BACK-BONE

Ribcage Installation

Hero4 Black

Hero4 Black Ribcage Installation

Contents

Before You Get Started

Figure: A

CAUTION!

1. Read all our documentation thoroughly before beginning your installation
2. If you have a question at any time during the installation please contact support@back-bone.ca and we'll get back to you as soon as possible.
3. Before proceeding we highly recommend that you perform firmware updates and do a full functionality check on the camera to make sure everything works correctly.
4. Ensure your work area is clean, well lit and free from dust.
5. We recommend inspecting and removing any dust or debris from the parts before you begin.
6. Make sure to charge your battery before beginning the installation.
7. It's important to note that none of the operations you will be performing require force. Patience and a gentle touch are all that is required.

8. We don't recommend switching back and forth between the ribcage and the camera's original configuration as it will create stress and wear on the components.
9. By applying this or any modifications to your GoPro devices you will **VOID** any warranties
10. Back-Bone takes no responsibility in your ability to use this modification
11. The Ribcage DIY kit is provide "as is" and without warranty
12. This kit is for the Hero 4 Black and Hero 4 Silver only. No other models are supported.
13. GOPRO, HERO, the GOPRO logo, and the GoPro Be a Hero logo are trademarks or registered trademarks of GoPro, Inc. Ribcage Mod Kits are a product of Back-Bone Gear Inc., and are not manufactured, distributed or endorsed by GoPro, Inc.

Tools Required

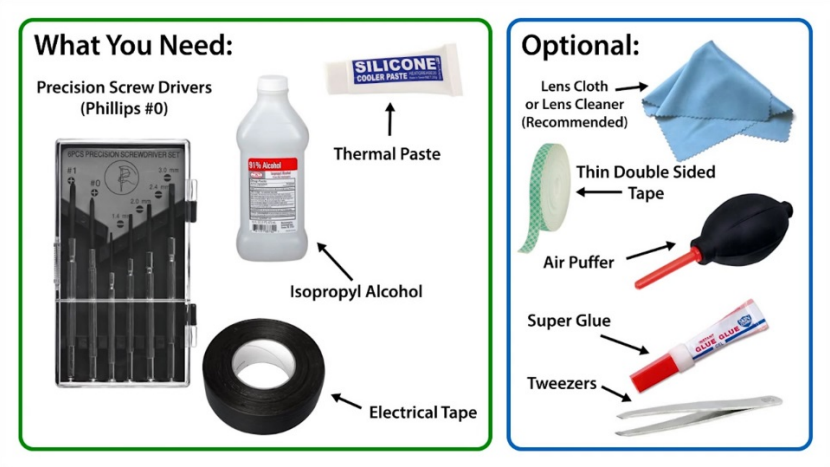
Before you begin you will need to gather the following:

REQUIRED:

- A set of small precision screw drivers with a Philips #000
- Isopropyl Alcohol – this is commonly available at your local Pharmacy
- A roll of electric tape
- Thermal Paste – A small amount is included with your kit.

OPTIONAL:

- 3M Double Sided Tape *Note: don't use thick mounting tape* – *****use only thin double sided tape or the parts may not fit correctly.*****
- Lens / CCD Cleaner, Puffer & Lens Cloth (Optional but recommended)
- Super Glue (only needed if you wish to use the original GoPro Power/Mode button)
- Tweezers



Section 1: Teardown

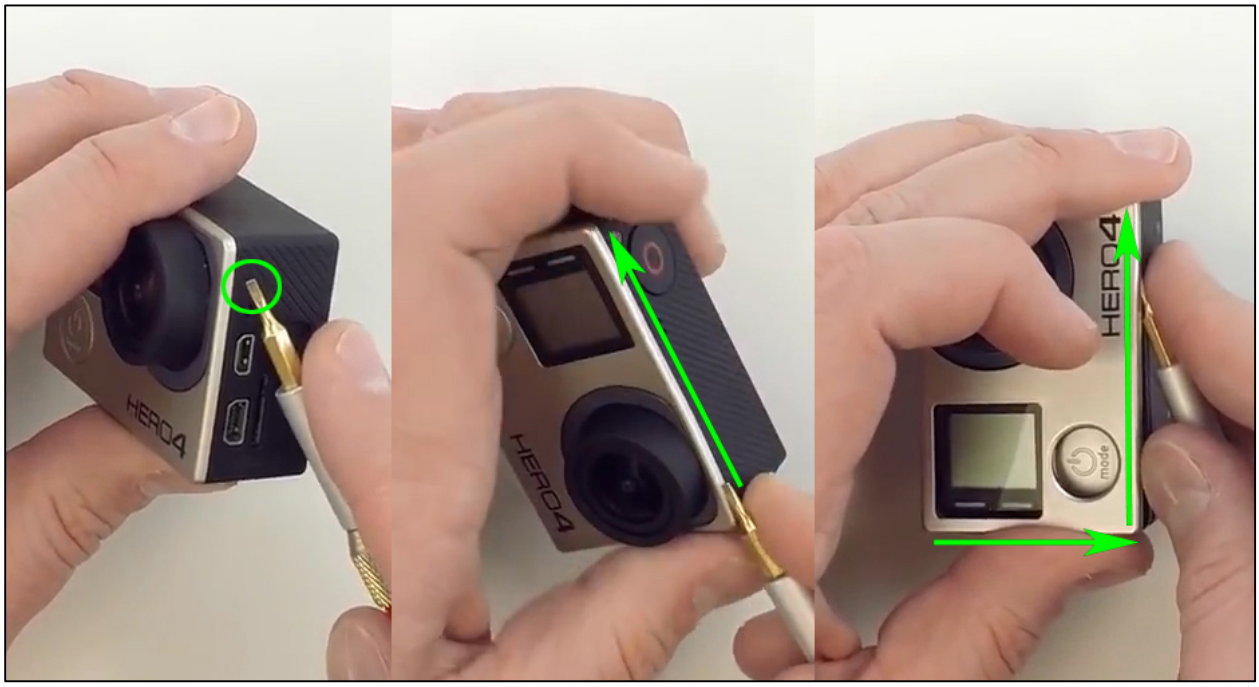
Video: https://youtu.be/hni57hh_93g

1-1 Remove Battery and Accessories

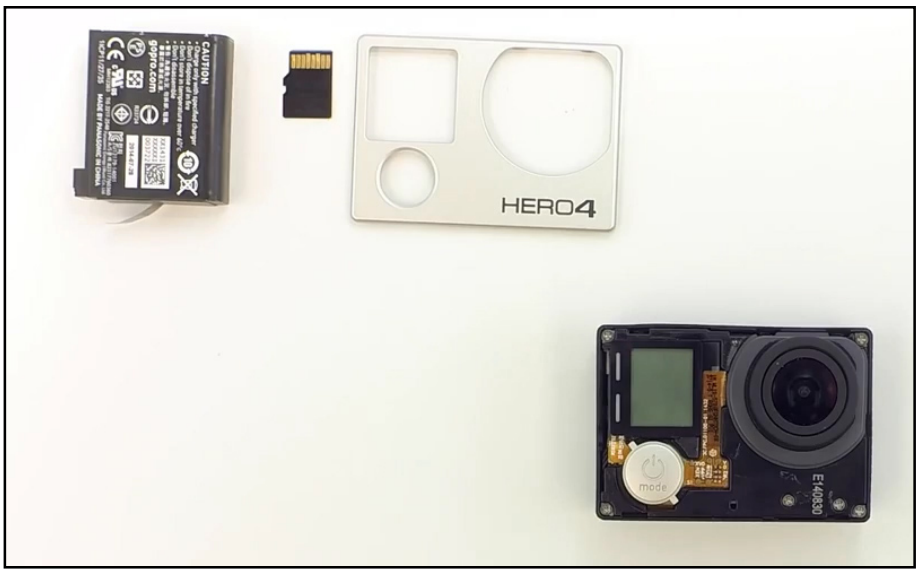
The first thing you need to do is remove all the accessories, SD card and the battery.

1-2 Remove the Cover Plate

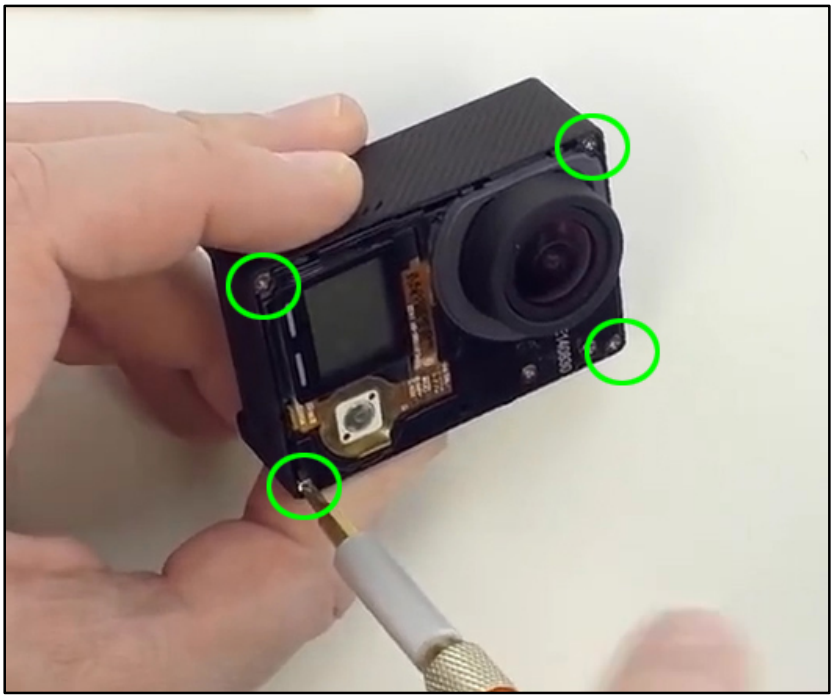
To remove the front cover use a miniature flathead screw driver. Gently insert the tool under the upper right corner of the cover above the lens and start working your way around the camera.



The face plate is attached with tape and plastic tabs. Pull the faceplate off and set it aside. Remove the button and set it aside for optional use later in the project



1-3 Remove the Assembly Screws



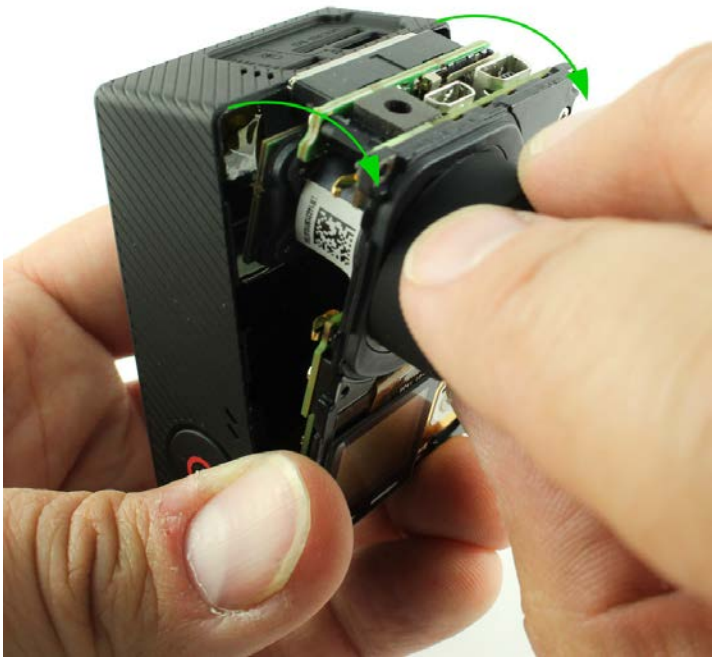
Next we'll remove the four corner screws. Note that the screw on the lower left is shorter than the others. We recommend leaving the top left screw until last.

When removing the top left screw make sure it doesn't catch on the corner of the LCD display. Undo it slowly and move the top of the screw around the LCD glass if required. Be sure to save all four screws for use later.

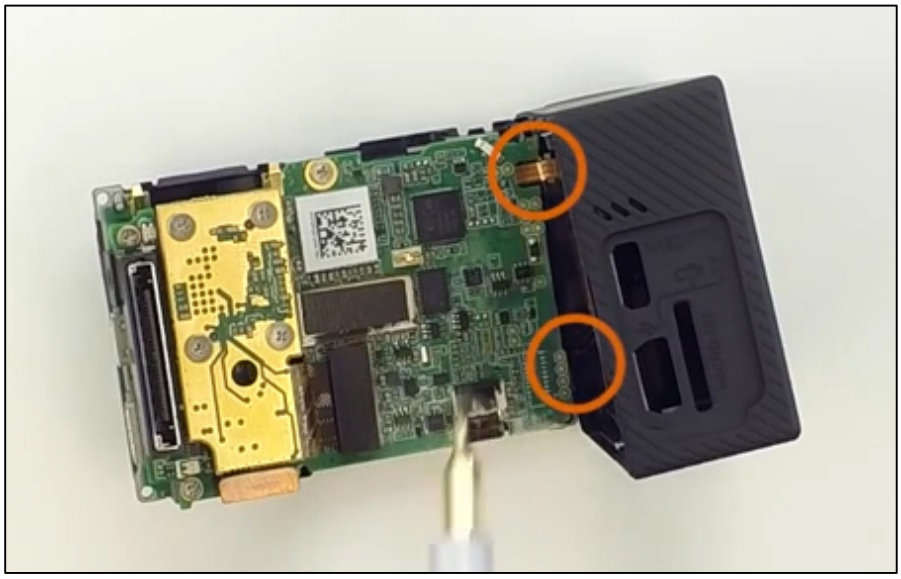
1-4 Remove Assembly from Housing

To remove the interior parts gently insert a screw driver under the housing next to the HDMI port and lift the housing slightly over the ports.

Grip the lens and work the PCB board assembly out of the housing by gently rocking the lens assembly back and forth until the internal aluminum plate and PCB board assembly is free.

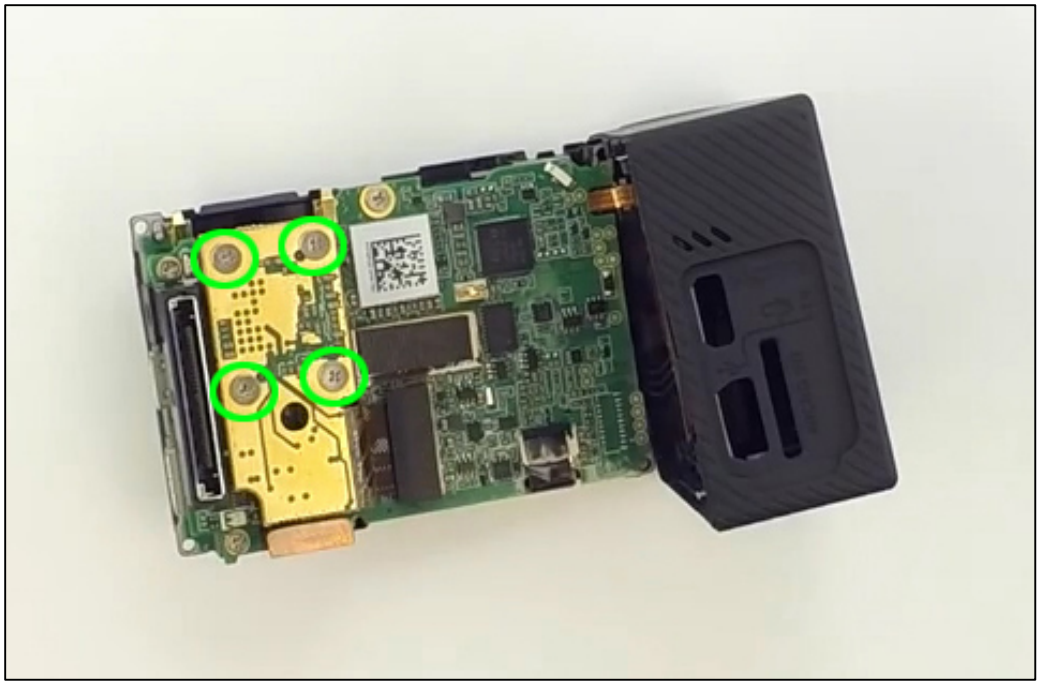


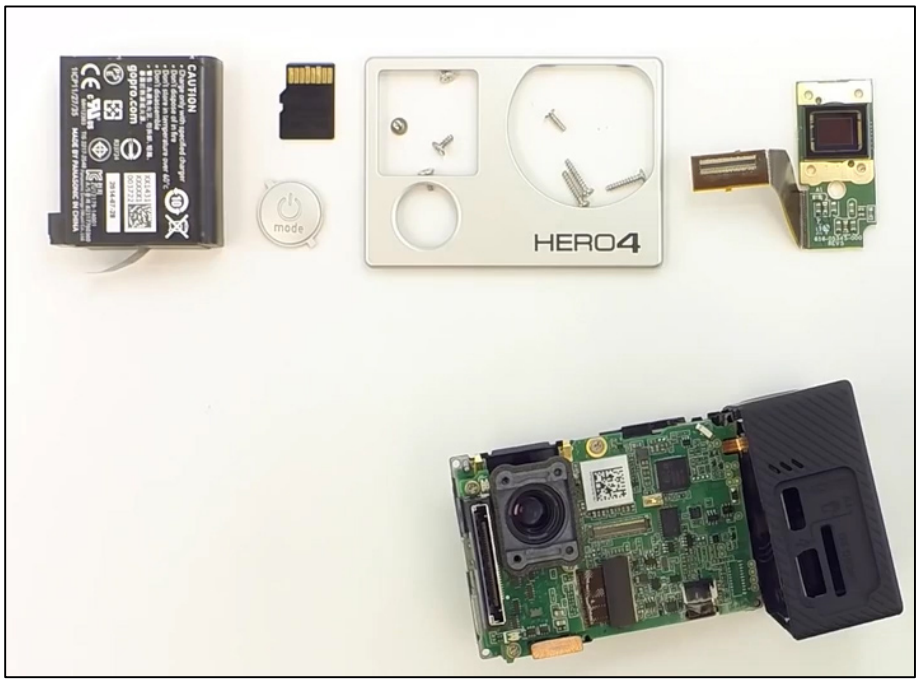
Swing the assembly down gently. There are internal connectors located along the edge of the board – take care not to put stress on them.



1-5 Remove the Image Sensor

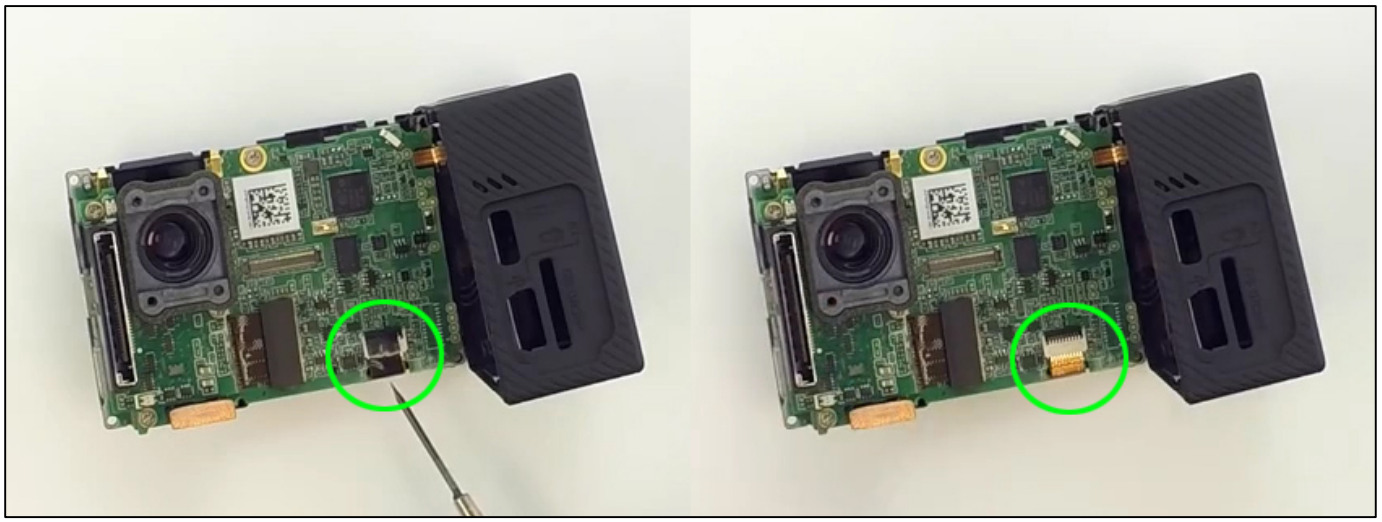
Remove the 4 screws holding the image sensor onto the rear of the assembly and set them aside. Gently pull up to disconnect the connector joining the image sensor and main board.



