

Modifying the PRC174 to operate on 160m

To modify the PRC174 to transmit on 160m involves 3 small changes. Total part count is 3 components a small signal transistor, a resistor and a capacitor.

The normally 174 will not allow transmission below 2MHz. To get around this the blocking control signal eliminated by cutting a lead on a diode on the mother board. The designers allowed reception below 2 MHz and to alleviate attenuation from the band pass filtering they had the set switch in two band pass filters below 2MHz; the 2 to 3 and the 3 to 5.

Rather than change the original logic module an easier option is to add components to prevent the second filter being switched on. This is a transistor and resistor that switches FL2 off when FL1 is on.

Lastly the filter FL1 MAY/SHOULD be modified.

The first two changes; clipping the diode and the transistor are essential. Modification of the filter should be done but the extent of the changes is up to the owner. I have modified mine giving low pass below 3MHz and a notch at 3.7 to suppress 160m harmonics. I do not have strong broadcast band transmissions nearby, others may have a problem and will want to try a band pass modification.

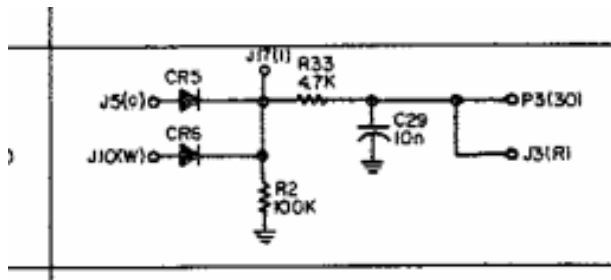
You should a copy of both the Maintenance manual and the IPB before trying this mod.

MODIFICATION PROCEDURE

Step 1.

The LORD generates a signal F0 when frequencies below 2MHz are selected. The F0 and the synthesiser unlock signal are diode ORed together to form the un-imaginatively named signal F0, UNLOCK. The CONT unit prevents transmission when this is asserted.

The F0 part is blocked by clipping ONE lead of diode CR5 (labeled CR5 on the circuit diagram and D5 on the mother board PCB). Diode D5 is connected to pin little o, the last pin on the LORD connector. Only clip one lead and put some insulation tape around it (this makes it easier to reverse the mod)



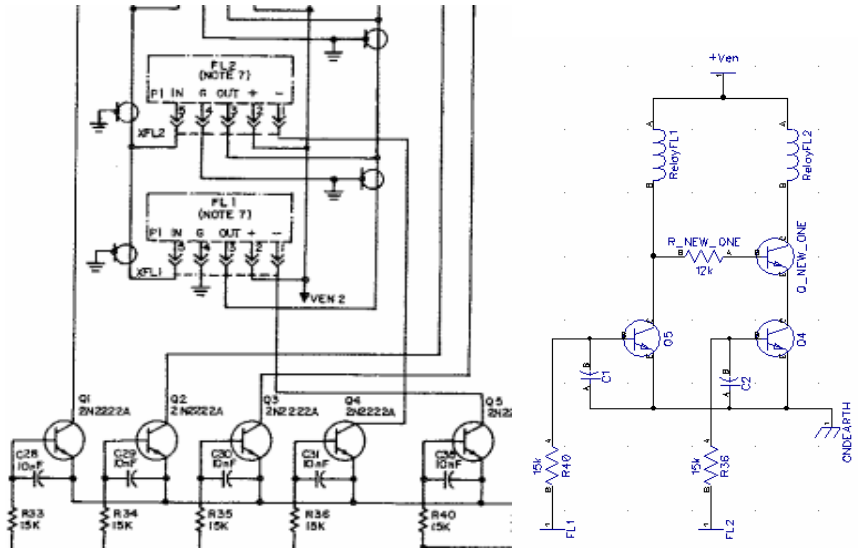
Testing step 1

The radio will not generate error beeps when frequencies below 2MHz are selected.

Transmission is possible. Depending on test equipment available measurements of the harmonics with a receiver with it own antenna will be useful. Transmit on AM at 1.8MHz, measure signal strength at 3.6MHZ.

