

Phil's ECSS Volume Mod Version 1.0 for the ICOM R75

WARNING: Performing this mod will void your warranty and could **destroy** your radio.
WARNING: DO NOT perform this mod without some type of **eye protection**.
CAUTION: This mod takes soldering skill so please practice beforehand.
DISCLAIMER: The author is not responsible for any damage resulting from this mod.

1. Abstract:

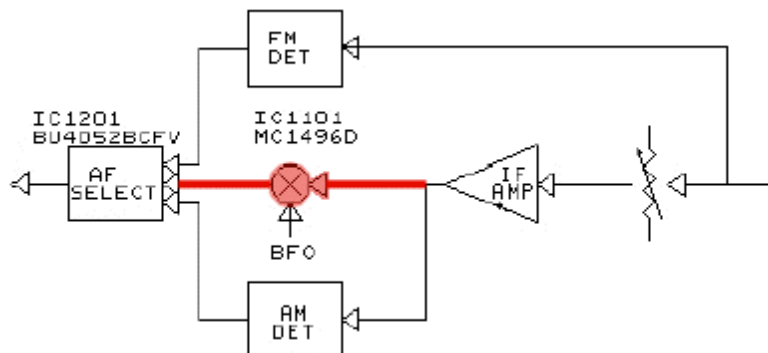
Increase SSB (ECSS) volume by soldering a resistor in parallel with R1102. The value of the added resistor ranges from ~300 ohms (high gain) to ~1300 ohms (low gain). R1102 is the gain resistor on the SSB mixer.

2. Introduction:

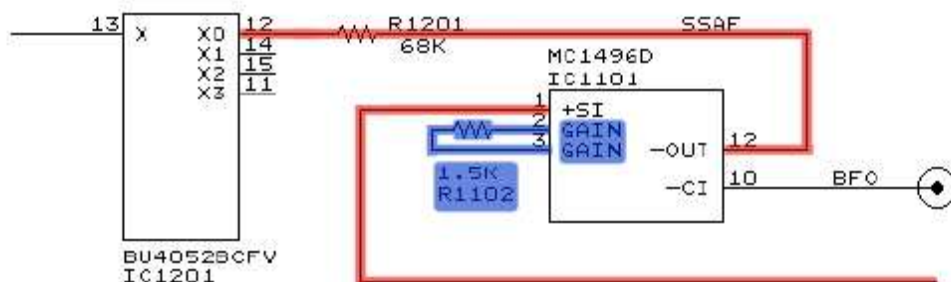
This modification will increase the audio volume of SSB and ECSS (the tuning of AM stations as if they were SSB) reception. The R75's stability and tuning accuracy allows for excellent ECSS reception. ECSS reduces fading, minimizes distortion, and allows selection of the sideband (either LSB or USB) with the least interference.

3. Theory:

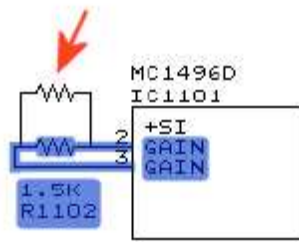
Below is a block diagram of the FM, SSB, and AM lines that enter the audio frequency select chip (IC1201).



Below is a schematic of the red area above: shown in blue is resistor R1102 that limits the gain of the signal coming from the SSB mixer (MC1496). Placing resistance in parallel with the 1.5k-ohm resistor (R1102) lowers total resistance. This lowered total resistance directly increases the SSB mixer's gain.



The schematic below shows (red arrow) how to attach resistance 'in parallel' with R1102.



I believe the volume difference between AM and ECSS exists because of the amplitude modulated signal's effect on the main AGC as well as the fact that the Motorola AM Stereo chip has an onboard AGC circuit capable of ~1200% signal gain. ECSS often necessitates turning the volume up excessively due to the SSB mixer presenting a weak signal to the pre-amplification chip. This mod corrects this problem by directly increasing the SSB mixer gain.