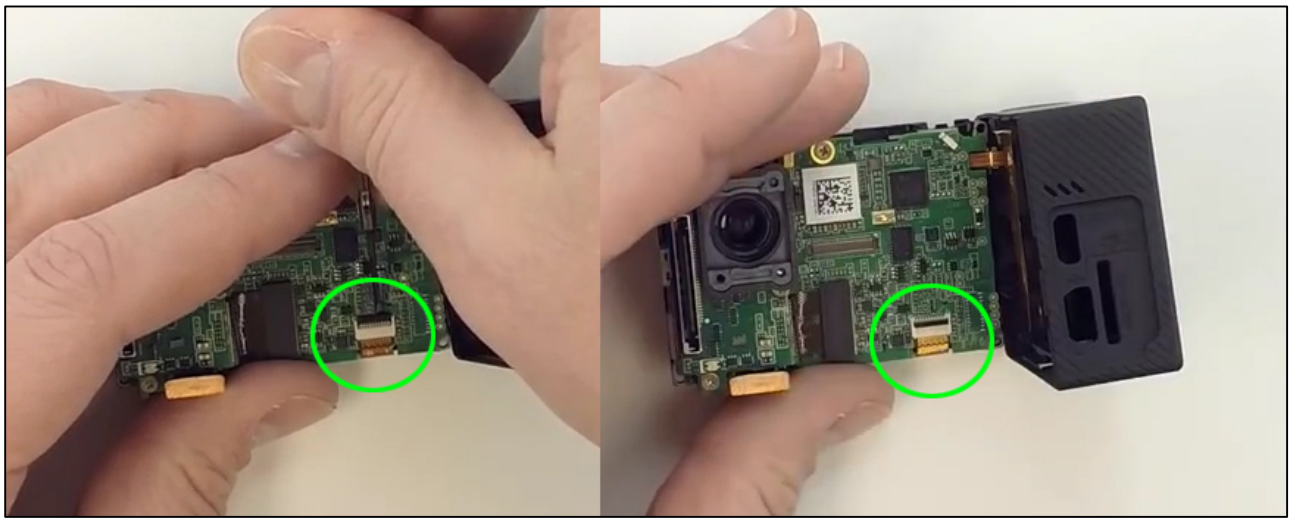


1-6 Disconnect the LCD/Button Strip

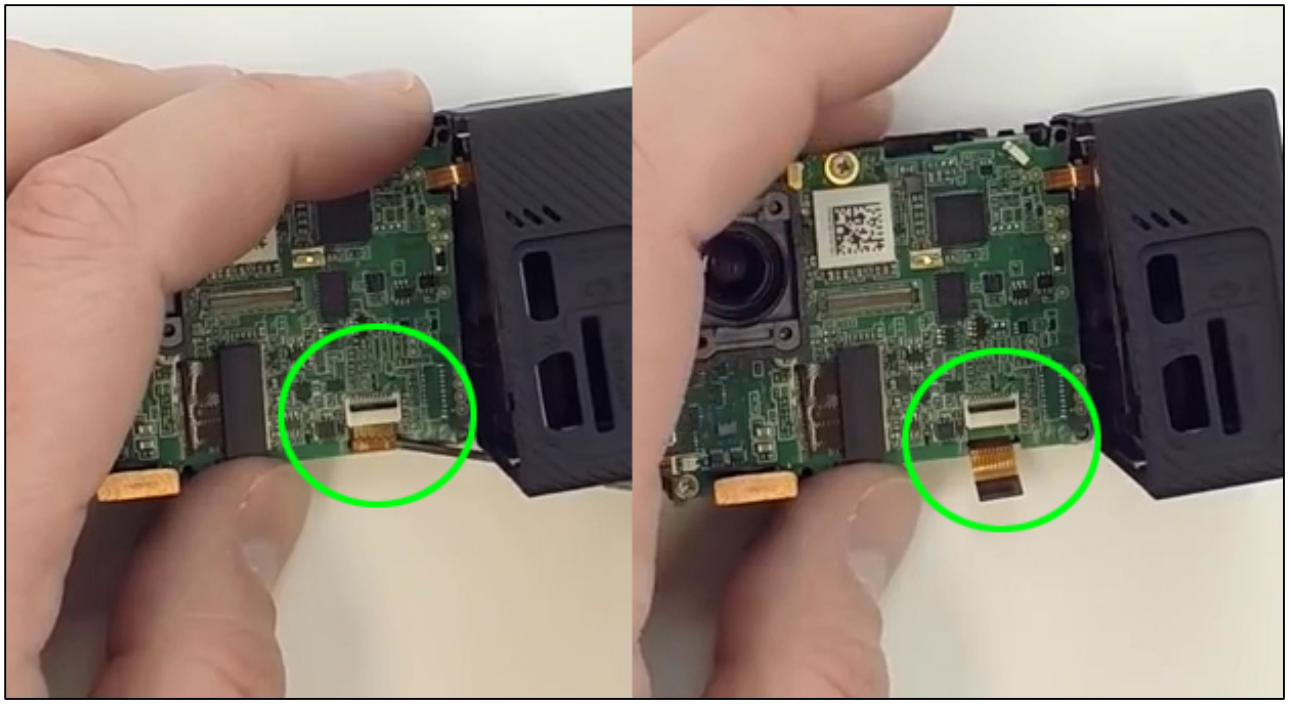
Use your fingernail or a small screw driver to remove the small piece of dark tape covering the ribbon connector at the base of the assembly. Take care not to damage the flexible ribbon at the bottom.



Now we'll disconnect the ribbon. Use a tiny screw driver to gently lift up on the black locking tab.

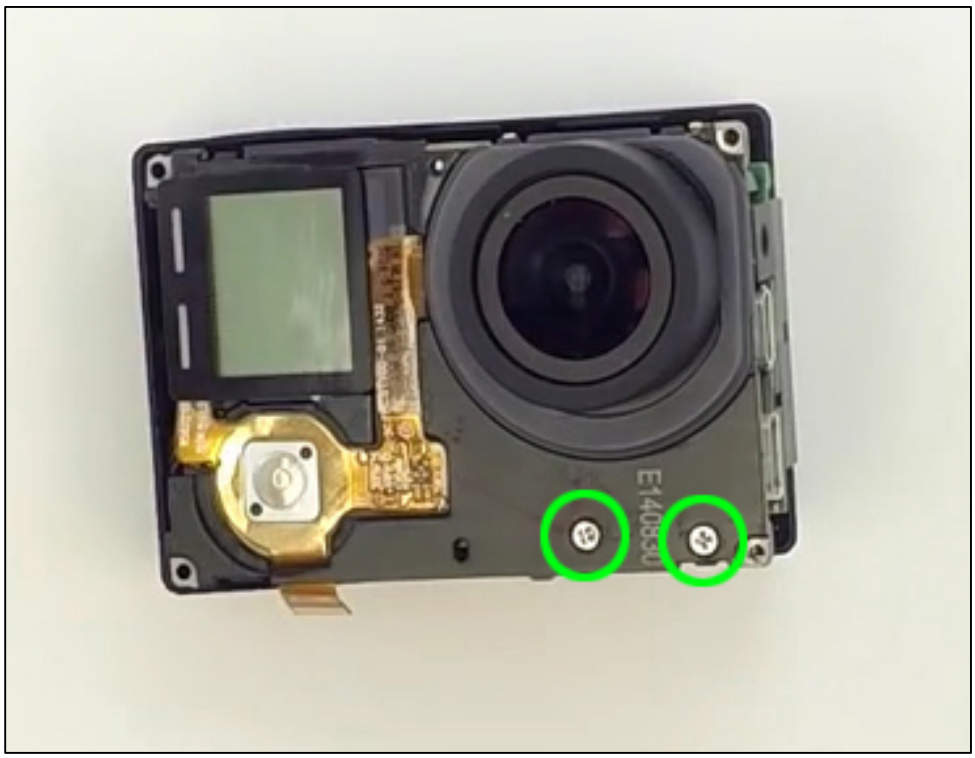


Use your screw driver to pull the connector free, taking care not to scratch or puncture the ribbon.

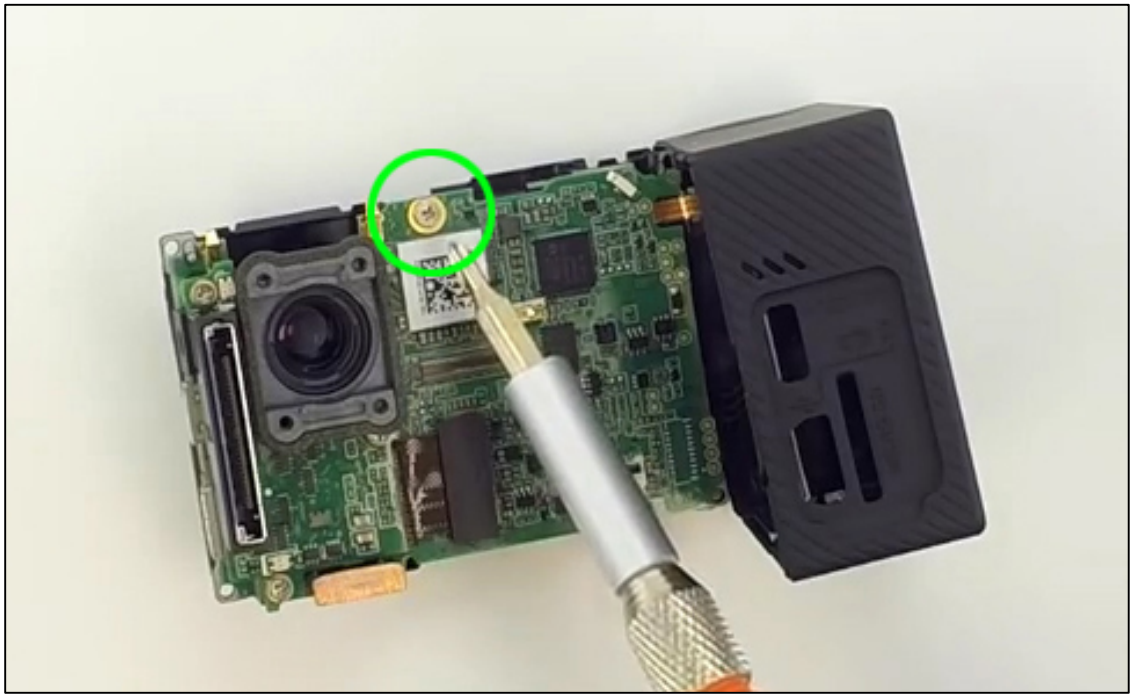


1-7 Remove the Aluminum Plate

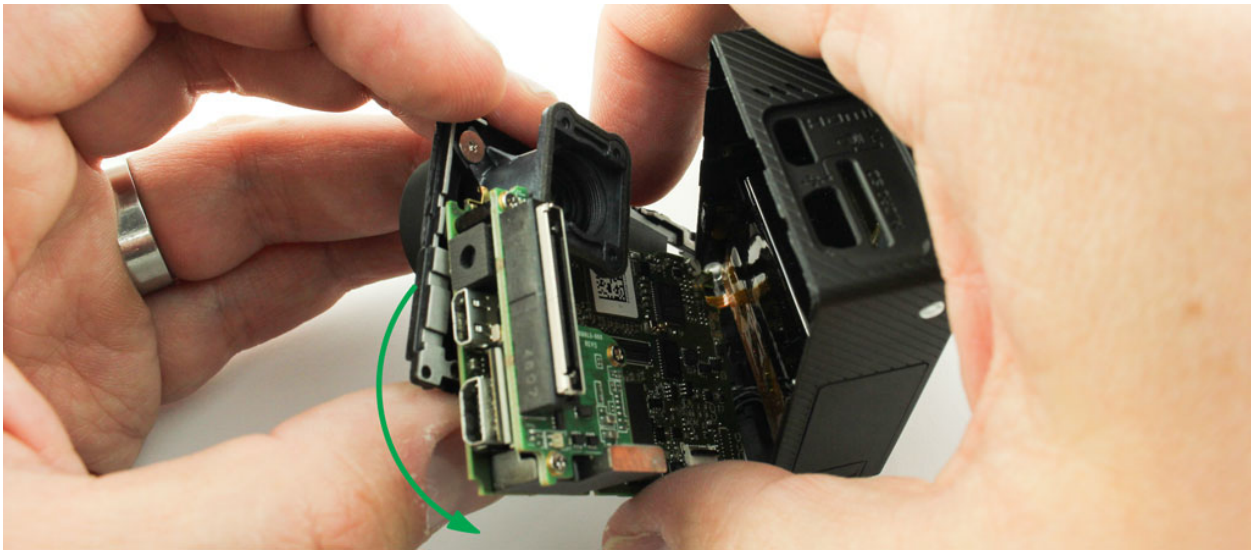
Remove the two screws located below the lens. **Be sure to save them as they will be needed later.**



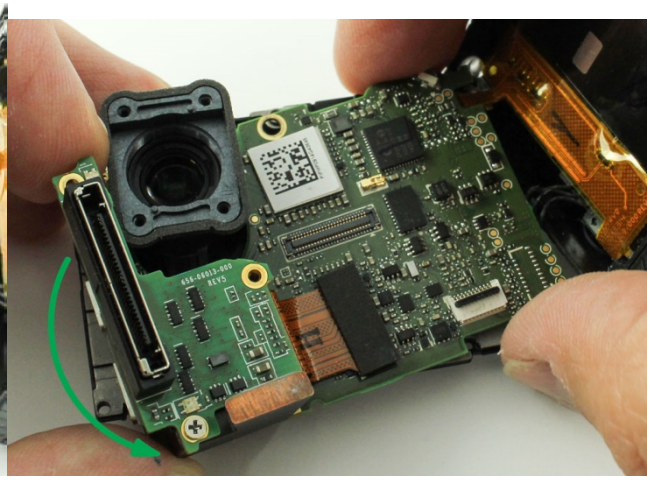
Remove the screw holding the main board onto the aluminum plate. **Save it for use later in the project.**



Gently lift up on the board to separate it from the aluminum plate and angle it down and away to remove it. Don't' force the board. This step may require a little patience to get the angle just right.

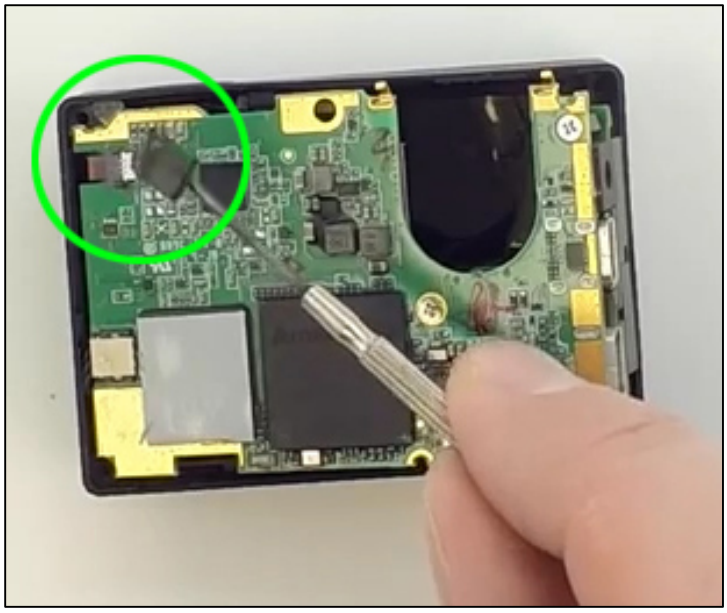


****Optional** in some cases the board can be difficult to remove.** If that's the case in your project you can remove the screws from the I/O board (pictured) and angle the board slightly so there's more room to remove the main circuit board. **Make sure you replace the screws once the board is free.**

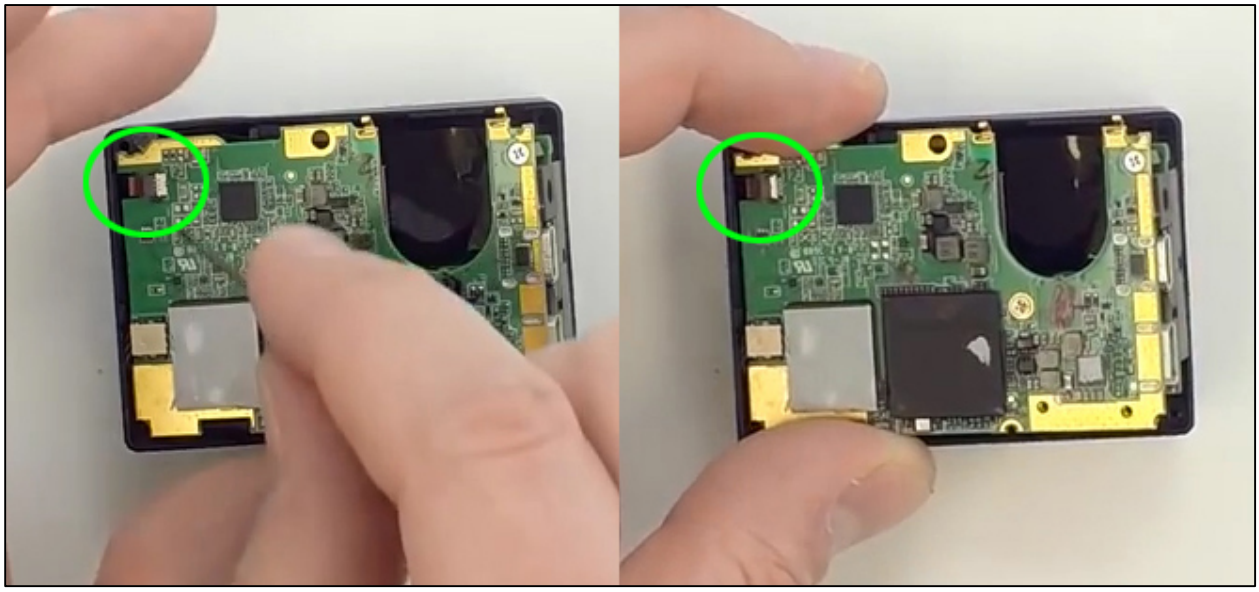


1-8 Detach Board Connectors

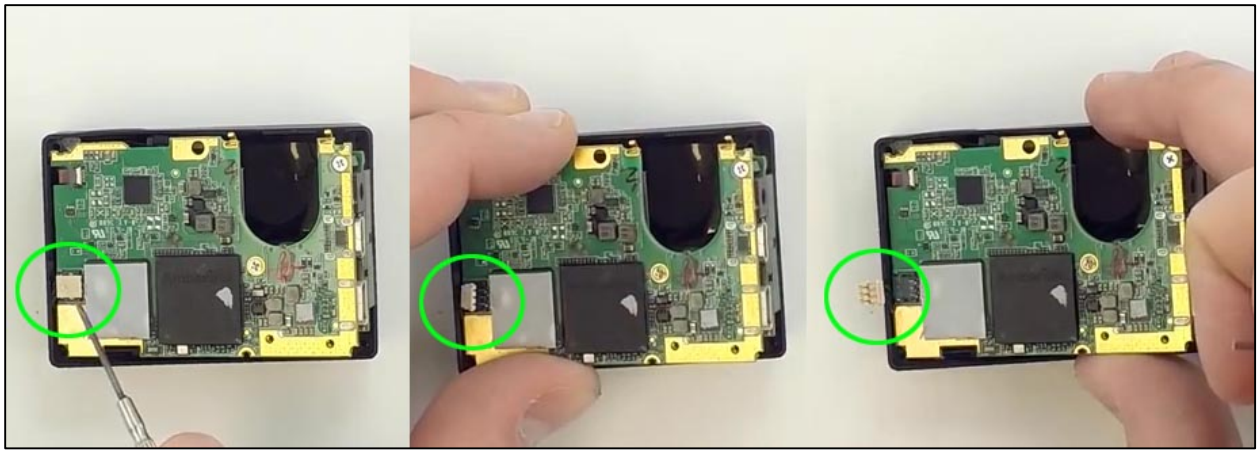
Fold the assembly over and lay it back onto the housing. Remove the tape covering the ribbon connector on the upper left.



Flip up the locking tab that holds in the remaining ribbon connector. In some cases this ribbon may have already come free during the previous steps, or may come out when you pulled off the tape.

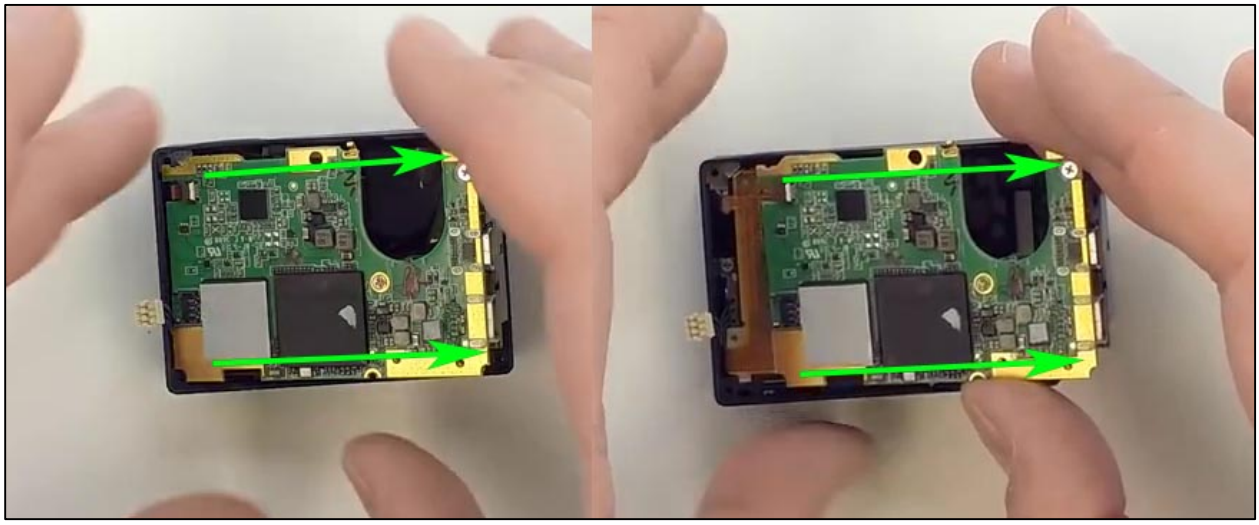


Pop off the light colored plastic connector by gently pulling up on the right edge with your screw driver.



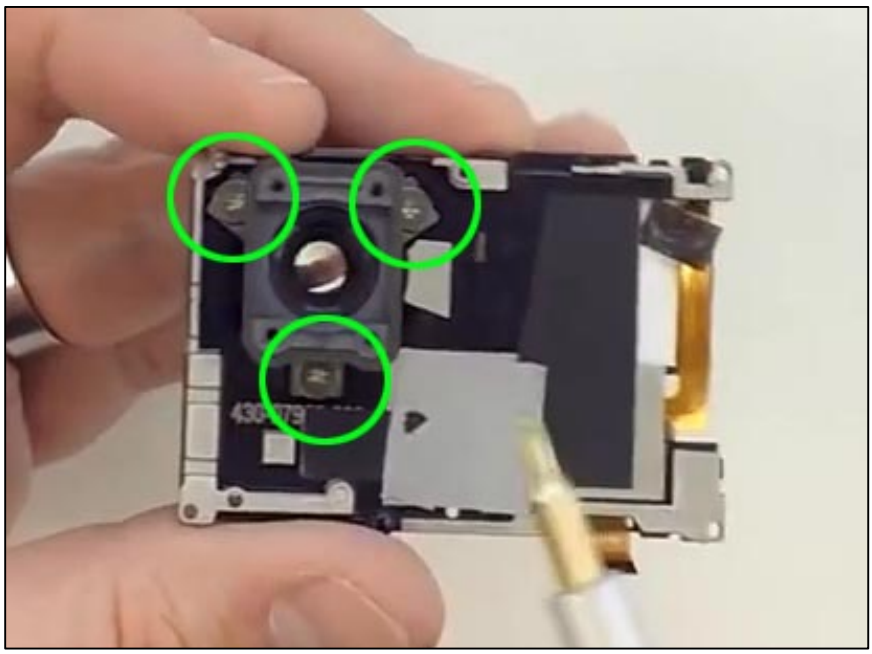
1-9 Remove the Main Board

Gently pull out the main board assembly to remove it from the housing.

