BACK-BONE

Ribcage v2.0 Upgrade Kit

Install Guide

Back-Bone
V2.0

Ribcage Installation: Part 2 - Assembly

Contents

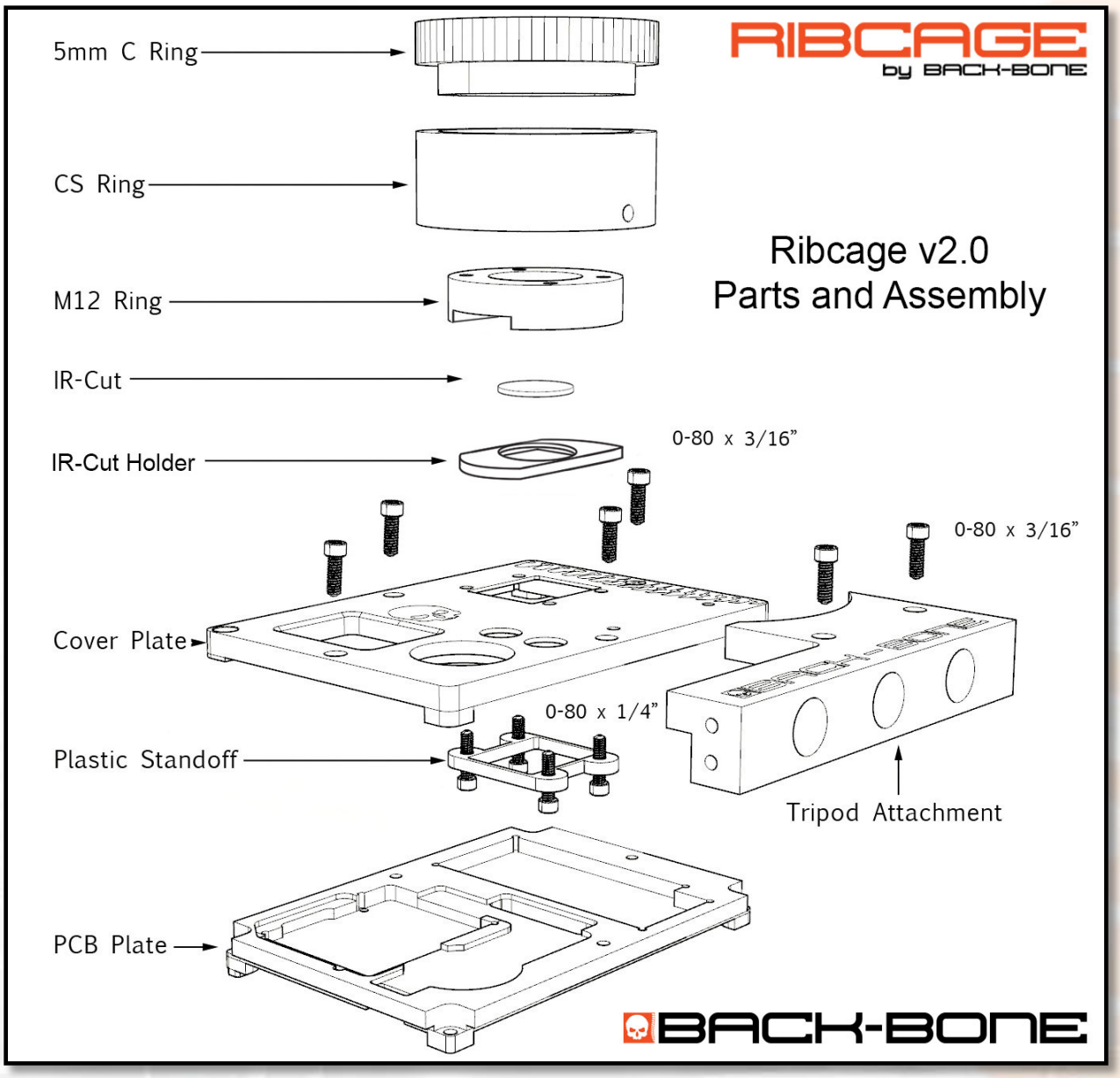
Ribcage Installation: Part 2 - Assembly

Section 1 – Before You Get Started

Included With Your Kit:

ITEM	DESCRIPTION	QUANTITY
1.	650nm IR-cut filter	2
2.	M12 ring	1
3.	Plastic standoff	1
4.	IR-Cut Holder	2
5.	Filter Stickers	4
6.	L-key 0.050” Hex	1
7.	L-key 0.035” Hex	1
8.	0-80 x 1/4” Philips screw	4
9.	Nylon tip set screw	1
10.	Rubber O-Ring	1

Figure: A


RIBCAGE
by BACK-BONE
5mm C Ring
CS Ring
M12 Ring
IR-Cut
IR-Cut Holder
Ribcage v2.0
Parts and Assembly
0-80 x 3/16"
0-80 x 3/16"
Cover Plate
0-80 x 1/4"
Plastic Standoff
Tripod Attachment
PCB Plate
BACK-BONE

CAUTION!

1. Read all our documentation thoroughly before beginning your installation
2. Make sure to charge your battery before beginning the installation.
3. NEVER force or exert force on any components. IF YOU FEEL THE NEED TO USE FORCE THAN YOU'RE DOING SOMETHING WRONG.
4. The Ribcage DIY kit consists of highly machined parts and fine threaded through holes. NEVER FORCE any screws as this can strip the fine threads on the through holes. Instead check your assembly and registration and try again. All parts are highly accurate and DO NOT require force to assemble.
5. Ensure your work area is clean, well lit and free from dust.
6. We recommend inspecting and removing any dust or debris from the parts before you begin.
7. Never over over tighten any of the small screws, especially on the faceplate and tripod mount. Excessive force or over tightening can result in stripped threads on the aluminum parts. Always loosely fit all screws in place before screwing them in until seated. Additional tightening is not required.
8. By applying this or any modifications to your GoPro devices you will **VOID** any warranties
9. Back-Bone takes no responsibility in your ability to use this modification
10. The Ribcage v2 Upgrade kit is provide "as is" and without warranty
11. Disclaimer: Ribcage is a product of Back-Bone Gear Inc., and is not manufactured, distributed or endorsed by Woodman Labs, Inc. the maker of GoPro and Hero Products.

HELP!

If at any point during the process you experience trouble please contact us at support@back-bone.ca and someone will help you through your problem. It's best to contact us first before causing damage! Our support email address is located on the bottom of every page. Our staff are on duty 9am-5pm EST Mon-Fri to answer questions, and we will often respond outside those hours.

Tools Required

Before you begin you will need to gather the following tools:

- A Torx T4 screw driver (not required for Hero3+)
- A set of small precision screw drivers with a Philips #0
- Lens / CCD Cleaner, Puffer & Lens Cloth (Optional but recommended)
- A utility knife
- A pair of scissors (optional)
- A roll of electric tape
- 3M Double Sided Tape (Optional) *Note: don't use thick mounting tape – use only very thin double sided tape or the parts may not fit correctly.*

Ribcage Installation: Part 2 - Assembly

Section 1: Disassembly

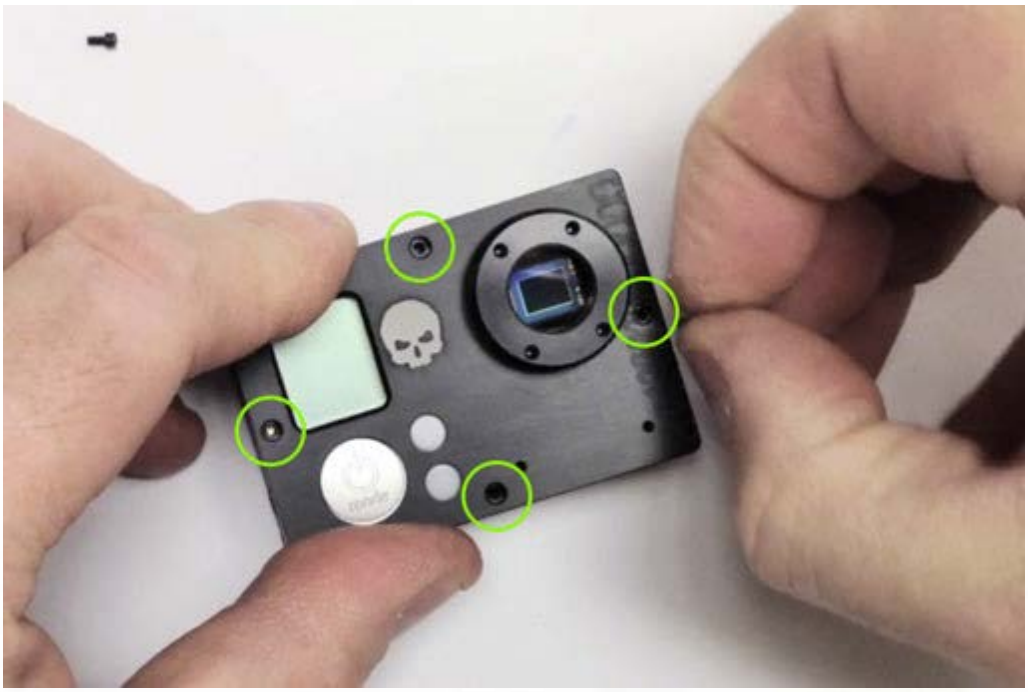
1-1 Remove Tripod Mount and Accessories

Let's start by removing the optional parts from your camera. Remove the battery and memory card. Next use your own tools or the larger of the two L-keys that came with your kit or camera to remove the screws holding on the tripod mount. (0.050" Hex)

Remove the 5mm C-Mount spacer ring. Use your small L-Key (0.035" Hex) to loosen the set screw on the large CS-Mount ring. Unscrew the ring to loosen. Turn the camera so that the front is facing the floor. Continue to unscrew the ring until it comes free. The IR-cut filter should drop into the CS-ring and plastic holder. Set the rings aside.

1-2 Remove Cover Plate Screws

Loosen and remove the 4 screws holding on the Ribcage faceplate.



Lift the plate slightly and rotate about 10 degrees to reveal the four corner mounting screws. Use your screwdriver to loosen and remove all four screws. Make sure to keep them for later. Remove the power button if it hasn't come out on its own. Rotate the cover plate back into position.

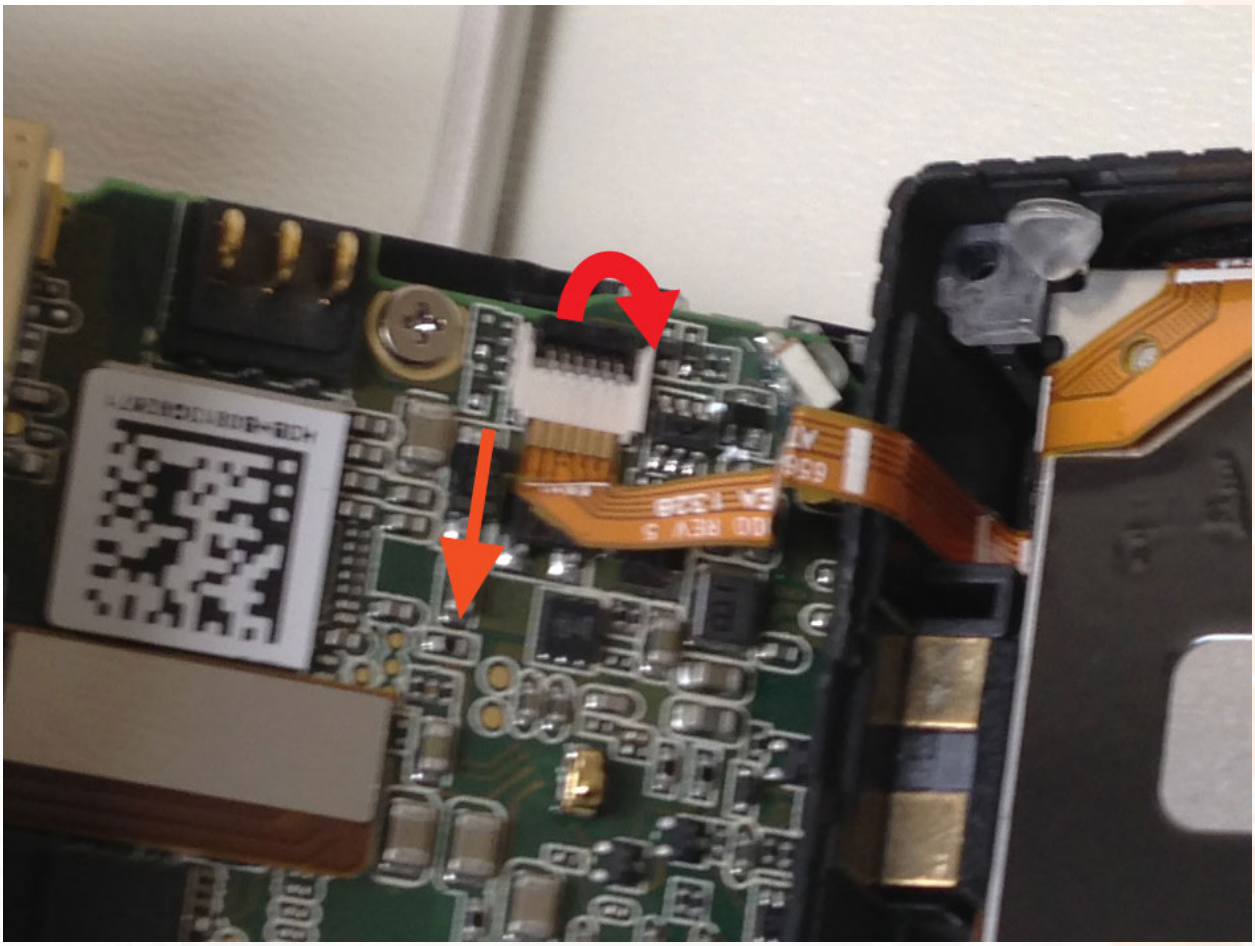
Fasten the cover plate back down with one or two of the screws you removed.