Step 2

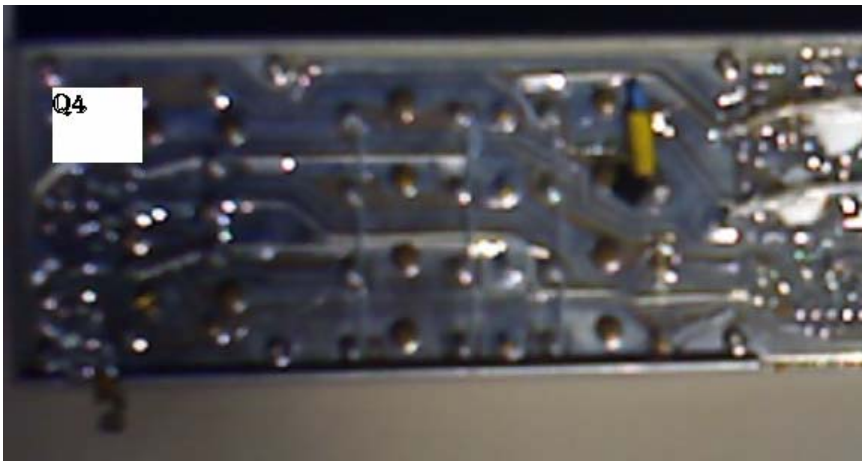
Adding a transistor to prevent FL2 from being turned on when FL1 is on.



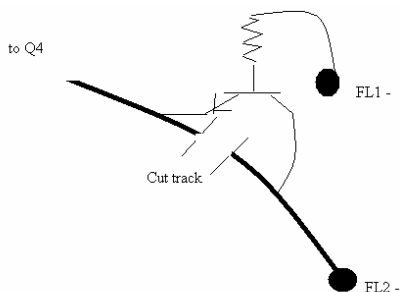
Original and modified circuit.

If FL1 is off then the collector of Q5 is high and a current can flow through R_{NEW_ONE} which switches Q_{NEW_ONE} on, enabling FL2.

If FL1 is on then the collector is low and Q_{NEW_ONE} is not on and FL2 cannot activate



A really blurry picture of the filter section of the SNF module. The transistor is the black blob below the yellow band. The track from Q4 to the FL2 - terminal is cut. Across this cut put the new transistor, collector to the + terminal, emitter toward Q4, base connected to the new 12k resistor. The other side of the resistor soldered to the track going to FL1 - terminal.



Step 3

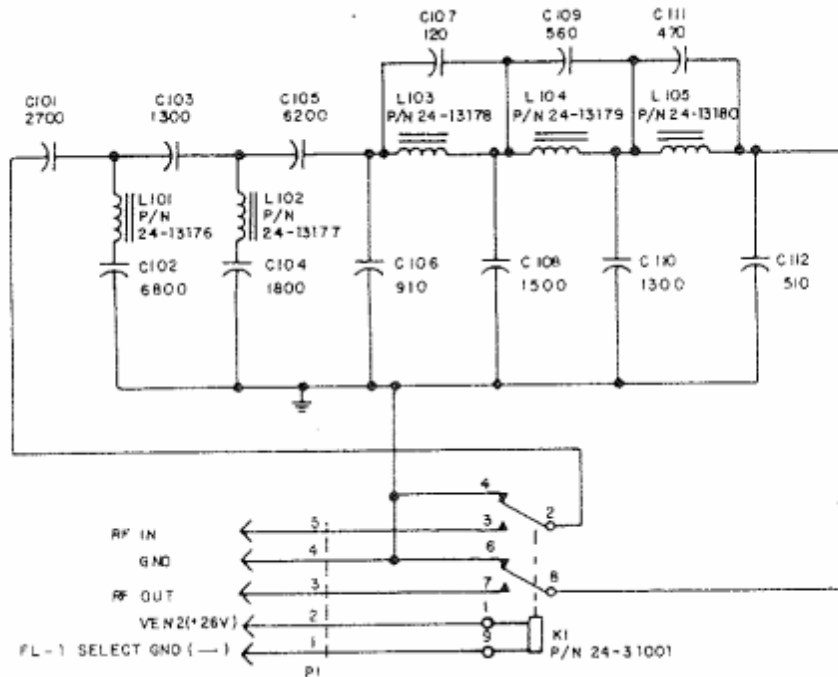
Modifying the filter.

The filter is a low pass filter and two notches (1 MHz C102, L101 and 1.4 MHz C104, L102) to provide the low frequency attenuation.

