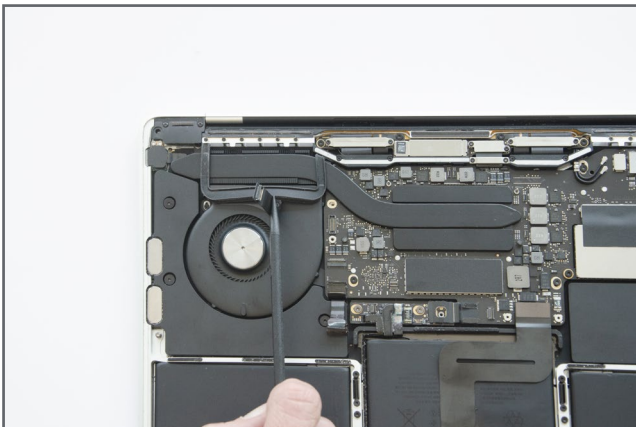
 Using a **Torx T5 screwdriver** remove the two screws holding the audio board cable securing bracket.

 The **upper screw** is longer than the **lower screw**. Both screws will need to be returned to their original positions to avoid damage when reassembling.

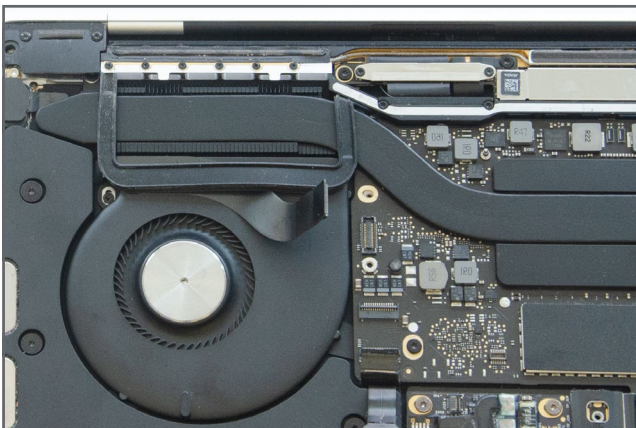
Step 22



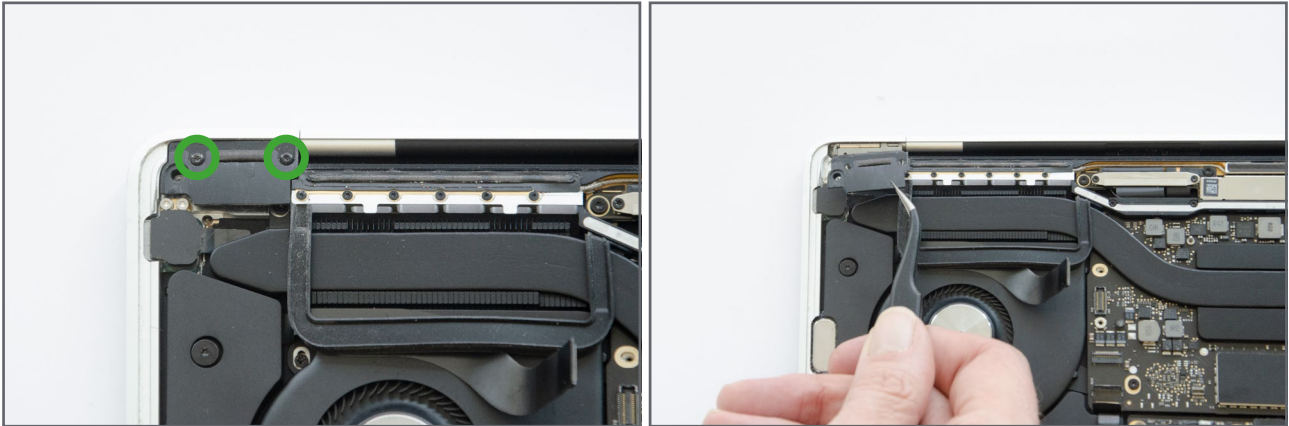
- Using the flat end of a spudger carefully lever the audio board cable directly up from the logic board.





- The audio cable is adhered to the fan using light adhesive. Carefully peel the cable away from the fan to about half-way. Do not fully remove the cable from the fan.

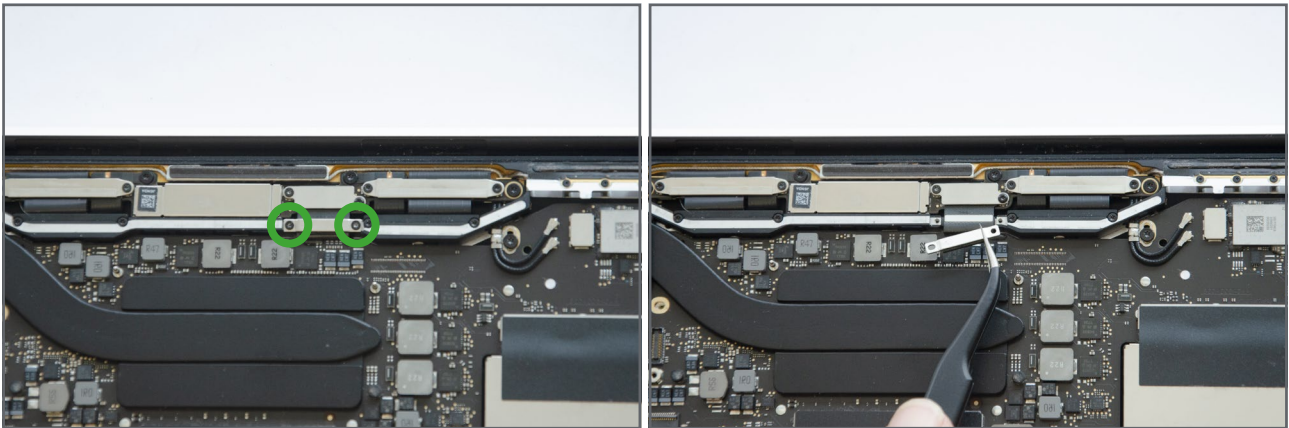




Step 23



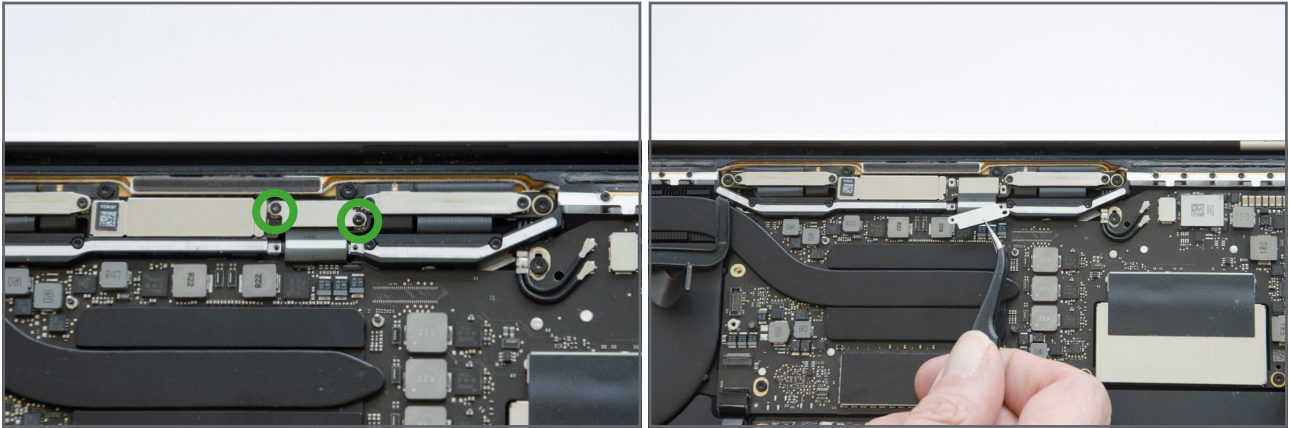
-  Using a **Torx T3 screwdriver** remove the 2 screws holding the clutch cover.
-  Remove the cover.