1-3 Remove Assembly From Housing

Insert a small flat screw driver into the small slot located between the faceplate and the USB/HDMI ports. Use it to pop the edge of the housing up over the USB and HDMI ports.

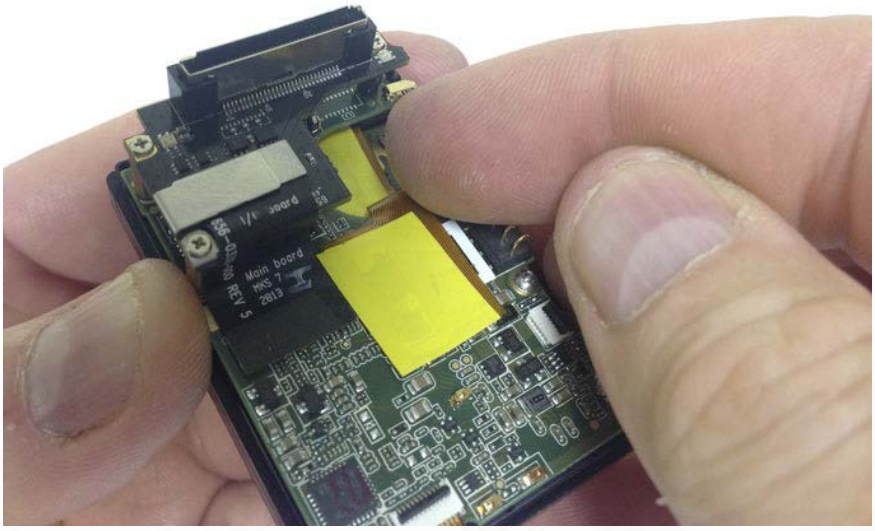
Gently wiggle the unit to work it out of the housing, taking care not to damage the tiny ribbon cable connecting the assembly to the housing.

To disconnect the ribbon, flip up the black locking tab and slide the end of the ribbon out of the socket.

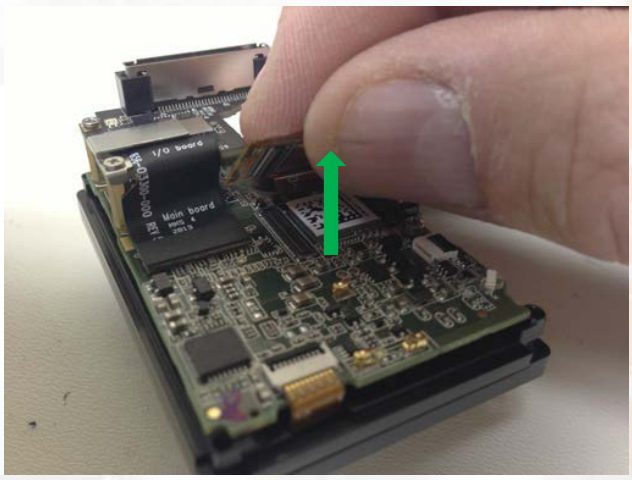


1-4 Disconnect Image Sensor

The tab connecting the image sensor ribbon to the main board is covered by a small piece of electrical tape. Gently remove the tape.

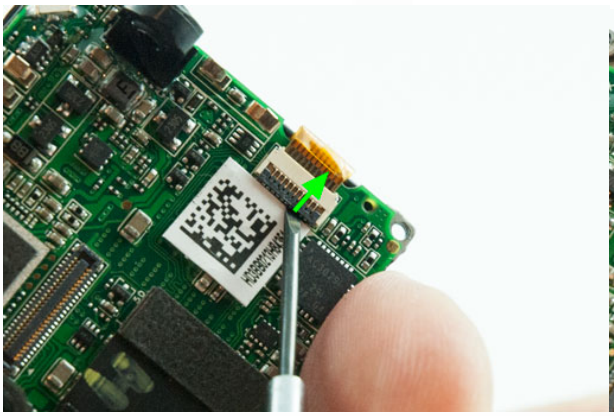


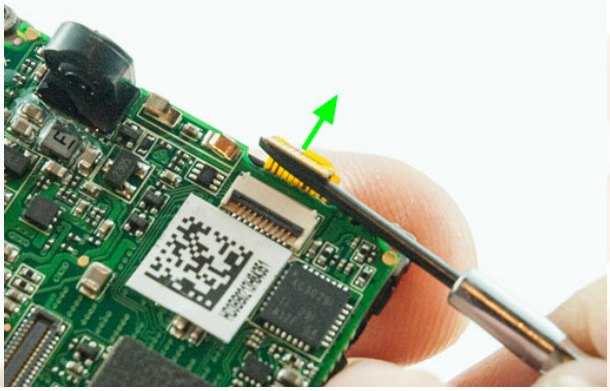
Gently lift the lower right hand corner of the connector with your fingernail or a slim non-metallic tool. A small amount of upward pressure should pop the connector free.



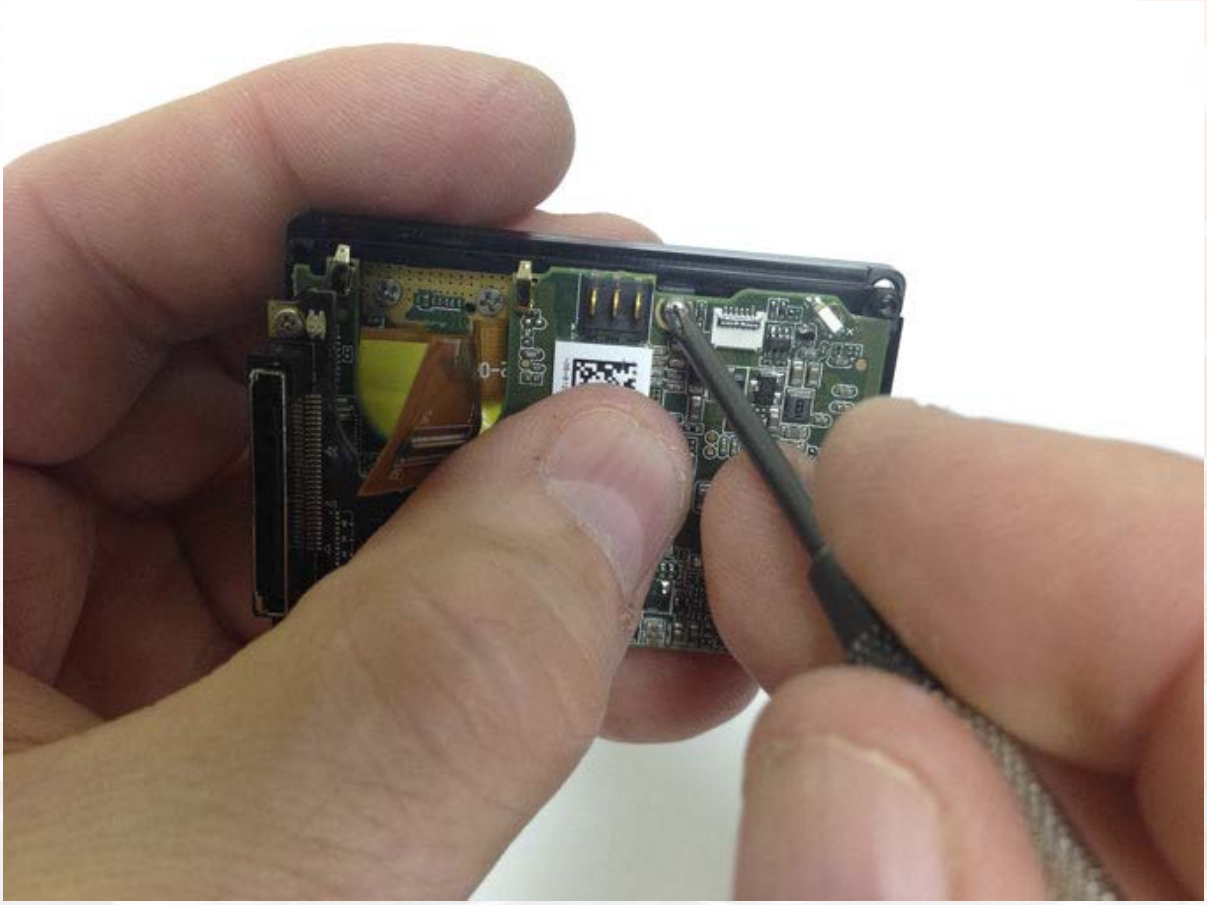
1-5 Remove Main Board

Unlock the black locking tab holding in the LCD connector on the lower right. Gently use your screw driver to pull the end of the connector from the socket.

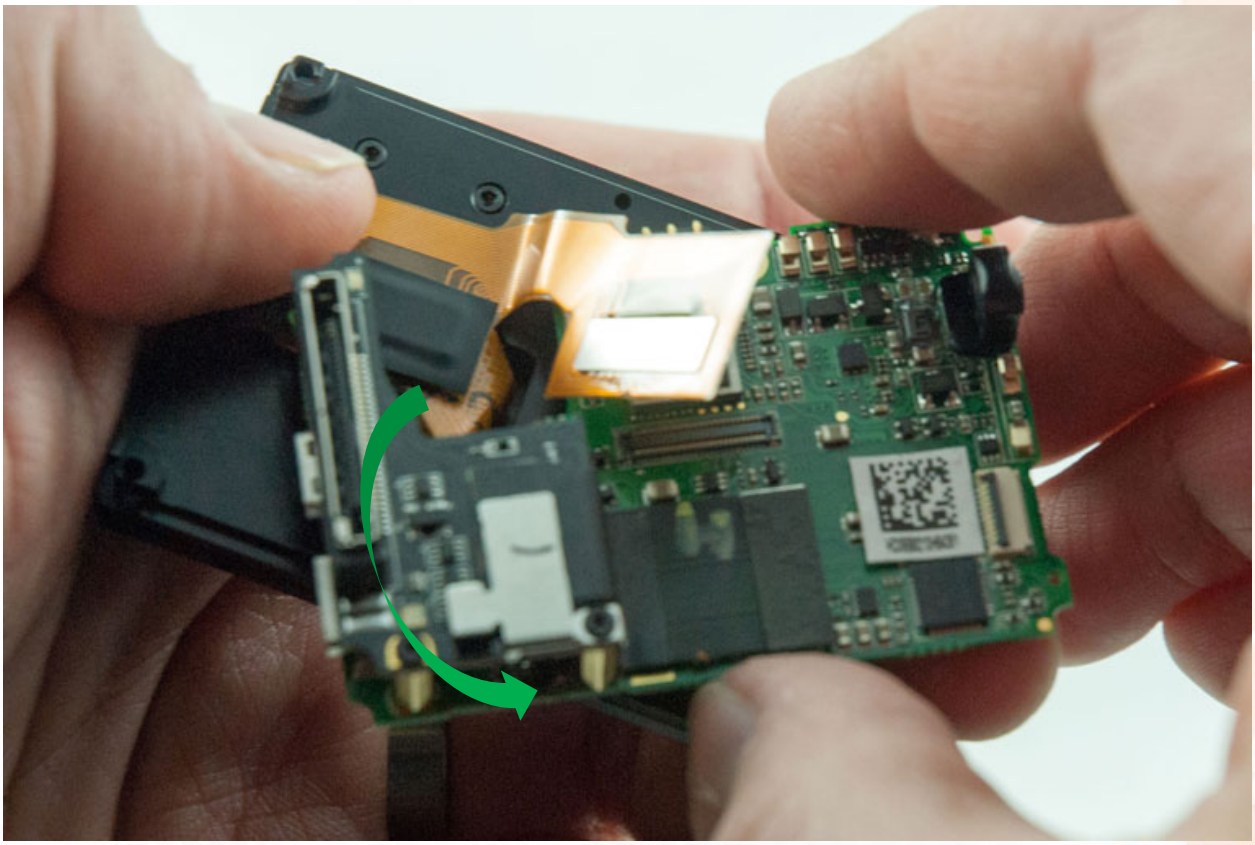




Remove the small metallic screw holding the main board in position.

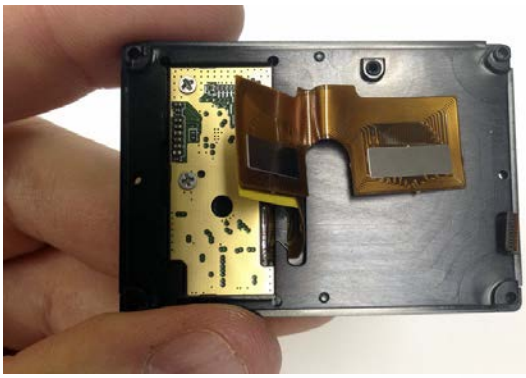


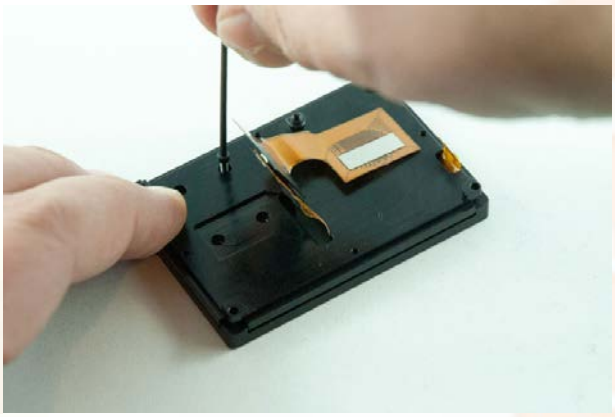
Next remove the main board by lifting it and moving it down and away from the CCD ribbon that was disconnected earlier.