This filter can be removed from the SNF board by undoing its two screws and sliding it out. It is a tight fit, start it moving by pushing the part unthreaded screws.

On the following page is some frequency response curves for the original filter and two modifications. C104 needs to be replaced with a 300pF capacitor, the track to L101 cut and C103 shorted.

Changing C104 moves its notch from 1.4MHz to 3.7MHz. It now attenuates 160m harmonics. Note using the listed values the notch frequency is 1.4MHz, it was measured at 1.5MHz. To notch at 3.7MHz a new value of 264pF was calculated, using the spectrum analyser the value was found to be too low. Guided by the spectrum analyser a value of 300pF was chosen. YOUR filter may be different to mine, check the filter response or harmonic output.



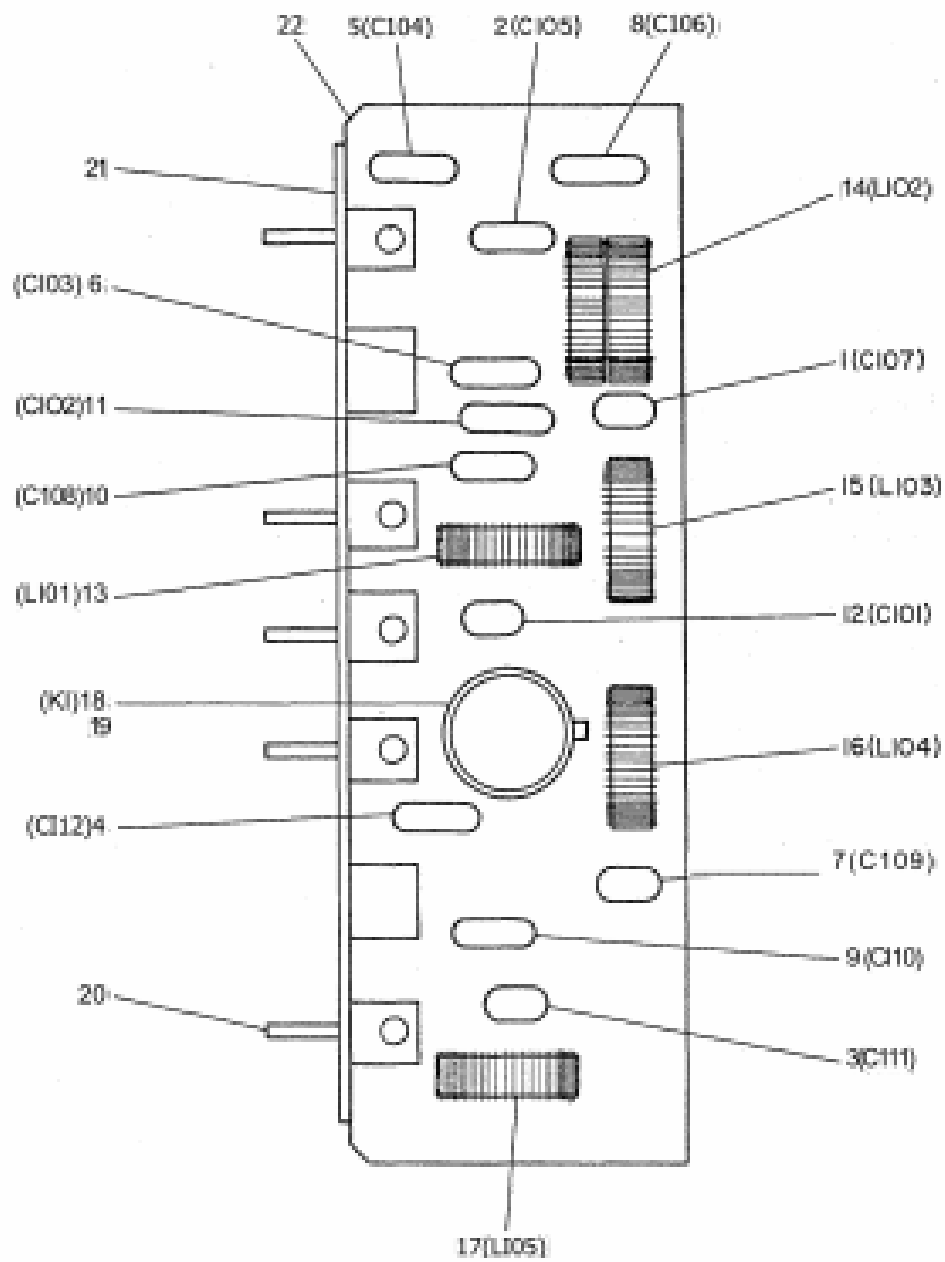
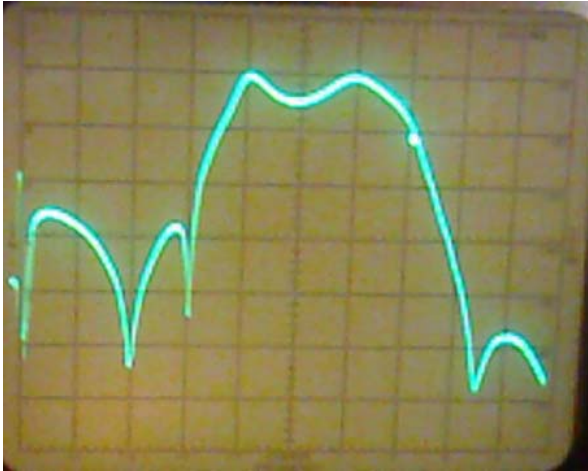
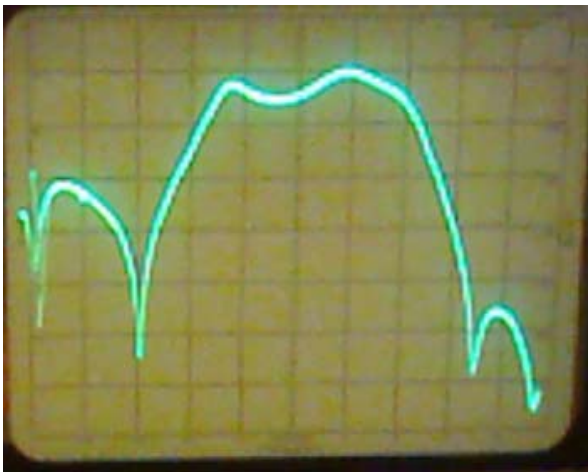


