

Modifying the Baofeng BF-888S Radio

Disclaimer: Please Note. I do not take credit for all the photos for this modification, I found these photos and write-up online some time back now in 2017 and don't know the source to give credit for them. I have however changed some text and added extra photos and I have adapted this article for my installation in an old DVD case.

Start with Programming the Radio

IMPORTANT:

Before you modify the radio, it will be easier to **program your BF-888s first.**

I used Chirp program to do this. When programming, I also recommend to use tone call to stop any interference from other nodes that may be local. We can modify all the radios on the same frequency but all using different tones. As there are 16 channels you can program 4 frequencies, each with 4 different tones.

The BF888s can be programmed to operate within the Amateur Radio 70cm band. I operate my node as a simplex repeater. 70cm band plans in NZ may vary, so you should investigate the best simplex frequencies for your area. Also, since the BF-888S has been programmed with 16 channels, if you use it at another location, you have a few different simplex frequencies that can be used during your travels. You also only need low power so do not use high power.

Be sure to follow your local countries rules and do not operate a Ham radio Allstar node on frequencies that you are not authorized to use for this purpose. (i.e., **obey your local laws**)

The Baofeng BF888S radio undergoes frequent changes to the printed circuit board design over time. The radios I ordered in the summer of 2018 were different than the radios shown in the article linked above and other articles I could find. While the PCBs are different all of the needed signals are still available on the PCB, but the locations of the connection to the circuit board may have changed.

To get to the radio PCB, the radio first needs to be disassembled:

1. Remove the battery pack from the radio.
2. Pull the power/volume knob off. Pull hard and straight off the shaft and it will come off.
3. Pull the channel selector off in the same way as the volume knob. This knob, on my radios, required more force to remove. A pair of pliers may help getting a better grip on the knob. Just pull straight to avoid stressing the switch on the PCB.
4. Unscrew the Antenna



Photo 1. Battery Pack, Knobs and Antenna removed

5. Remove the two Torx screws at the bottom of the battery compartment. These are T-8 Screws



Photo 2. Location of Torx screws

6. Remove the two Phillips head screws from the upper back side.



Photo 3. Phillips screws location

7. Remove the retaining nuts around the Antenna and two knobs at the top of the radio. The nuts are usually not on too tight and can be removed with a small flat blade screwdriver by pushing the blade into the slots and pushing the nut around counter clockwise.