1-6 Remove M12 Ring

Pull up on the tape holding down the Ribbon connector to reveal the four screws that hold the M12 ring in position. Depending on the date your camera or kit was purchased there is a slight variation in the appearance but the following steps are the same for both.





Loosen each of the screws until the M12 ring comes free, but do not remove the screws. Depending on the version of the kit used you will need either a Philips #0 screw driver or the larger of your two L-keys. If the metal plate holding the image sensor has an open back take care not to dislodge the image sensor as it will become loose once the M12 ring is removed. When lifting the unit hold the sensor in place from the back with your finger.

1-7 Remove Image Sensor and Standoff

Finally remove the image sensor from the cover plate. Remove the original plastic standoff and the four screws as we'll be using the new ones provided in your upgrade kit.

**At this point it's a great time to clean your CMOS sensor if any debris or smudges are visible.

NOTE:

At this point you may find it useful to view our v2 assembly video. Some of the steps are not required but all of the steps outlined in the document going forward are pictured. Links to relevant sections of this video are provided at the beginning of each section.

http://youtu.be/I1kAaRuEa3o?t=9m36s

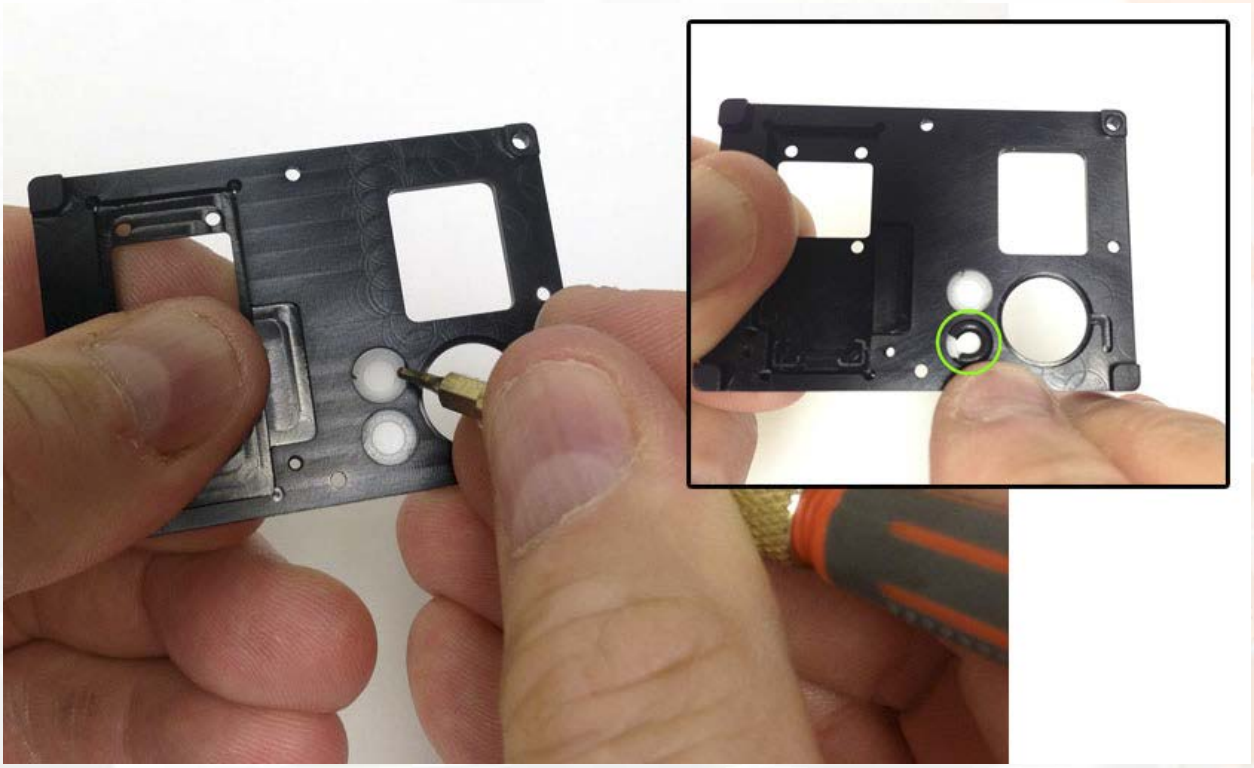
Section 2: Assembly

2-1 Insert O-Ring

Video: http://youtu.be/I1kAaRuEa3o?t=9m36s

Take the supplied rubber O-ring and cut it in half with a pair of scissors or a utility knife. These will prevent the LED covers from being accidentally pushed back into the camera after re-assembly.

Place each half of the O-ring behind the LED covers in the faceplate.

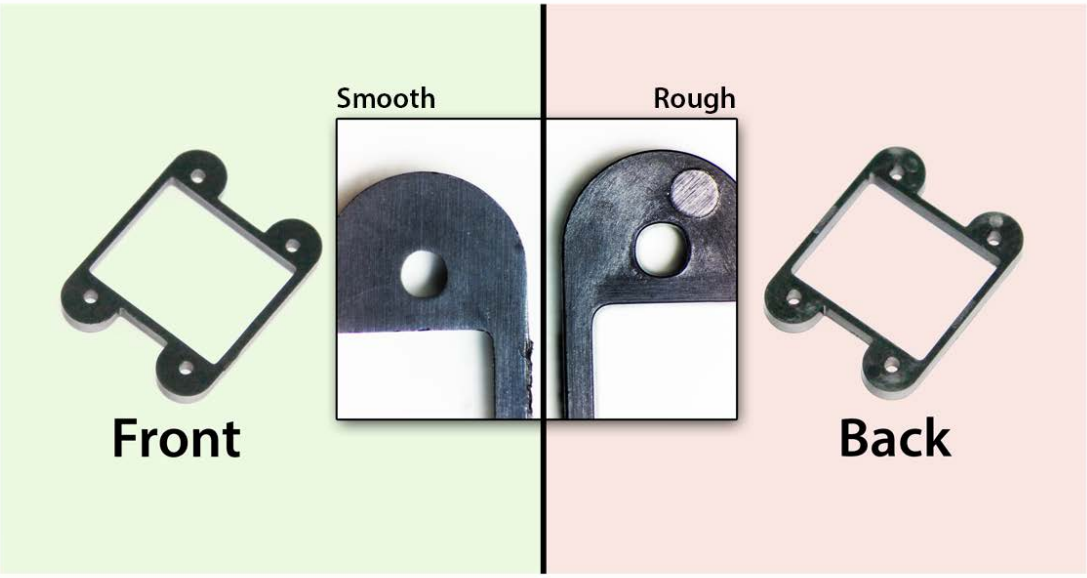


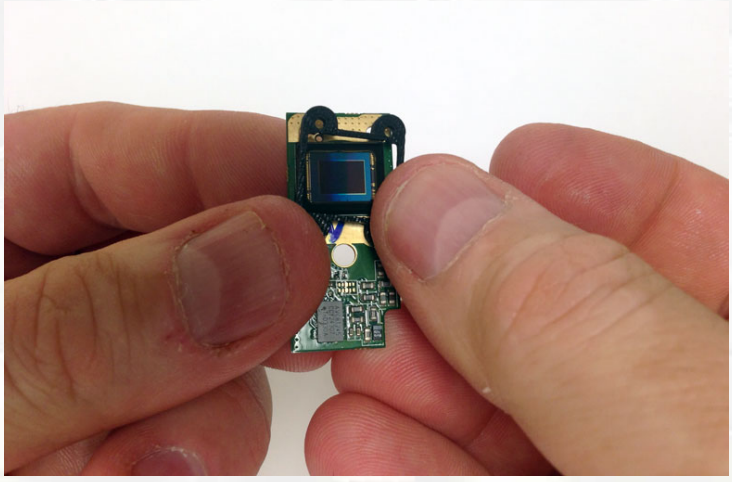
2-2 Attach CMOS Sensor to Cover Plate

Video: http://youtu.be/I1kAaRuEa3o?t=10m41s

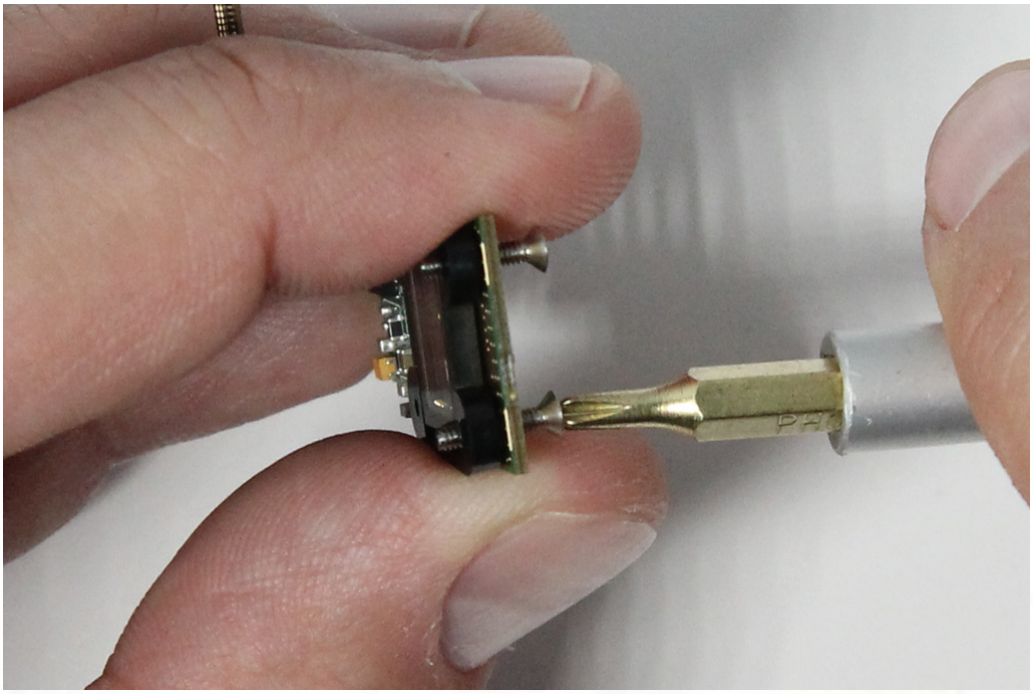
(PLEASE READ THIS ENTIRE SECTION BEFORE PROCEEDING)

You will now need the tools and screws provided in the kit. Place the new plastic standoff over the image sensor. If you look closely, you will notice that one side of the plastic standoff is smoother than the other. The smooth side should face forward when placed over the sensor. If you find threading the screws difficult, flip the plastic standoff over and try again. You can also thread the screws through the standoff first and then remove them to make this step easier. Take care not to touch the image sensor during the following steps, but if you do it can be cleaned later.

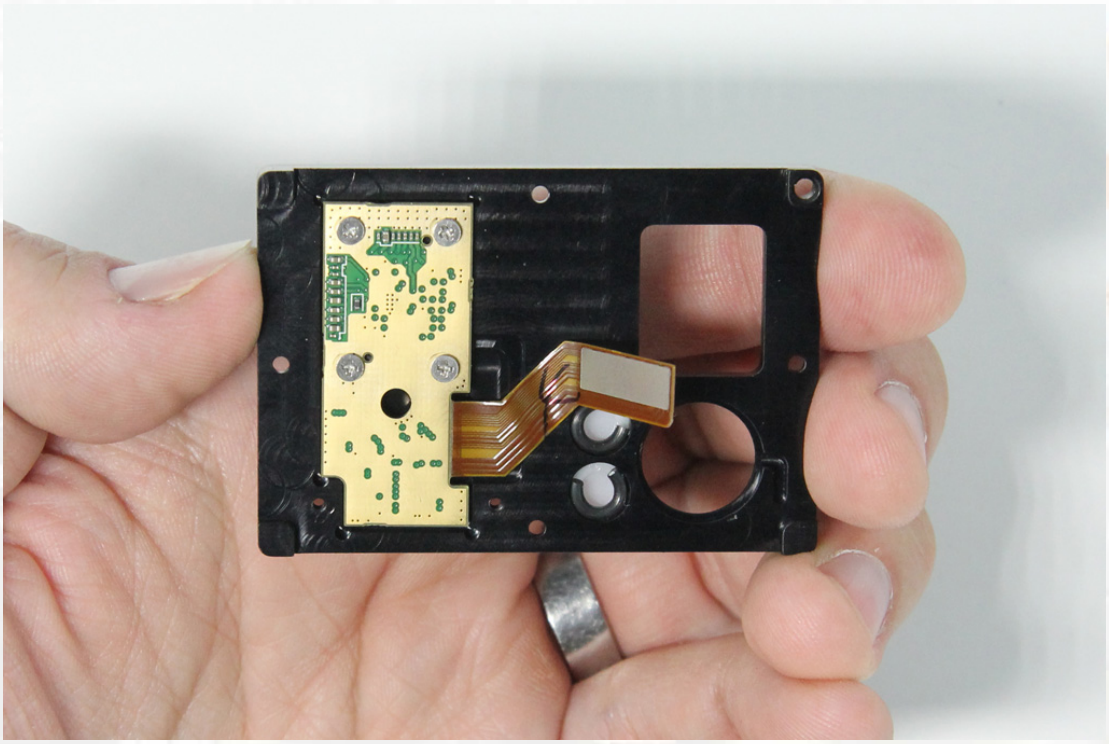




Screw in four of the long silver screws provided through the holes in the back of the image sensor board and through the standoff.

