Articulating Retina Monitor

Created by Phil Herlihy

https://learn.adafruit.com/articulating-retina-monitor

Last updated on 2022-12-01 02:17:14 PM EST

Table of Contents

Introduction - Tools, Parts and Pitfalls

Have you ever wanted to have an adjustable articulating monitor for your desk? Maybe your desk is a bit on the small side, but you could really use an extra screen?

This rad little project is for you!

The idea is to take your Retina Display, mount it in an iPad shell, and mount that onto your lamp!

To start, you'll need to gather some parts.

- Adafruit Qualia Bare Board (http://adafru.it/1716)
- LG LP097QX1 - iPad 3/4 Retina Display (http://adafru.it/1751)
- Mini DisplayPort to DisplayPort Cable (http://adafru.it/1698) (HDMI to DisplayPort will not work, must be pure DisplayPort.)
- Hampton Bay Architect's Lamp (22 in. Matte Black) ()
- 12V-9V 1A Power Supply (http://adafru.it/63) (With Barrel Jack)
- iPad 3/4 Back Cover or Donor iPad 1/2/3/4
- Front Glass/Digitizer (That matches your chosen back panel -- Optional)

Some important notes about the back cover. For a perfect out-of-the-box fit with the Retina Display, you can use an iPad 3 or 4 backing. They're a little expensive (65 $US+). If you want the device to seal, you'll also need a glass/digitizer panel, which can be had for cheap, but is an additional expense. On eBay and other online markets, the iPad 3/4 back panel is sometimes called a "battery cover", which is technically correct, but isn't an obvious thing to search. You'll also need the Retina Display mounting screws for the iPad 3/4.

This guide uses a broken iPad 2 as a donor for it's back panel and digitizer. For the iPad 2 back panel, there are a couple slight modifications that need to be done for the Retina Display to mount properly, but otherwise, it works. When searching for a donor iPad 2, liquid spills are your best option. This means that the front glass and back panel are intact, and you can recycle the innards. It's also important to note, you cannot use the iPad 2 Screen as your Retina Display. You have to use the 3/4 Screen.

The last option for the back panel is to use an iPad 1 back panel. These are plentiful online, and cheap. The big difference is that the 1 back panel is tapered (not mostly flat like the later models), and the Retina Display will not match any of the display mounting holes on the back panel.

Some mounting hardware:

- 4x - 2x8mm Machine Screws
- 2x - 3x12mm Machine Screws
- 2x - #3 Crush Washer
- 4x - #3 Plastic Washer
- 2x - #3 Metric Hex Nut
- 4x - #2 Plastic Washer
- 4x - #2 Metric Hex Nut
- Zipties in your favorite color!

 Finally, some tools:

- Grinder/Dremel Tool with Metal Cutting Discs
- Power Drill With Hole-Drilling Bits
- Needlenose Pliers
- Wire Cutters
- Screwdriver (matching the head of your machine screws)
- Sharpie or Fine Tip Permanent Marker

Preparing Your Lamp

With that out of the way, let's get into it!

First, you want to snip the AC wire at the top of the lamp, about an inch from where it goes into the head. You can now pull it out of the body of the lamp.

Now, select a drill bit for your drill that's just around the same size as the head of the two silver rivets that are holding the lamp head onto the arm.

Awesome! I'd save the head of the lamp for another cool project. We won't need it here! Last bit for the lamp for now. The oval bracket that was holding the head before is slightly curved (to be flush with the lamp head), so use your needlenose pliers and straighten it out.

Preparing The iPad Back Panel

This part of the guide is written specific to the iPad 2 Back Panel!

Okay, onto the iPad 2 Back Panel preparations. First, make sure that you've removed all of the electronics, and core pieces from your iPad. You want a clean, empty back panel, and a clean front glass/digitizer.

The Retina Display will clash with the Back Panel in the two corners that are on the same side as the rear facing camera. The corner that is closer to the rear facing camera will have to have some of the aluminum removed. Grab your Dremel, and cut along the orange line I have marked in this photo.

