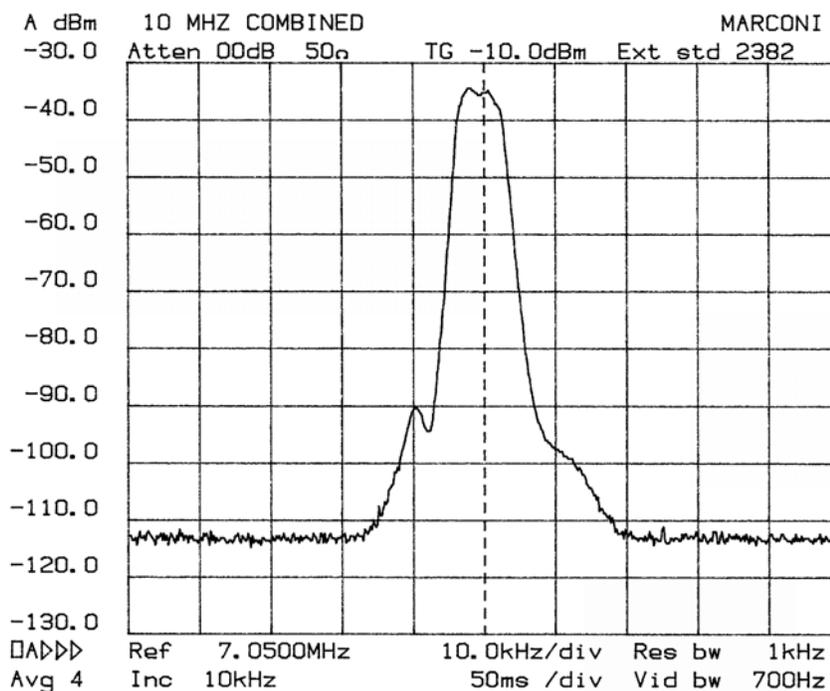


FT-920: Installing the Inrad Roofing Filter Mod

The FT-920 roofing filter mod consists of a 6 pole, 4 to 5 kHz wide filter followed by a high dynamic range feedback amplifier. The amplifier provides enough gain to overcome the filter insertion loss.

The plot below shows the sweep frequency response of the front end with the Inrad roofing filter mod in place. For comparison, the OEM filter is about 20 kHz wide at the -6 dB points.



The result of the bandwidth improvement is the reduction of close in intermodulation from multiple signals. The IMD dynamic range will be improved up to 20 dB for signal spacings from 2 to 20 kHz. Also, the blocking dynamic range will be improved for close in signals.

Frequently Asked Questions

1. What can you expect from this mod?

Less IMD in crowded band conditions, particularly from stations at offset frequencies of 2 to 20 kHz on either side of the operating frequency.

2. Will it defeat the noise blanker?

There will be some change in the NB performance due to the narrower bandwidth of the mod. In practice, it may not be noticeable.

3. Will this mod allow for wide band SSB, AM and FM reception?

The overall widest bandwidth will be determined by the roofing filter, which is about 5 kHz. AM and FM will be degraded, but not excessively. Normal 2400 Hz SSB will not be affected.

Description of Operation

The roofing filter mod inserts a narrow band crystal filter after the first mixer and before the OEM roofing filter. An amplifier is included to compensate for the filter loss. Reducing the bandwidth at this point in the radio helps to keep strong off-frequency signals out of the second mixer, where they can cause intermodulation. Transmission is not changed, as it does not pass through the roofing filter.

Installation Instructions

Warning: Modern radios contain components which may be damaged by static discharge. Precautions must be taken to eliminate any static electricity buildup between the operator and the radio before any of the internal circuits are touched. If you are not familiar with the proper techniques for this, consult the Radio Amateurs Handbook.

Warning: This modification requires a high level of soldering skill, possibly beyond that normally possessed by the average radio amateur. Professional assistance is advised if you are not confident that you have this ability.

Note: If you have a known test signal available before you start, note the S meter reading for the main and sub receivers. After the installation, the S meter should read about the same as before.

Preparing the Inrad Mod for Installation

1. Prepare one side of each coax cable by stripping ½ inch of outer covering and shield from the end. Strip approximately 1/8 inch of insulation from the center conductor.
2. Next, prepare the opposite side of each coax cable to accept a TMP connector by stripping ½ inch of outer covering and shield. Strip approximately 1/4 inch of insulation from the center conductor. Insert the center conductor into the TMP connector center pin and solder it in. Then take the dressed braid and solder it to the connector outer shield. The cables should now be ready for the installation. See Figure 1 for more information on the cable preparation.
3. Set prepared cables aside.