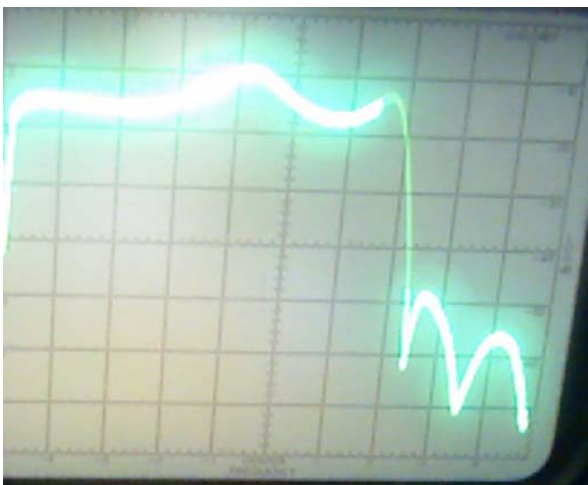
Figure 32. PC Board Assembly, 1A5A3A1 (FLU)



Un-modified filter FL1. 0 to 5MHz, 0.5MHz per division. Vertical 10 dB per division, 0 dB one division down.
Can see two notches at 1 and 1.5MHz, Calculated at 1 and 1.4. Filter has peaks at 2 and 3MHz with a -6dB dip in the middle of the passband.



Initial modification. Remove the 1.5MHz notch.
This moved the 2MHz peak down to 1.8, this is good. Unfortunately the attenuation at 3.6MHz is only around 10dB, poor harmonic suppression when transmitting at 160m.



Next and (so far) final modification.
Remove the 1MHz notch and move the 1.5 MHz notch to 3.7MHz. (change C104 1800pF to 300pF)

Summary:

This mod is fairly easy to do and give the 174 access to one more amateur band. The logic part of the modification is the most simple and effective changes possible.

Modifications to the filter can be improved. Strong broadcast stations may require a band pass filter rather than the low pass presented here. A complete redesign and replacement may give less ripple between 2 and 3MHz, it is not an issue to me.

The tuner takes a while to find a match using an 80m dipole and sometime decides to retune (full cycle) next transmission. Using the FO signal on the LORD to introduce additional reactance may help the tuning.