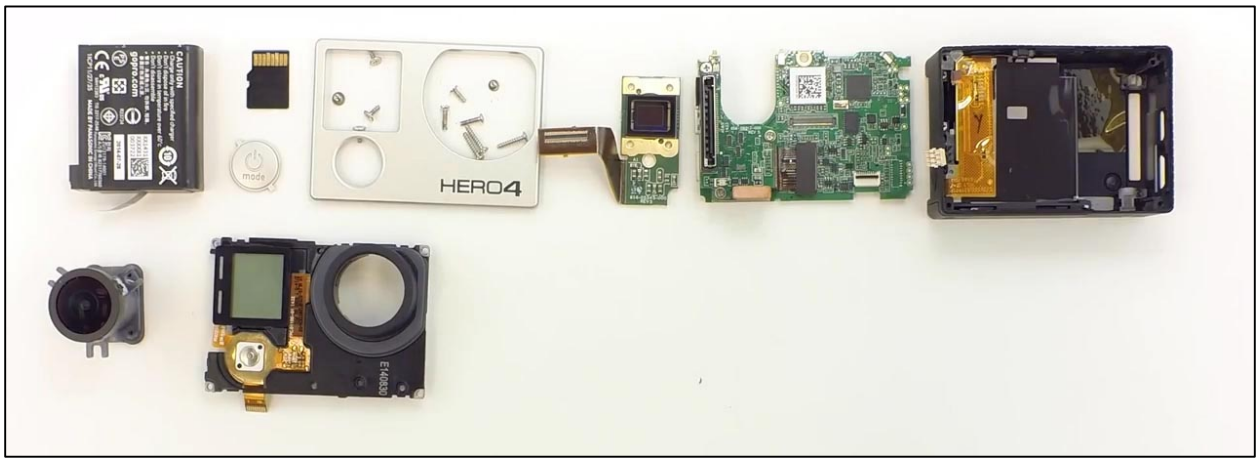


1-10 Remove Lens Assembly

Remove the three screws holding in the lens assembly.

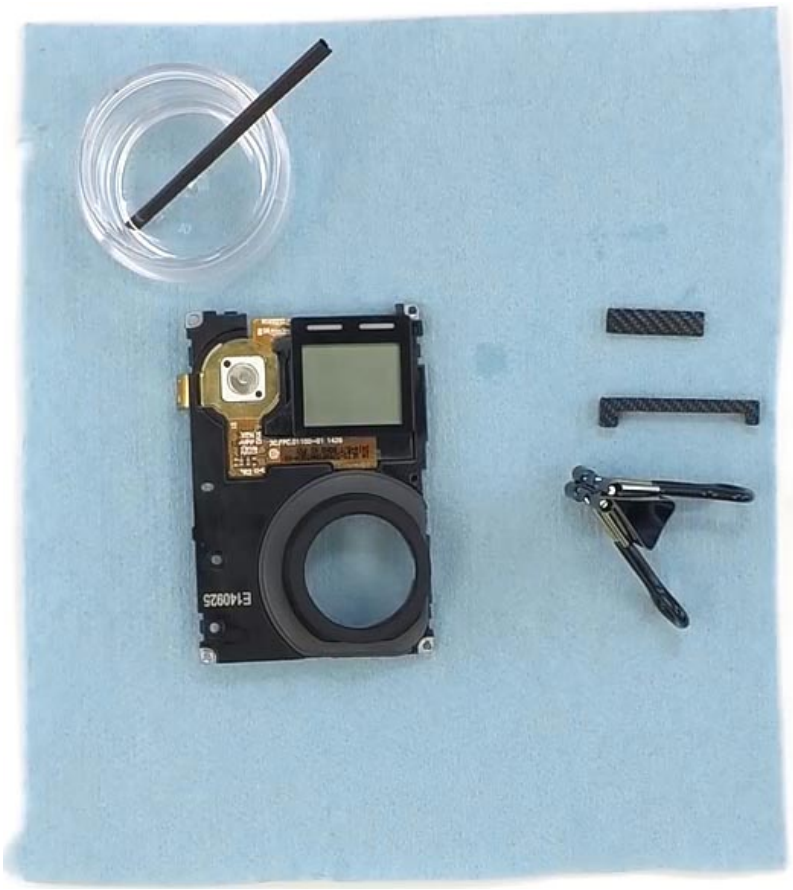


Pull out the lens to remove it. We'll prepare the lens for use in the Ribcage in a separate tutorial.

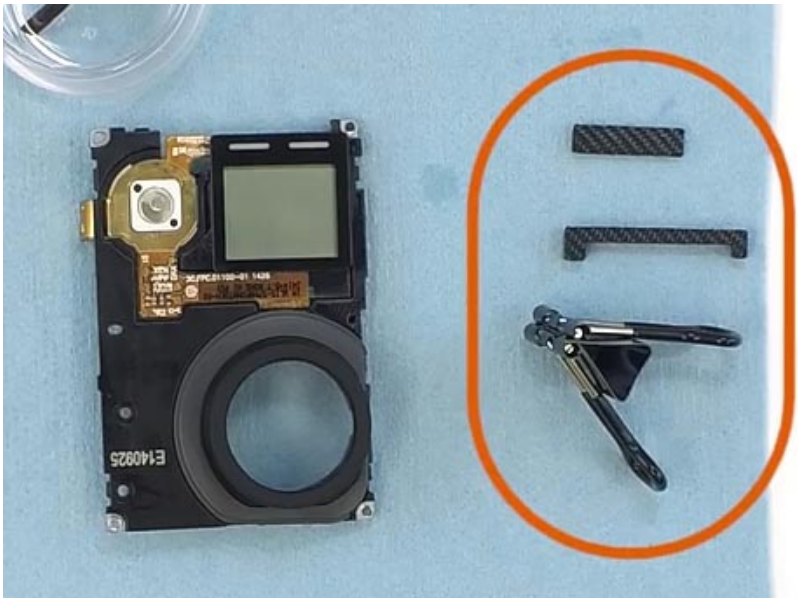


1-11 Remove the LCD/Button Strip

Now let's remove the LCD button strip.



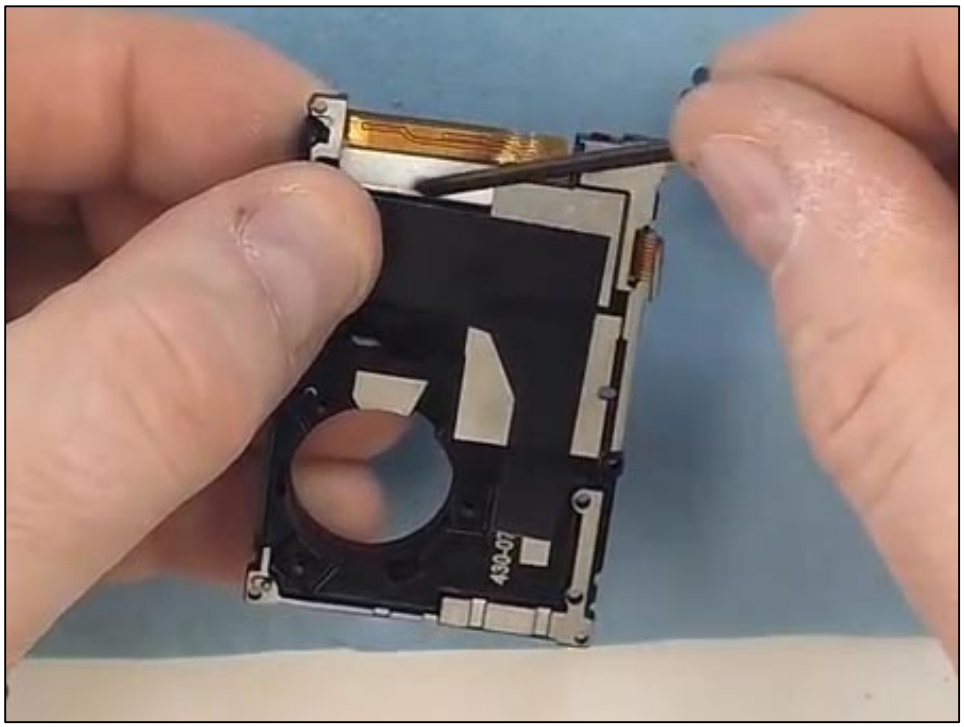
It's important to note that this is a delicate part, so patience is key during this step. Never pry or force this part. We'll need the Isopropyl alcohol and a small applicator for this step. In this case we're using a plastic stir stick. Locate the two plastic parts and the clamp pictured. ***Note that they may also be white or orange.***



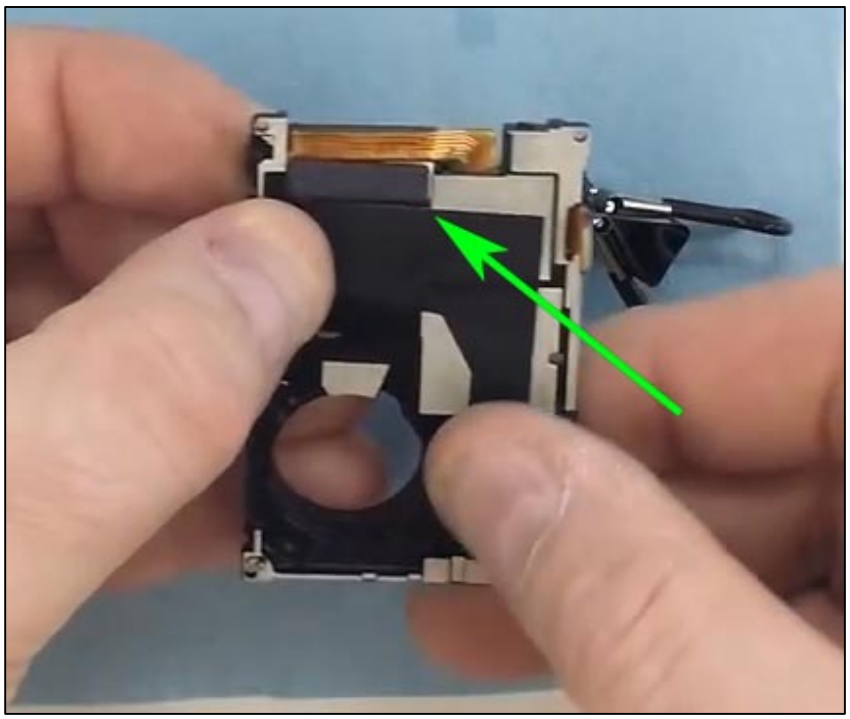
Place the plastic bridge over the left side of the LCD display with the smaller tab at the top edge.

This should be placed as far left as possible while still having both ends touching the aluminum plate.

Place a few drops of alcohol on the white LCD backing against the aluminum plate.

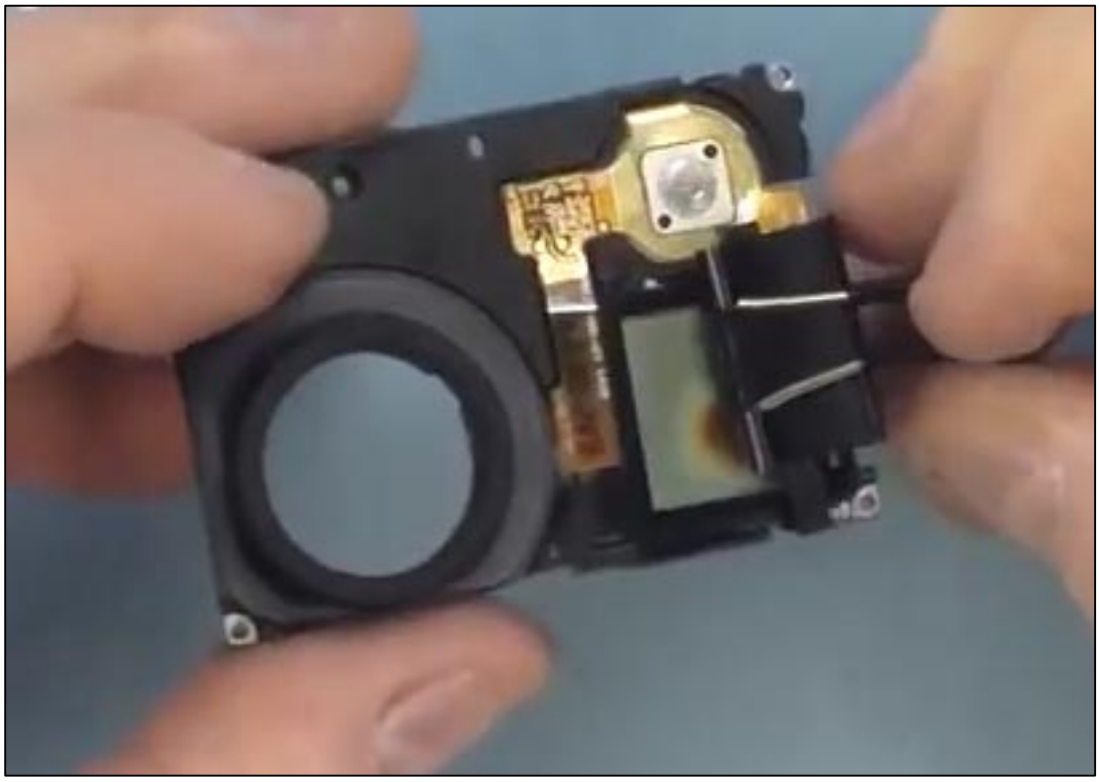


Place the rectangular plastic part over the white backing.



Open the clamp and carefully place it over the plastic parts so there is even pressure and slowly release it.

You'll probably notice a small dark patch appear on the LCD. This is normal and will disappear shortly.

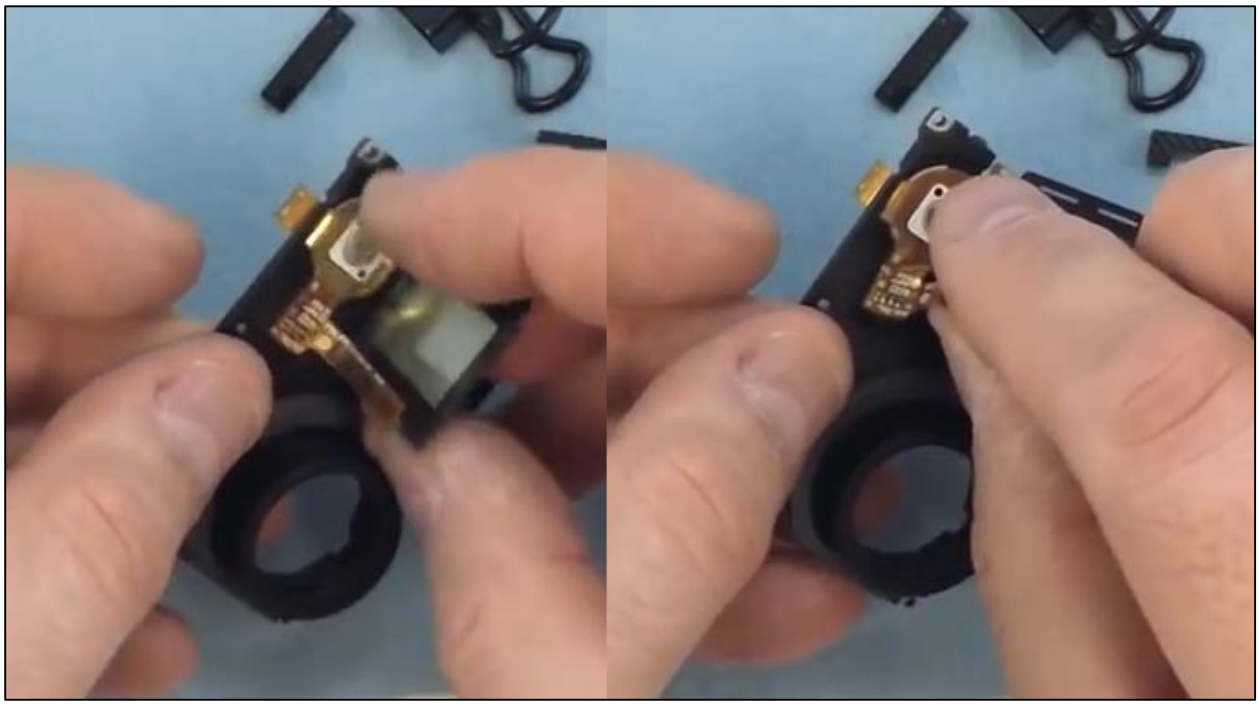


Apply a few drops of alcohol under the top right corner of the LCD display. You should notice the dark patch on the screen slowly fade as the adhesive releases.

Add more alcohol as needed. This step is usually fairly quick; however on rare occasions the LCD may require up to 15 minutes before it fully releases. Never attempt to force or pry the display off.

Remove the clamp and plastic parts. Gently lift the LCD display to verify that it's free. If the LCD remains stuck even slightly it's best to use a little more alcohol and wait for it to be completely free before attempting to remove it.

Gently peel off the lower portion of the button strip taking care not to tear or bend it sharply.



Wipe off the remaining alcohol. The rest should evaporate after a few minutes.

The camera teardown in now complete. Now let's install the mod kit!

Section 2: Ribcage Assembly

Video: https://youtu.be/hni57hh_93g?t=10m2s

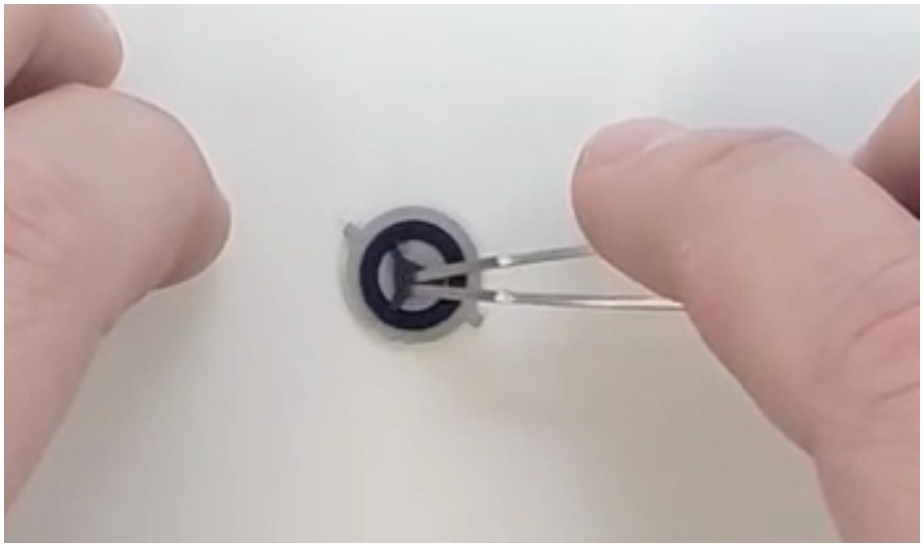
2-1 Your Ribcage Kit

Let's get started by opening up your kit and removing the contents.

If you experience any difficulty or have questions during your install please contact support. Be sure to include your support code for the fastest possible service. It's better to ask first if you're not certain about any of the steps.

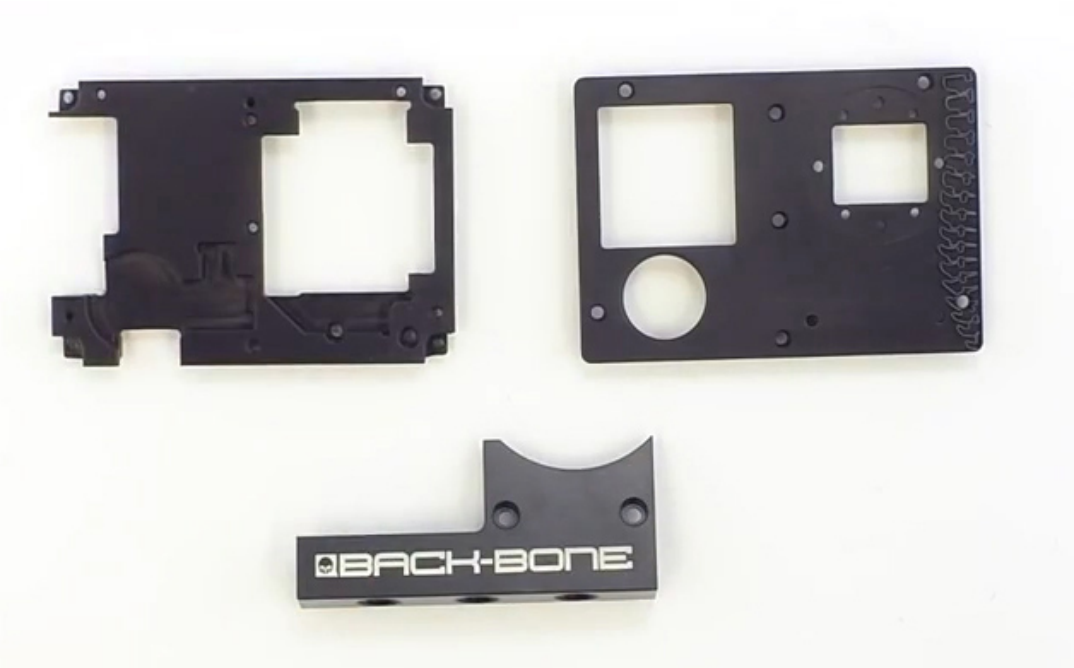
2-2 Button Prep

**** Optional **** If you want to use the original button instead of ours place a dab of superglue on the back and add the button standoff with a pair of tweezers.



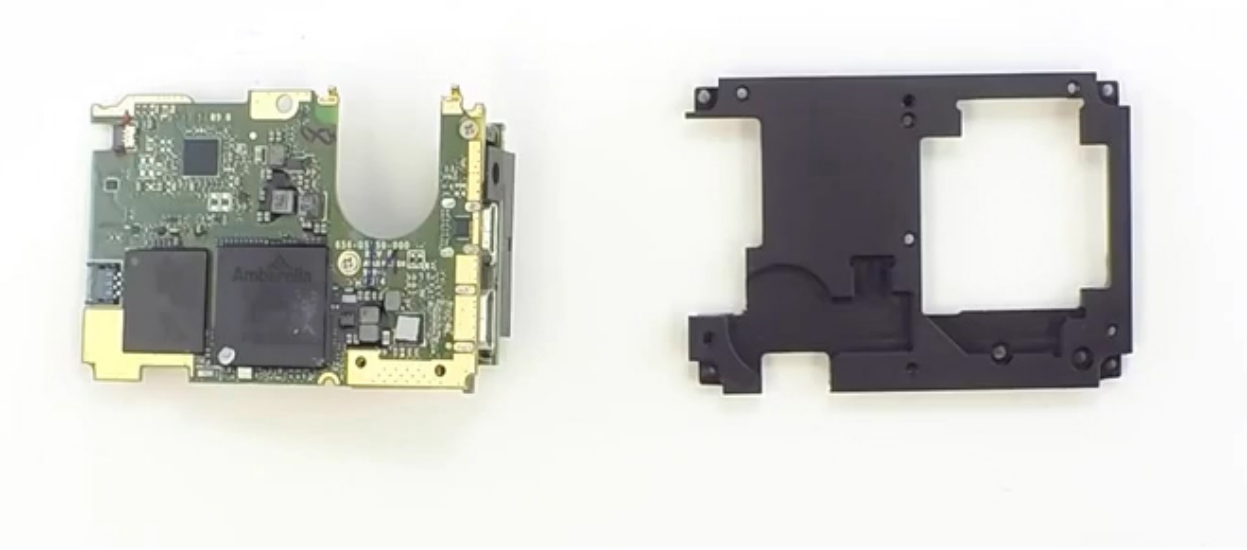
2-3 Separate the Aluminum Plates

Now let's start the assembly by separating the metal plates using the L-keys provided.