4. Side Effects:

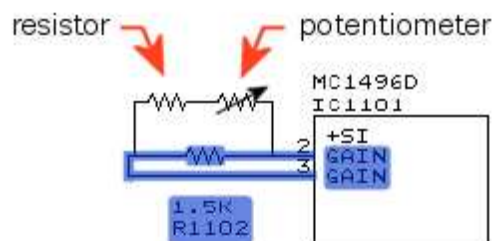
This modification may cause SSB (ECSS) mode volume to be fairly loud with the AGC OFF. This can be adjusted for by reducing the RF gain. Minor VFO adjustments (few Hz) may also be necessary. This mod is easily reversible.

5. Warnings and Preparation:

Please wear eye protection. Before you begin disconnect all cables ESPECIALLY the power supply and avoid static discharge by grounding yourself. Be careful that the soldering iron does not burn any cables!

6. Resistance Options:

Deciding on a resistor value is somewhat of a personal choice. Ken liked a value of 1300 ohms (low gain), whereas I liked a value of 400 ohms (high gain). A good initial value to try is 1000-ohms. One way to make the 'trying' easy is by putting a 300-ohm resistor in series with a 1000-ohm pot (see below). Radio Shack sells a 1k-ohm 15-turn PC-mount trimmer pot (variable resistor #271-342). Connect the center contact and one of the ends in the circuit. Tape the pot behind the display with the screw exposed so that it can be adjusted with the case opened slightly (pictured further down). On my R75 there is only a 1000-ohm pot, as I do not believe shorting pin 2 and 3 will cause any problem other than overload; however, I recommend the more cautious and larger gain range setup mentioned above. **WARNING: Make certain the screwdriver does not fall into the unit while adjusting as this could cause a short.** Every three half turns represent another 100 ohms.



7. Materials:

To perform this modification you will need the following items:

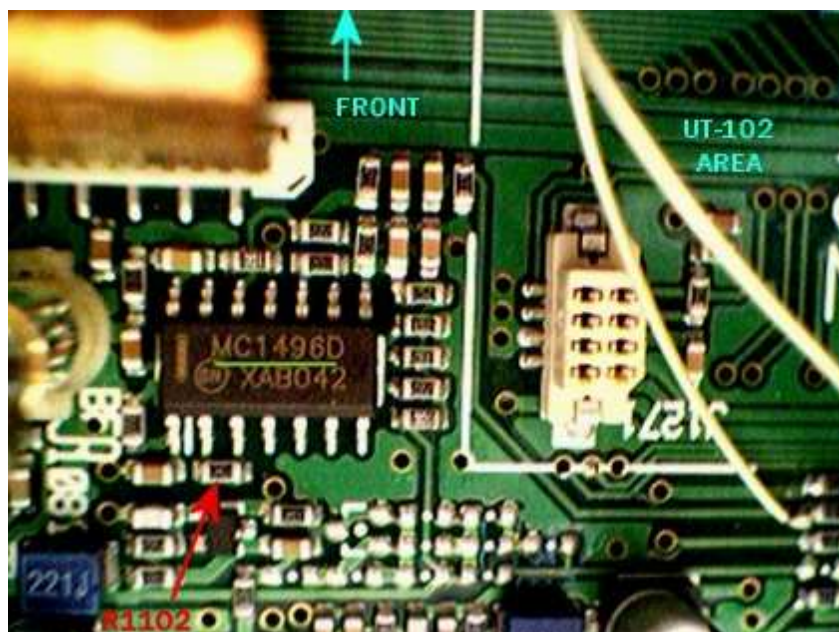
- a resistor
- possibly a potentiometer [recommended] (see 'Resistance Options' above)
- thin insulated wire (ex. wire wrap) and electrical tape
- a low-wattage needle-tipped soldering iron, holder, sponge, and solder
- safety glasses or goggles

8. Methods:

- Take off the top cover by removing eight screws (see user manual for details).
- Locate the general region where R1102 is located from the picture below (red square).