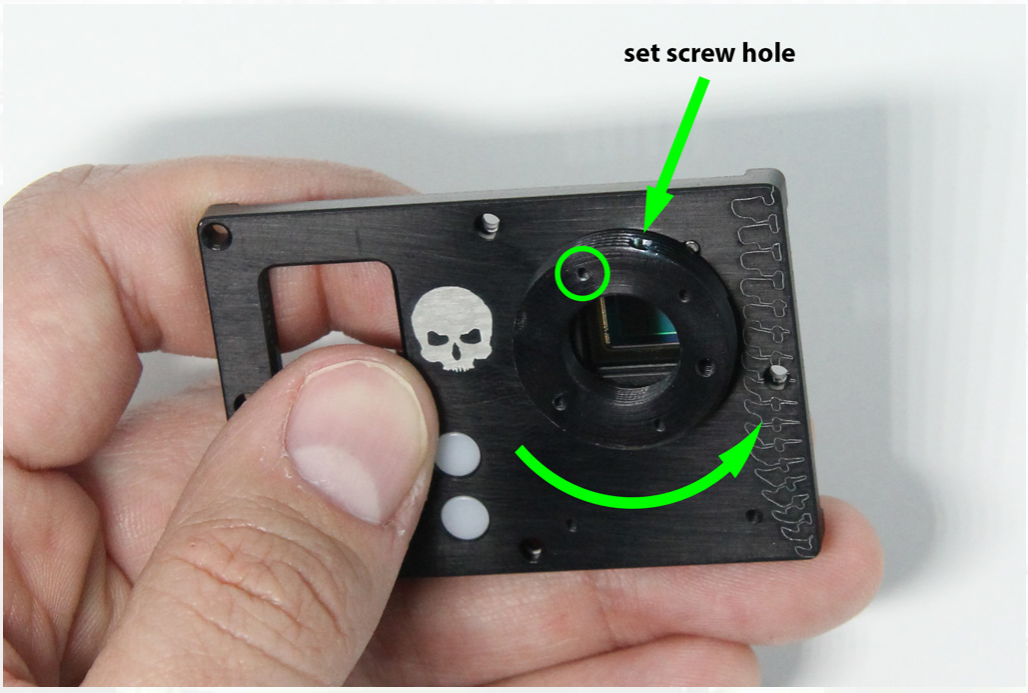


Insert the image sensor with the plastic standoff back into the Ribcage cover plate so that the four holes line up correctly.

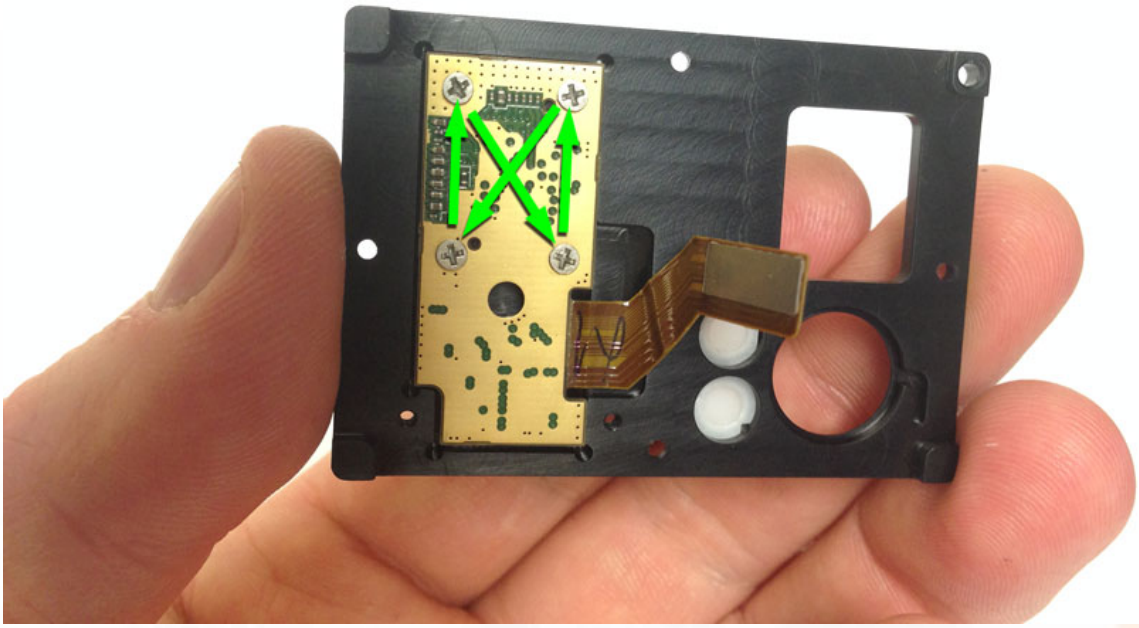


Ensure that three of the four screws are flush with the front of the cover plate. The fourth screw should extend beyond the cover plate slightly for attaching the M12 ring.

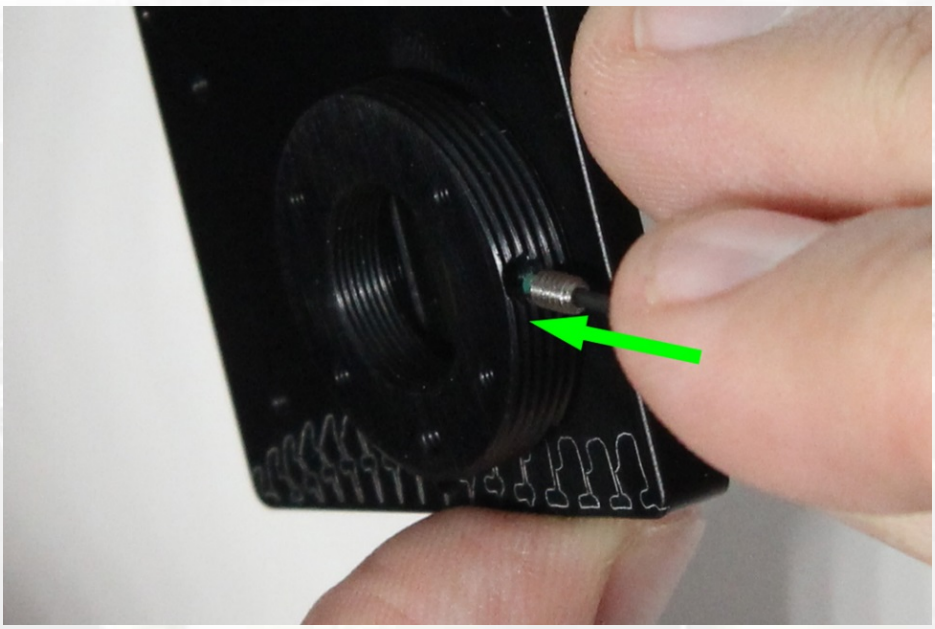
Position the M12-ring with its set screw hole towards the top. Screw the first socket screw into the M12-ring, but do not tighten it. **It's important that the ring is flat against the plate as you engage the screws to ensure that no gap is present behind the ring when complete.** With the first screw loosely in position, turn the M-12 ring to align the remaining three holes with the holes in the cover plate.



Lastly, we will gently in a repeating crisscross fashion tighten all 4 screws until the M-12 ring lays flush with the cover plate and the 4 screws are snug ONLY i.e. tighten only to the point of contact. **Before continuing make sure there are no gaps behind the ring and it sits perfectly flat on the surface**



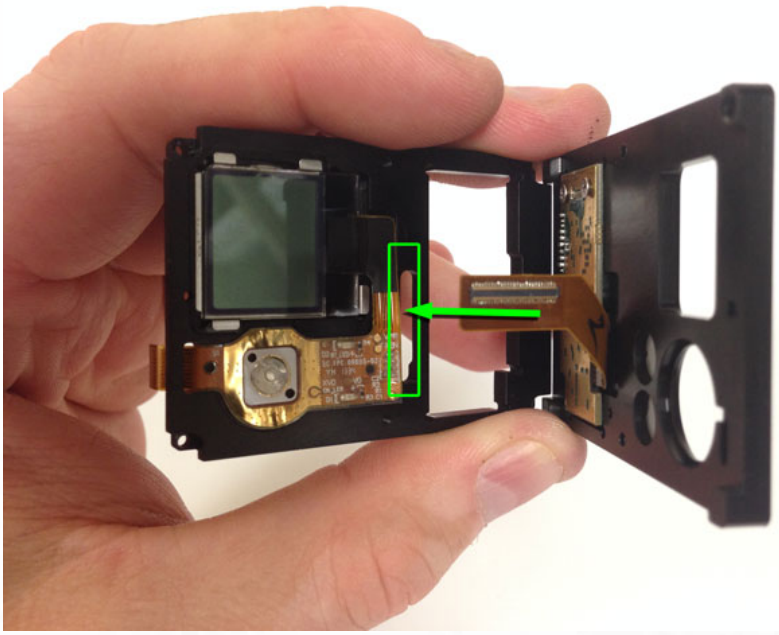
If you plan to use M12 lenses similar to the original GoPro lens, insert the tiny set screw from your original M12 ring into the top of the new M12 ring using the small L-key provided.



2-3 Attach the Cover Plate to the PCB Plate.

Video: http://youtu.be/I1kAaRuEa3o?t=13m17s

Attach the cover plate to the PCB plate. Carefully thread the flexible connector through the opening in the PCB plate.

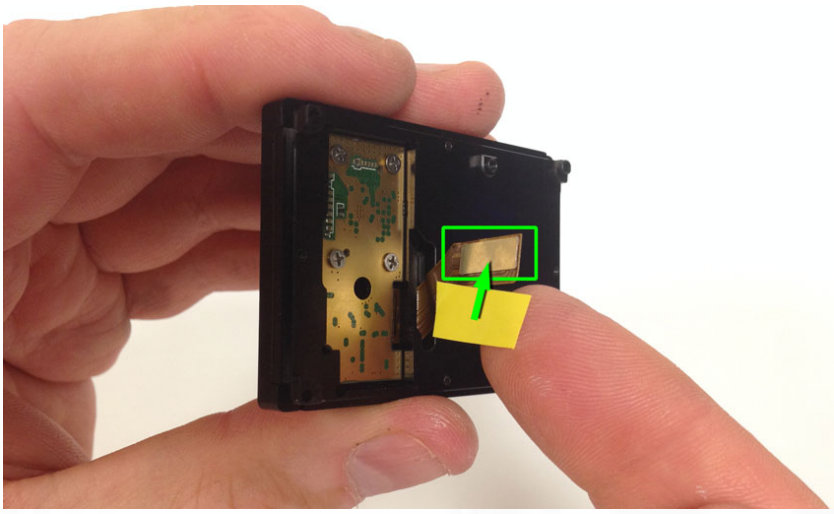


Once together connect them with one of the black screws provided. *Note: when all the pieces are properly aligned the assembly fits together easily. Never force any of the components, instead check that they are seated properly and try again.*

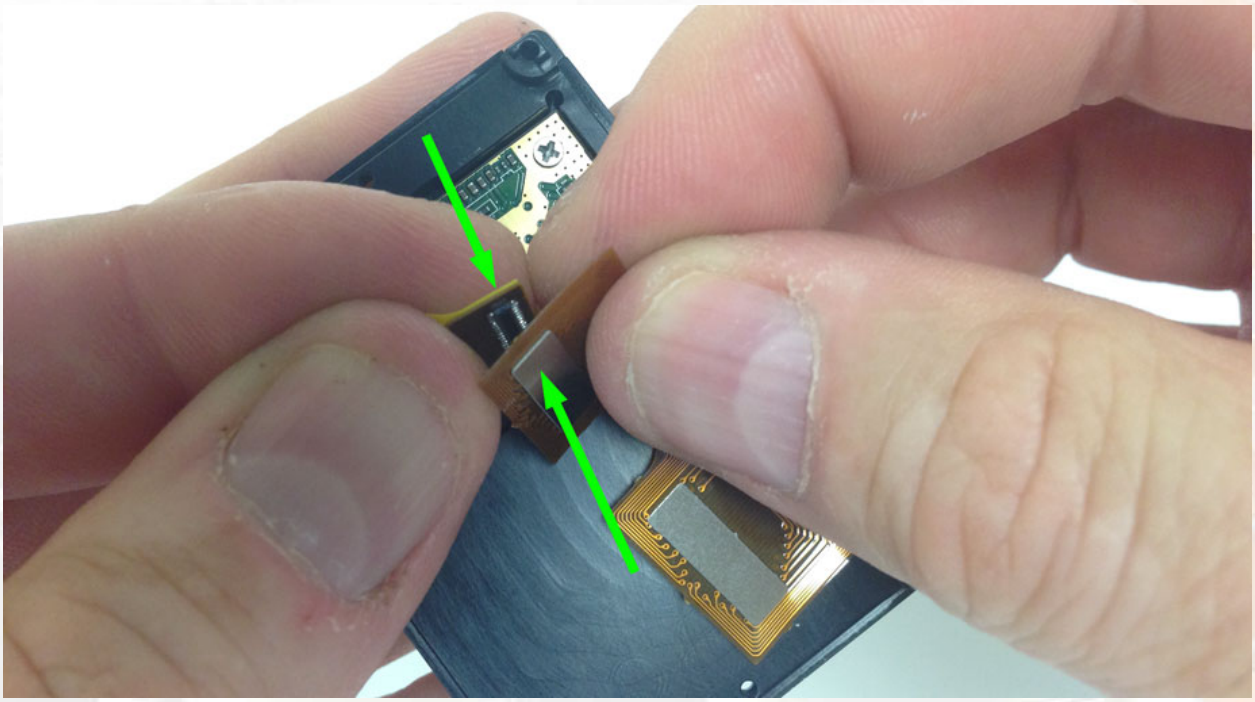
2-4 Connect flexible PCB jumper to PCB plate.