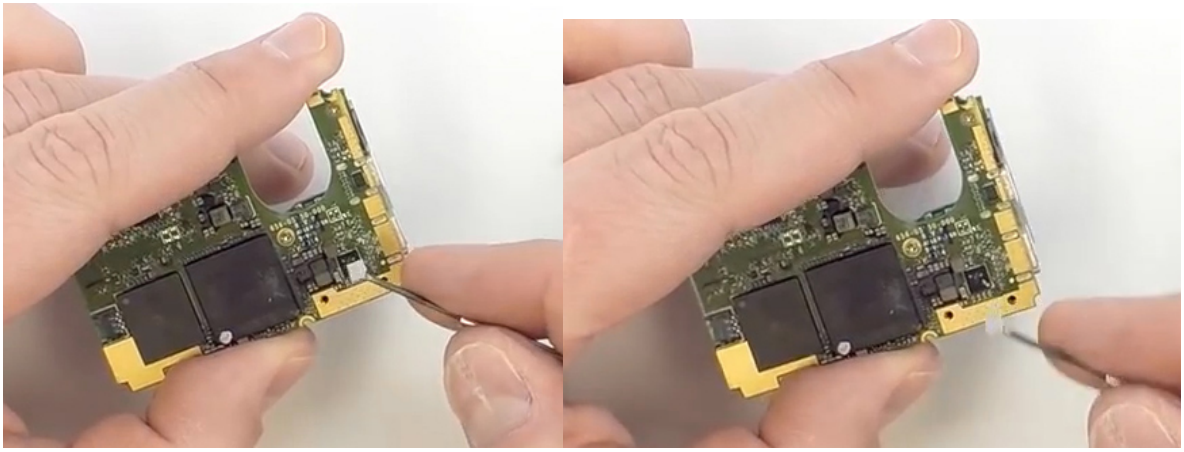


2-4 Attach the Main Board.

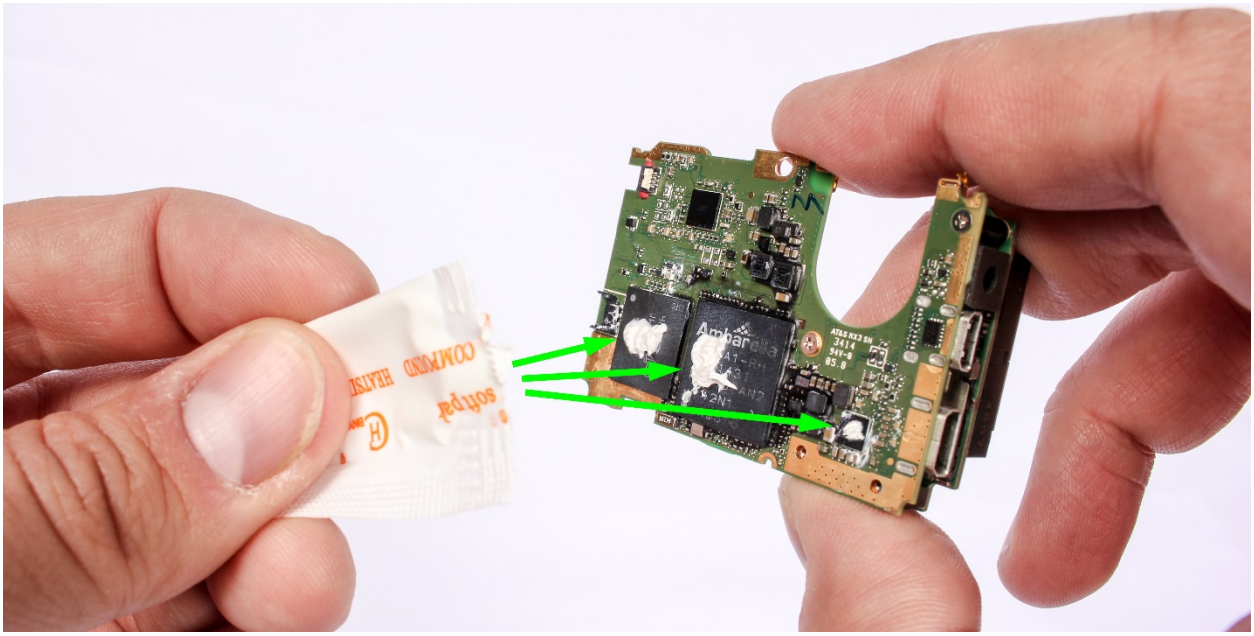
Now we'll insert the main board into the PCB plate.



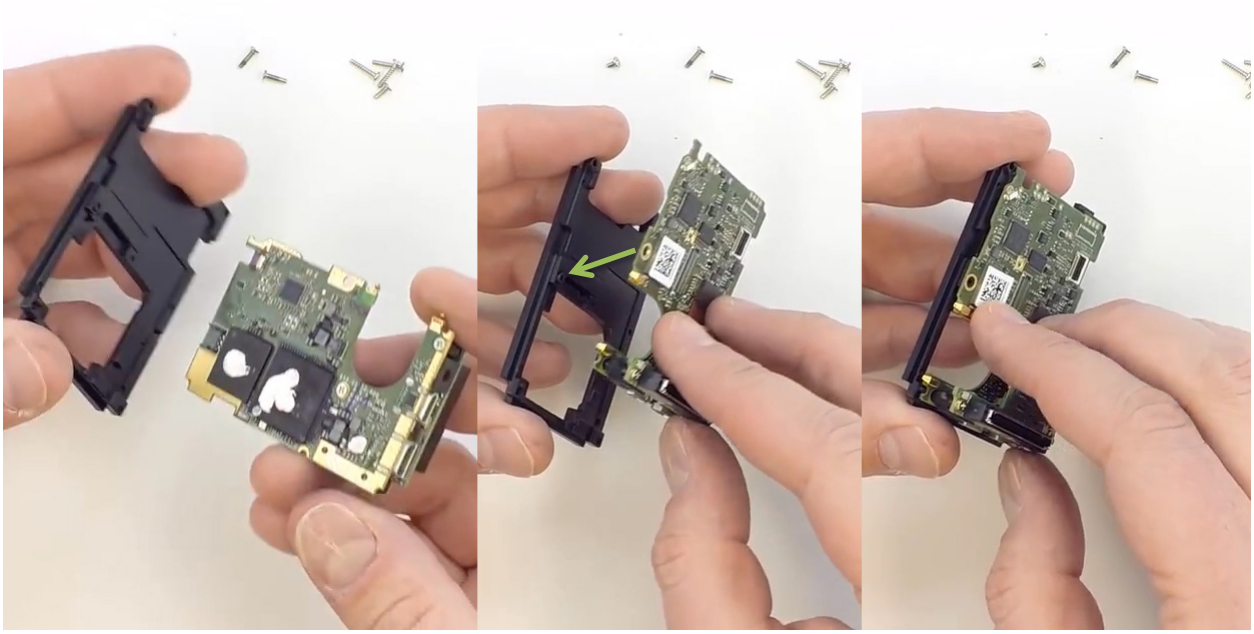
First remove any of the grey heat transfer material that remains on the chips.

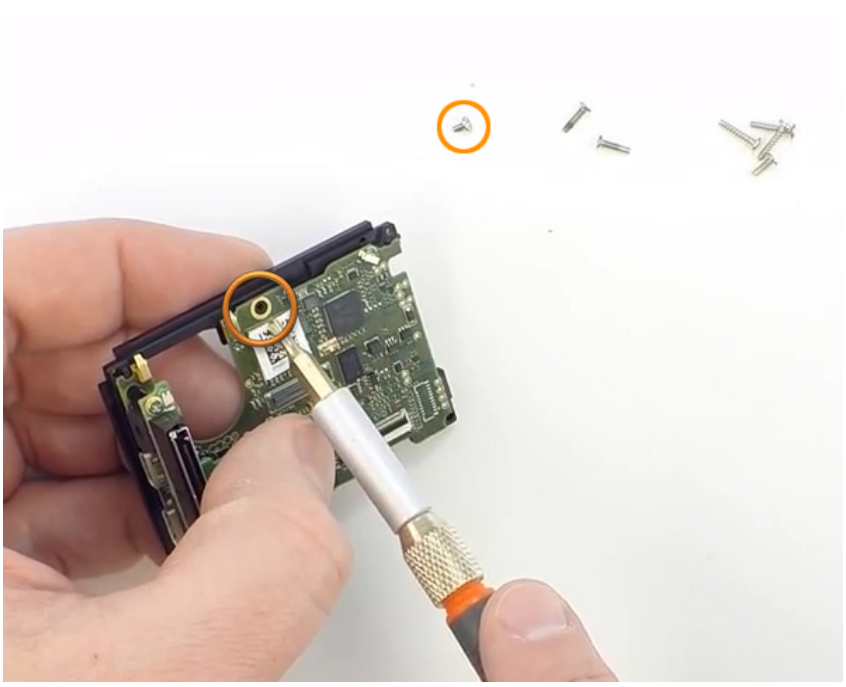


Place a **small** dab of heat paste on each of the large chips. Place the dab on the left side of the largest chip as shown.

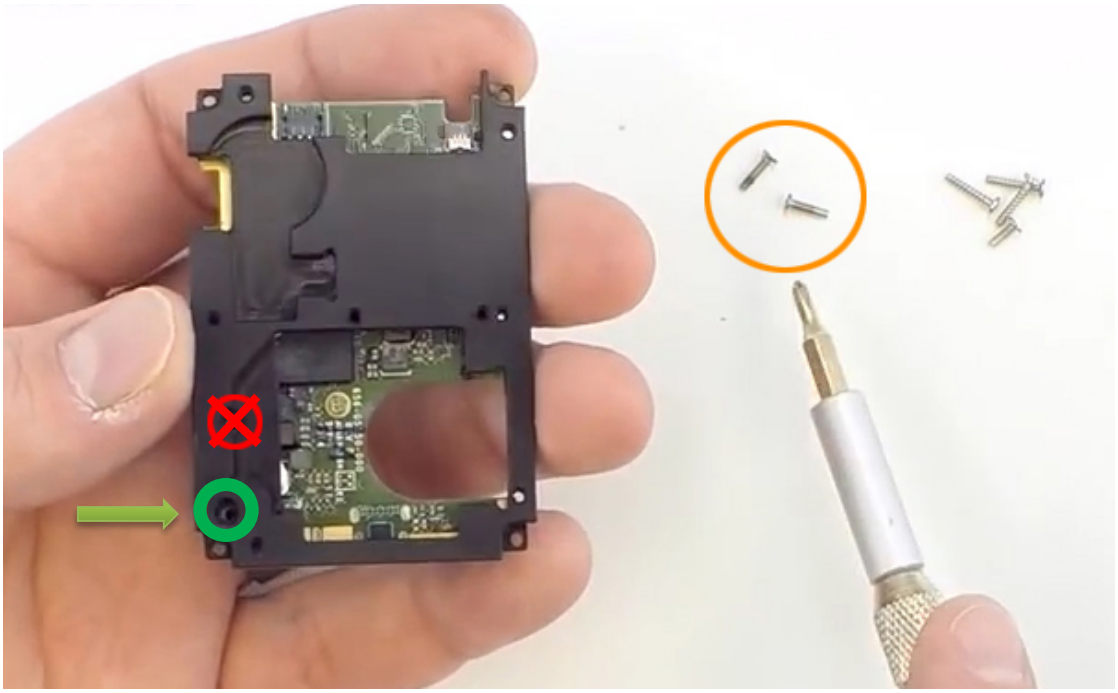


Place the board onto the PCB plate and fasten it in place with the PCB board screw that you removed earlier. Check the corners to make sure the board sits flat and is properly aligned before tightening the screw.



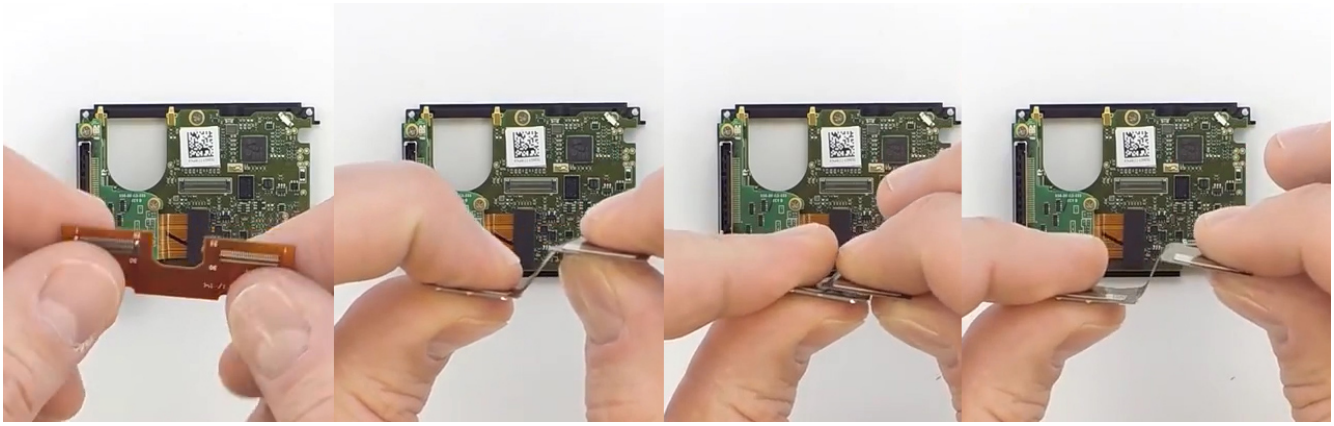


Now we'll insert one of original screws back into the lower edge of the plate. It's important not to overtighten the screw in this step. Do not add the additional screw.

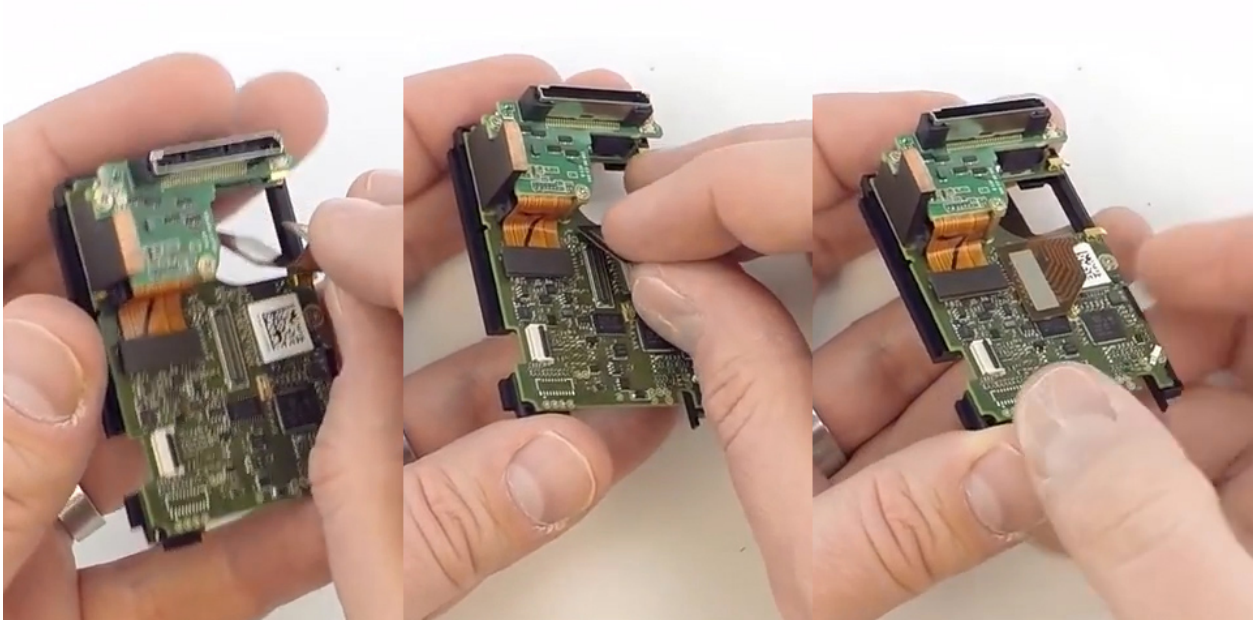


2-5 Connect the Flexible Jumper

Next take the flexible jumper from your kit. Carefully bend the jumper as shown.

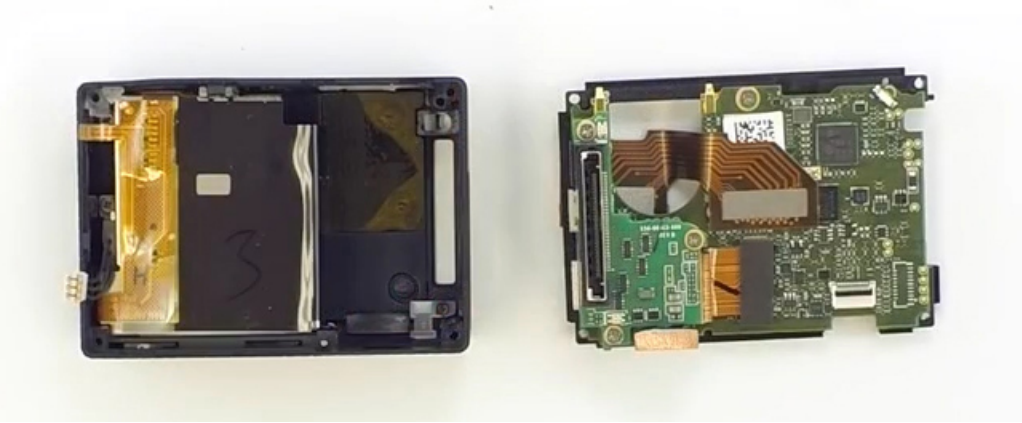


Insert the left side of the jumper through the board where the lens assembly was located.

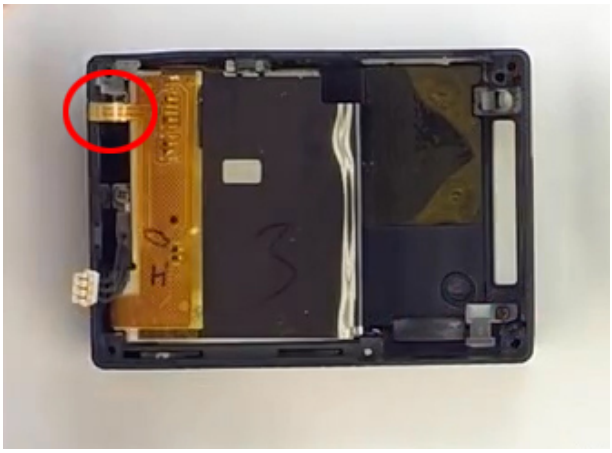


Connect the flexible jumper to the main board taking care to align the connectors prior to exerting any pressure to seat them together. They should click together easily when properly aligned.

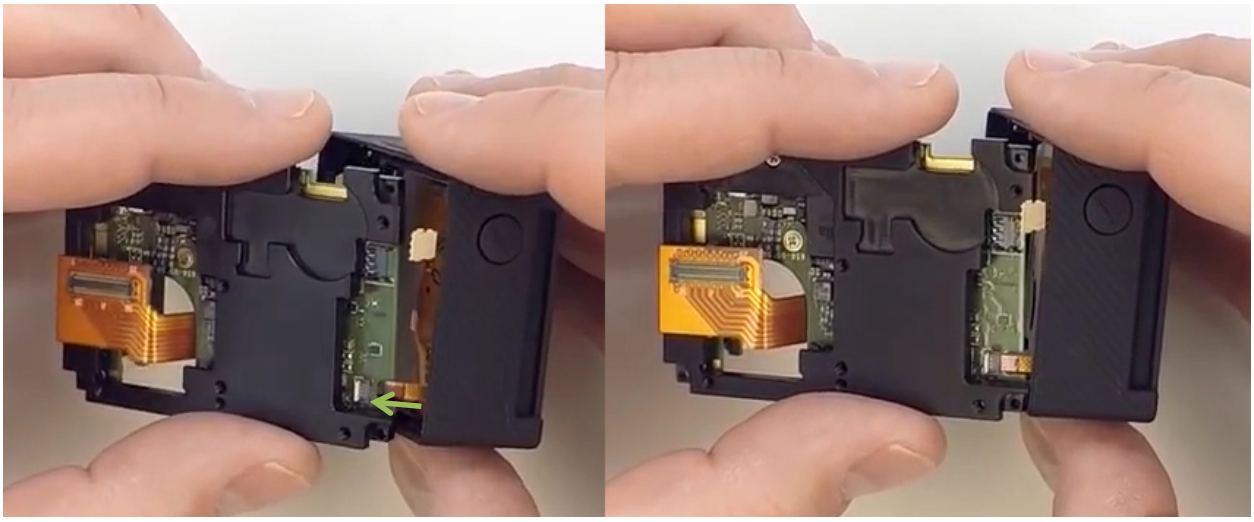
2-6 Connect Main Board to Housing



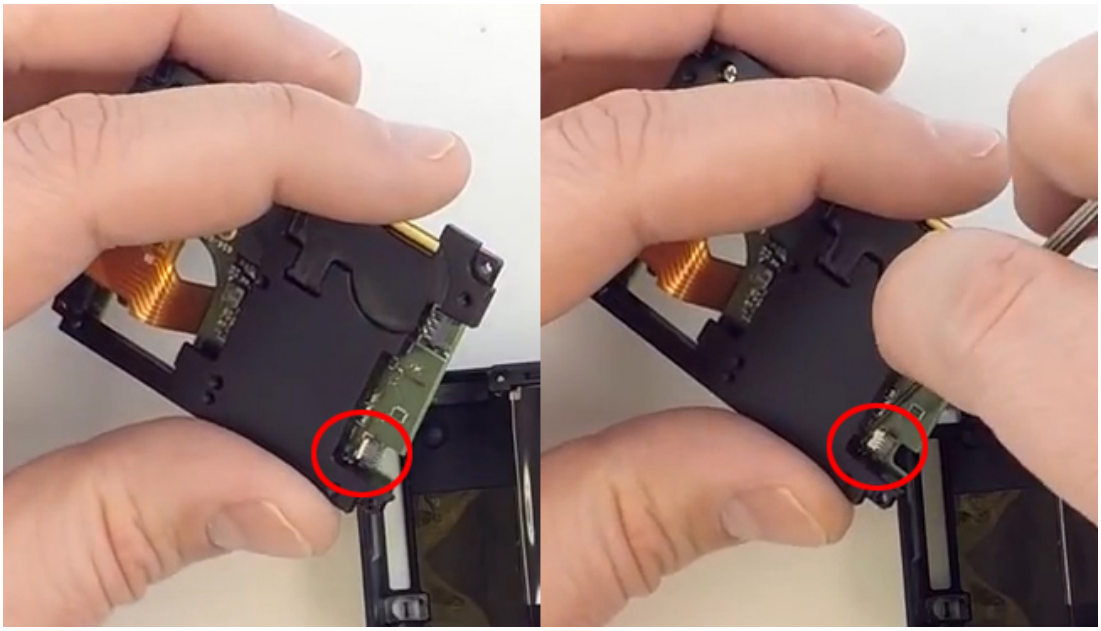
Take the rear housing of the camera and carefully bend the flexible ribbon so that it's straight and extends out as far as possible



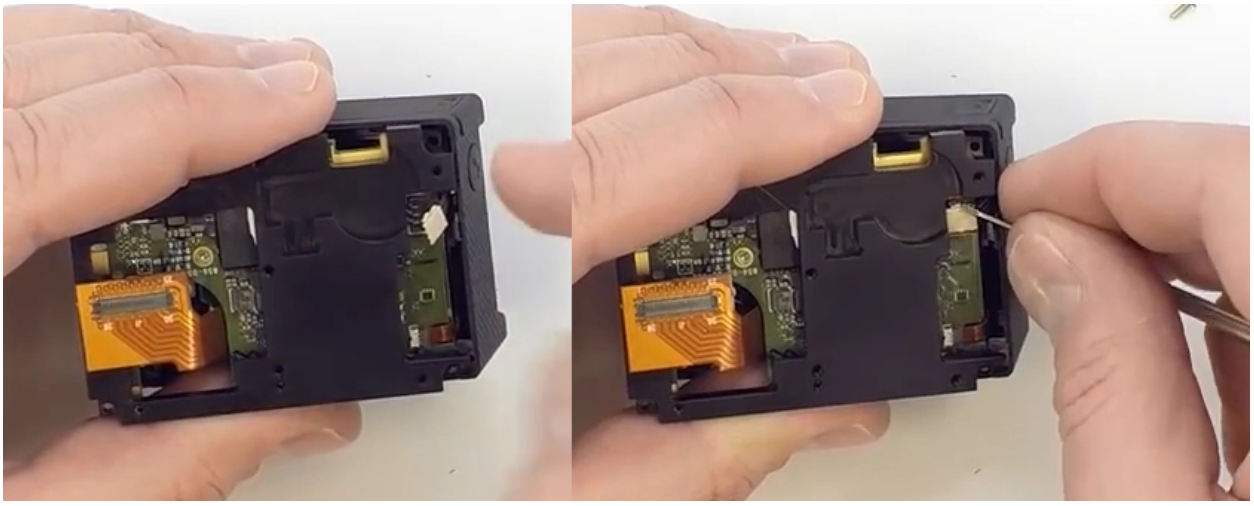
Make sure the locking tab is up. Carefully insert the ribbon into the socket on the main board as shown. If it doesn't go in all the way we can correct that in a moment.