Preparing the Radio for Installation

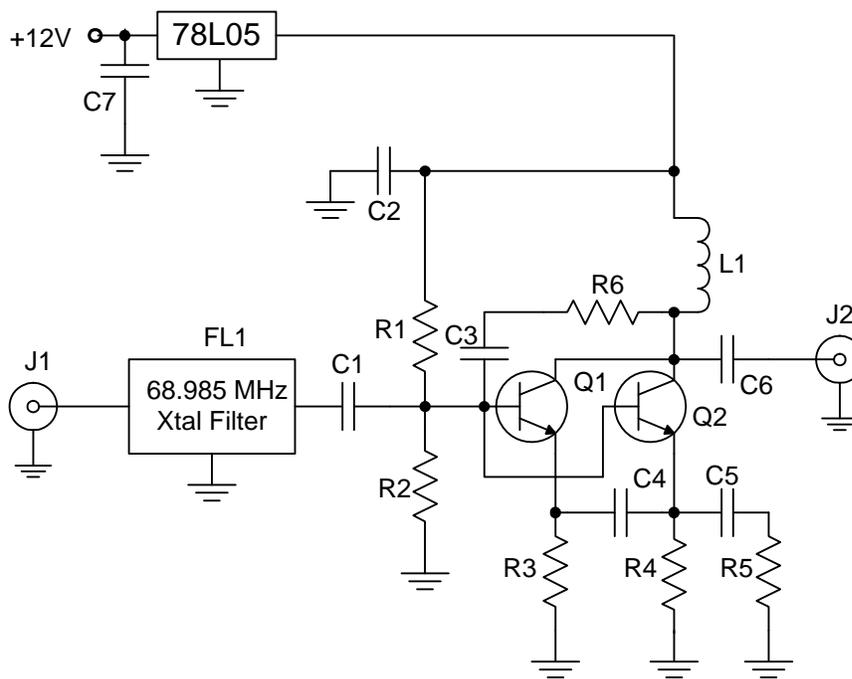
If you haven't already read the instructions completely, please do so now before continuing.

1. Remove the DC power cord from the transceiver.
2. Place the radio upside down on a soft surface such as a towel, with the front panel facing you.
3. Loosen the four screws on the sides of the upper case, but do not remove them.
4. Remove the six screws holding the bottom cover in place. Remove the bottom cover.
5. Turn the radio over and remove 9 screws in the top cover. Remove the top cover.
6. Turn the radio over again so the bottom of the radio is facing up. Locate T1013 and T1014 on the right front side of the main pc board. The modifications will take place on the underside of the pc board in this area.
7. On the large shielded assembly on the front left side, remove three screws: two on the edge of the casting and one inserted through the PC board.
8. Gently lift the assembly to unplug it from its connector. Peel back enough of the two red tapes in the assembly underside to free the wires. Unplug the connector from the assembly and leave the wires

going to the main board. Use care as the wires are fragile. Set the assembly aside on a soft surface next to the casting.

9. Remove the twelve screws holding the main board to the casting. Detach the four white strip wire harnesses from the main board. Note the location and orientation of each strip.
10. Raise the front edge of the PC board and move the cable in the right front corner to the right. Slide the board toward the front panel and lift the front edge up and over the casting until the connectors on the rear edge are clear of the casting holes. Place a towel on the front panel upper edge to protect it. When the board is free, raise it to the vertical position and rotate it 90 degrees counterclockwise.
11. Lay the board and assembly on the towel on top of the radio casting.
12. Locate the work area between T1013 and T1014 on the trace side of the board. Compare it to Figure 2. Note that each transformer has 5 terminals, a group of 3 and a group of 2. T1013 and T1014 have the 2 terminal groups facing each other with C1111 making a connection between them. Remove C1111. Use a soldering iron tip which is wide enough to unsolder both sides of the capacitor together. A toothpick can be used to slide the capacitor off of its pads.
13. Examine Figure 3. Dress the coax cables up and to the center of the pc board. Connect the coax cable center conductors to the pads left open by C1111. The pad connecting to T1013 will go to J1 on the Inrad mod. The pad connecting to T1014 will go to J2 on the Inrad mod. Ground the shields to the nearest ground pad.
14. Check that the soldering is secure before turning the board over.
15. Reverse the removal procedure to reinstall the PC board and shielded assembly. Use care to align the assembly pins with their sockets before applying any pressure.
16. Set the radio on its left side with the panel facing left. The Roofing Filter mod board will mount on the right side of the casting which is now facing up.
17. Prepare the mod board by soldering the red wire to the +12V pad. Ground will return through the coax shields.
18. Press the standoffs into the mod board holes from the bottom side.
19. Remove the safety papers from the sticky ends of the standoffs and press the mod board assembly onto the top of the radio casting as shown in Figure 4.