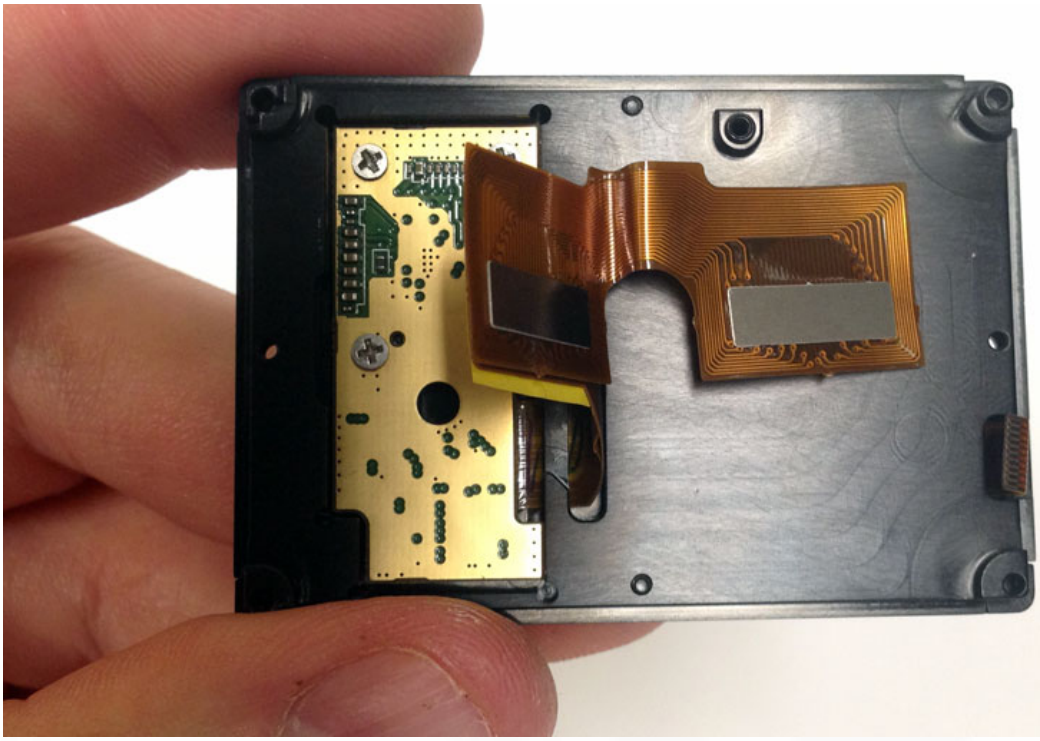
Video: http://youtu.be/I1kAaRuEa3o?t=13m51s

Optional - If you wish you can choose to place a small piece of electrical tape on the back of the flexible 50 pin connector.

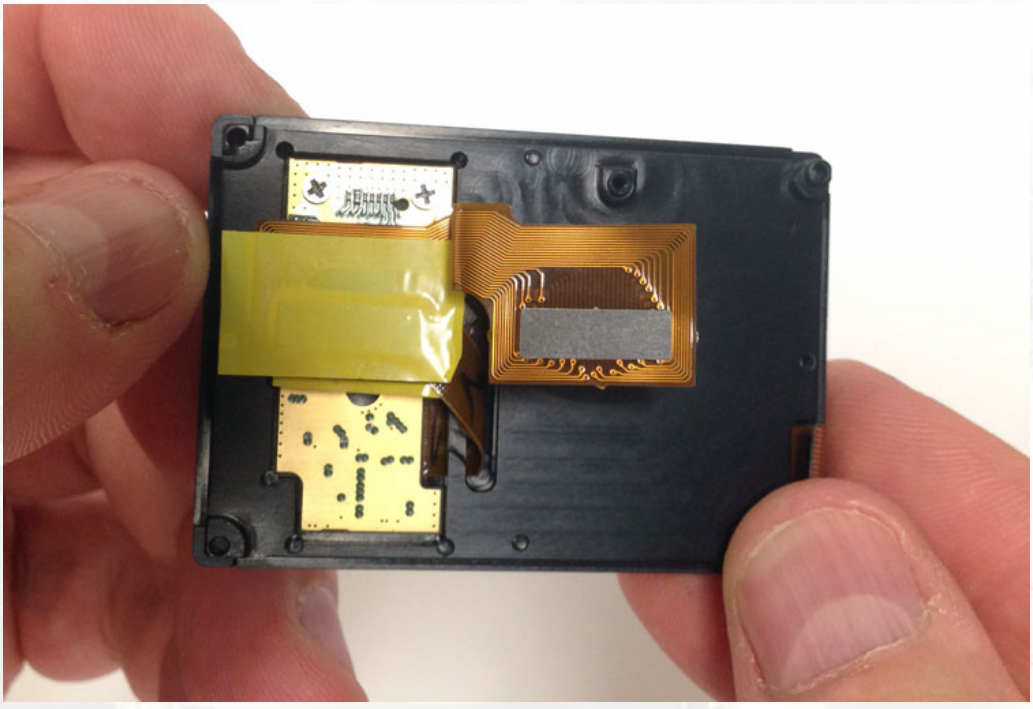


Next we'll connect the flexible jumper. Be very careful to align the tiny 50 pin connectors together before exerting a small amount of pressure. FORCING THE CONNECTORS TOGETHER WILL DAMAGE THEM ESPECIALLY IF THEY ARE NOT PROPERLY SEATED.

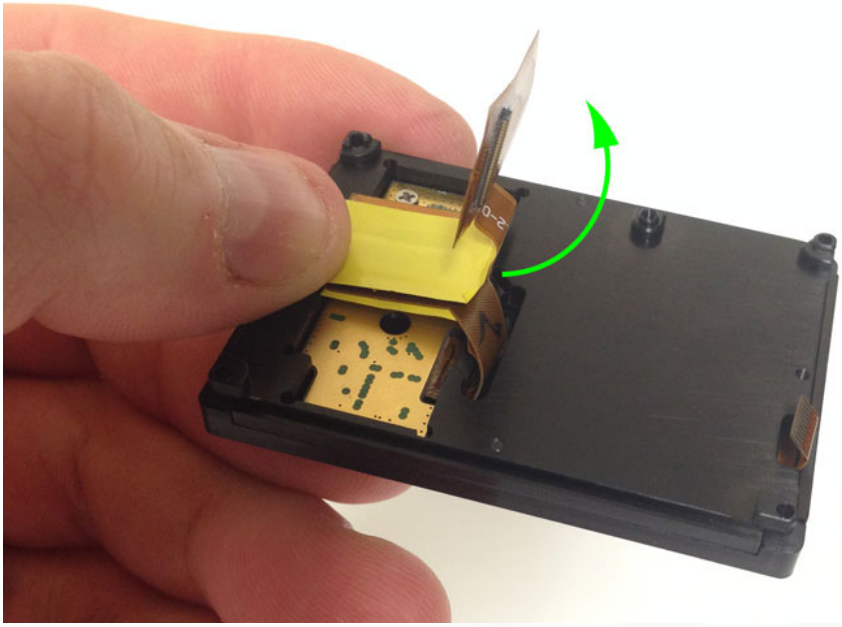




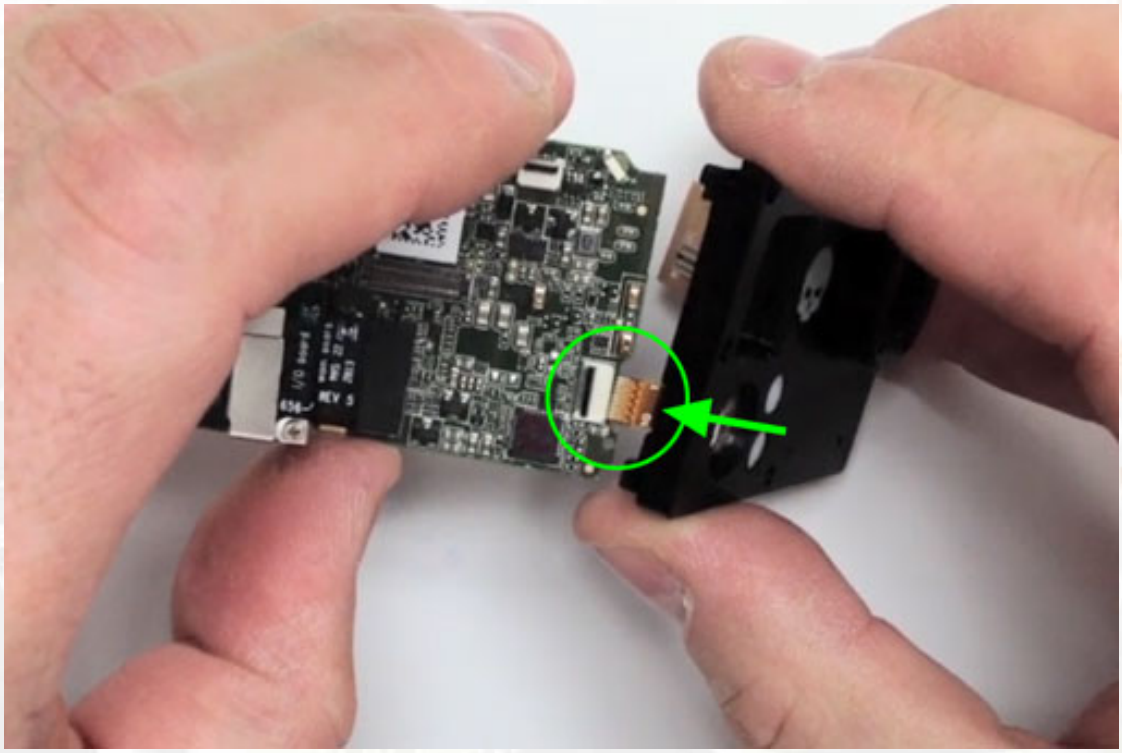
Place a small piece of electrical tape over top the metal stiffener on the flexible PCB. The tape will help isolate the metal stiffener from the bottom side of the PCB board that we will be attaching next. Be sure to align the ribbon as closely as possible to the channel in the PCB plate. The tape pictured is yellow but regular black electric tape is also a great choice.

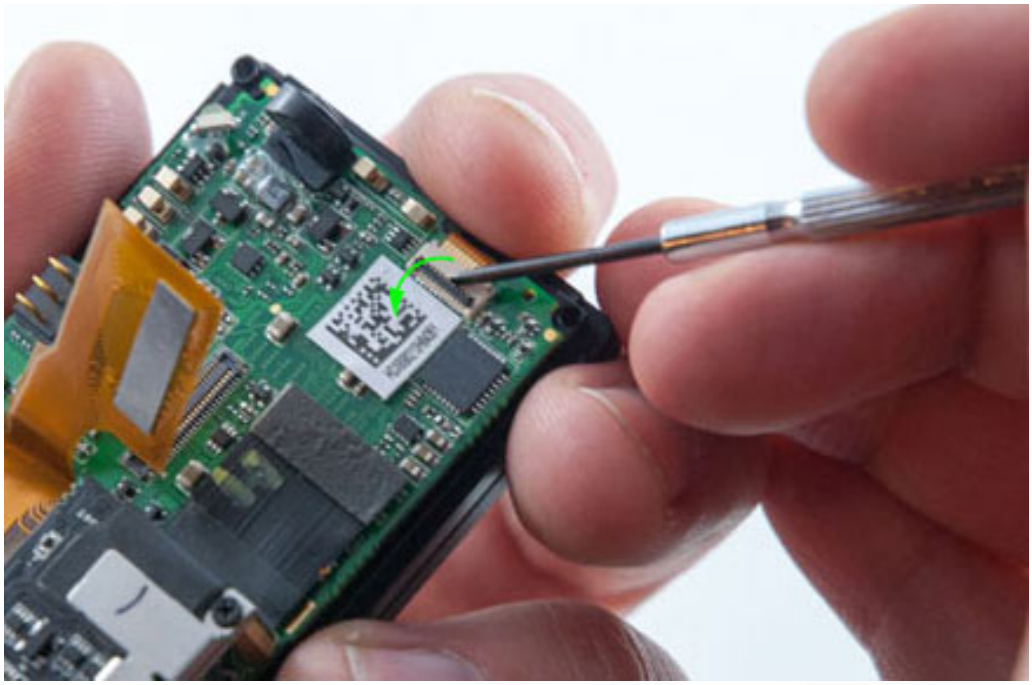


Bend the flexible PCB 90 degrees. This will make attaching the PCB board in the next step easier.