Step 24



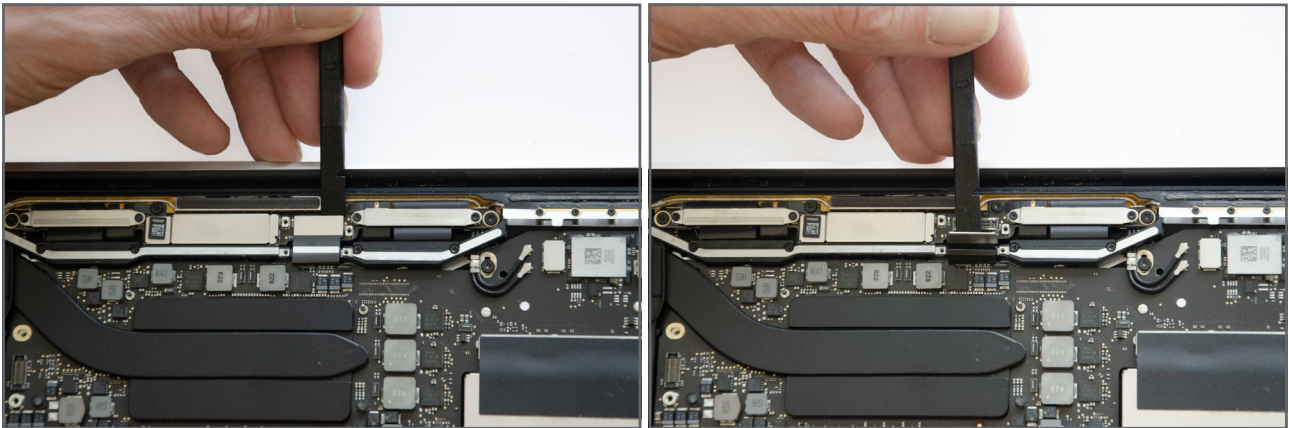
-  Using a **Torx T3 screwdriver** remove the 2 screws holding the display cable bracket.
-  Remove the bracket.

Step 25



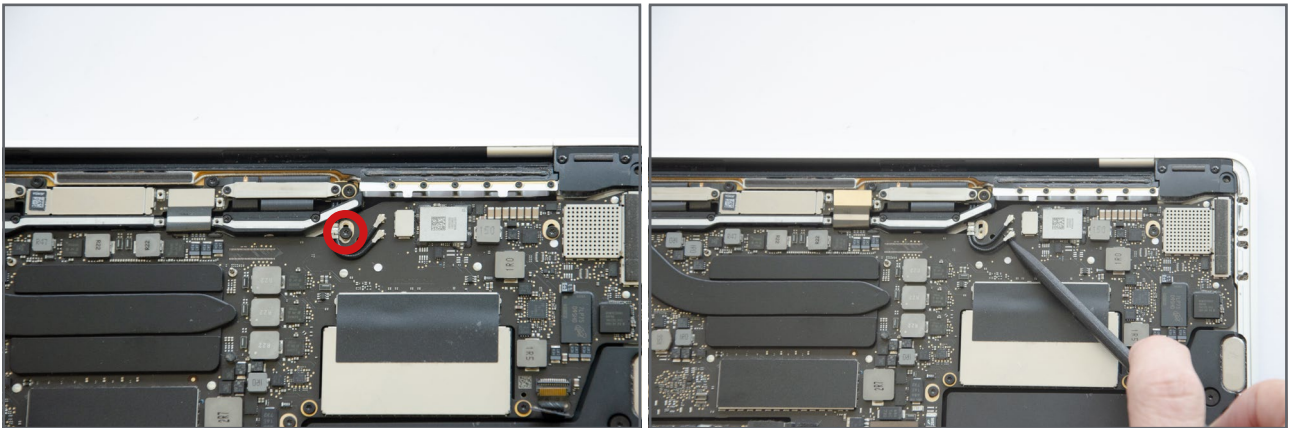
-  Using a **Torx T3 screwdriver** remove the 2 screws securing the display cable bracket.
-  Remove the bracket.



Step 26



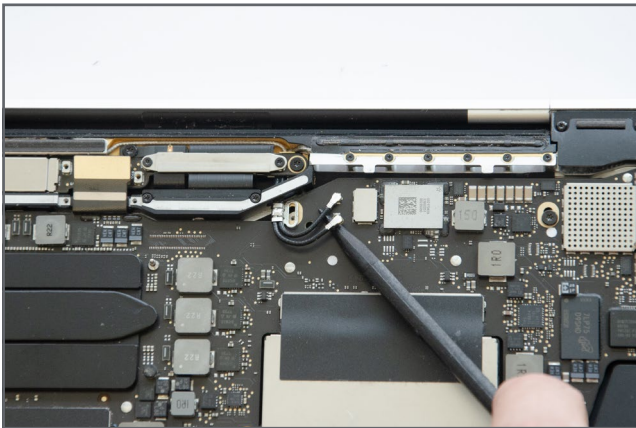
-  Using the flat end of a spudger carefully lever the display cable directly up from the display board.

Step 27

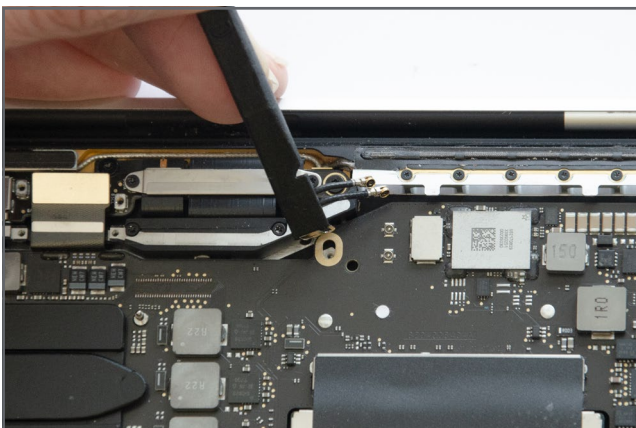
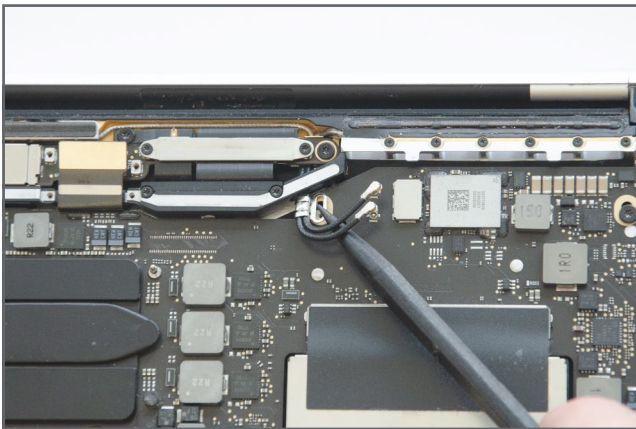


-  Using a **Torx T5 screwdriver** remove the screw holding the antenna cable securing tab.
-  Use the pointed end on a spudger to disconnect the 2 antenna cables from the logic board.