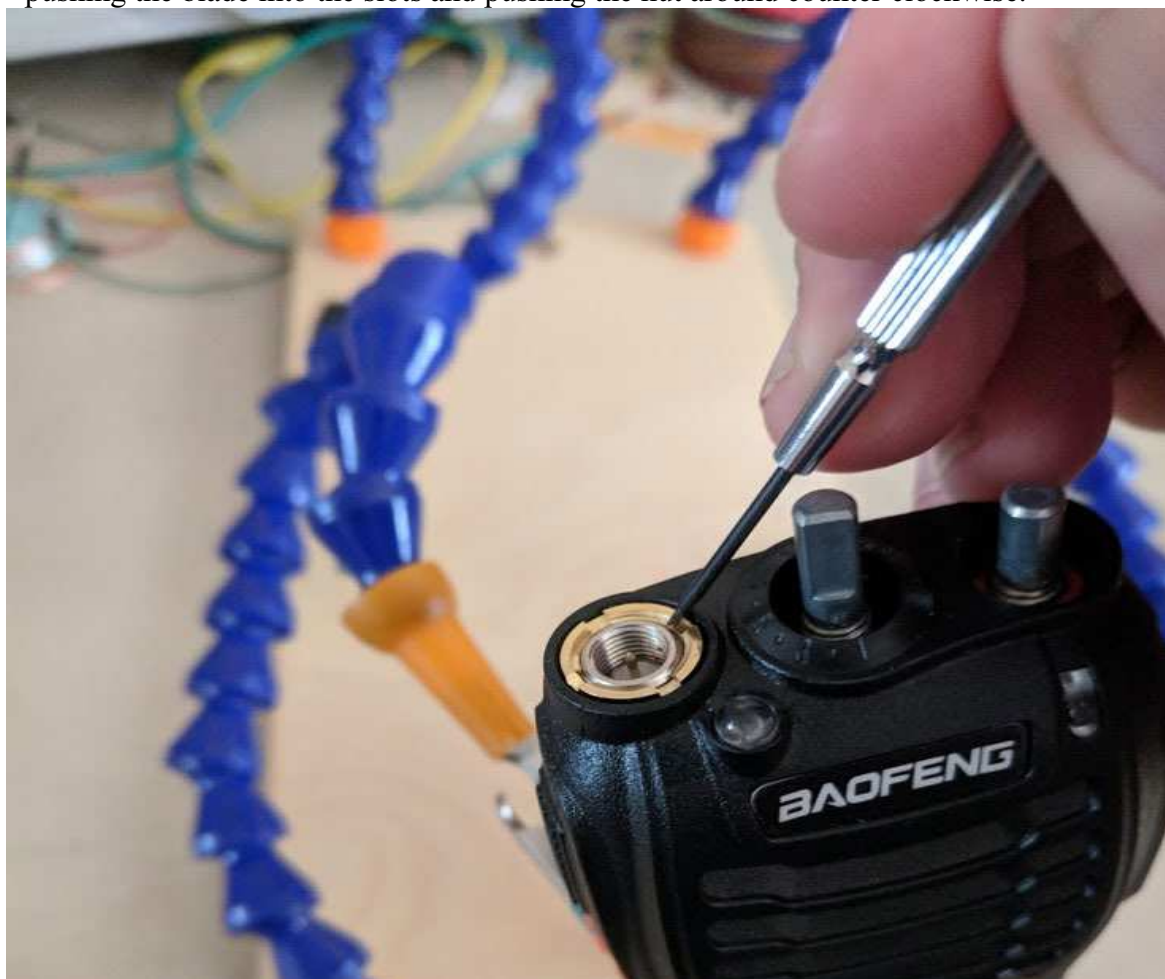


Photo 4.

8. Lift the bottom, where the Torx screws were of the metal body up a little bit.



Photo 5.