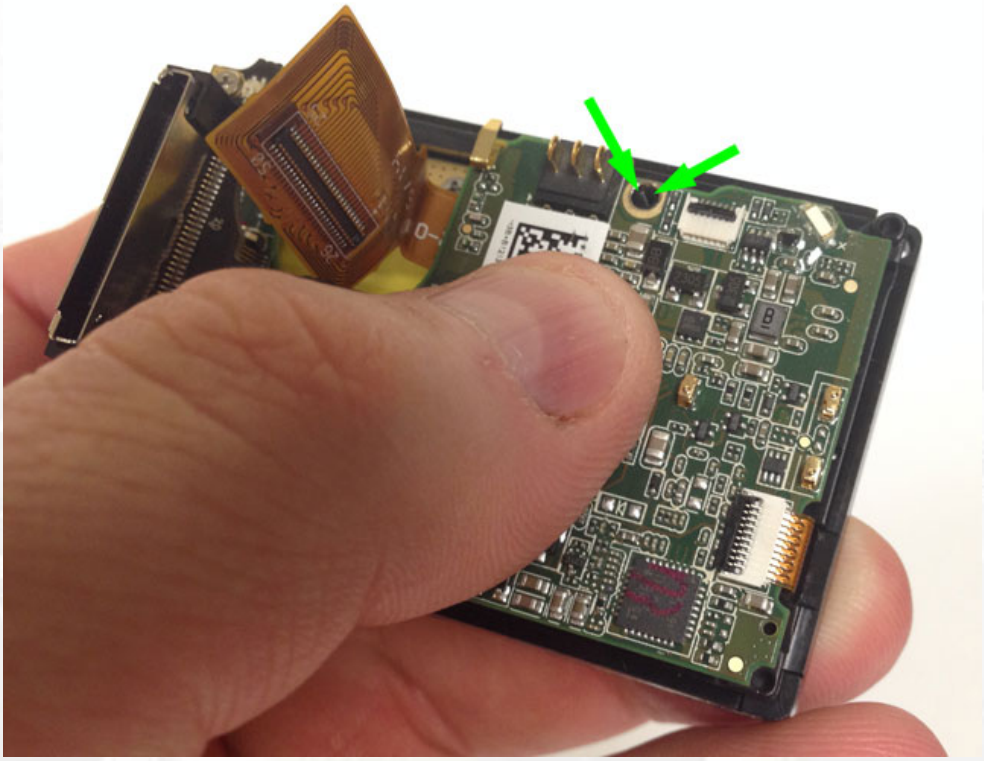


Attach the small ribbon connector and flip down the black plastic locking mechanism to hold the LCD connector in place.

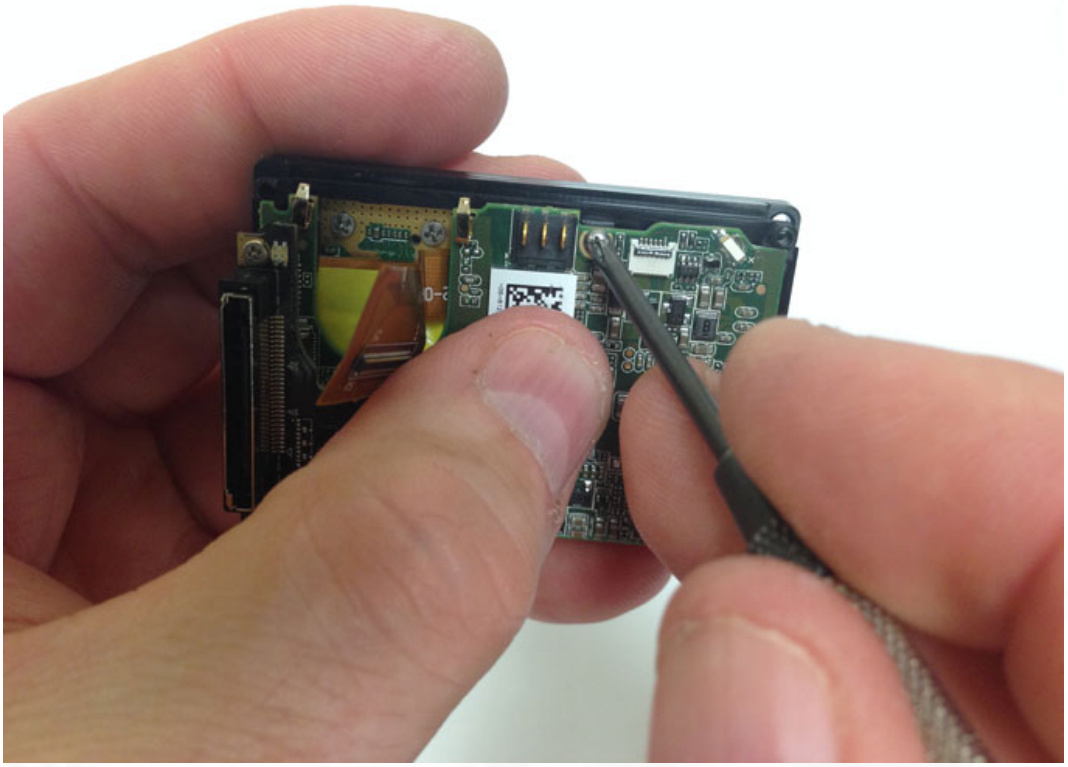




Carefully move the flexible PCB jumper into the empty area where the wide angle lens assembly resided and match the through hole of the PCB board with the mount on the PCB plate.

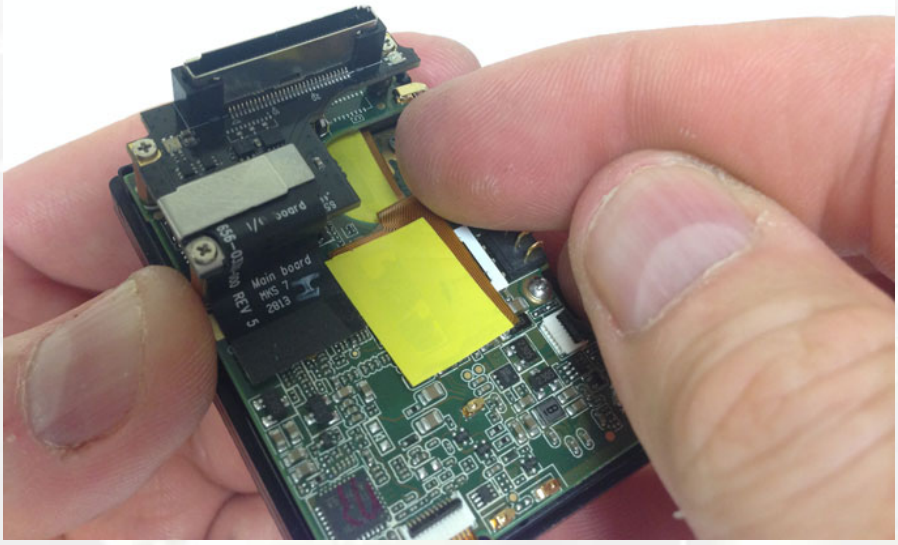


Attach the board with the small metallic 1/8” Philips screw provided.

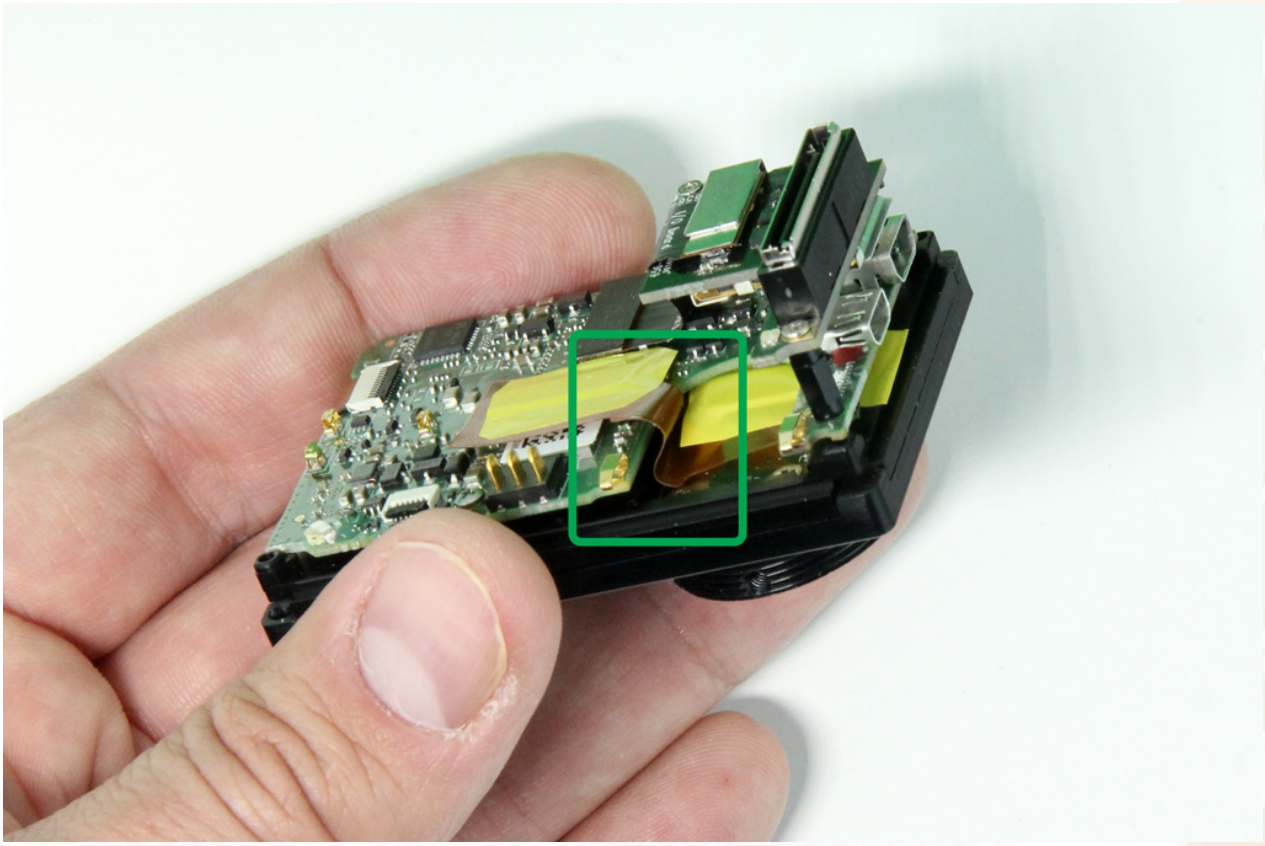


Connect the flexible PCB jumper to the PCB board taking care to align the connectors prior to exerting any pressure to seat them together. They should click together easily when properly aligned.

Add a small piece of electrical tape to the upper side of the flexible PCB jumper to help isolate the jumper from the housing. *Note: the tape shown here is yellow but standard black electrical tape is also recommended.*



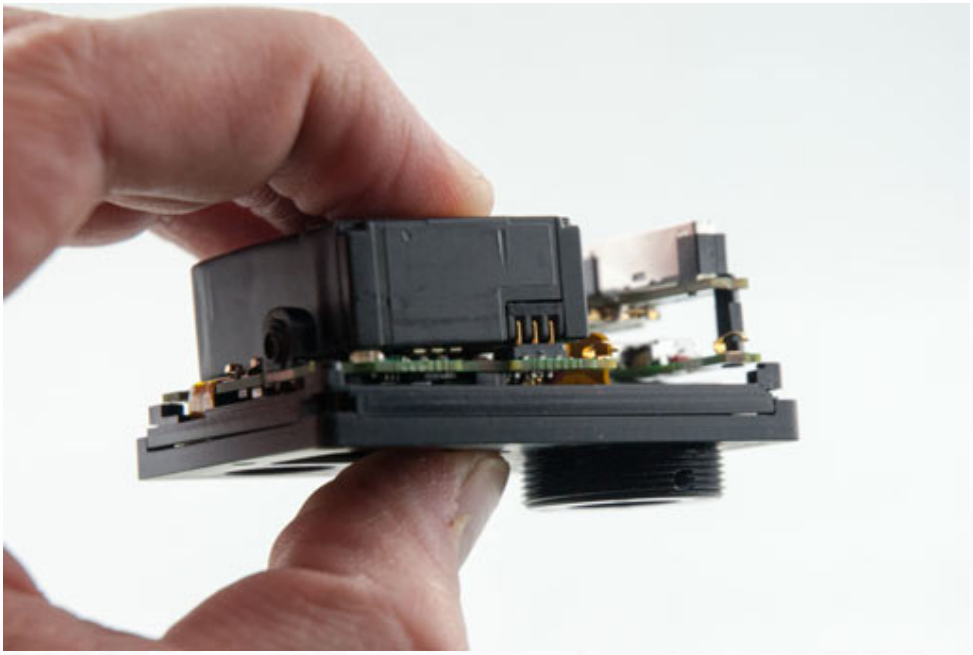
Part of the ribbon should remain tucked under the board slightly and bent over to form an ‘S’ shape as pictured.



2-5 Functionality Test

Video: http://youtu.be/I1kAaRuEa3o?t=17m1s

Now it's time for a quick test. Take the GoPro battery and slide it onto the contacts located on the back of the camera. Hold the battery in place and press the power button. 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.

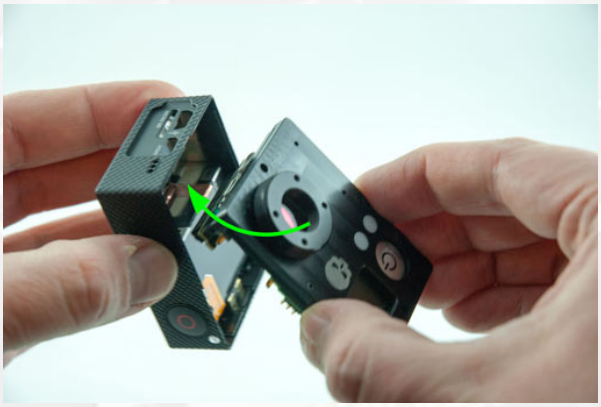


2-6 Put Ribcage Assembly Back Into Housing

Video: http://youtu.be/I1kAaRuEa3o?t=17m25s

Now we'll place the assembly back into the housing. If you have a Hero3+ make sure you re-attach the small ribbon connected to the housing. Re-insert the ribbon into the connection socket as pictured and click down the black locking mechanism to hold it in place. This is not required for Hero3.