Flip down the plastic locking mechanism to keep it in place.



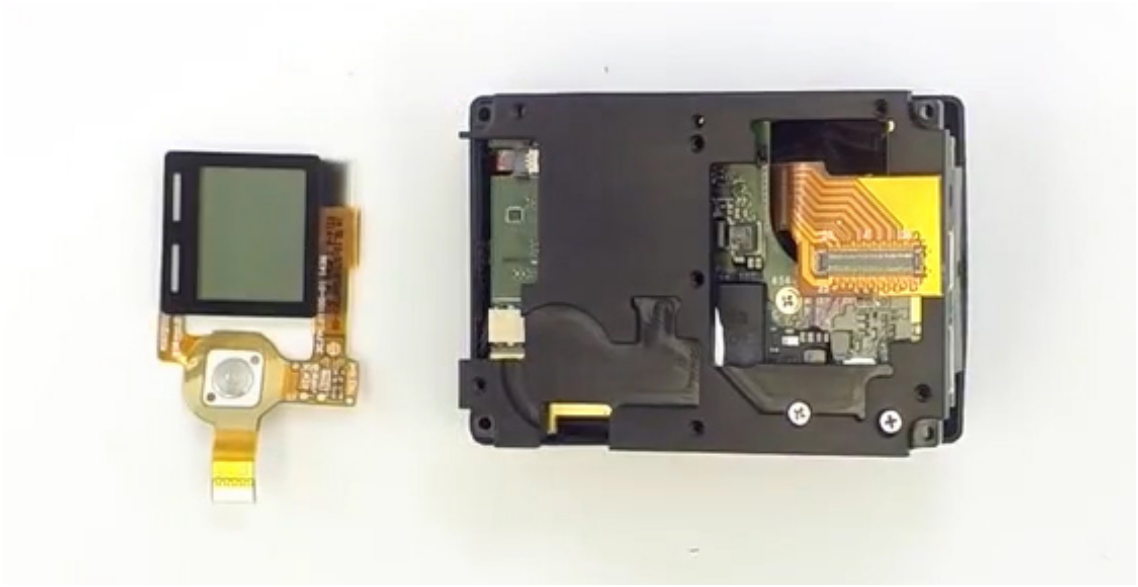
Next insert the light colored plastic connector into its socket.



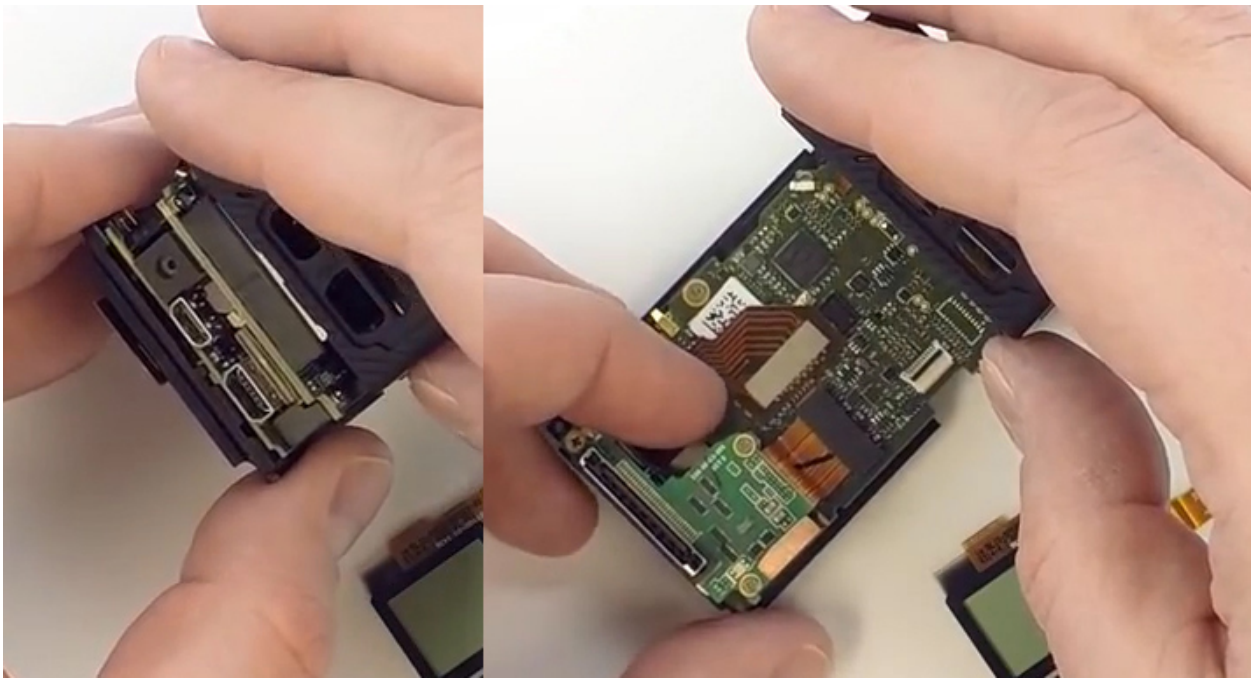
Carefully align the rear of the connector with the socket and push down on the front to click it into place.

2-7 Connect LCD/Button Strip

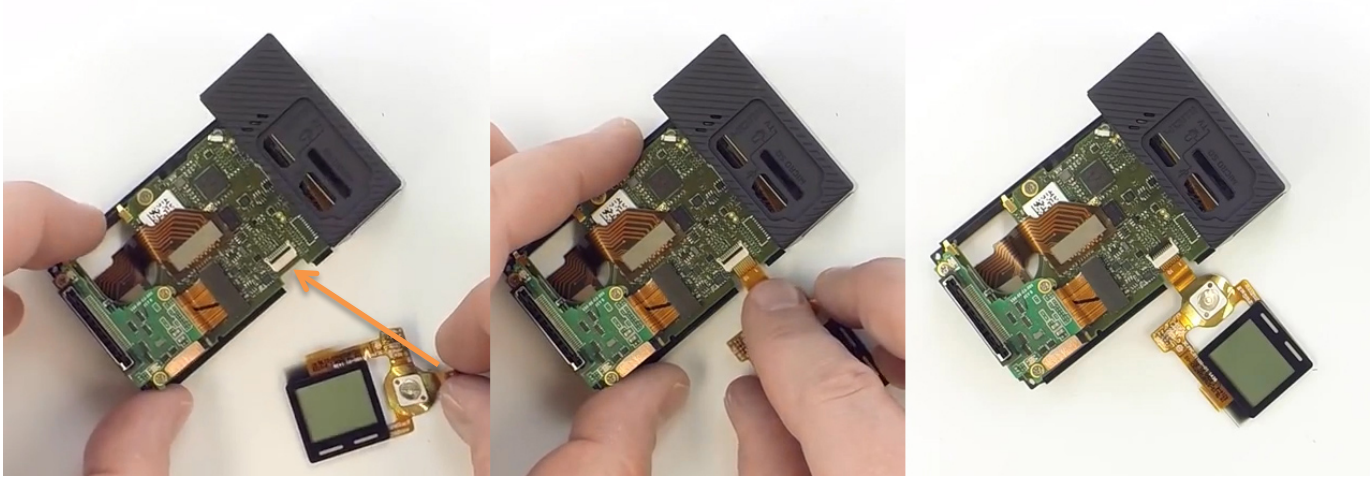
Now it's time to connect the LCD button strip.



Gently flip open the assembly taking care not to dismount your connections.



Orient the LCD so that it's face up and insert the ribbon connector into the socket on the main board as shown.

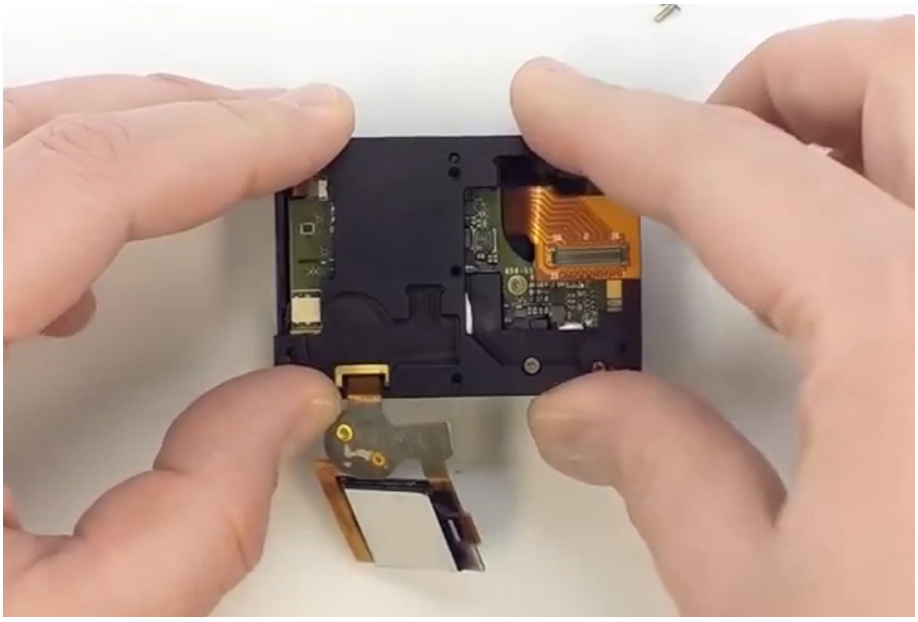


Flip down the locking mechanism to hold it in place.

2-8 Insert Assembly into Housing

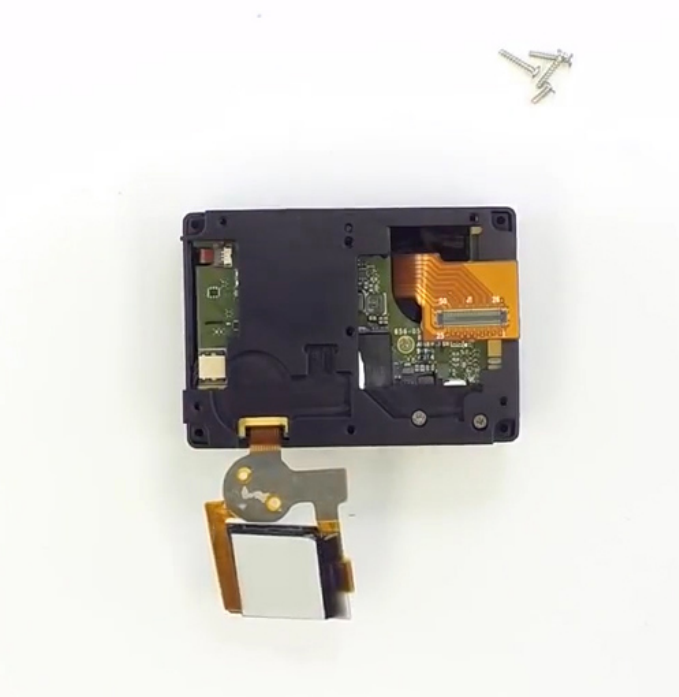
Next angle the board assembly back into the housing, taking care not to stress or disconnect the connections. You may need to gently lift the edge of the housing with a flat screw driver to get the assembly in.

Push it together until it clicks into place and the USB and HDMI ports are properly aligned with the housing.

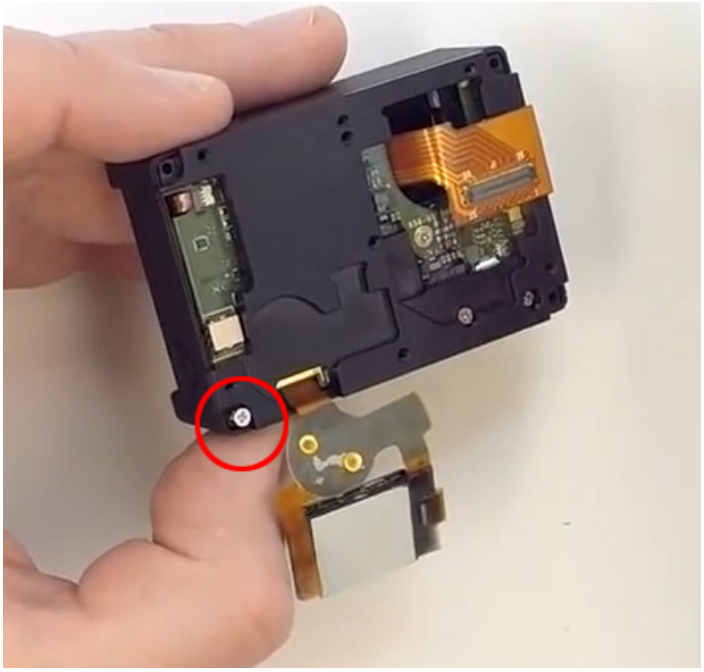


Now is a good time to check your connections. If they aren't fully inserted take a moment to make the proper adjustments.

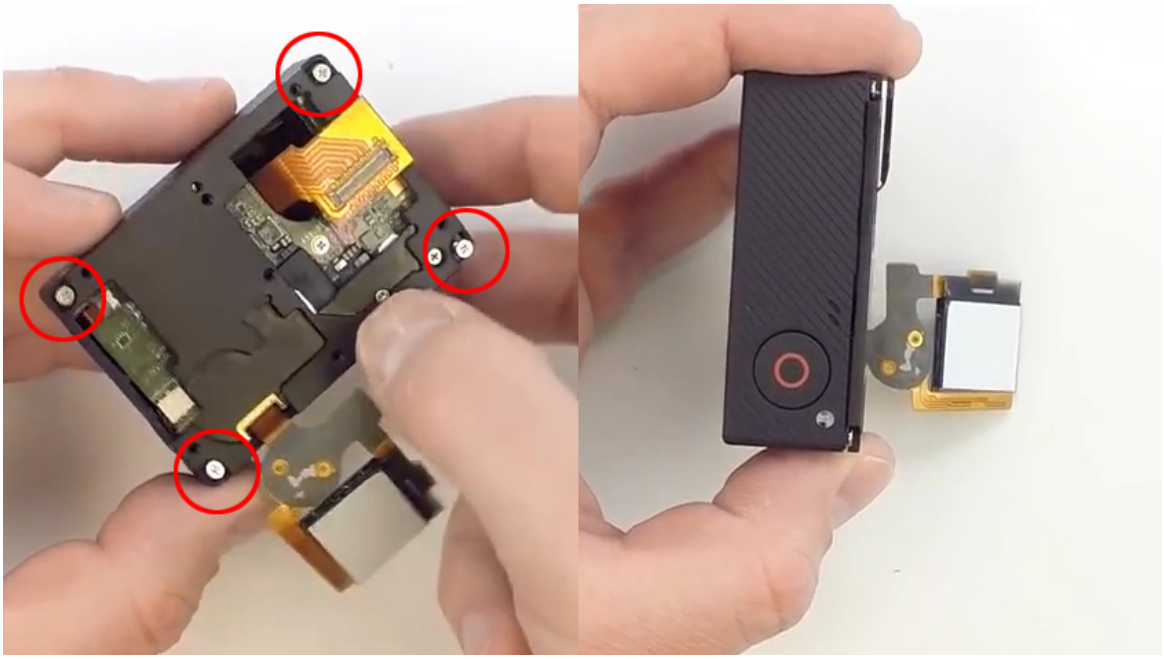
Next secure the assembly with the four corner screws.



Note that the shortest screw must be used on the lower left.



Gently tighten the screws until the plate contacts the housing, making sure that the edge of the housing stays parallel with the edge of the plate all the way around.

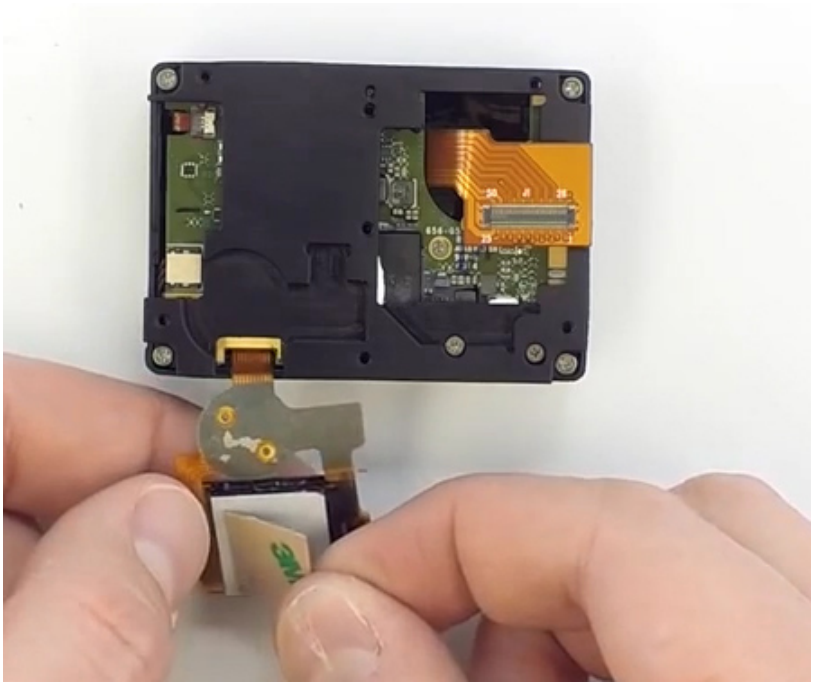


Once snug additional tightening is not required and may cause the housing the bend. If you start to see this happen loosen the screws as needed.

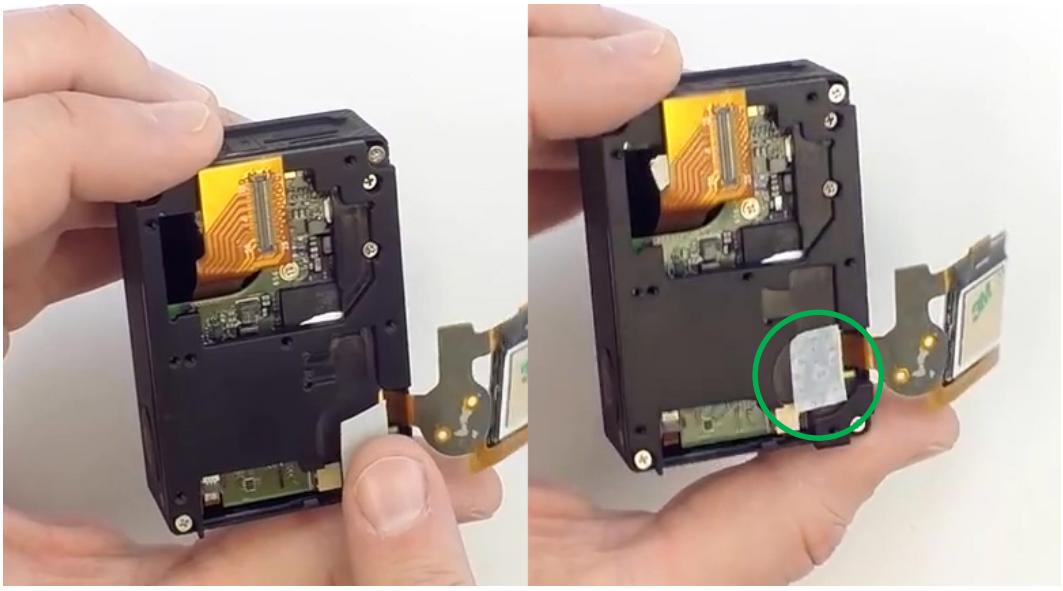
2-9 Mount LCD Display

Remove the backing from one side of the double sided tape provided.