Step 28

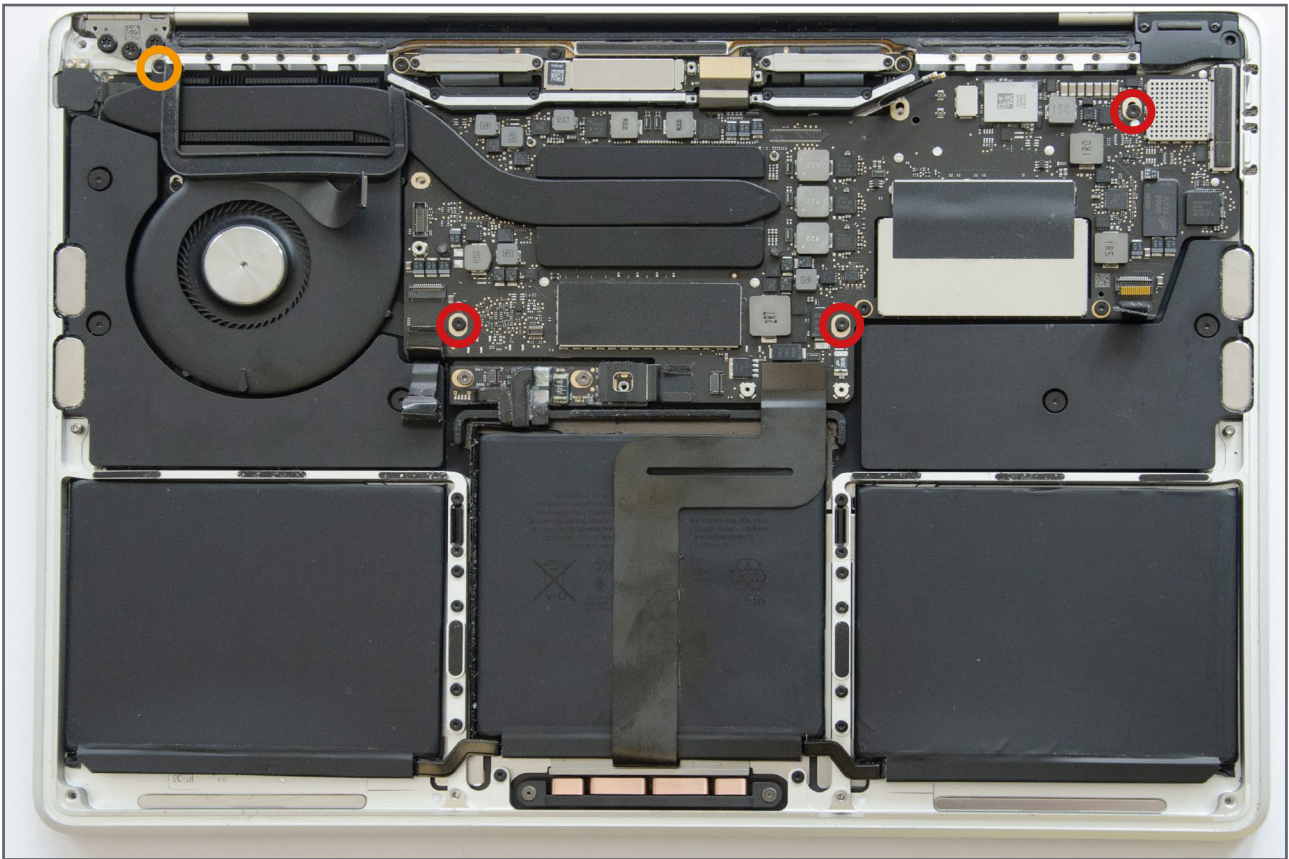


- Slide the pointed end of a spudger underneath each antenna cable close to the connector and carefully use a levering motion to release each connector.



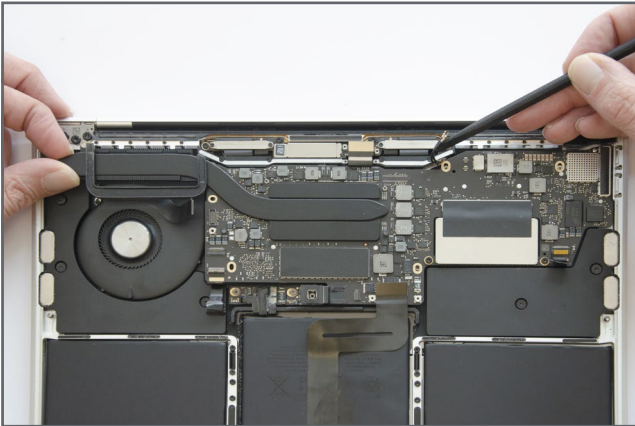
- Carefully bend the cables upwards so that the cables don't interfere with the removal of the logic board.
- To reconnect the antenna cables position the connector directly on the socket and carefully press down. You should feel a slight pop as the connector clicks into place.

Step 29

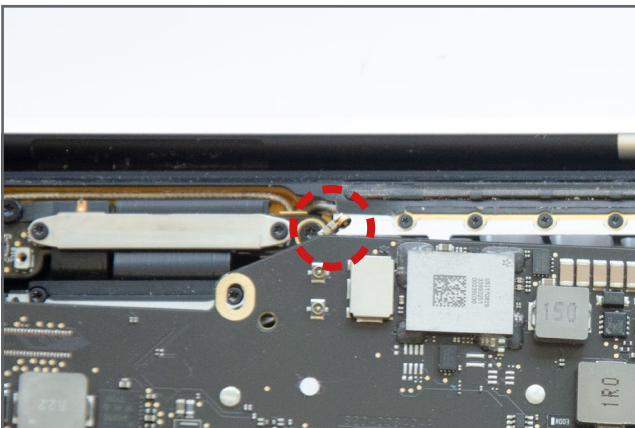
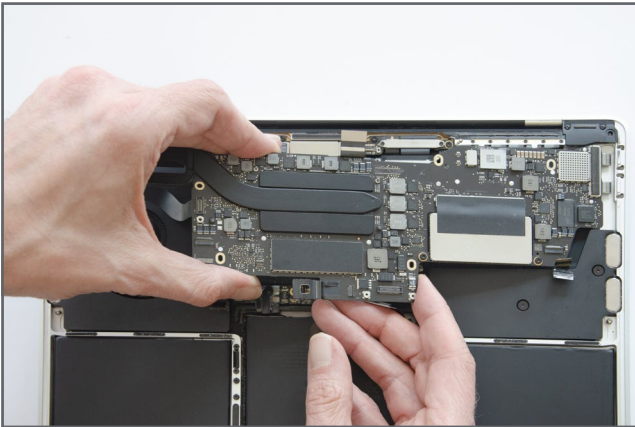


- Using a **Torx T5 screwdriver** remove **one small screw** from the end of the heatsink and **3 larger screws** from the logic board as depicted in the image. These screws will need to be returned to their original positions when reassembling.