Take the Ribcage assembly and angle it back into the housing ensuring the HDMI and USB ports properly mate with their openings and the assembly is fully inserted.

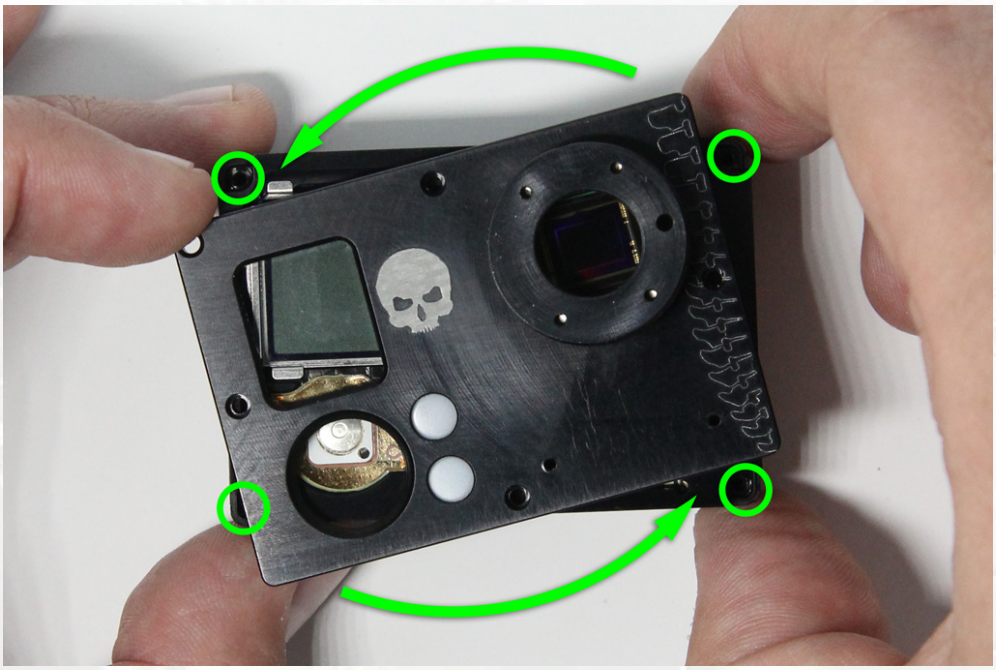


2-7 Release Cover Plate Screws

Video: http://youtu.be/I1kAaRuEa3o?t=17m55s

Release the screw holding on the new cover plate.

Separate the plate slightly and rotate it about ten degrees to reveal the four screw holes located in the corners.



2-8 Insert Original Corner Screws

Video: http://youtu.be/I1kAaRuEa3o?t=18m17s

Insert the original four corner fastening screws. Tighten them until snug.

2-9 Screw on Cover Plate

Video: http://youtu.be/I1kAaRuEa3o?t=18m56s

Next turn the unit over and place the power button in position within the cover plate.

Guide it in with your screw driver if necessary. Click the cover plate back into place.

Now fasten the faceplate with four of the black screws provided. Loosely fit all four screws before tightening all the way. Do not over tighten. A snug fit is all that's required.

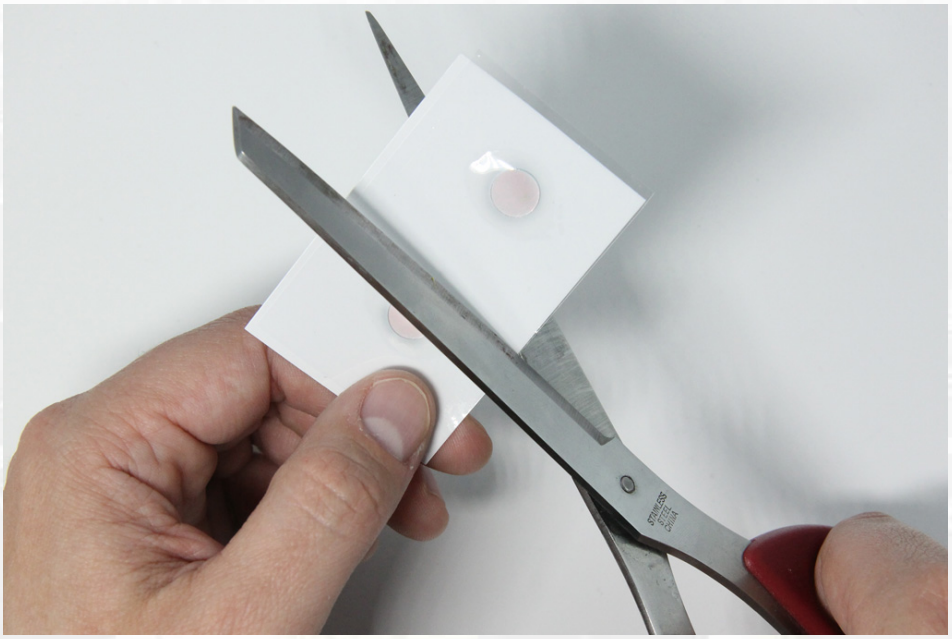
Note: In some cases debris may have worked its way into the threads. Use your puffer to clear it out if threading the screw is difficult

2-10 Install the IR-Cut Filter

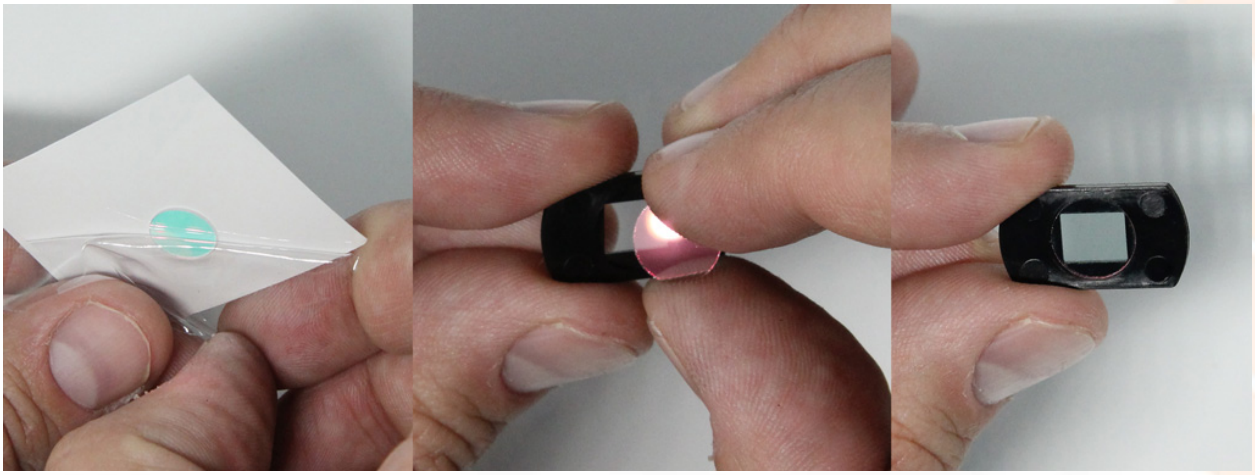
Video: http://youtu.be/I1kAaRuEa3o?t=19m52s

Now we'll prepare the IR-cut filter. You will need the filters, filter holders and circular black stickers from your kit.

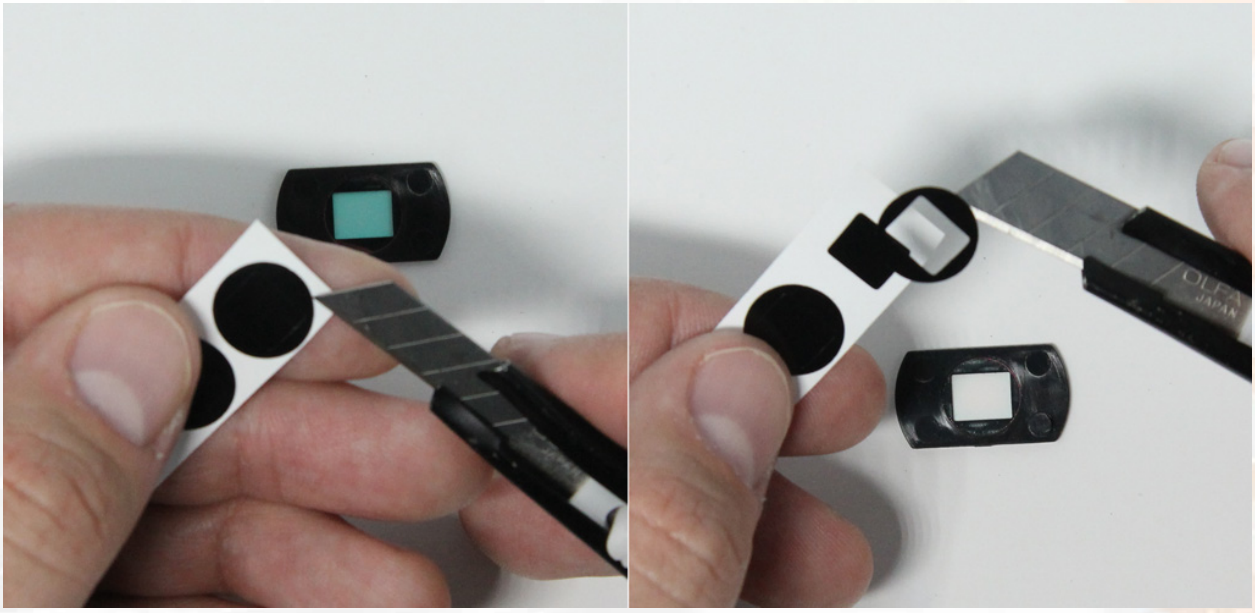
Cut the filter pack in half with a pair of scissors or a utility knife.



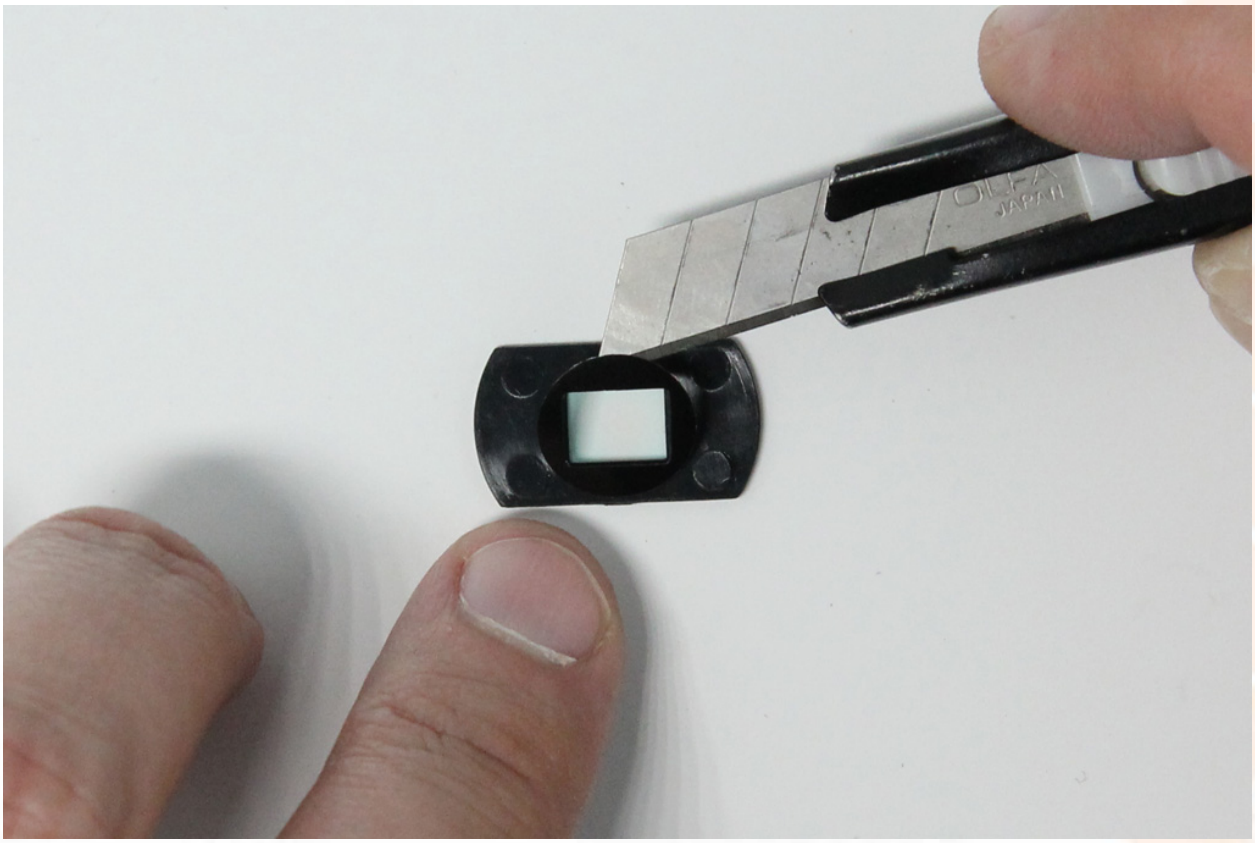
Next, peel away the plastic film from one of the filters. Pop in into the socket in one of the filter holders. *Note: It's best to handle the filter by the edges to avoid adding smudges.* Set aside the backing paper for use in a moment.