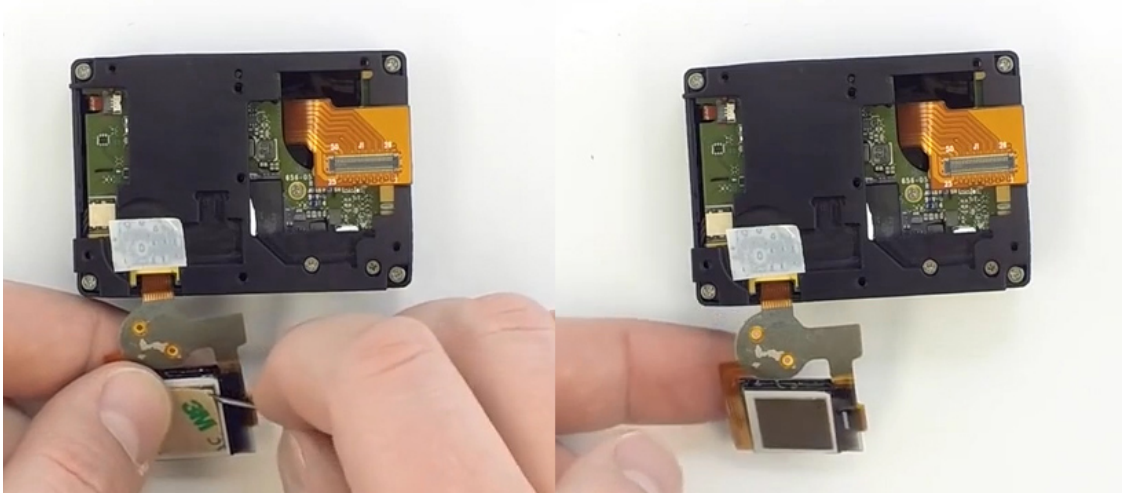
Place the tape on the back of the LCD.



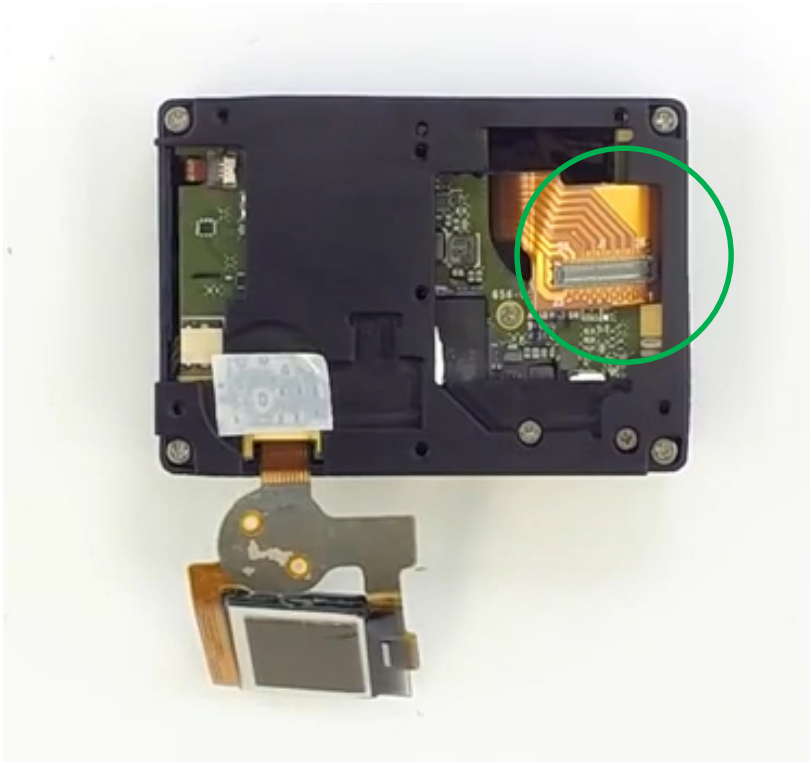
You can optionally add a thin piece of double sided tape to the rounded button socket.



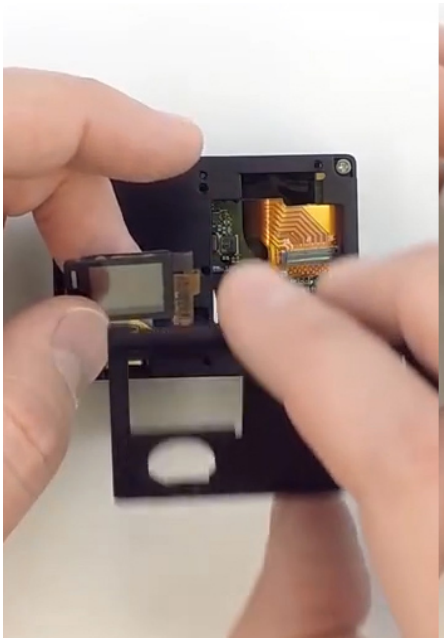
Remove the backing from the tape on the LCD display. If you use a tool to do this, make sure not to scratch the back of the display.

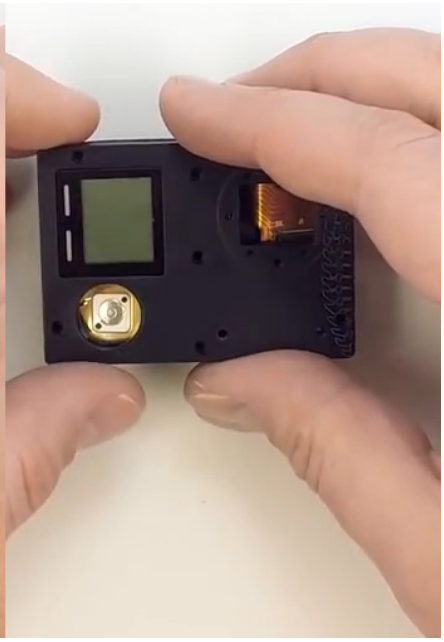


Tuck the flexible jumper under the edge of the aluminum plate.

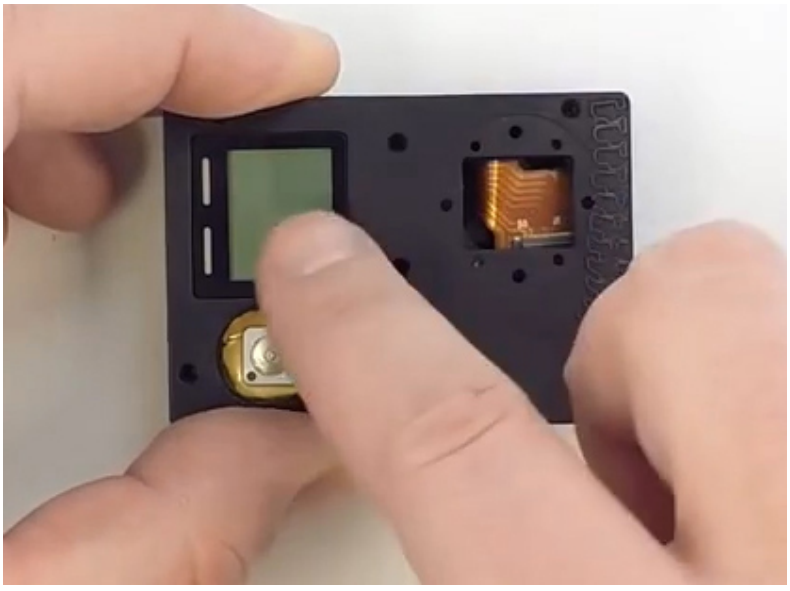


Take the aluminum cover plate and carefully align the LCD screen with the hole in the plate.

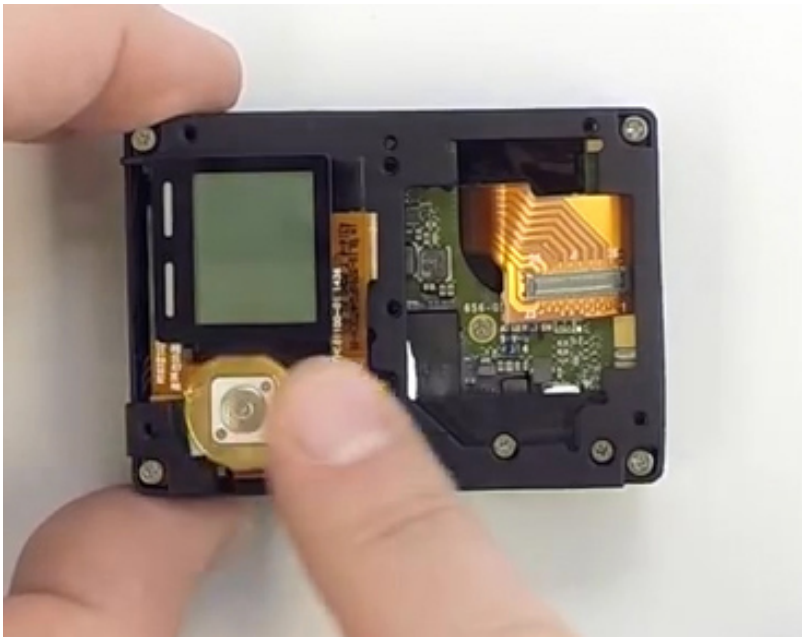




Slowly put the cover plate in position over the PCB plate making sure that the LCD display is properly aligned. Once in place gently press on the screen with your finger to stick it in place.

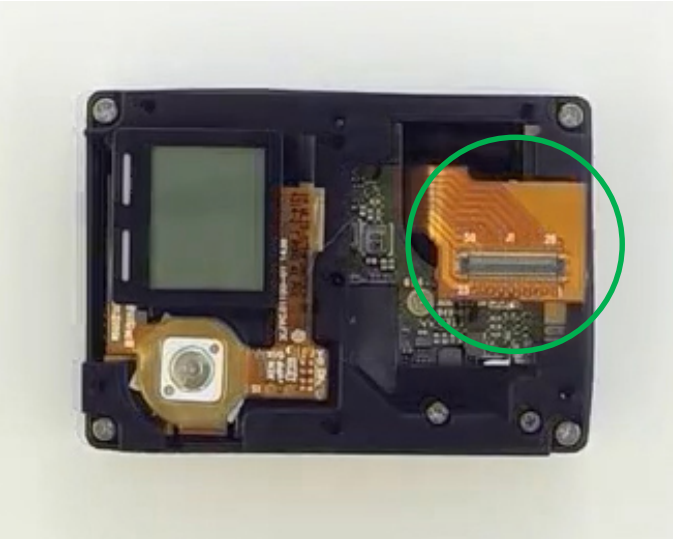


Remove the cover plate for use in a few minutes. Stick down the button strip.

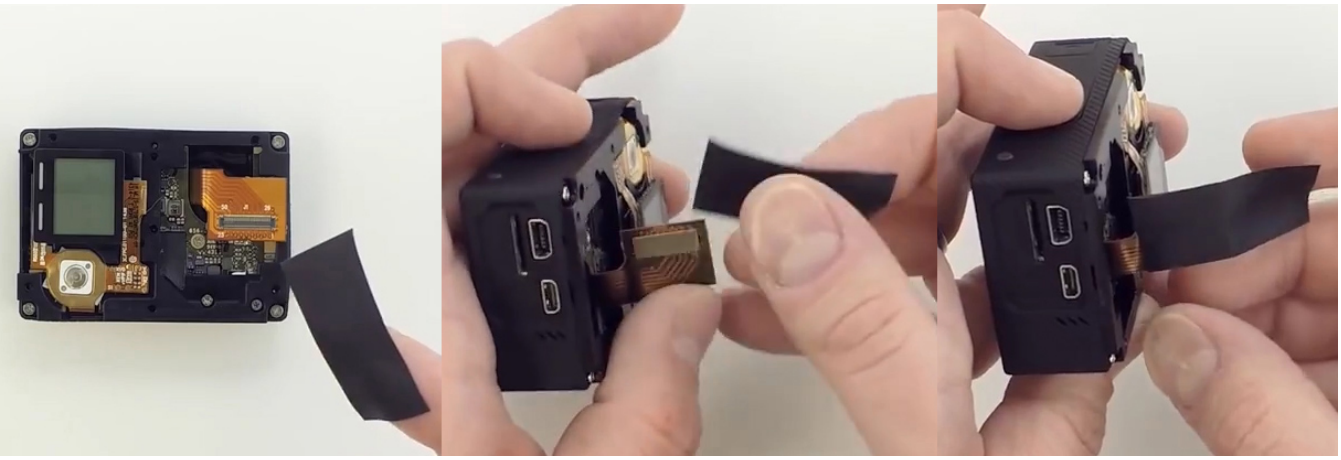


Once the LCD screen is stuck down **we recommend that you don't attempt to remove it.** To avoid damage we also recommend that you don't apply any pressure to the left and right edges of the screen when handling the unit during assembly.

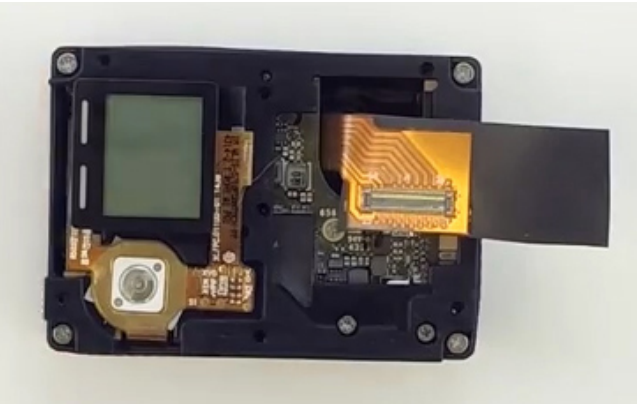
Pop the flexible jumper back out from under the aluminum plate.



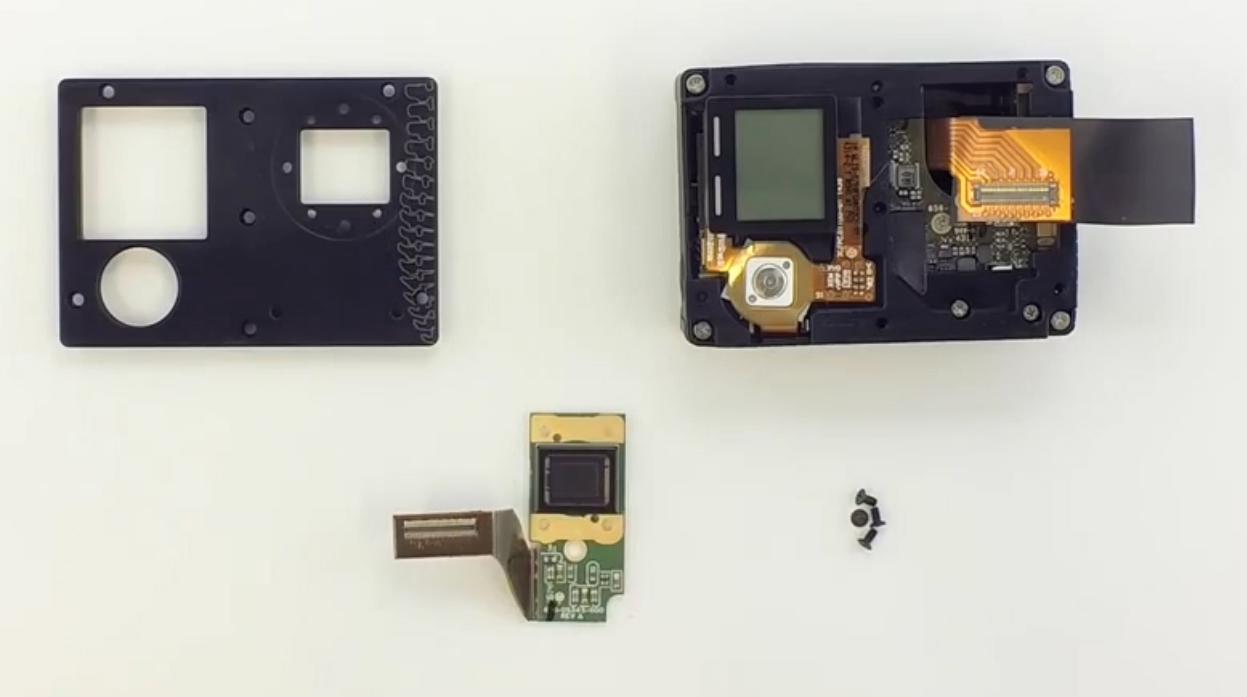
Cut a piece of electrical tape and apply it to the back of the flexible jumper as shown.



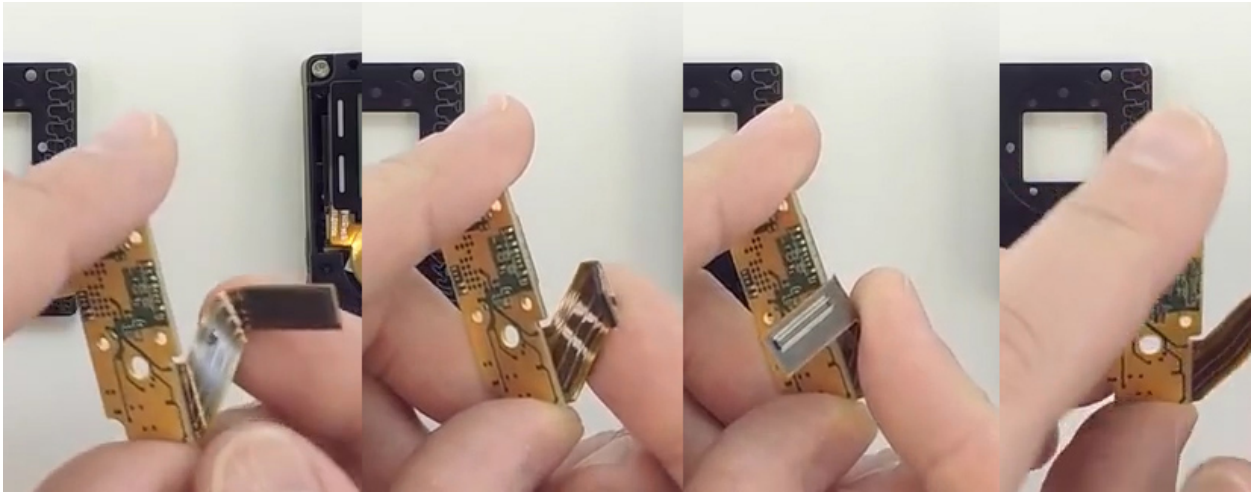
The tape should extend slightly past the jumper on the right side.



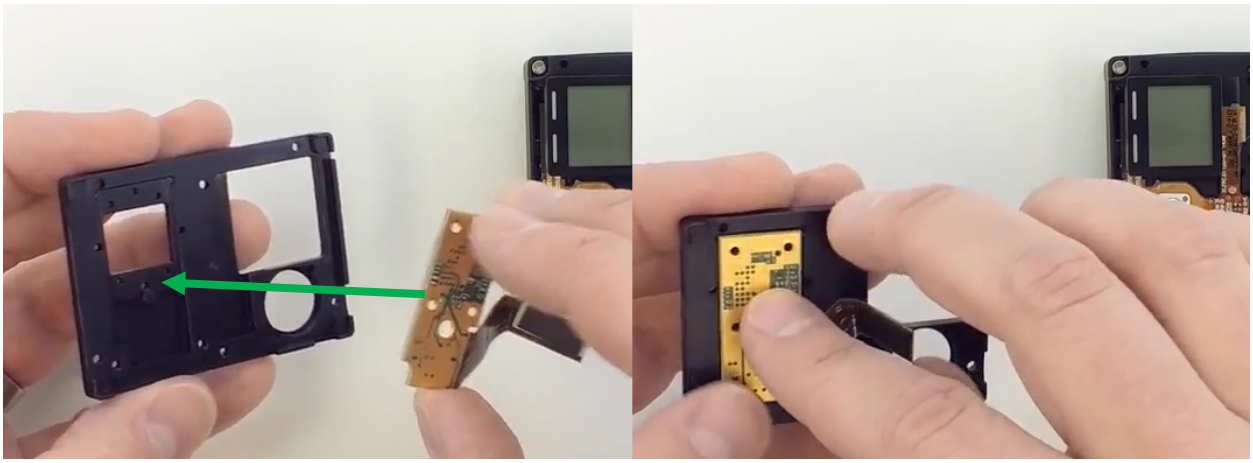
2-10 Mount the Image Sensor



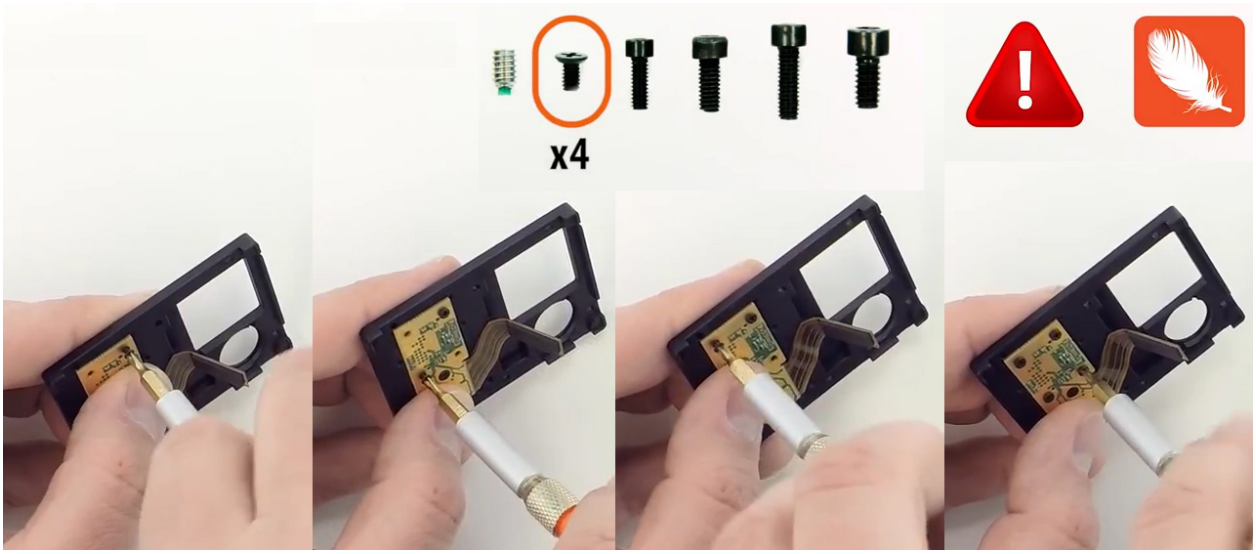
Now we'll insert the image sensor into the cover plate. Take the sensor board and very gently bend the ribbon back as pictured.