Step 30

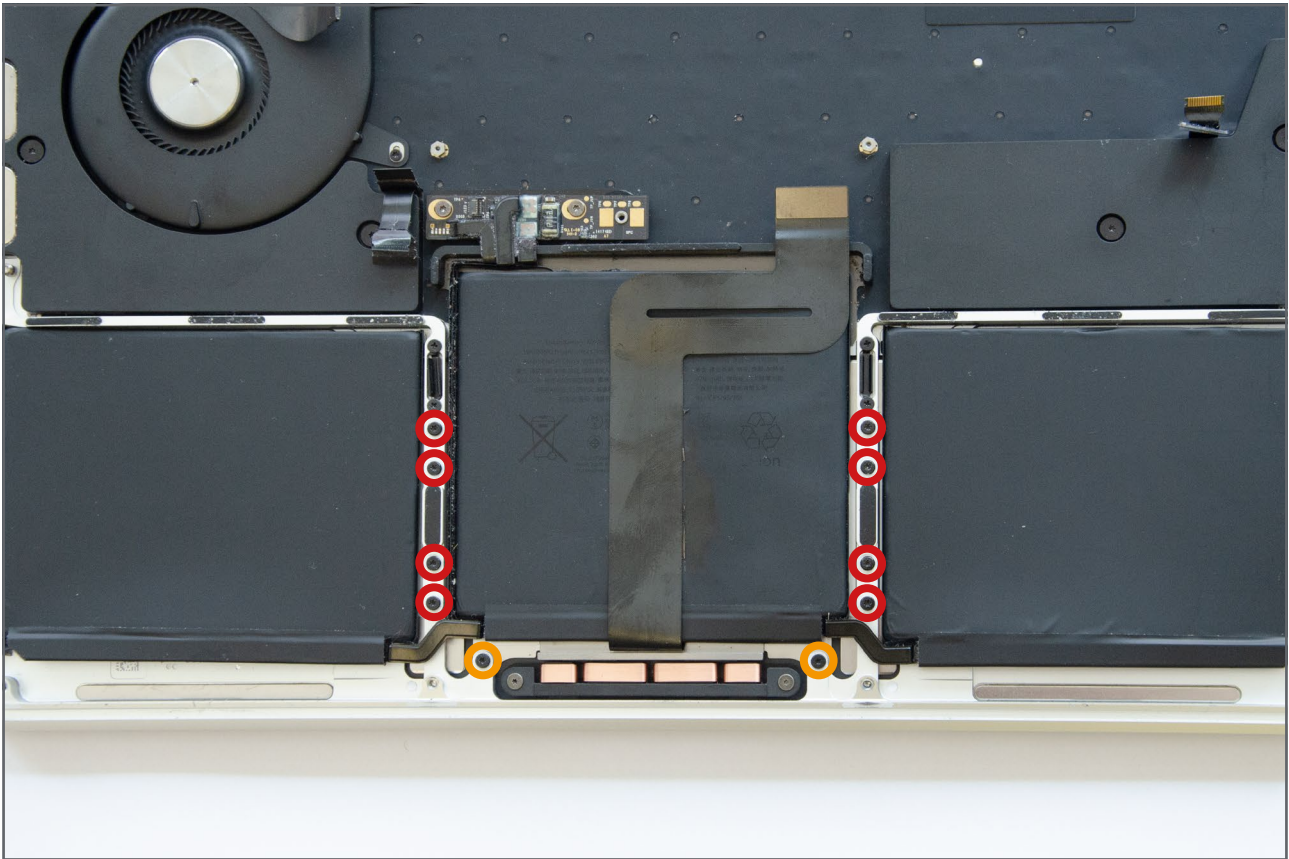



- Carefully lift the logic board from the left while checking for snagged cables. If you feel resistance stop and review the previous steps to ensure that all cables have been correctly disconnected and that all logic board screws have been removed.



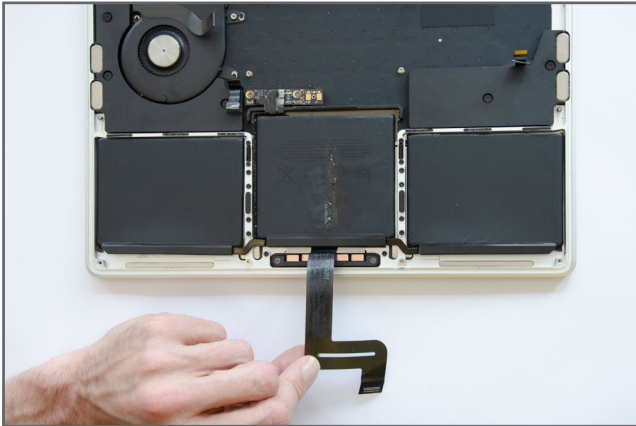
- ⚠ Special attention should be paid to the **antenna cables** as you may need to hold the cables out of the way while you maneuver the logic board around them.


Step 31

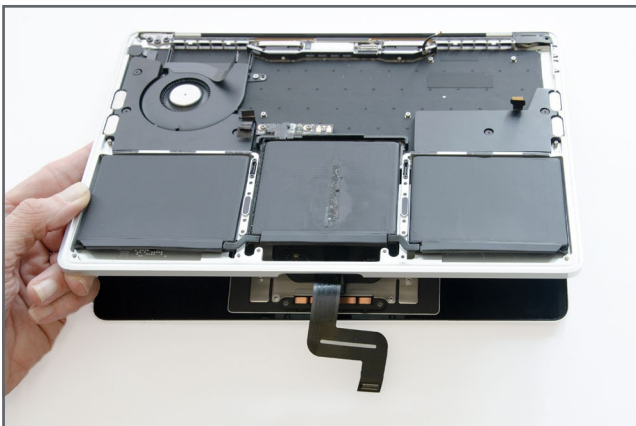
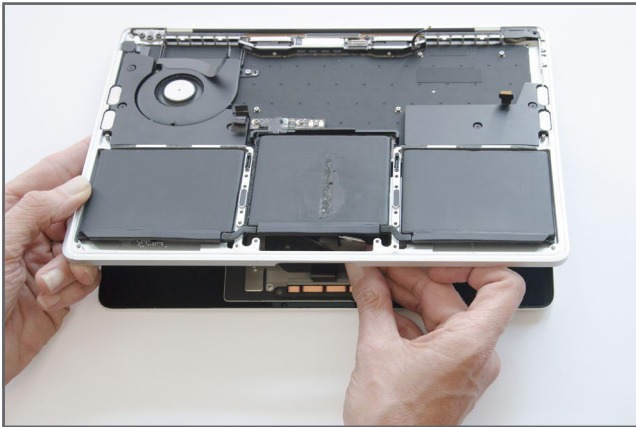


-  Using a **Torx T5 screwdriver** remove **8 larger screws** and **2 smaller screws** as depicted. These screws must be returned to their original position when reassembling to prevent damage to the trackpad

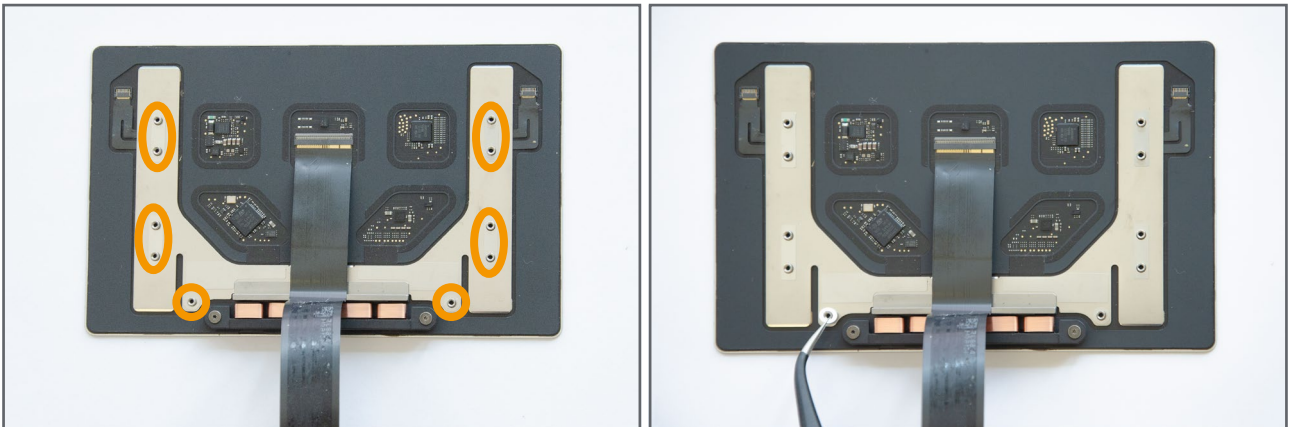
Step 32



 Carefully open the Macbook while keeping the display flat and guiding the trackpad cable around the battery. Once the cable is clear remove the trackpad.