20. Connect the red wire to the right end of R1305. It is a small power resistor near the center rear of the radio. See Figure 5. Note: If the Inrad Switchboard Mod is installed, the red wire can go directly to the red +12V terminal on that unit.
21. Plug the two coax cables into J1 and J2 on the mod board. Note the proper connections as pointed out in Step 13.
22. Turn the radio upside down. Dress the coaxes and red wire through the opening in the casting near the front panel on the right side of the radio as it lies up side down and through the opening in the front center.
23. Fasten the new wires in place with tie wraps.
24. Turn the radio over. Replace the top cover. It is best to leave the top cover screws loose. **Note:** Use extreme care to avoid damage to the mod board.
25. Turn the radio upside down. Attach the bottom cover with the 5 black screws. Use care to route the new wires so they are not pinched by the cover.
26. Finish tightening all screws.



C1,2,3,4,5,6	0.1uF
C7	0.47uF
L1	2.2uH
R1	3.9K
R2	2.2K
R3,4	68
R5	12
R6	220
Q1,2	MPS5179

FT 920 Roofing Filter Mod

W2VJN 3/22/08

Parts List

- Assembled Inrad 117 board
- 2 RG-178 coax cables, 32" each
- 2 male TMP connectors
- Red and black wire-18" each, #26
- 2 stick-on standoffs
- 2 tie wraps

Figure 1. Preparation of coax cable.

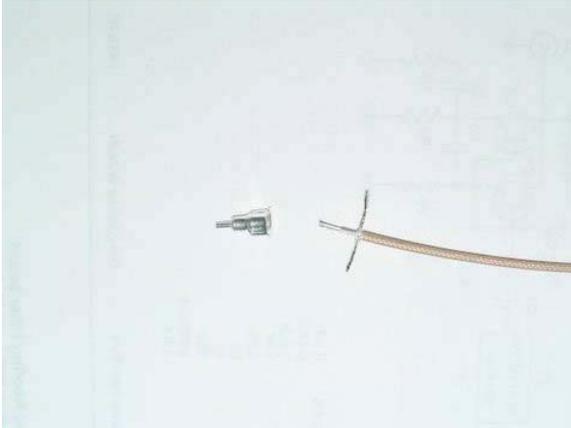


Figure 2. Area for modification. Bottom of pc board.