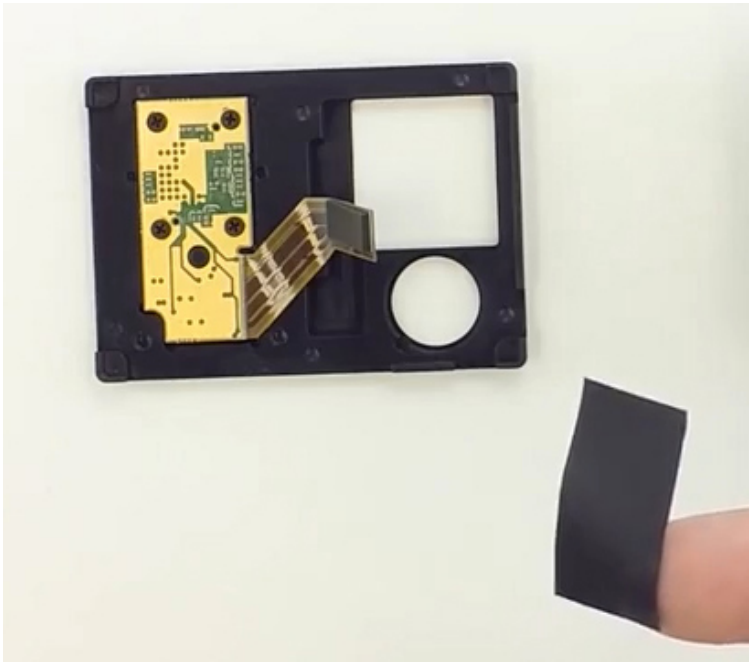
Insert the sensor into the socket on the back of the plate. Take care not to touch the glass sensor, but it if you do it can be cleaned later.



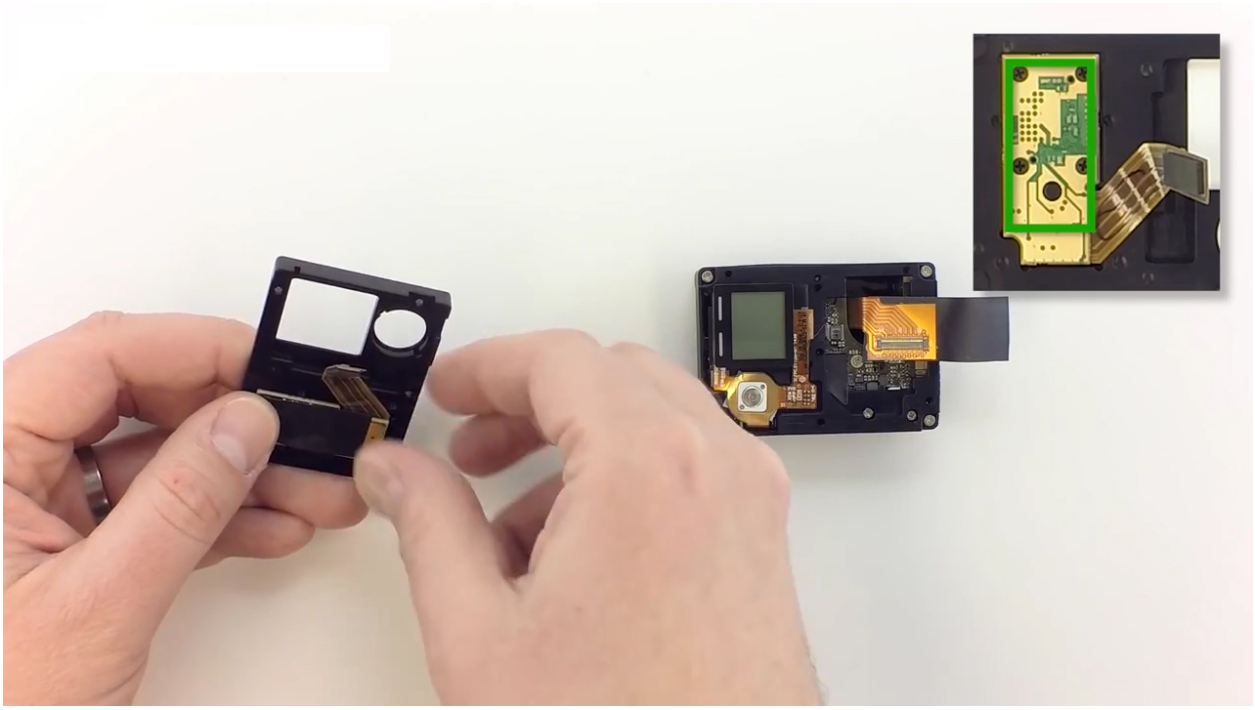
Secure the sensor board in place with the 4 short black screws supplied.



Loosely add all four screws and then tighten them slowly in a crisscross fashion. The screws should be snug only. Do not overtighten!

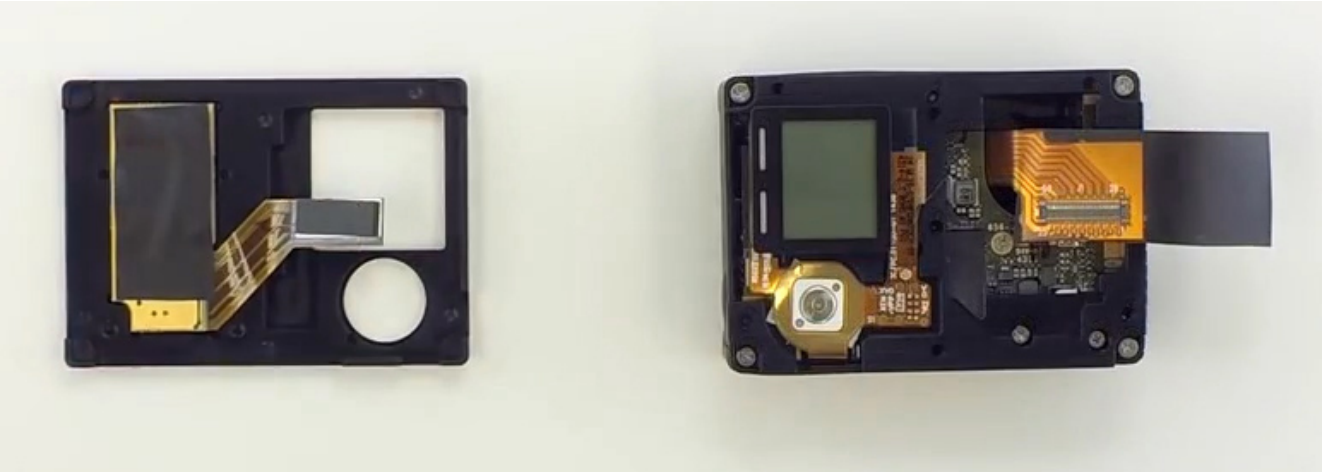


Cut a piece of electrical tape and apply it to the back of the sensor board as shown. Cut the tape as closely as possible to the sensor size so that the plates fit together properly in the next step.

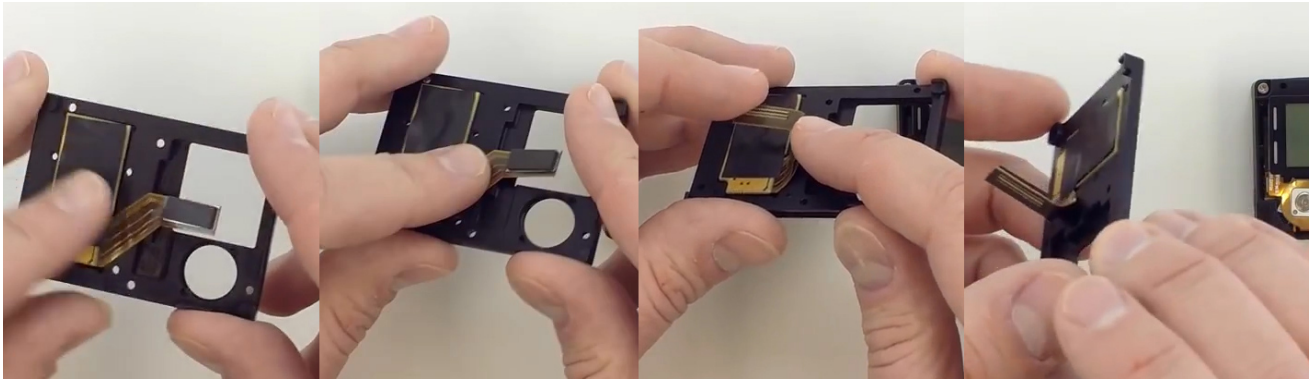


2-11 Connect the Image Sensor

Next we'll connect the image sensor to the flexible jumper.

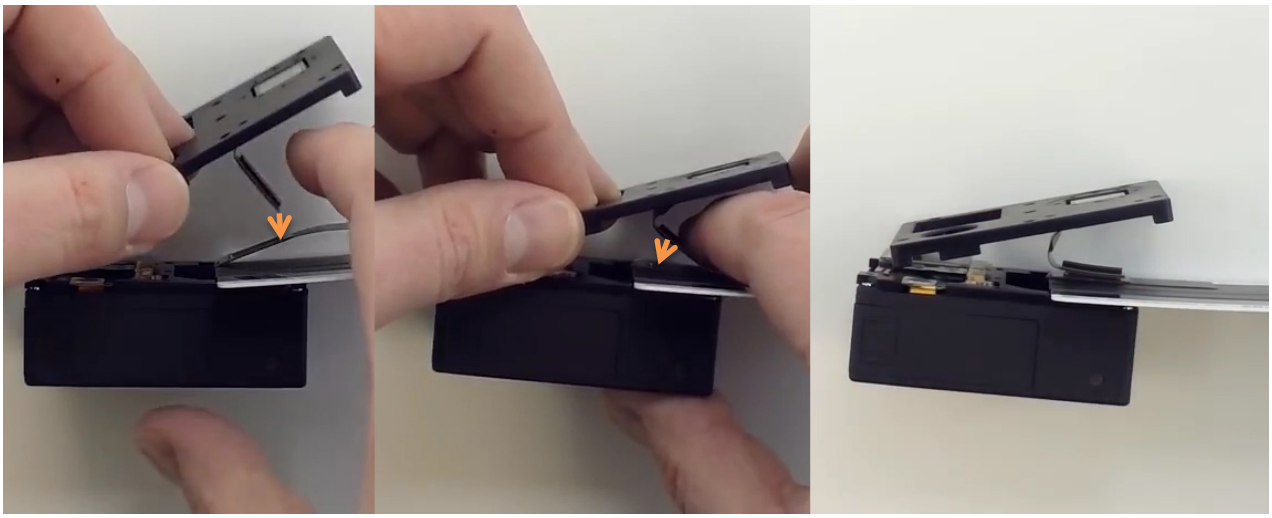


Gently bend the sensor ribbon around your finger so that the connector faces up.

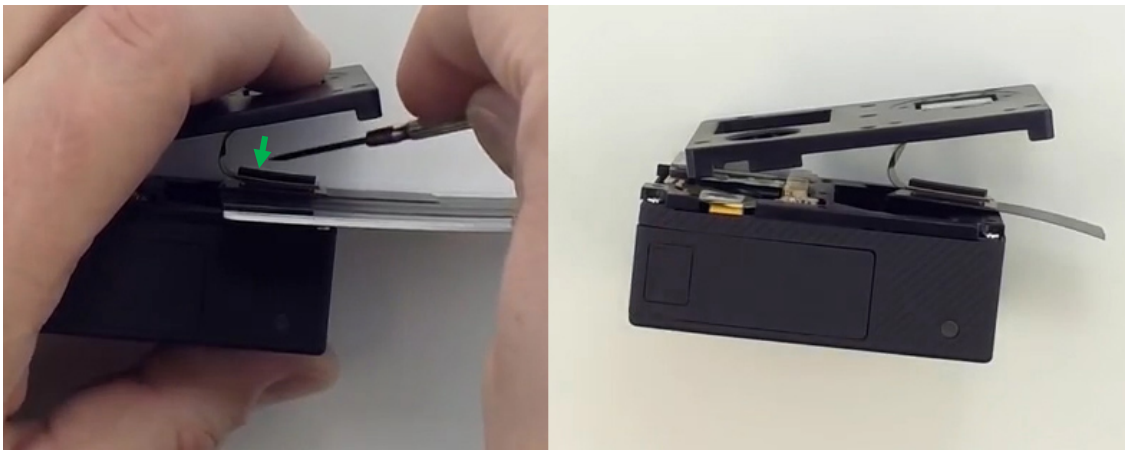


For this step you will require something thin and rigid such as a small ruler or a credit card. Here we're using a plastic gift card. Place the camera body on a flat surface with the battery compartment facing up and slide the card behind the flexible jumper.

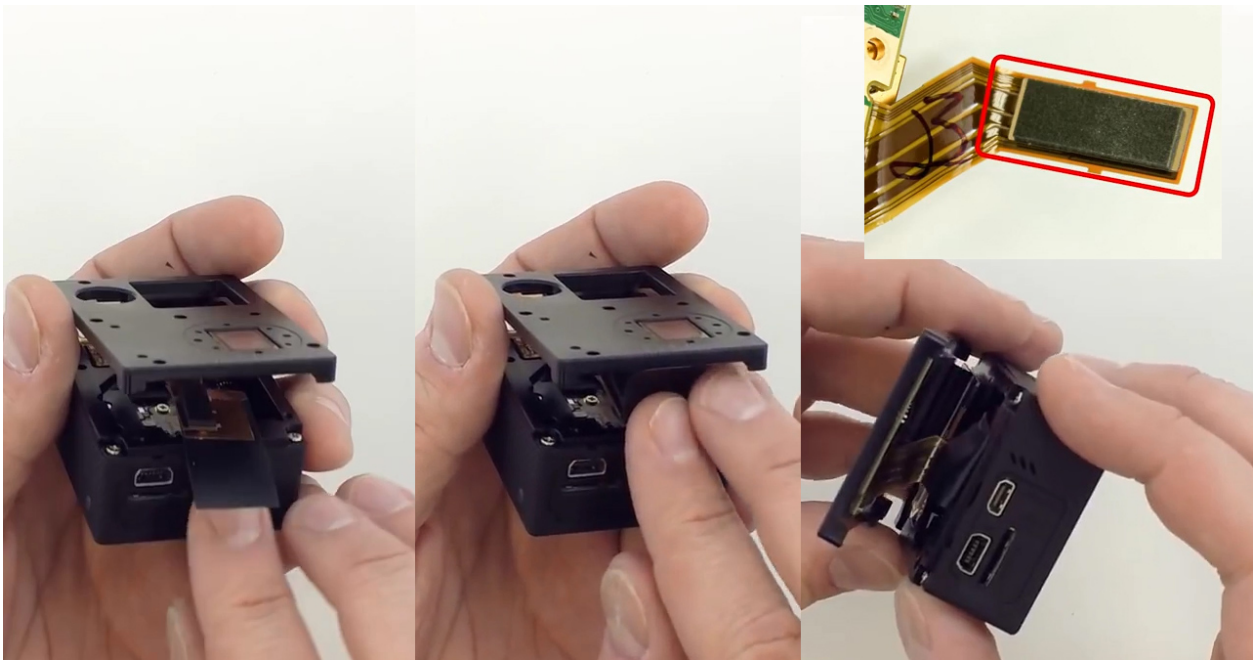
Take the cover plate and image sensor and carefully align the two connectors.



Align the connectors on the right side and Push down with your finger to connect them. Use patience and care with this step – using too much force may damage the connectors. If required use a screw driver to push the connectors fully into place. They should click together nicely once properly aligned.

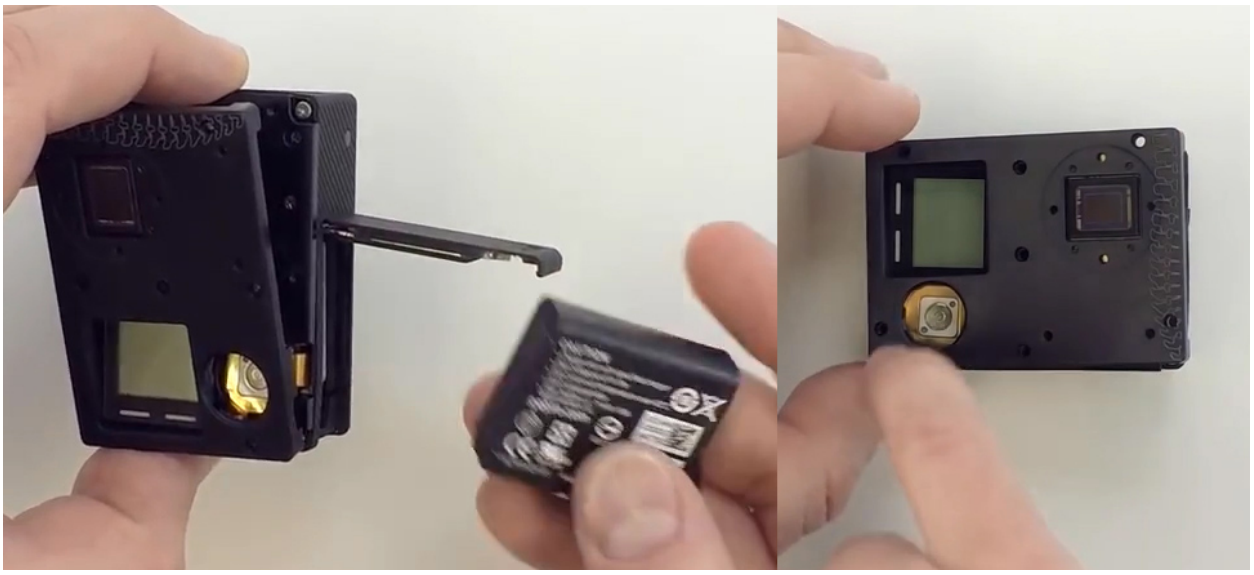


Fold the electrical tape over the connectors. If required add a small piece to cover the rest of the connector backing.



2-12 Functionality Test

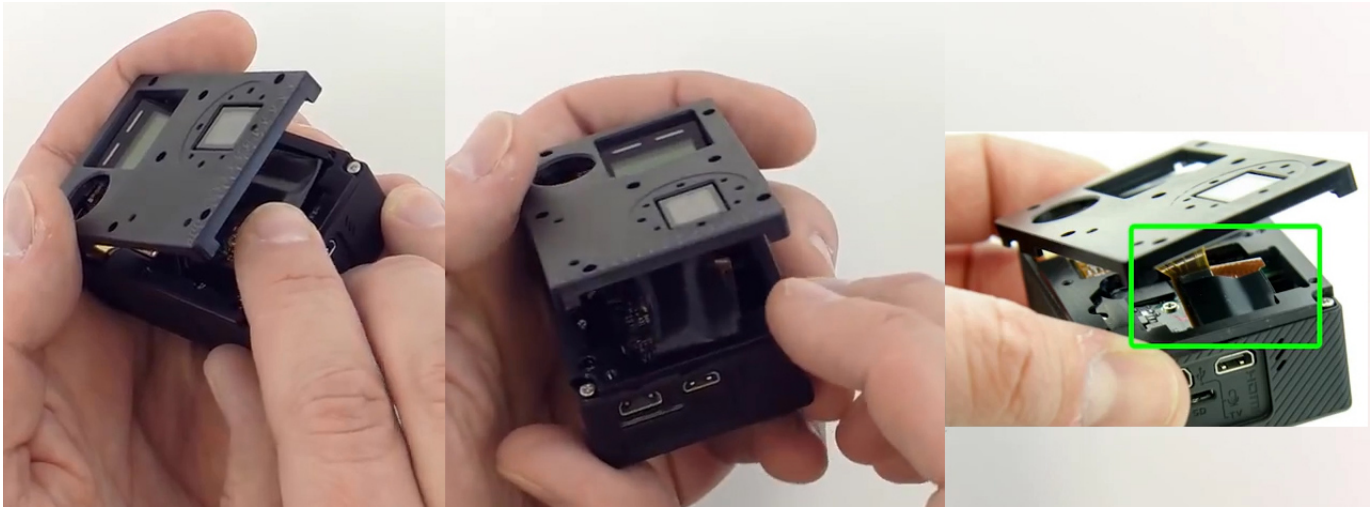
Now it's time for a quick test. Insert the battery into the housing and press the power button.



Be sure to check that side and top buttons work as well. Hit the side button and switch video modes; press the top button to confirm. Hit the side button again to exit. If the camera powers on and you are able to switch modes everything is good! If the camera doesn't power on, or you can't change modes ensure your battery is charged, double check your connections and try again. If the side and top buttons don’t work verify that the ribbon on the side of the board is properly connected.

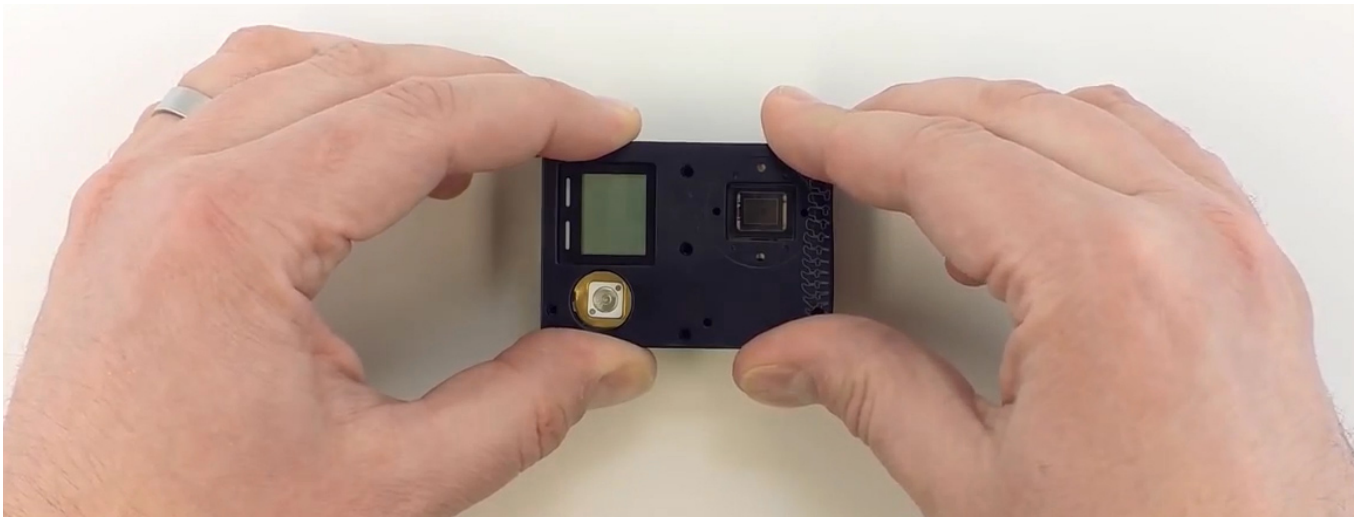
2-13 Attach the Cover Plate

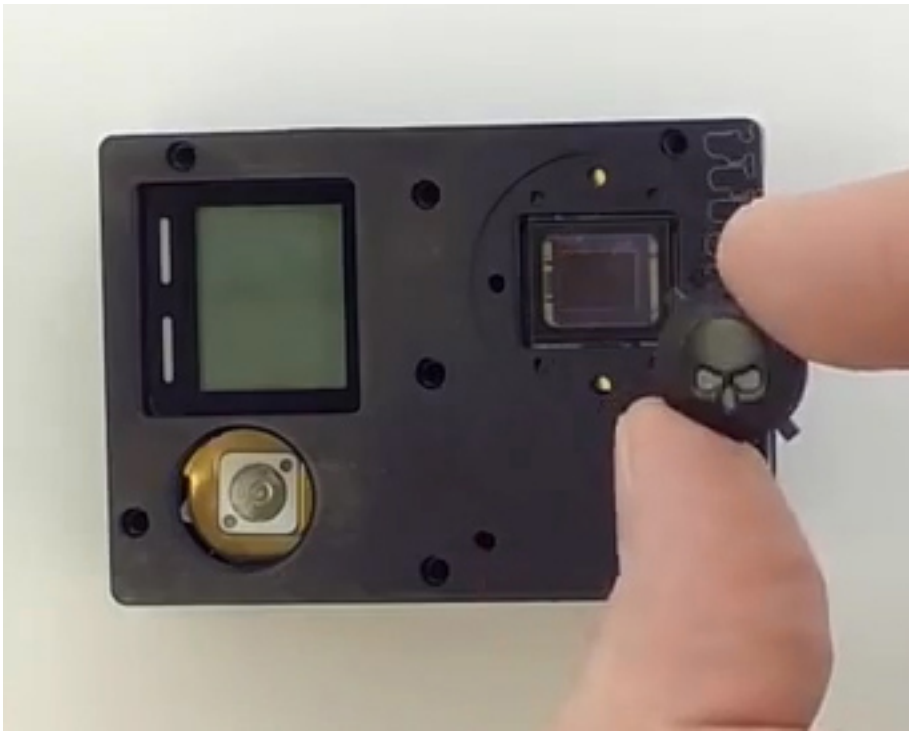
Next we'll attach the faceplate. Push the ribbon connectors into the camera and tuck them under the edge of the aluminum plate.