9. Pull downward on the metal body until the knobs and antenna connector are free from the case.

10. You can now open the case and body like the two sides of a book to expose the PCB.

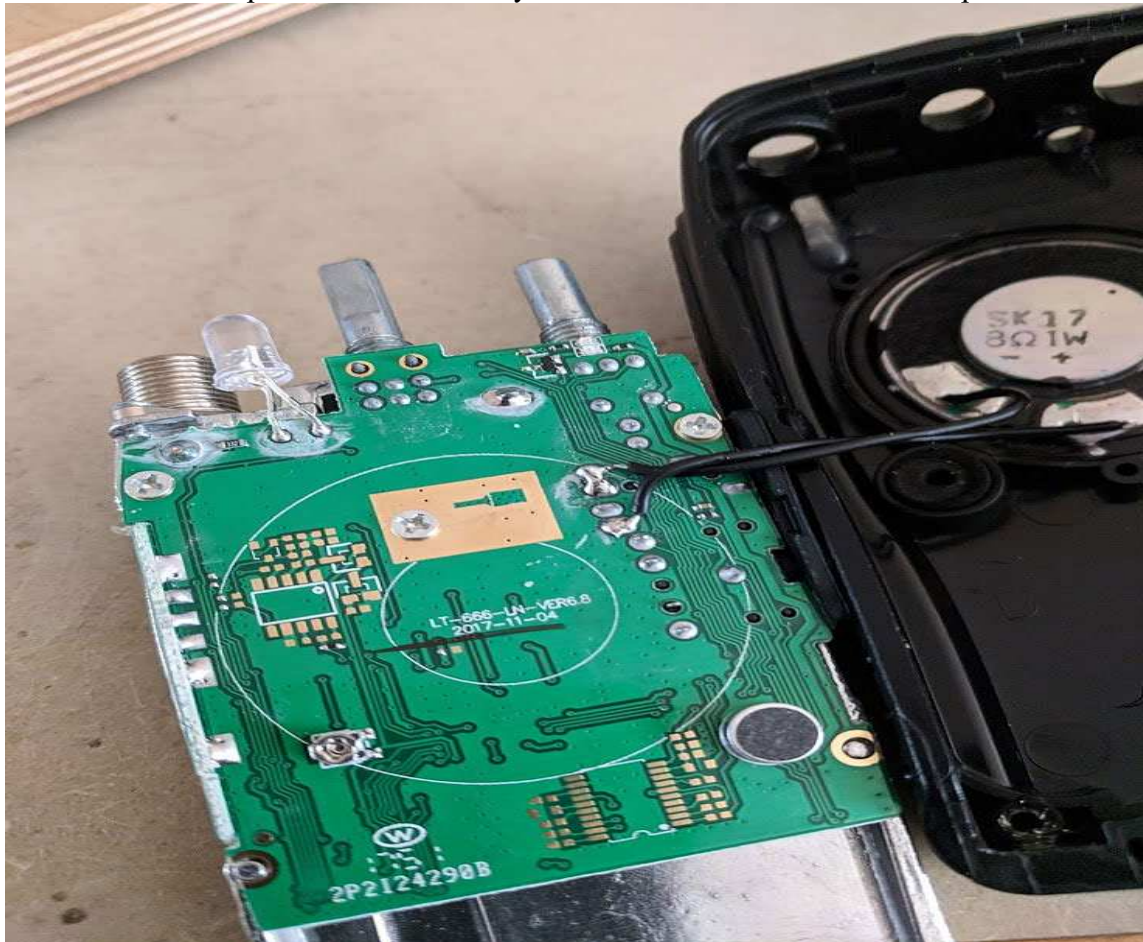


Photo 6.

11. Unsolder the two black speaker wires to disconnect the body from the plastic case. My design does not use the case so throw the case into the used parts bin (or trash)

There are six wires that need to be soldered to the board.

1. Power
2. Ground
3. Carrier sense (COS)
4. Push to talk (PTT)
5. TX audio
6. RX Audio

Unfortunately, on my version of the radio, the COS on the bottom side of the PCB and requires additional disassembly. Some previous version of the radio radios has a point on the front side to make this connection, but on my version, I was not able to find it. to make this connection follow these instructions below.

Remove the PCB from the metal body. (See diagram below)

1. Remove the three screws (Green Circles) attaching the PCB to the metal body.
2. Unsolder the antenna and power connectors from the board. (Red Circles)
3. Lift the PCB off the metal body.
4. Be careful not to lose the soft grey heatsink material which is squashed between the case and the power transistor.
IMPORTANT if you remove it to do the work make sure you put it back before re assembly.
5. While you have the aluminium case out, if you are mounting this into a case like mine you will need to file or grind the front down in order to be flat and this allows the nuts to be fitted on the controls and hold the radio in place. Another idea is to mount the radio inside and use a SMA lead extension cable for the antenna. I used a SMA right angle for the antenna to be vertical.