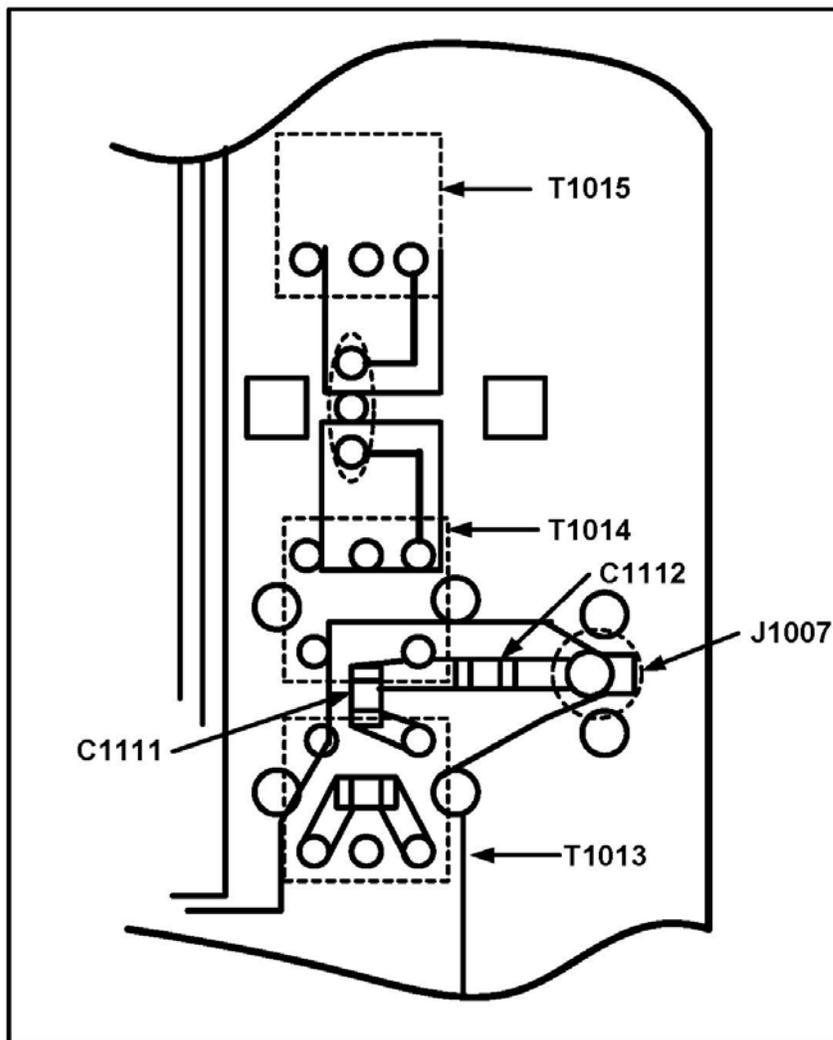


Figure 3. View of the board modification.

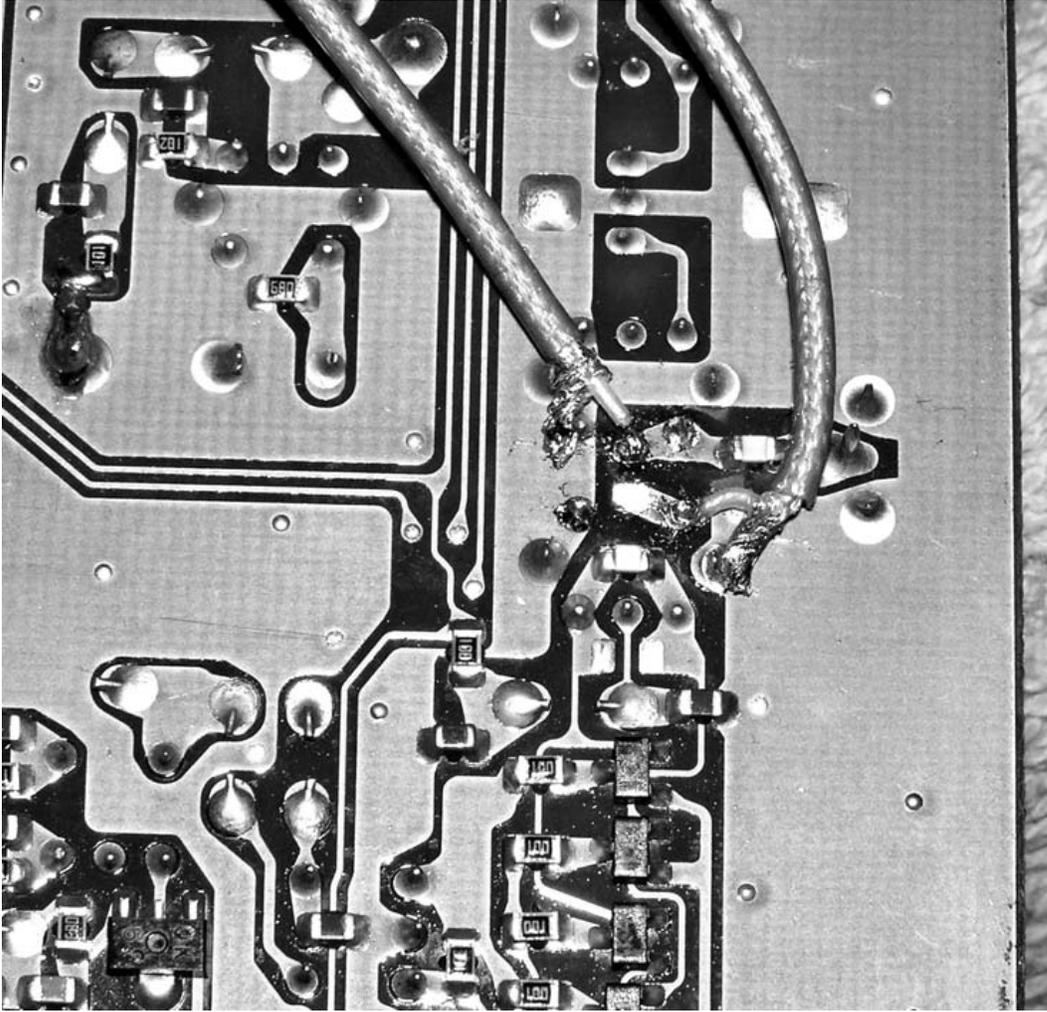


Figure 4. Mounting the modification board.



Figure 5. +12V connection point.

Connect red +12V wire here.