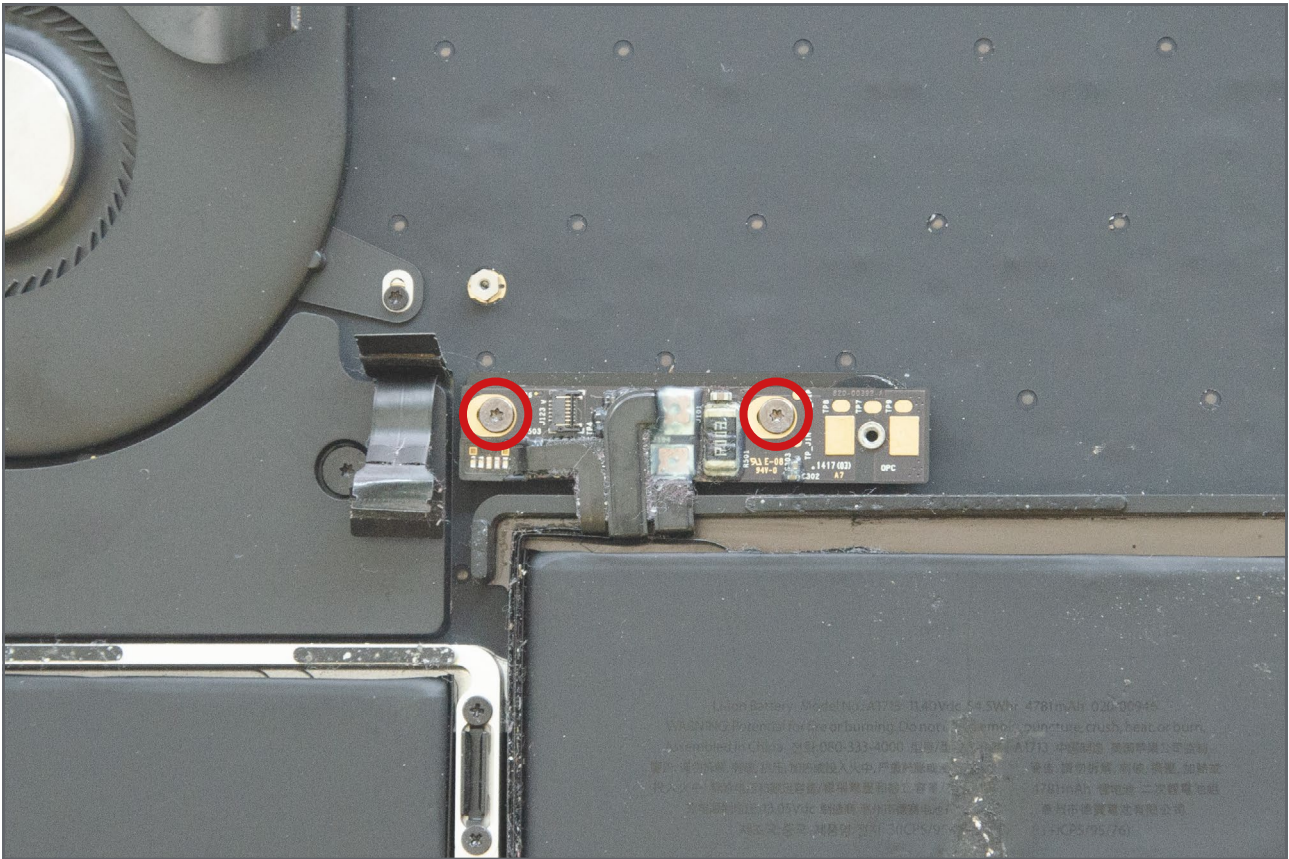


Step 33



- i** The trackpad has 6 metal shims around the screw holes. Be careful not to lose these as they come away easily. If a shim does come away use tweezers to place the shim back on the trackpad.

Step 34

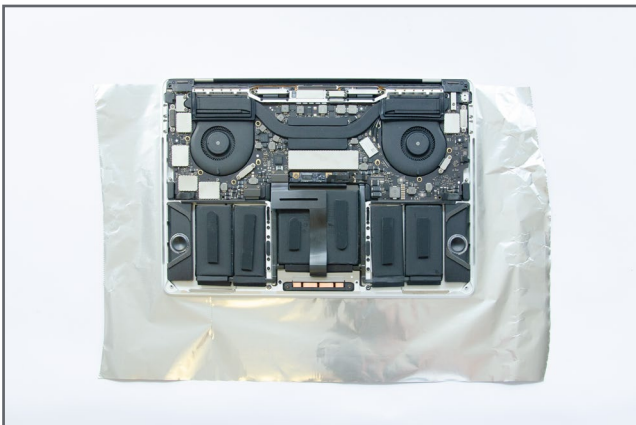


 Using a **Torx T5 screwdriver** remove 2 screws from the battery board.

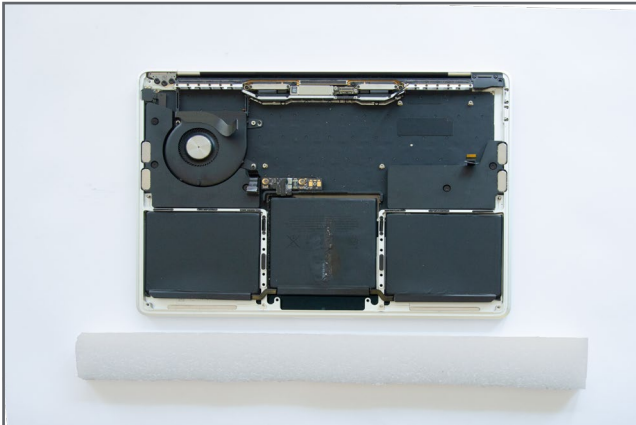
Step 35



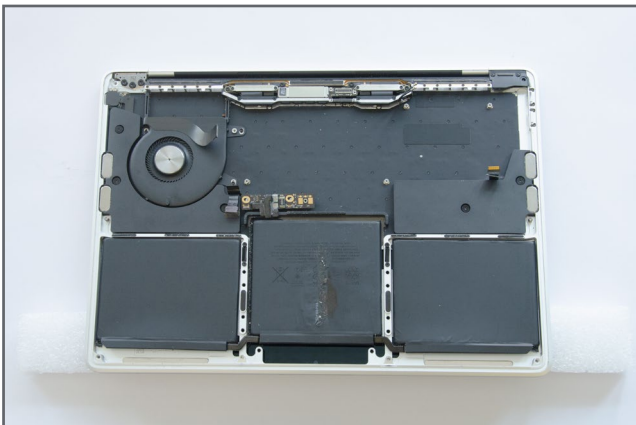
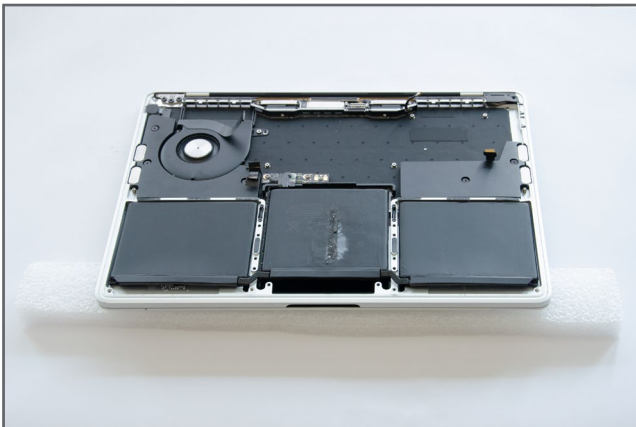
- ⚠** The adhesive solvent can damage the anti-glare coating on the display glass, therefore we recommend that a protective layer of tin foil is placed between the display and housing so that the display is fully covered.








Step 36




Place the MacBook on a book or foam wedge so that the laptop tilts backwards. This will help the solvent flow underneath the cells and penetrate the adhesive.



Step 37



-  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.
-  Protective gloves are highly advisable but are not included in the kit.



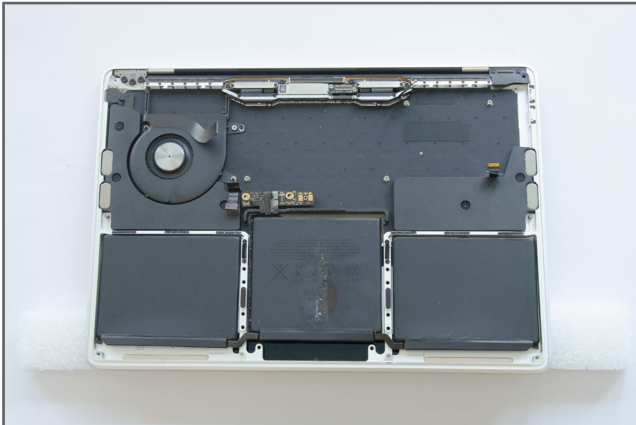
-  Use a small flat screwdriver or tweezers to remove the centre part of the bottle cap. This will reveal a rubber seal.

