

NorCal 2N2/XX VFO Parts Retrofit Addendum V1.0

This addendum fixes the drift issues reported with NorCal 2N2/XX kits built using original "as received" parts. Kits shipped after December 12, 2008 will contain retrofit parts as well as "original parts" which should not be installed.

These parts are supplied to remedy drift problems:

- 1 T50-7 (white) toroid; this toroid replaces the original toroid used at L13, which was defective.
- 1 5-60 pF NPO orange trimmer capacitor; this trimmer replaces the original brown trimmer used at TC6, which was not an NPO type.
- 1 100 pF NPO disc ceramic capacitor, this capacitor replaces the original polystyrene capacitor used at location C66.
- 1 180 or 270 pF NPO disc ceramic capacitor; this capacitor replaces the original disc ceramic capacitor used at location C65. A 180 pF capacitor is used on 20 and 30-meters, a 270 pF capacitor used on 40-meters.
- 2 #8 nylon shouldered washers; these washers replace the original #6 shouldered washers, which were the incorrect size to hold the L13 inductor properly and not the correct nylon material.
- 1 4-40 X 1 inch nylon screw; this screw replaces the original screw which was not the correct nylon material.

Using the right tools

The most difficult part of doing the VFO retrofit is removing the old parts and cleaning out their PCB holes so that the new parts can be installed. It is very important to remember that the goal is to get the parts out without damaging the PCB, not the saving of the part itself. The removed parts will not be used again in this retrofit; they are throw-a-ways! It is suggested that three tools be obtained before starting the removal of any parts.

The first tool is a sharp, long tapered scratch awl, as shown in the photograph.

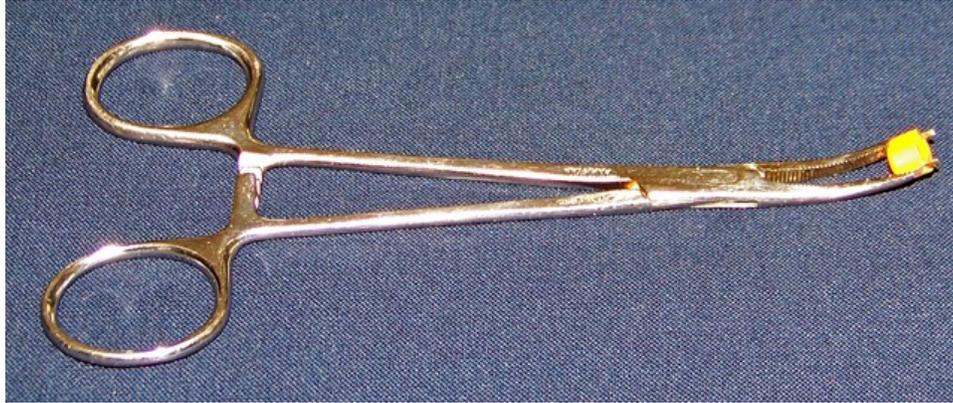


- Figure 1 -

This tool is available at most hardware stores. One can use this tool to lift component, such as trimmer capacitor seated tightly on the top side of the PCB, as its pin is being headed on the bottom

side of the PCB with a soldering iron. As a component pin is heated, this awl is pushed under the edge near the pin and the component gently lifted away from the PCB surface.

Another tool that is very handy for parts removal is a medium size hemostat, as shown in the next photo holding a trimmer capacitor like that used at TC6.



- Figure 2 -

This tool can be used to grab on to parts to be removed, allowing one to "roll" the part out of the PCB as each lead is heated from the bottom side of the board. It often damages the part due to the serrated jaws, but is the part removal tool of choice if the part doesn't need to be reused. It is available from most on-line tool supply outlets for a few dollars.

A third very useful tool is a spring powered solder sucker, as shown in the next photograph.



- Figure 3 -

This tool is available from many of the on-line soldering supply outlets for about \$10. The current model of the one shown is made by Edsyn Mfg. and sold as part number SS750LS. Using this "solder sucker", one can remove the solder from plated through hole pads, after a part has been removed, with minimum risk of damage to the PCB.

Suggested sequence of parts removal

- [] Remove the old L13 inductor by unsoldering its leads one at a time. After the part has been removed, add some solder each pad on the underside of the PCB, then using a solder sucker, reheat the pad and suck out the solder from each pad and through hole.
- [] **Of the old parts to be removed, the trimmer at TC6 is the most difficult. It must be done carefully, or the pads where it mounts will be damaged, making the installation of the new trimmer very difficult.** Before removing TC6, cut the pins off on the underside of the PCB to make them as short as possible. Remove TC6 by heating the pin closest to L13 and gently