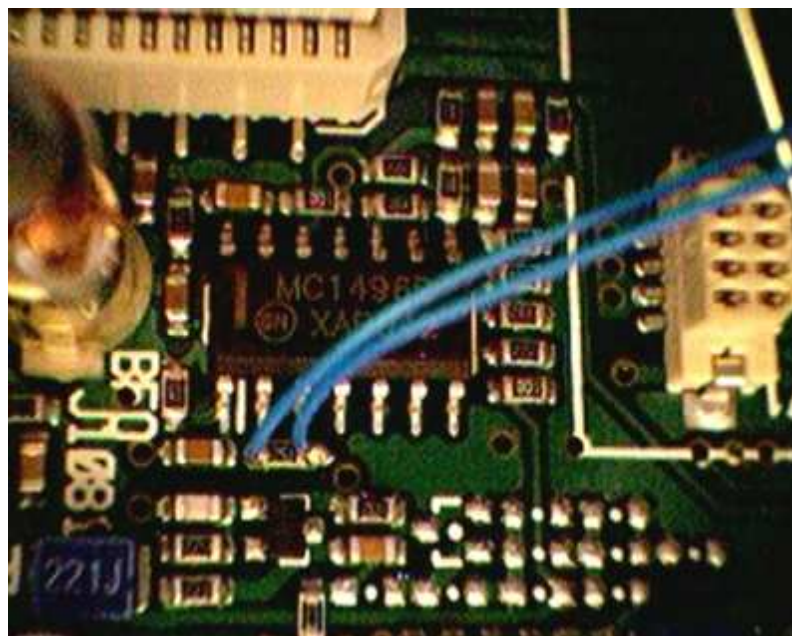
- Locate resistor R1102 (1.5k ohms) as pointed to by the red arrow in the picture below. Using a magnifier you will note the resistor has the marking '152' that stands for 1500 ohms. You can check this via multimeter. Note that pins 2 and 3 of the mixer (MC1496; see green underline) attach directly to R1102 as per the schematic above.



- Clip short the ends of the resistor (and potentiometer if used), solder both ends to some wire, use either heat shrink or electrical tape (or both) to cover all exposed metal, and tape this to the metal wall 'behind' the display area. If a potentiometer is used make sure the screw (yellow arrow below) faces upward to allow for easy adjustment.



- Solder one end of the wire to one side of R1102. Solder the other end of the wire to the other side of R1102. It should look similar to the picture below. Notice the blue wires coming from the added resistance.



- Check visually that no short exists. **DO NOT leave any tools inside the unit!**
- Check everything again, close the unit back up and connect all cables.

10. Surface Mount Soldering Tips:

Here is the technique I used: clip some wire wrap so only 2 mm is exposed, apply solder to the iron, dip the wire into the solder until only very little solder gets on the wire, wipe the excess off the iron, touch the wire to the end of the surface mount component (a resistor here), heat the solder with a needle tip iron for a few seconds until there is adequate flow and you are done. If by not following the above you use too much solder and it flows into another component **DO NOT PANIC**: take desoldering braid, add some solder to it as this will aid flow, put overtop of the mess, heat the solder you added to the braid, and press until you see the mess flow up into the braid. **DO NOT OVERHEAT**: if you are not done any step within a few seconds, stop, wait for everything to cool, and

then go back. Lastly, practice first: please DO NOT make this mod your first attempt at soldering surface mount. I practiced by making ~30 connections on an old cellular phone PCB and I was (at one time) a proficient solderer.

11. Future Improvements:

There probably is a case for making a switch that would add this resistance only during ECSS versus SSB and possibly a case for an externally adjustable pot.

12. Conclusion:

Your R75 will now be louder in SSB mode and during ECSS reception of AM signals. This mod is ideal for those who exclusively use ECSS or who are unwilling to send their unit to Kiwa or who do not wish to do the more intricate modifications necessary to restore the AM synchronous mode. It is also good for DXers chasing weak signals. I hope this mod makes your R75 experience more enjoyable. I can be reached at just_rtfm@yahoo.com with any comments. dr phil :)

13. Credits:

I would like to thank my good friend Ken for being brave enough to be the first to test the various incarnations of this mod: without his help there would be no mod. I also thank Dr. Rado for his guidance. And to the several people whose names cannot be mentioned here (you know who you are)... thanks! Lastly I want to thank the R75 community for being one of the big reasons this receiver is so great!



'You don't know the power of the Dark Side.'

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