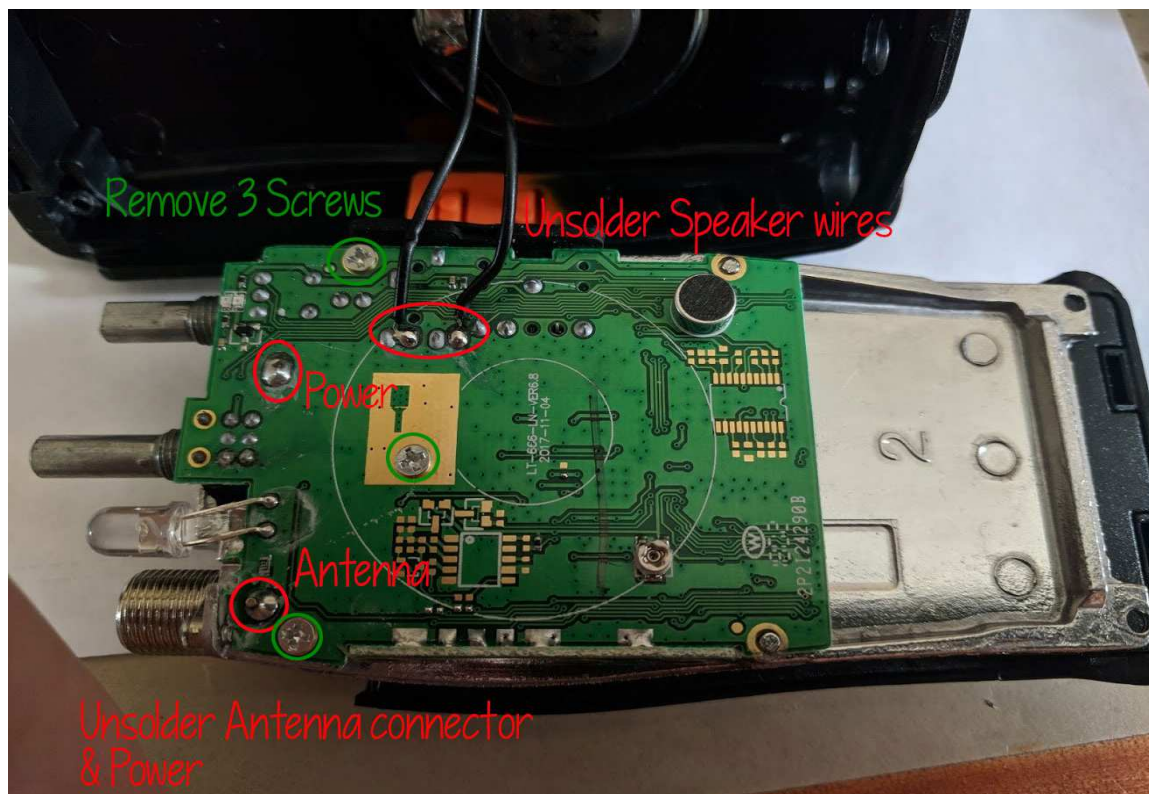


Photo 7.

Attach the COS wire.