Step 38

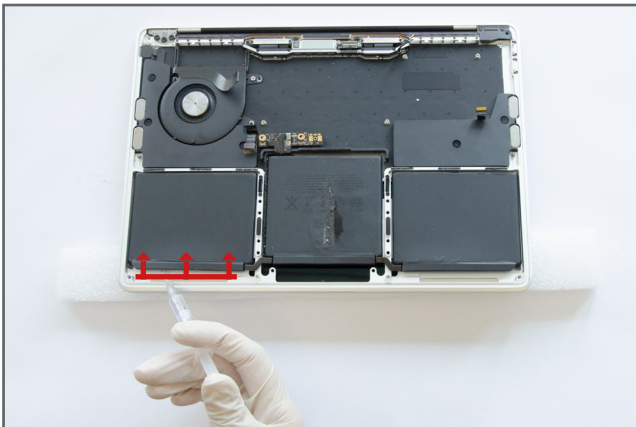


-  Insert the needle through the rubber seal and draw the solvent into the syringe as shown.
-  With the needle still inserted into the bottle push the plunger just enough to expel any air that is in the syringe.

Step 39

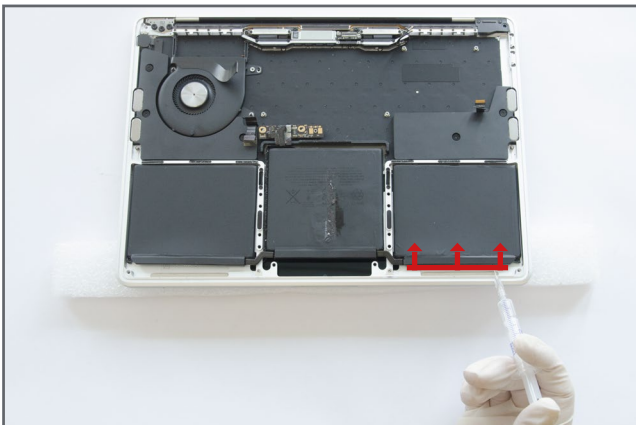


- i** This model of MacBook has 3 battery cells. 1 left, 1 middle and 1 right.



- 🔧** Apply the solvent underneath the left cell first. Apply it along the very front edge as depicted. Then apply the solvent is exactly the same way to the right cell. Let the solvent work into the adhesive for at least 2 minutes before beginning the next step.

- i** The longer the solvent has to loosen the adhesive the more effective it is so it may help to wait for around 5 minutes or longer before you begin.



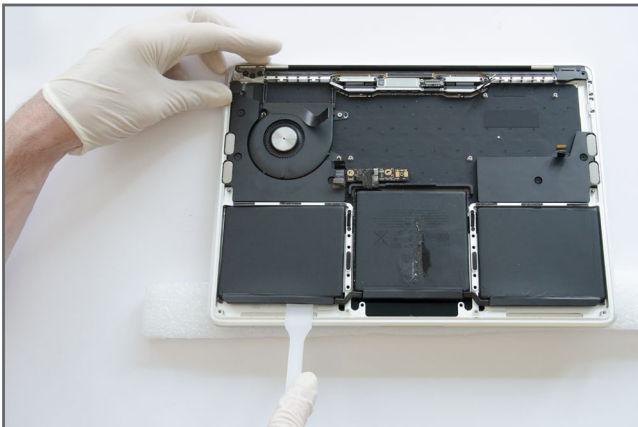
- i** You do not need to use a lot of solvent. The supplied bottle is more than sufficient to remove all of the cells.

Step 40



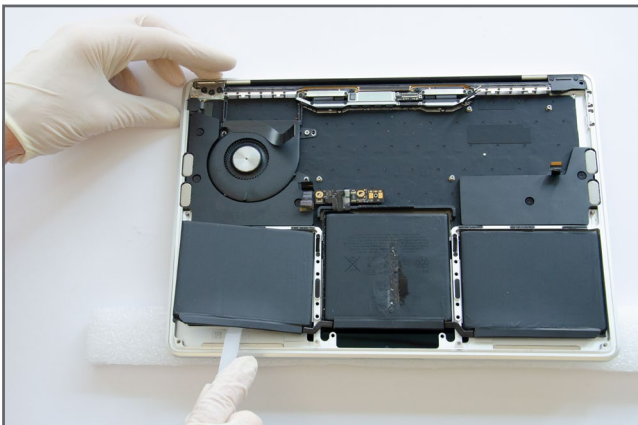
⚠ Do not rush the following steps. You will need to work slowly and patiently to avoid damage.

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



🔧 After around 2 minutes insert the sharp end of the spatula underneath the left cell. It's best to orientate the spatula so that the flat side of the sharp end is upwards - see image.

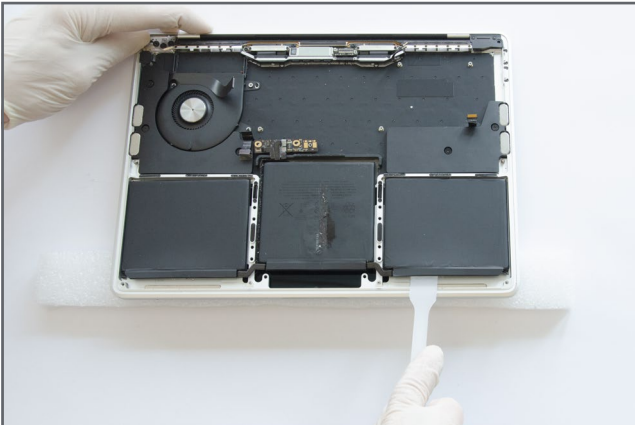
⚠ If it's difficult to insert the spatula apply some more solvent and/or wait a further 3 or 4 minutes.




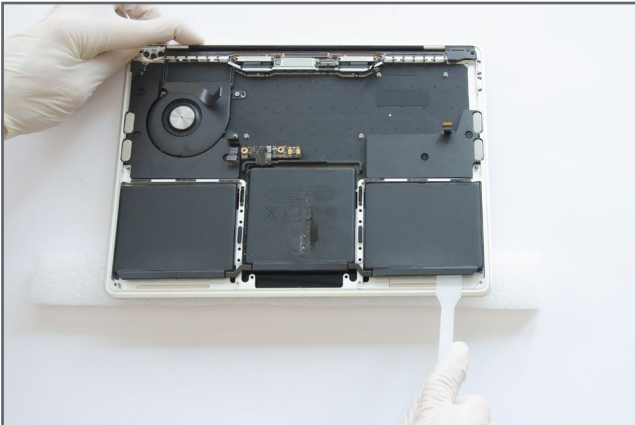
🔧 Work the spatula under the cell. Use a wiggling motion along the entire length of the cell to release the adhesive.

⚠ Once the cell is free DO NOT attempt to remove it. The battery is one unit and all 3 cells need to be released before the battery can be removed.