For the corner on the same side, but closer to the dock connector, a small section must be ground down. You should not cut this piece competely off, as it will be good to have support underneath the Retina Display's mounting bracket. You should shave a millimeter or two down. The area is marked with orange marker here.


Next, place the screen into the back panel, and observe where the ribbon cable will need to exit the case. You will need to make a cut with your Dremel to pass this cable through the case, and out to the Qualia board.

Once the cut is made, verify that your ribbon fits well, and is not flexed. (Ignore that second cut below the main one. It's not necessary.)

The Retina Display ribbon cable is delicate. It can easily be torn or damaged, so take care when handling it.
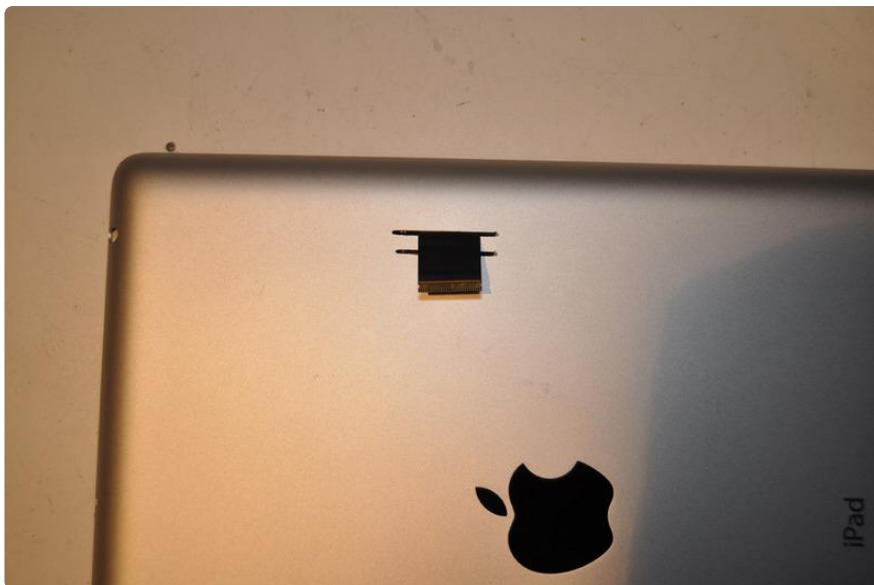
Using the ribbon as your guide, place your Qualia bareboard where you should mount it on the back of the iPad back panel. The ribbon should not flex or bend in a strange way. Try to align it so that it goes straight into the Qualia.

Now, use your fine tipped marker to mark where the mounting holes line up. Another method is to place the board on an 8x11 sheet of paper, and create a drilling stencil. Then, hold the back panel up to the head of your lamp, and mark where you need to drill the holes for the lamp mount. The ideal place for the lamp is not dead center, but slightly offset towards the side with the rear facing camera.
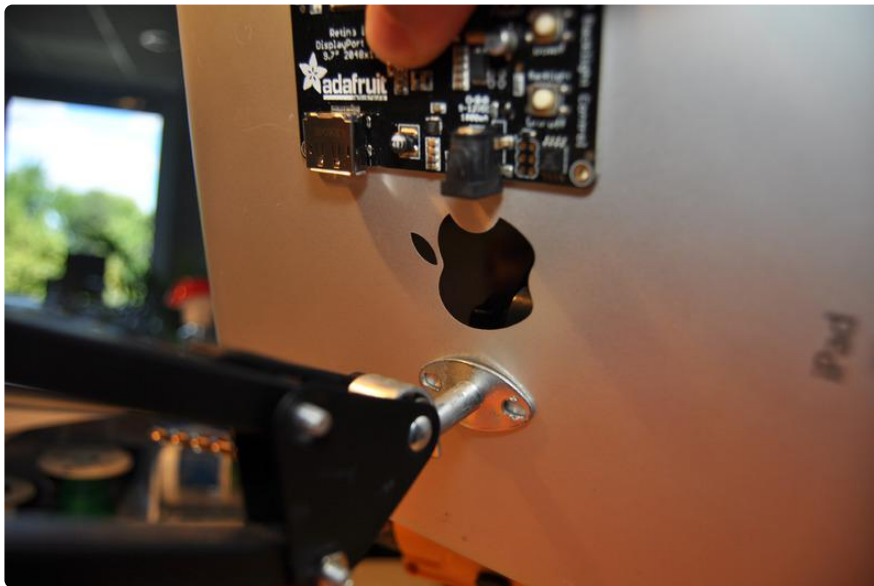
If you're happy with how the marks look, go ahead and drill 'em! The two large holes are #3 Metric, and the smaller ones are for the #2. Be careful not to overdrill the holes.