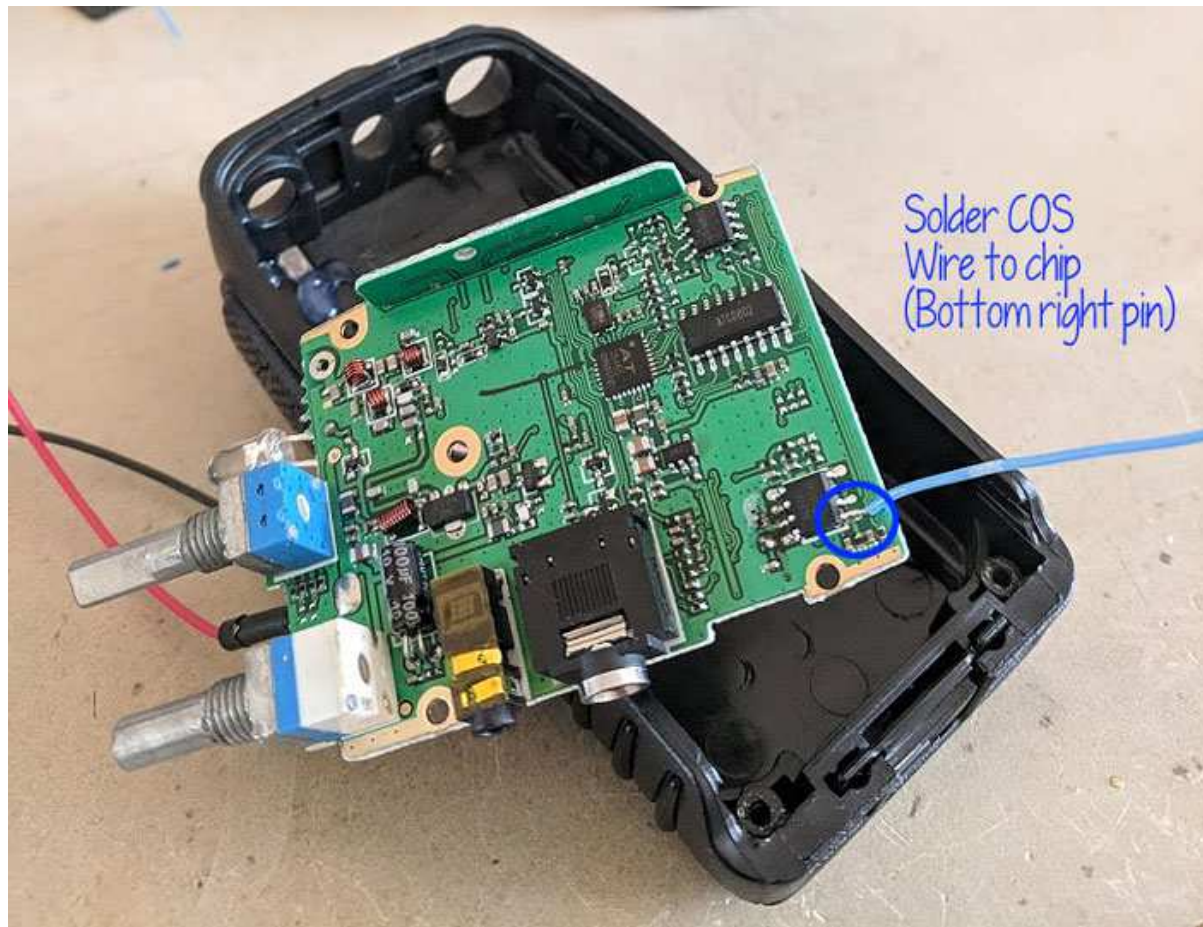


Photo 8.

The COS senses if there is a carrier on the receiving frequency. COS goes high when the squelch open (i.e. a signal is received) Carefully attach a fine wire to pin 1 on the integrated circuit shown in the picture. (blue wire in this photo, I have used a white wire on my build) It helps to tin the stripped end of the wire first and then touch it to the IC pin and quickly heat with the tip of the soldering iron. **Use caution here to not overheat the IC pin and damage the IC.**

ADDITIONAL NOTES:

I **did not** glue mine but used a cable tie or equivalent to secure the wires down, so it is up to you if you want to glue, as the glue is hard to get off, if you need to change anything later.

I also removed the Mic and LED off the board as these are not needed. (See next photo below)

As I have mounted mine in an old DVD case, I modified the aluminium body at the top of the radio so it is flat when it goes into the case. I used a grinder to cut off the tabs. Unscrew and remove the SMA antenna so you don't damage the connector. Be careful, the chassis can get hot quite quickly when grinding. See photos 9 & 10 below, it shows the top of the chassis grinded flat. This allows the controls to be accessed form the back of the case. When it is assembled you can use the original nuts to hold the radio in place.

I used a SMA right angle for the radio's antenna so it is vertical.



Photos 9 & 10

PCB side view (PCB removed)

Surface grinded flat

Battery side view

If you want to glue then add a little dab of silicon glue to secure the wire to the PCB. Avoid using any RTV type silicon because it produces an acid during the curing process and this may damage the PCB. A dab of hot melt glue will also work. This will relieve any strain on the delicate connection when the wire is pulled on.

Also, as I am not going to use the Baofeng radio's case again, I cut the top off to use as a template to mark and drill the holes out for the radio at the back of the DVD case. (Marked in red)

Also, I used the template to size each hole with the right drill.

Be sure to mark this the right way round, so the radio's PCB is facing upwards and make sure there is enough clearance for the radio once the wires are attached.



Photo 11.

Re-attach the PCB to the aluminium body with the heat-sink material back in place. Fit the screws and solder the power line and antenna connector back onto the PCB. We will attach a lead for the power, from the buck converter, but we first need to check and adjust to 3.7v is coming out of the buck converter first before you connect the radio's power, as not to damage the radio. I used double sided tape to mount the buck converters. Also make sure you can access these easily to adjust if needed. These trim pots are tiny and easy broken so use caution and the correct trimmer tool.

The rest of the wire connections to the radio are fitted once the FOB is built.