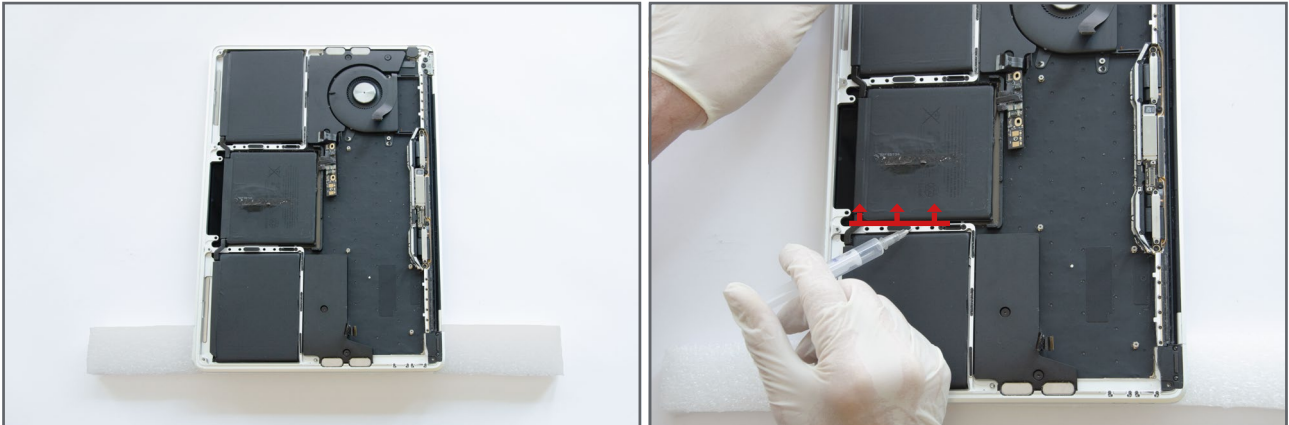
Step 41






 Repeat the above process for the right cell, but don't attempt to remove it.

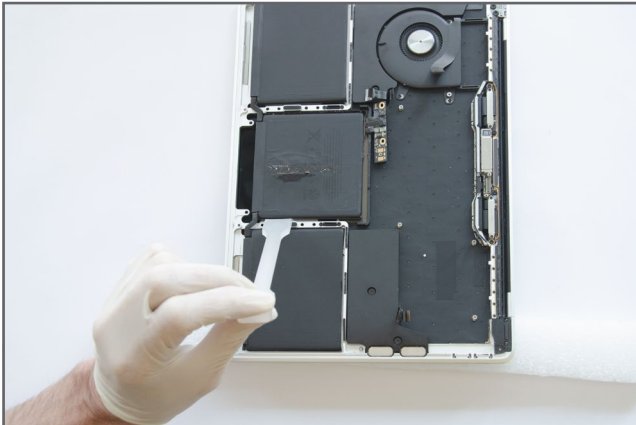


Step 42



-  Rotate the MacBook so that the right side sits on the book or foam wedge.
-  Apply the solvent along the right edge of the middle cell. Only apply solvent in the area shown in the image
-  As before wait at least 2 minutes before proceeding.

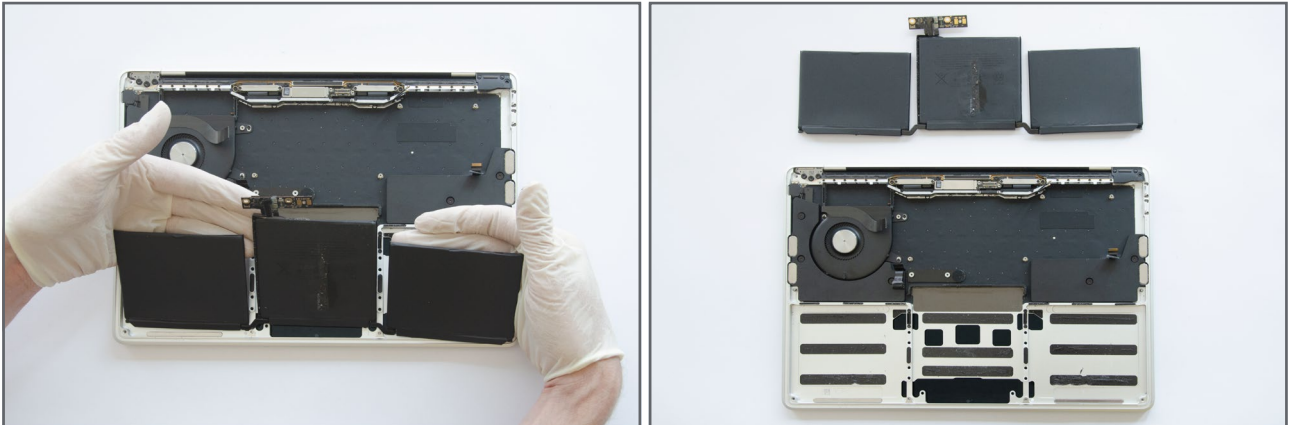
Step 43




- Carefully use the sharp end of the spatula, this time with the flat side down. Work along the right side carefully levering the cell up to loosen the adhesive. Be patient and keep levering the cell bit by bit until the adhesive releases enough to be able to fully insert the spatula. Then work with a wiggling motion to release the remainder of the adhesive.

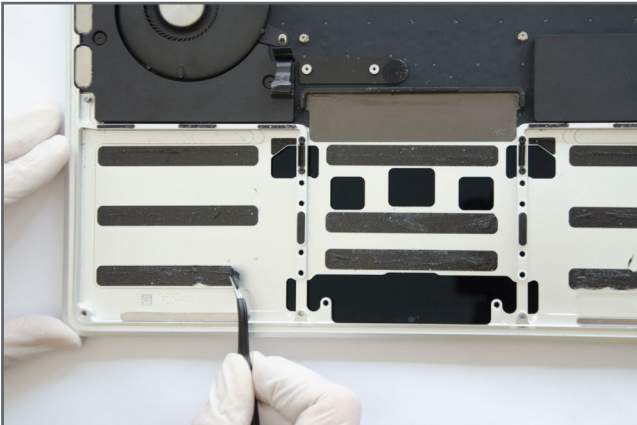



Step 44





-  Once the middle cell is fully released the battery can be lifted out and removed.

Step 45




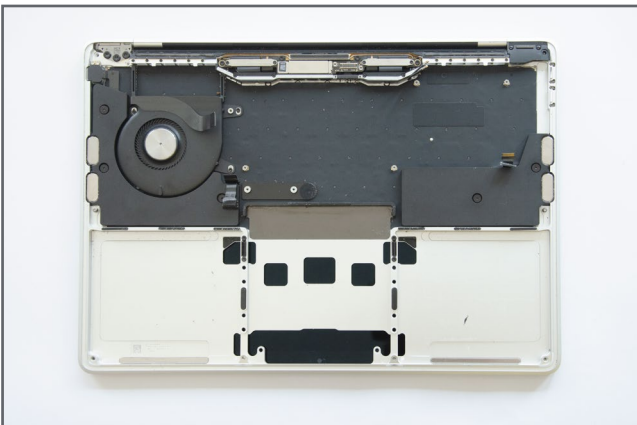
 The remaining adhesive attached to the housing will need to be removed before the new battery can be installed.

 Large strips of adhesive can be removed by slowly peeling them up with tweezers.

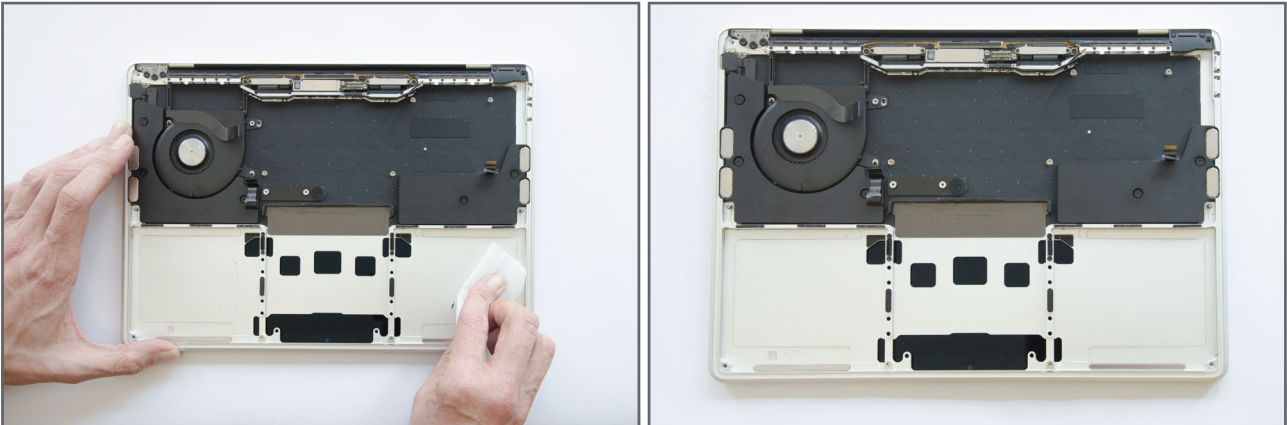
 Any remaining bits of adhesive need to be scrapped away with either the spatula or the spudger.