Now, take a strip of thick tape, and completely cover the bottom of the Qualia. This is to prevent it from shorting out on the aluminum of the back panel. You can poke some small holes in the tape so that the screws will go through it easily.

Okay, you're ready to attach the Qualia! Put a 2x8mm screw through each of the holes for the Qualia in the back panel, with the heads on the inside of the iPad. Place a #2 plastic washer on each of the machine screws. Now, drop the Qualia board onto the screws, and secure it with the #2 metric hex nuts.

Place a #3 washer on each 3x12mm machine screw. Then, thread those through the iPad back panel, with the heads on the inside of the case (same as before). Place your back panel onto the lamp head, and thread the screws through the bracket. place your #3 crush washers onto the screws, then another set of #3 plastic washers, and finally cap them with the #3 metric hex nuts. Tighten it up, and it's mounted!
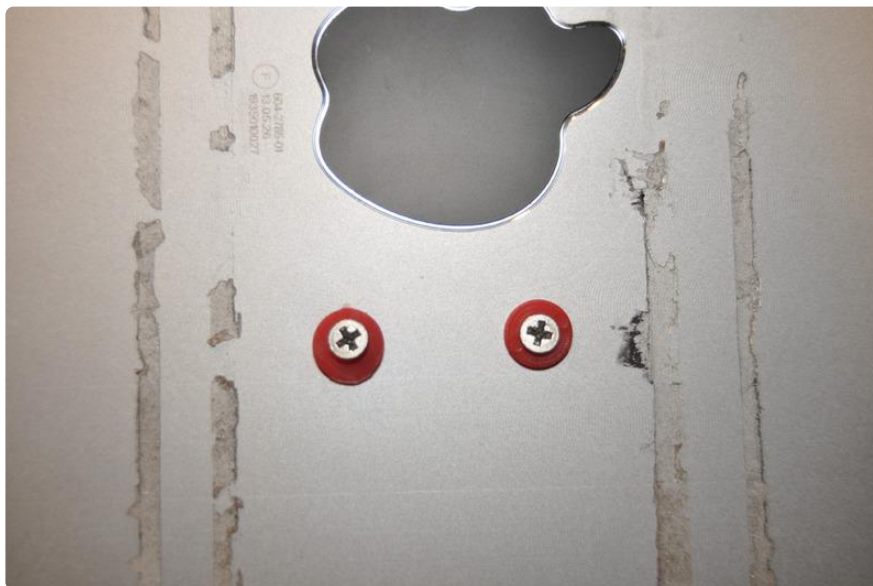
Final Assembly

Woo! We're into the home stretch. It's time to place your screen into the iPad back panel. The best way to do this is to tilt it in, while feeding the ribbon through the hole you cut. The ribbon cable isn't incredibly malleable, so it will require some manuvering to guide it into the Qualia connector.

Once it's in, connect up your DisplayPort and Power Supply cables and give it a test run! If everything looks good, you can screw the panel in. If you're using the iPad 2 Back Panel, you should apply a dab of hot glue in both of the bottom corners (since you can't screw those in). Then, pop your front glass on. If the double stick tape on the glass is worn out from it's initial removal, it's a good idea to refresh it.

You can run the cables down the arm, and use those zipties to hold them down. Make sure to leave some slack around the joint, so the screen can adjust freely.

Hurray! Your lamp buddy is complete!! Celebratory dancing!! Now, for some glamor shots. This works really great in both portrait and landscape configurations.