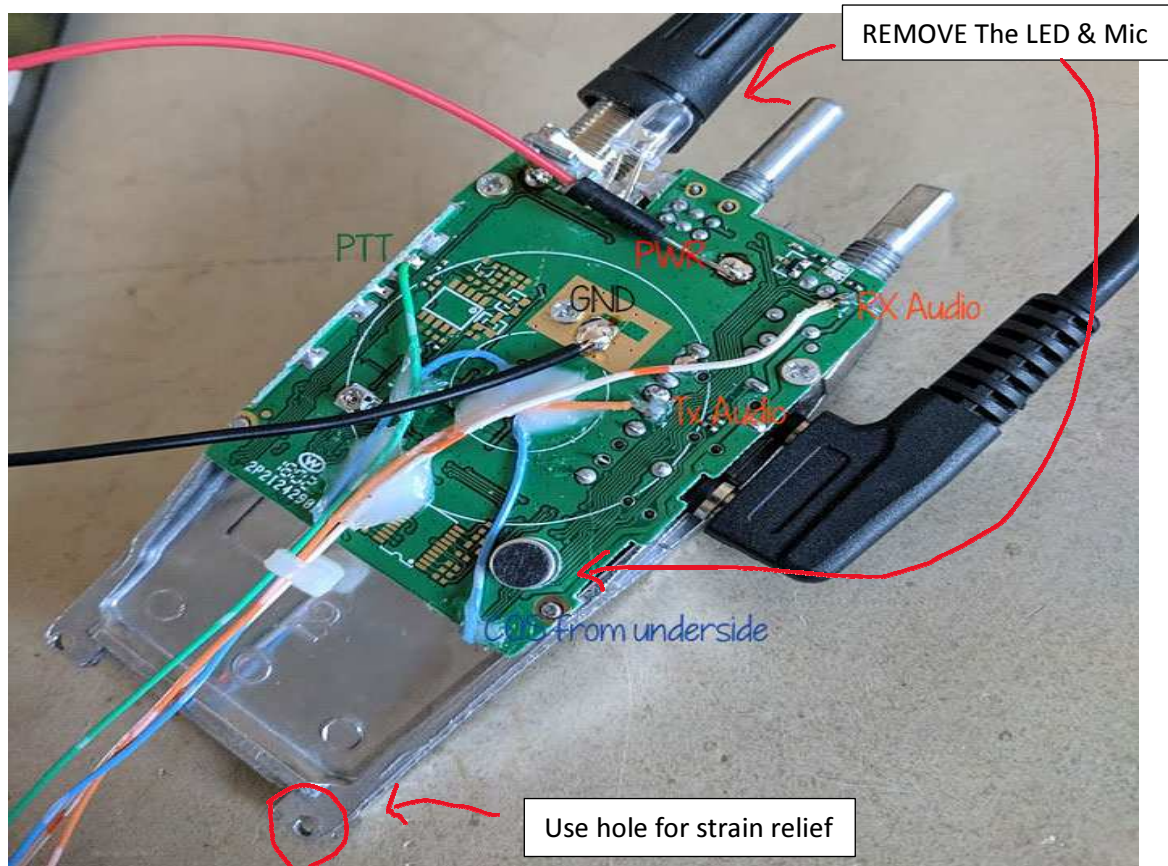


Photo 12.

All connections shown in photo 12 above (Plus the programming lead which you should have programmed before modifying and removed.) except power connections are coming from the FOB

Once the wires are attached, as indicated in the picture for Power, Ground, PTT, TX audio and RX audio. The radio can draw around 1 amp on transmit, so use a heavier gauge hook up wire (20-22 awg) for power and ground.

When done soldering, gather the wires and secure them with a cable tie through the mounting hole on the aluminium body at the bottom of the picture to give some strain relief to the connections. **(Better than glueing...)**

Tip:

Mount the radio into the case, along with the pi, leaving enough room for the USB Fob. The wires are already on the FOB to connect to the radio. The only wire on the radio at this stage should be the COS, pin 1 of IC. (White wire on my build) You also need the wires as short as possible so do not mount the pi too far away from the radio

Leave the wires long for now. You can cut them to size when you attach them to the interface board (described later)

This should now be done ready to hook up to the USB Fob.

Next Step, modify the USB sound card fob.
Close this link and go back to the next step.