 This can involve a lot of work, so be patient. Using more solvent on the adhesive patches can help with the removal of them.

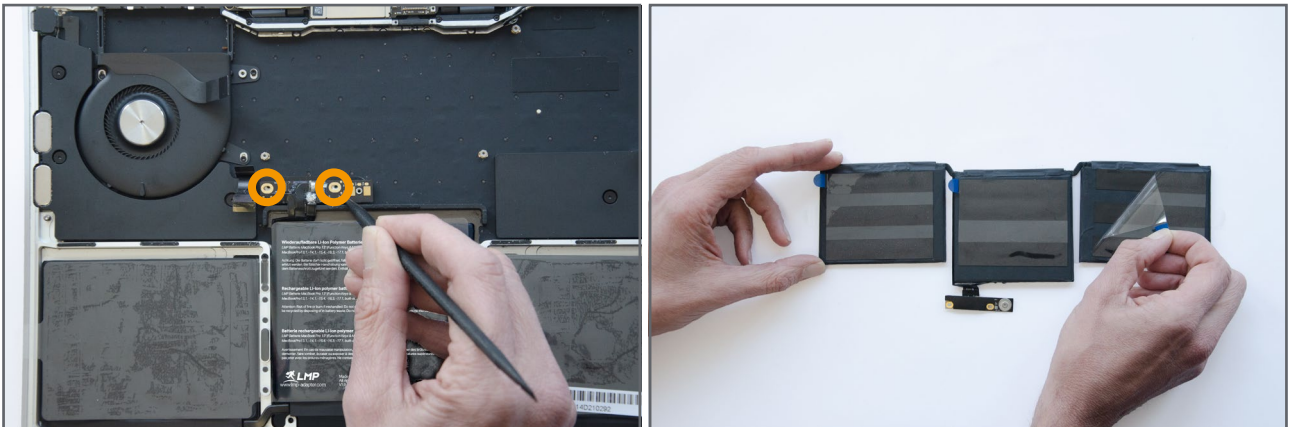




Step 46



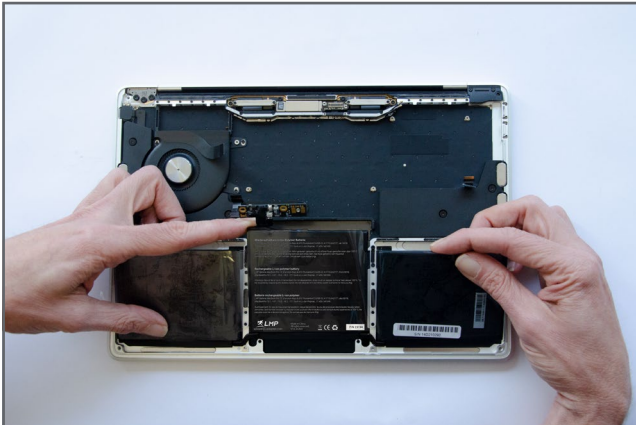
- 🔧 Finally wipe the entire area with an isopropyl wipe to ensure that the adhesive of the new battery adheres correctly. Allow the area to dry before attempting to install the new battery.

Step 47

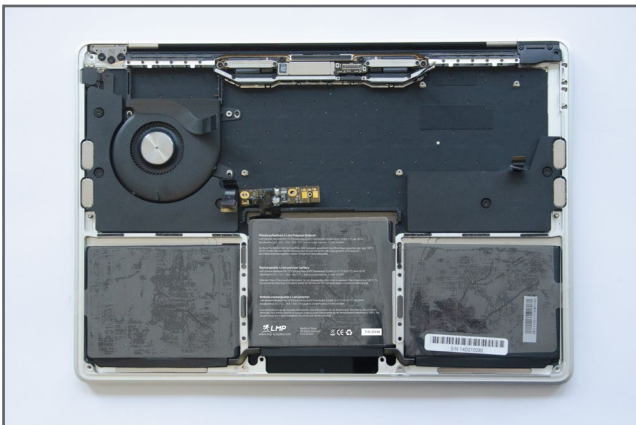


-  Before removing the adhesive covers on the underside of the battery, place the battery in the housing and check the alignment of the battery and especially the alignment of the **battery board screw holes**.
-  Carefully peel away the plastic adhesive covers from the bottom of the battery.

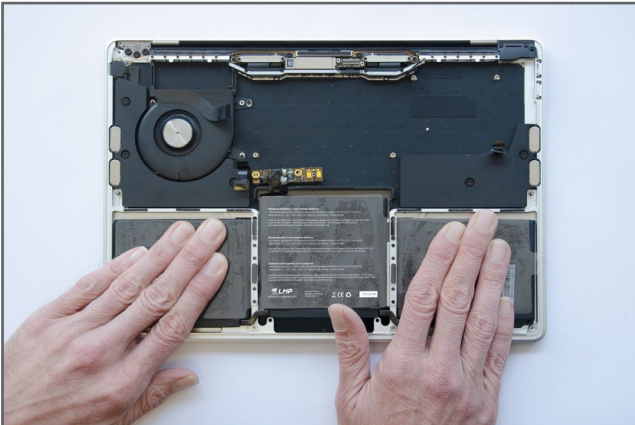
Step 48



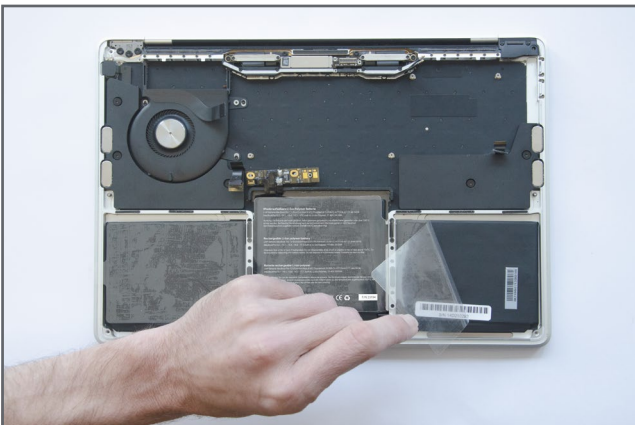
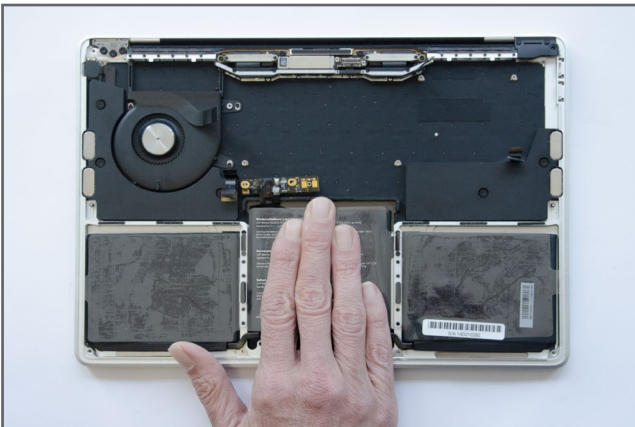
🔧 Carefully place the battery into the housing while paying particular attention to the alignment of the battery board screw holes.



Step 49






🔨 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 50

-  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 on charge 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%.
-  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.