Make sure it sits straight and not at an angle. From right to left gently fit the cover plate into position while keeping an eye on the sensor ribbon. It should keep a nice curve and not develop any sharp bends or kinks.

Gently press down to put the cover plate in place. The flexible jumper is somewhat rigid so you will feel some resistance as you put it in place.



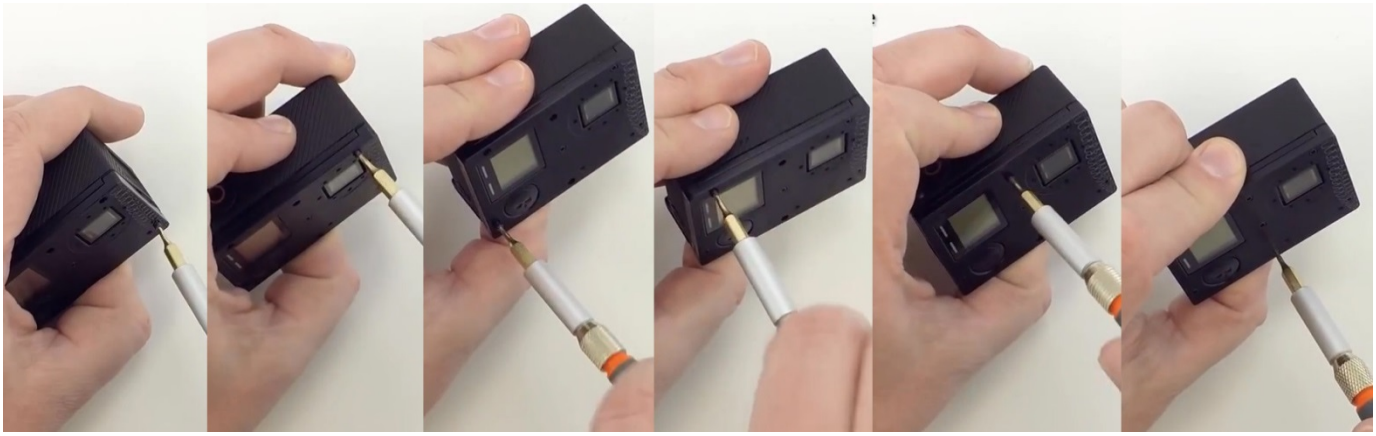


Now that we've fit the parts together turn the camera over and insert the plastic button as shown. Make sure nothing is caught between the plates if they won't go together.




Use one of the small socket head screws from the kit to screw the plates together in the center.

Continue adding the remaining screws to the cover plate until it sits snug and flat.



2-14 Optional Test

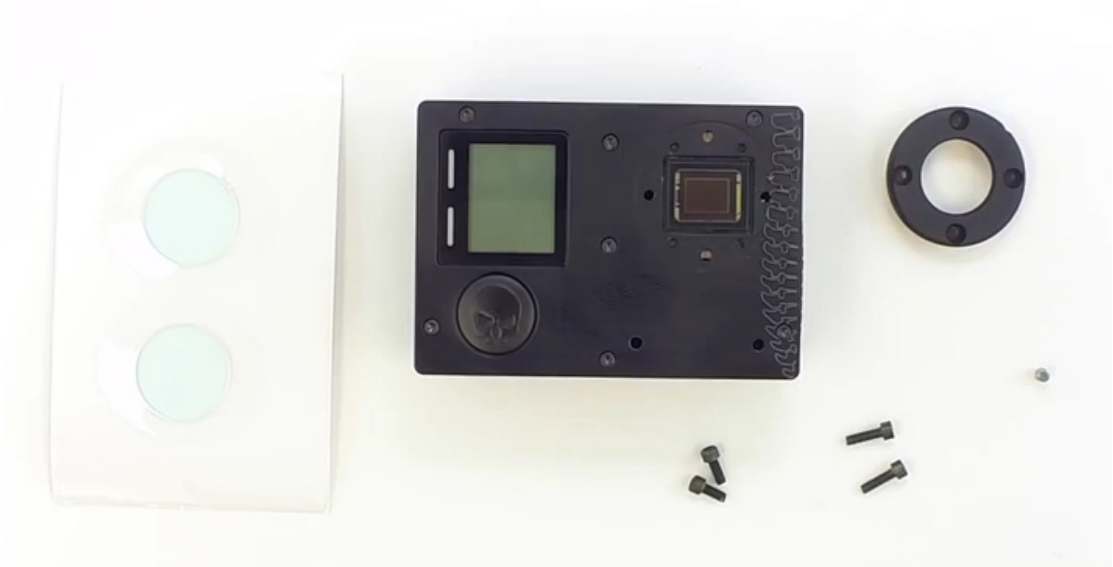
Before going further you may optionally want to perform another quick test to verify everything is functioning properly.

2-15 Clean the Image Sensor

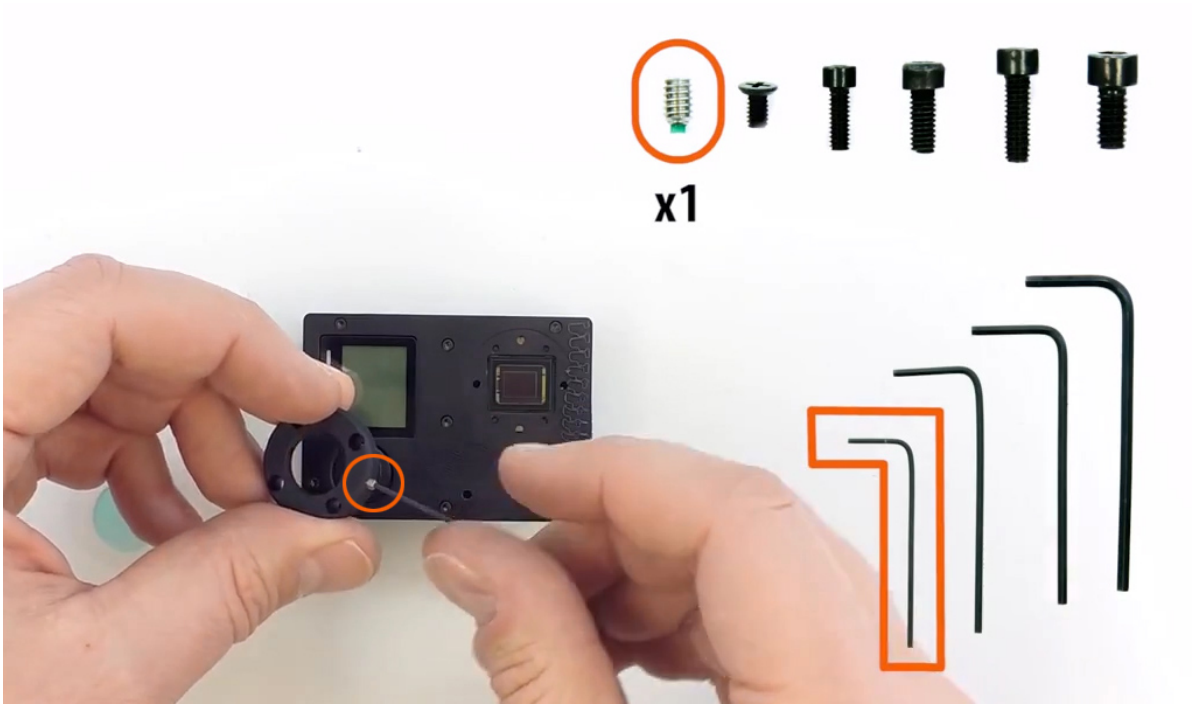
Now is a good time to clean the sensor if required. For the best image quality make sure it's clean and free from dust and fingerprints. A lenspen or microfiber lens cloth usually works quite well. If using lens cleaning fluid never spray it directly on the sensor. Always spray the cloth first and then wipe clean, followed by a puffer to remove any tiny particles. Never use tissues as they will leave a lot of small debris.

2-16 Mount the M12 Ring and IR-Cut Filter

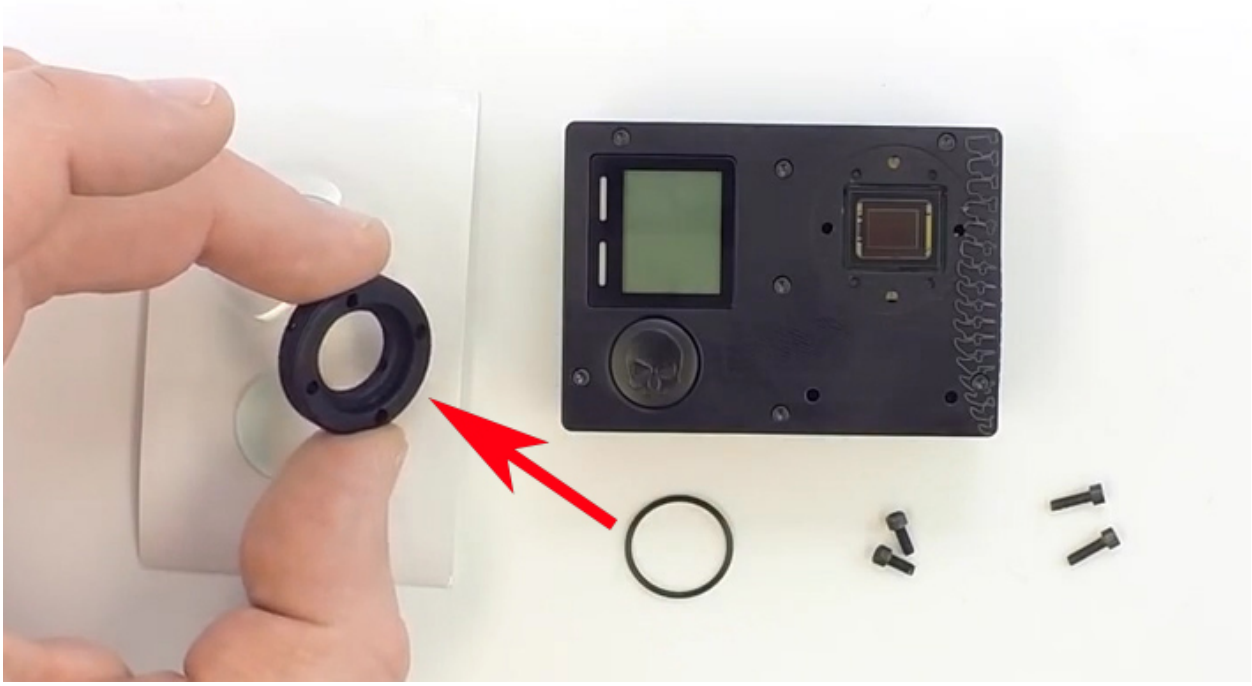
Unscrew the M12 ring from inside the CS-Mounting ring.



Add a steel set screw to the M12 ring using the smallest L-key.

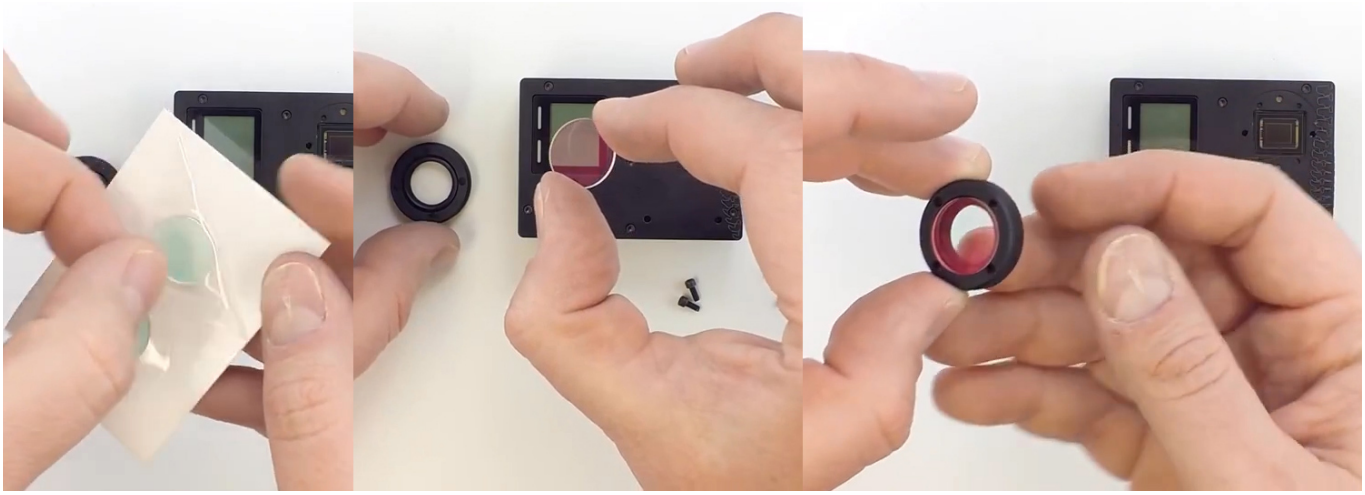


Now we'll install the IR-cut filter. Optionally If you want to use the camera for night vision, or if you plan to use M12 lenses with built in IR cut filters you can leave the filter out.



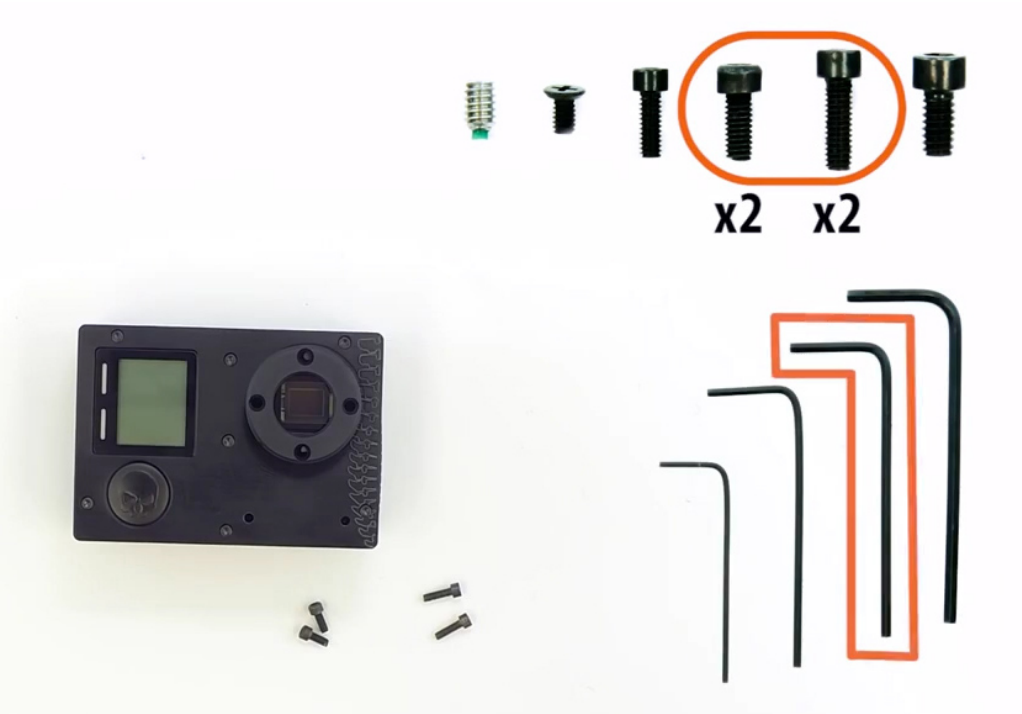
Take the rubber O-Ring and drop it into the socket on the back of the M12 ring.

Next take one of the filters from the kit and place it on top. Take care to keep the filter clean by handling it by the edges.

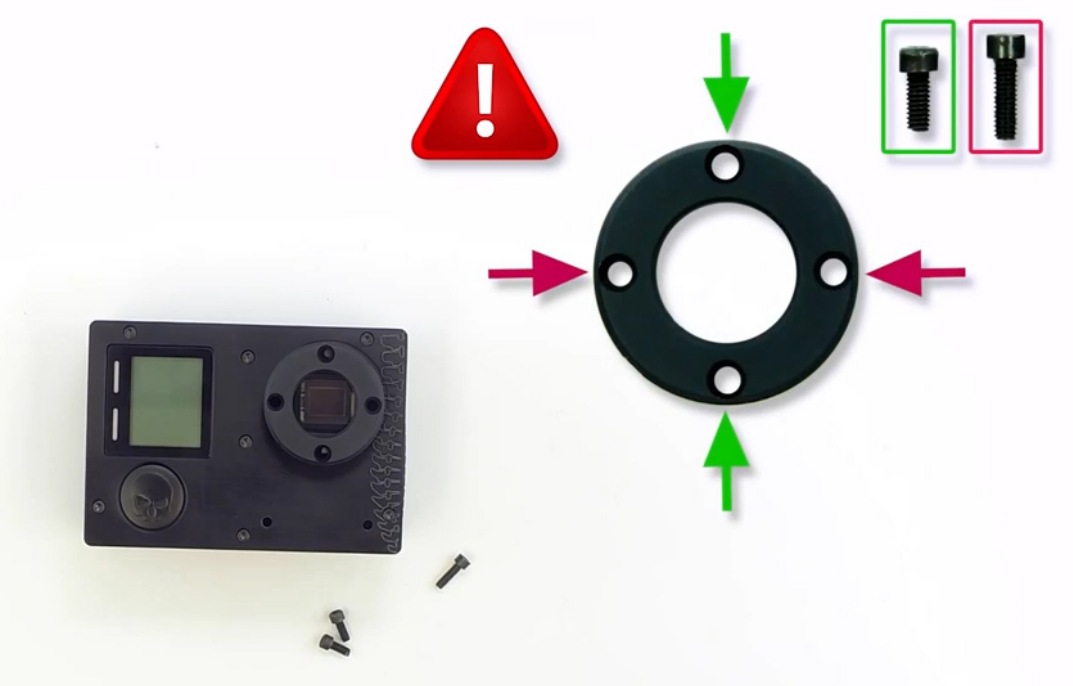


Align the ring and filter to the holes on the front of the camera, making sure that the set screw is located on the upper right.

Take the four medium sized socket screws from your kit. The short screws should be fitted to the top and bottom and the longer ones on the left and right.



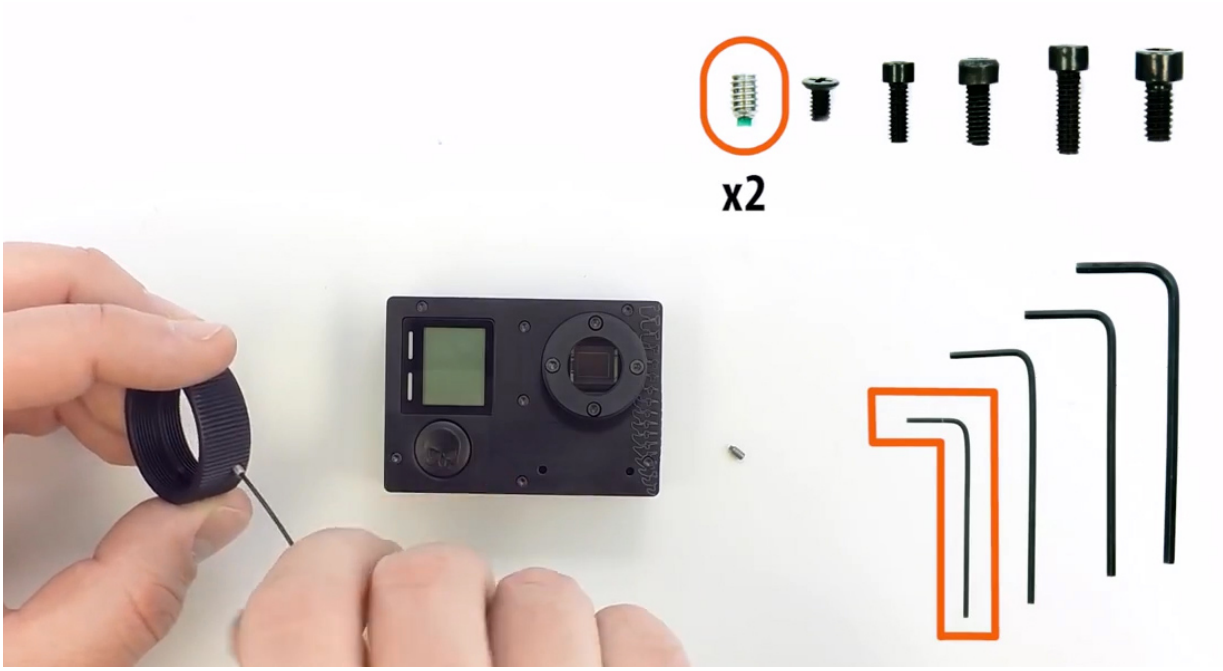
Take care not to use the long screws on the top and bottom as they can potentially cause damage!



Tighten the screws until the ring sits snug and flat on the surface.

2-17 Attach Lens and Tripod Mounts

Add the two remaining set screws to the CS-Mounting ring.



Thread the CS-ring onto the camera.

Connect the tripod mounting plate with the large screws and L-key.

Unscrew the plastic cap from your C-Mount ring and add the ring to the camera.

Use the plastic cap to keep the sensor clean when no lens is attached.

2-18 All Done!

Now you're all done! Add your battery, SD card, accessories and your favorite lenses. Have fun shooting!