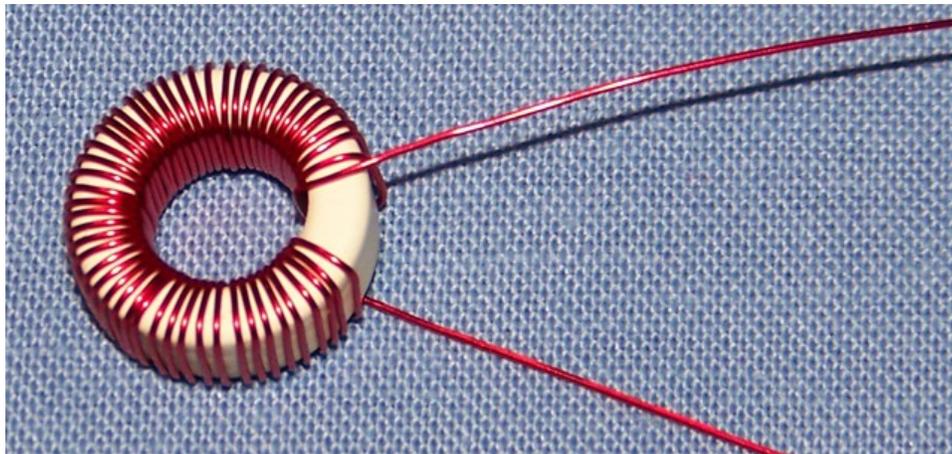
lifting that end of the trimmer with the scratch awl by pushing it under the edge near the heated pin. Heat the other pin and push the awl farther under the trimmer body. Repeat these two operations until the trimmer is free on both ends. Or, using a hemostat, clamp on to the trimmer body, heat the pin closest to L13, and roll the trimmer so that pin is clear of the PCB. Heat the other pin and gently lift the trimmer off the board. Once the trimmer is removed, add some solder to each pad on the underside of the PCB, then using a solder sucker, reheat the pad and suck out the solder from each pad and through hole.

- [] Remove ceramic capacitor C65 by heating one pad and pushing the capacitor as far as it will go toward the still soldered side. The heated lead should be clear of the pad at this point. Heat the opposite pad and gently pull the other capacitor lead out of its hole. Holding the capacitor with hemostats often works well and keeps one's fingers from getting burned. With the capacitor removed, add some solder to each pad on the underside of the PCB, then using a solder sucker, reheat the pad and suck out the solder from each pad and through hole.
- [] Following the above procedure, remove polystyrene capacitor C66.

With these parts removed, clean the top side and bottom side of the PCB where these parts were with lacquer thinner, grain alcohol, or rubbing alcohol to remove old solder flux.

Suggested sequence of parts installation

- [] Install the new TC6 trimmer. It is orange in color. The rounded end is the grounded end and should point away from L13.
- [] Using the replacement T50-7 toroid (white color) wind and install inductor L13. This inductor should be wound so that the turns are tight to the core both on the inside and outside as shown in the next photograph.



- Figure 4 -

To accomplish winding a toroid this way, a tool (a #2 plastic crochet hook) can be used to back the wire through the center of the core, then pulled over the top and downward. The tool is used to reach through the center of the core to grab the wire and pull it through again. With a bit of practice, it becomes very natural and allows toroids to be wound with tight windings so that they don't slip around, especially important for inductors being used in VFO service.

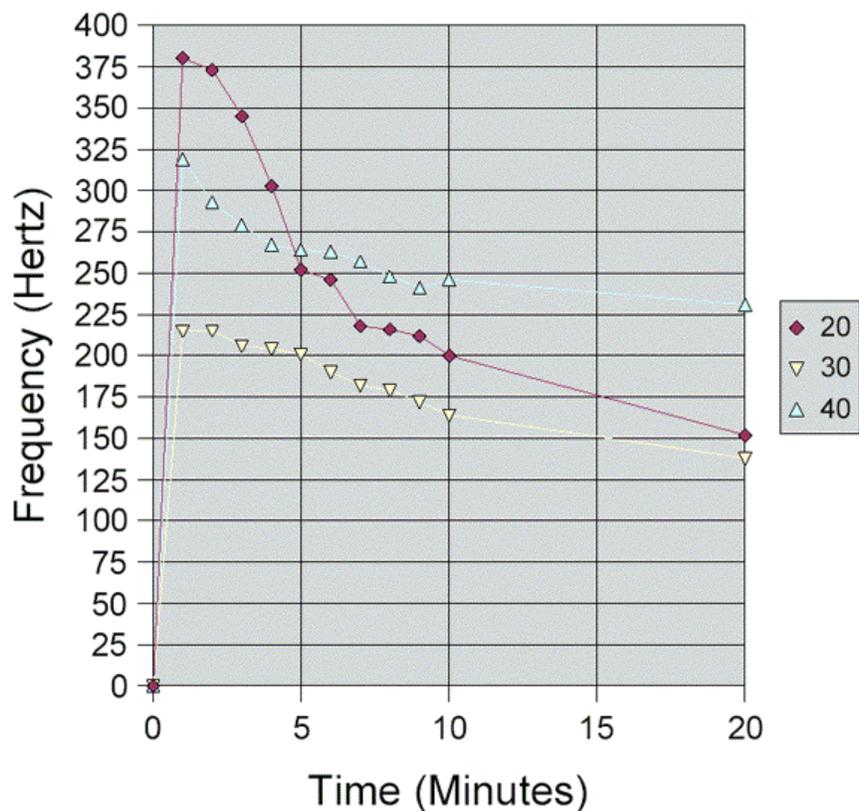
The inductor is installed using the pair of #8 shouldered washers supplied (on opposite sides of the core) and the new 4-40 X 1 inch nylon screw. The old nylon nut should be reused. Tighten the nut finger tight, just enough to hold the L13 toroid from moving around easily.

- [] Install a 180 pF NPO disc ceramic capacitor (270 pF NPO disc ceramic for 40-meter rigs) at location C65.
- [] Install a 100 pF NPO disc ceramic capacitor at C66.

That's it! With the new parts installed, the rig should be warmed up and the upper and lower VFO frequencies set. As a reminder, TC6 is used to set the upper frequency, and R78 for the lower frequency. The adjustment procedure is detailed in the 2N2/XX Assembly Manual.

Typical drift with these new parts should be no more than 500 Hz, and typically, around 250 Hz after 10-minutes from a cold start as shown in the next photograph.

2N2/XX VFO Drift at Startup



- Figure 5 -