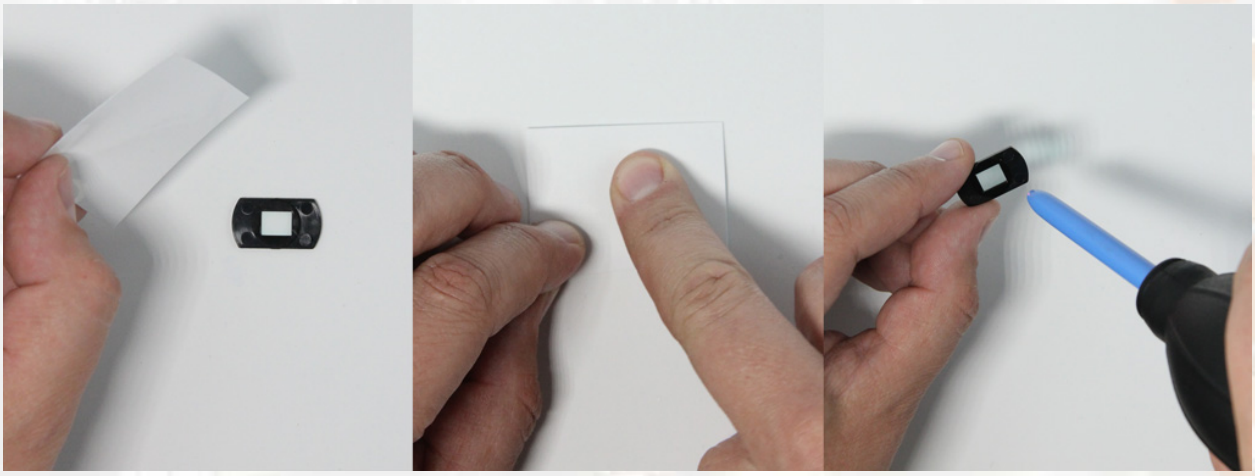
Now take a utility knife and remove one of the stickers from the backing.



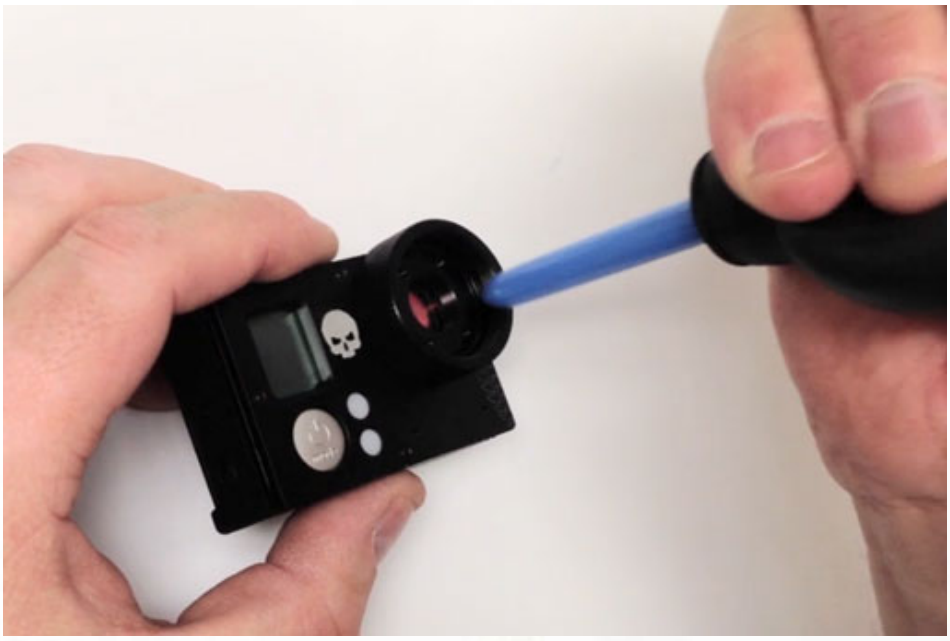
Carefully place it over the filter to keep it in position.



Take the filter backing paper, find the shiny side and place it over the filter and sticker. Try to make sure the area you use hasn't been touched or you might transfer oil from your fingers to the filter. Gently press down to fix the sticker in place. Now is a good time to clean the filter if required. **Note: Make sure the sticker is perfectly flat with no lifted edges and trim any excess that hangs over the side. An incorrectly applied sticker may make inserting and removing the filter tray more difficult. Spare stickers are provided in case you need to re-apply.**

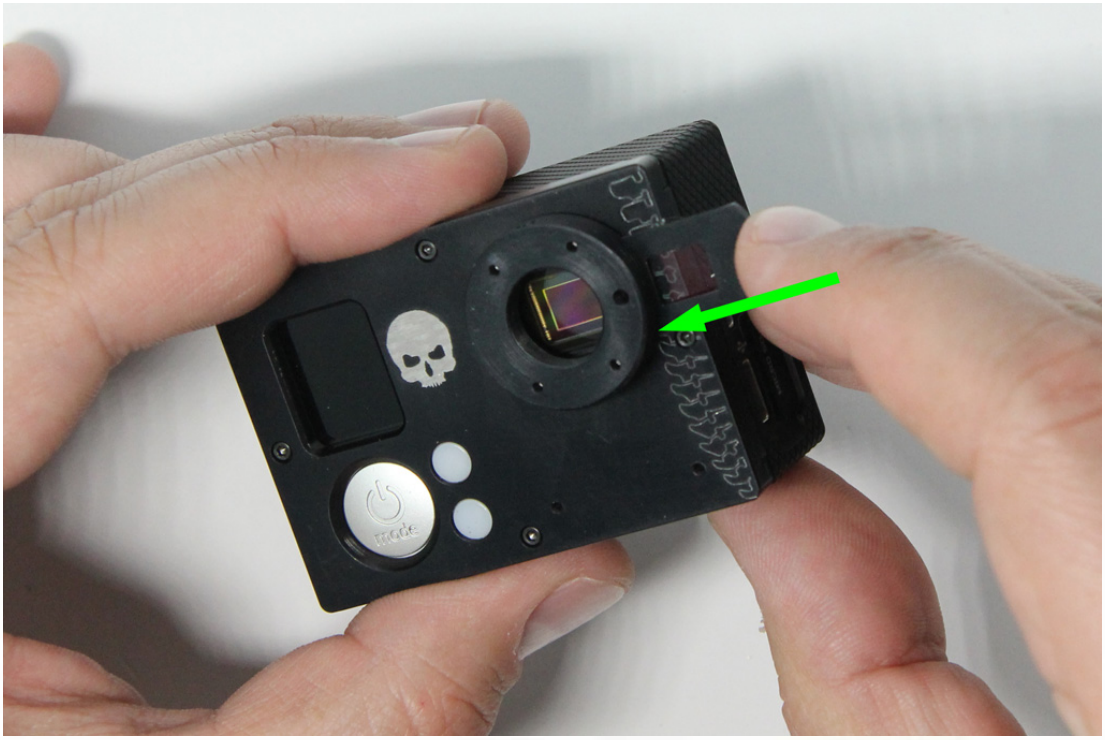


Use a puffer to make sure there is no debris inside the assembly or on the image sensor. If needed use some lens cleaner, or your favorite sensor cleaning tools to make sure it's crystal clear. A magnifying glass is a handy tool to spot any tiny debris. We recommend the Kinetronics SpeckGrabber Pro Cleaning Kit for cleaning the sensor when needed.

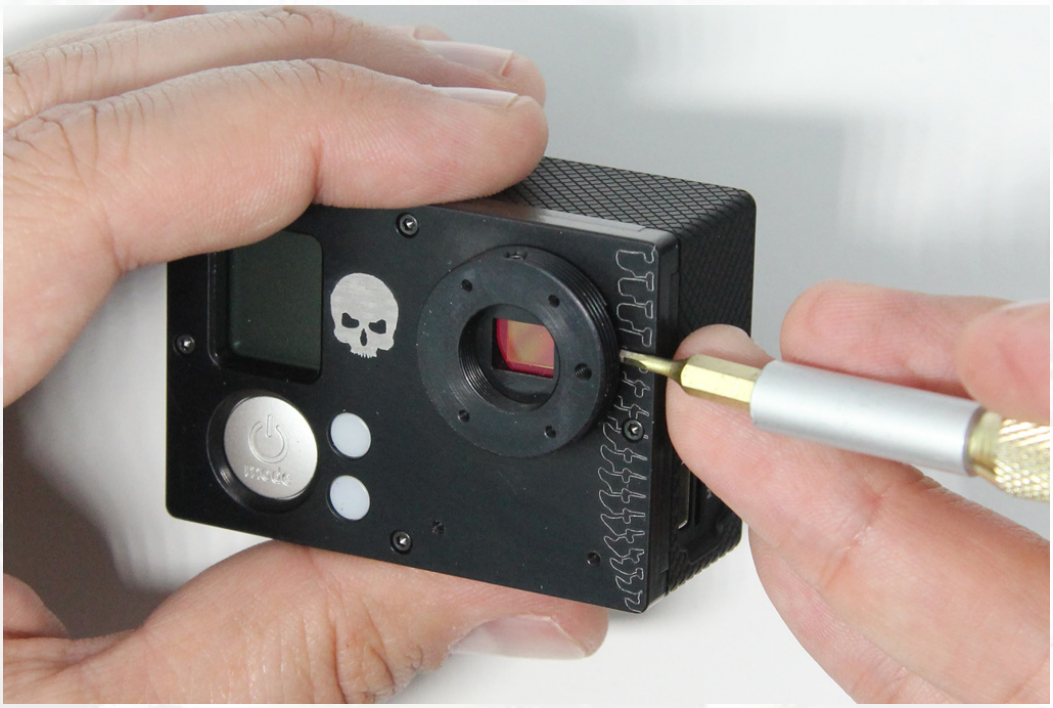


Next we'll add the IR-cut filter. We recommend that you position the IR-cut cartridge with the square opening facing forward. This will protect the filter and sensor in case you happen to screw in an M12 lens too far.

Take one of the two filter cartridges provided and slide it into the slot at the base of the M12 ring.



Use your screw driver to move it into place so that it's centered over the image sensor.



Insert a tiny set screw into the empty hole on the front of the M12 ring. Tighten it until snug to keep the IR filter in place. *Note: use the smallest L-key provided*

If you ever want to remove the filter for night vision, the best method is to loosen the set screw and push it out with the spare filter cartridge. *Note: we don't recommend pushing it out with any tools as there is a chance they can make contact with the sensor.*

2-11 Attach the Mounting Rings

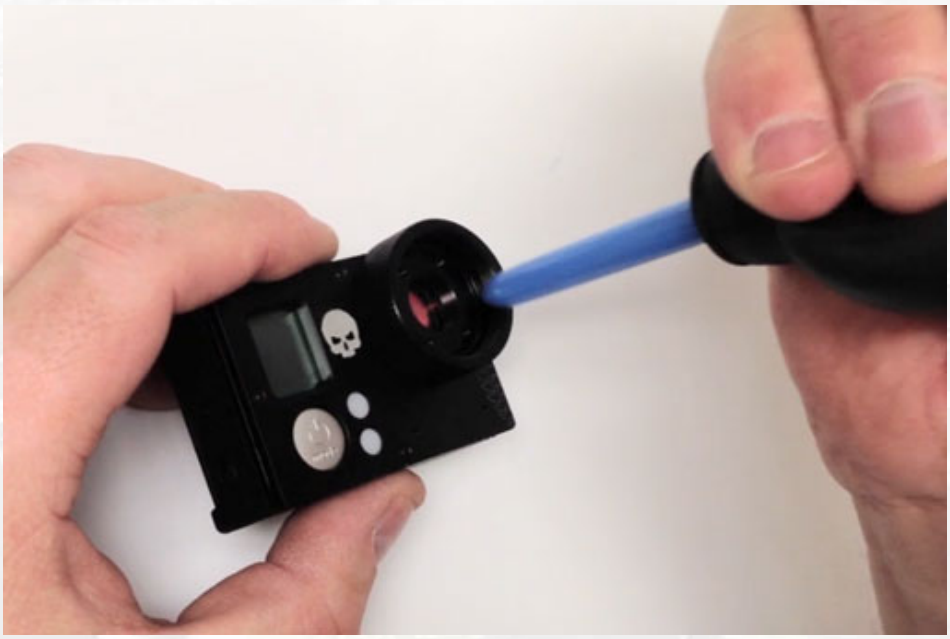
Video: http://youtu.be/I1kAaRuEa3o?t=22m18s

Screw the CS-Mount ring into place over the M12 ring.

Insert the remaining tiny set screw into the CS ring and tighten until snug using the provided Allen key.

In order to attach C-Mount lenses attach the 5mm C-Mount spacer ring that came with the original kit.

Use a puffer to remove any debris from the assembly.



It’s recommended that you use the protective cap when no lens is attached.

2-14 Re-attach Battery and Accessories

Video: http://youtu.be/I1kAaRuEa3o?t=23m19s

Re-attach the battery and accessories.

2-15 Attach Tripod Mount

Video: http://youtu.be/I1kAaRuEa3o?t=23m51s

Attach the tripod plate using the two original black screws. If the screw requires any force to put in, it is best to back it off and try again. The screws will go in easily when properly aligned. Loosely fit both screws before tightening all the way. Do not over tighten. If the screws feel tight, back them off slightly and make sure the threads are properly aligned.

2-12 Done!

Video: http://youtu.be/I1kAaRuEa3o?t=24m21s

Now we're all done! Go out and enjoy your upgraded camera and have fun experimenting with different lenses!