Adding the Cumbria Designs X-Lock 2 to the Ten Tec Corsair I

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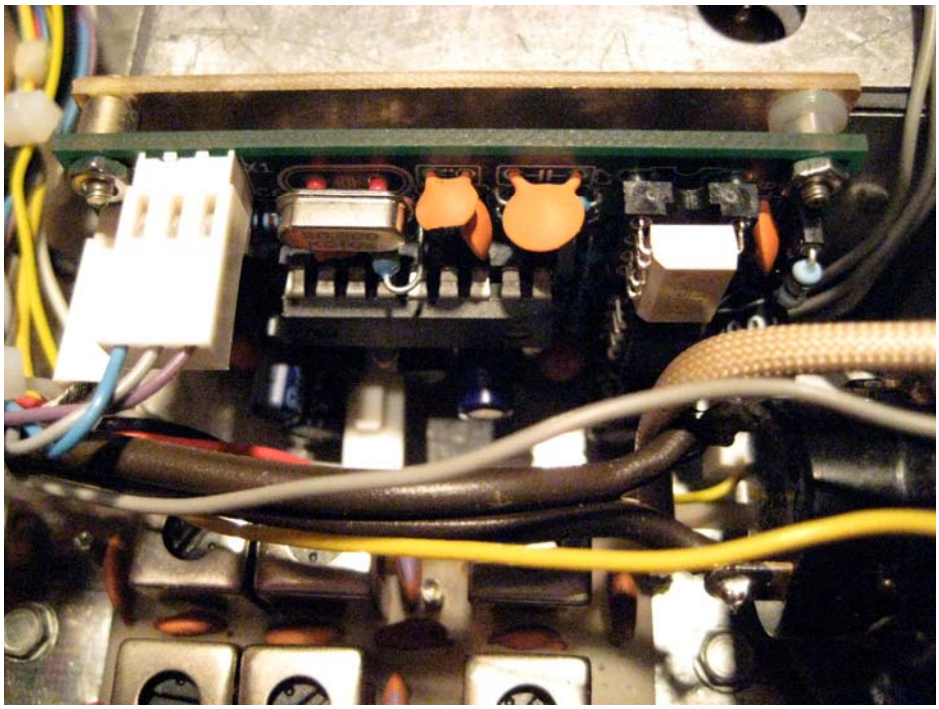
Early in 2011, I couldn't resist purchasing a Ten Tec Corsair I. The unit was in medium condition to which I added the optional 500 Hz CW Filter. The radio performs very nicely save for one annoying problem – it drifts. But it does have an unusual drift characteristic. From a cold start it will drift upward about 500 Hz over a two-hour period and then it would settle down and stay put. Such a long warm up period obviously was a problem especially if you turned on the radio and just wanted to make a few short contacts. The other option was to keep the radio on at all times. After a few weeks of this problem I looked for some way to stabilize the PTO.

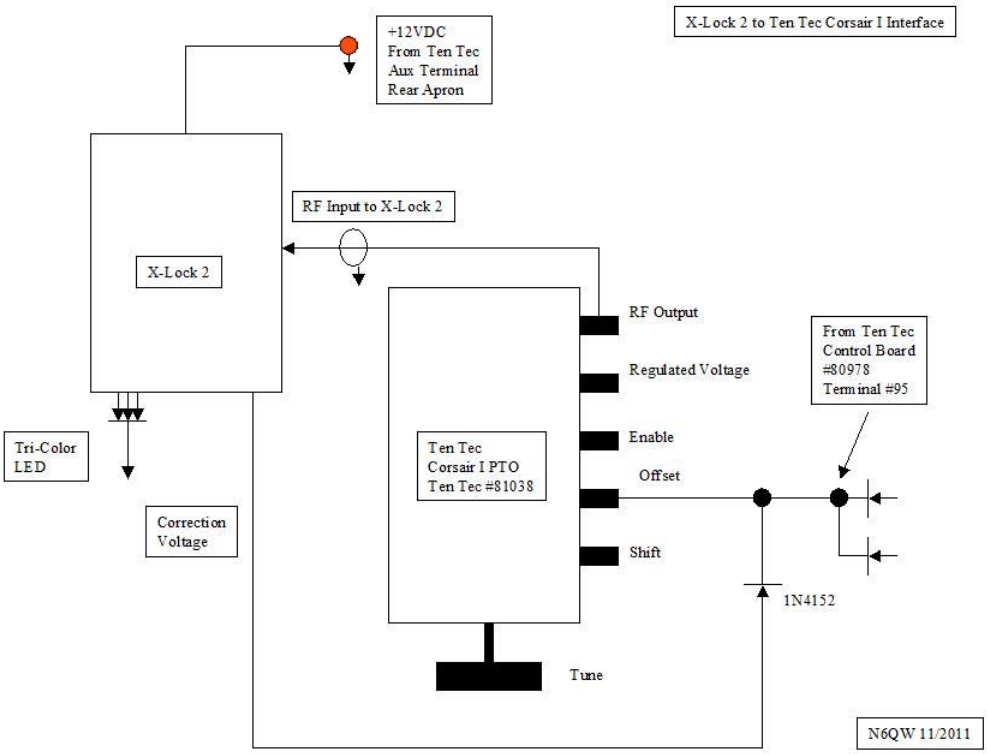
I am no stranger to huff and puff circuits, in fact I have built about a dozen or so especially the one shown on EI9GQ's website, (Ed Skelton). But that circuit employed it's own display and I wanted to use the factory display. I next looked to purchasing a commercial unit from Ron Taylor, G4GXO known as the X-Lock 2. After reading some of the user inputs on Ron Taylor's website (Cumbria Designs) I was convinced this was the solution. It was indeed.

The X-Lock 2 is a high quality kit and I can't say enough about the instruction manual. It is simply superb! Ron Taylor has created a very nice kit that is a solution to the older non-DDS type Variable Frequency Oscillators. As luck would have it there is a small space right next to the Ten Tec Corsair I PTO and it tucks into that space very nicely. So connections to the Corsair are easily accomplished. See Below.



A couple of build notes:

1) I used four small glass beads that are used in beaded jewelry making to elevate the crystal from the circuit board. Two beads are stacked and slipped over the leads of the crystal to elevate the crystal above the board so it will not be damaged by heat during the soldering process. Taylor recommends two millimeters (mm) above the circuit board. Yes you guessed it –two beads stacked on top of each other, were two mm high. The inside diameter of the beads is a really good fit for the wire crystal leads. See the red beads on the photo above.
2) For the tri-color LED I solder a plug on the end to match the header on the PC Board. This arrangement facilitates the initial testing so the LED and circuit board are a singular assembly. I then made up an extension cable so the LED then can plug into that cable, which is now plugged into the circuit board and routed outside the radio through one of the bottom access holes. Since the wiring to the LED at the extension socket is exposed I put a piece of heat shrink tubing over the end to cover the exposed wire. But I did not shrink the tubing. Instead I simply taped the assembly to the bottom of the radio case and the LED sticks out just a bit from the bottom of the front panel. No holes and all can be easily removed.
3) Interface to the Corsair I takes one signal diode, a 1N4152 connected to the X-Lock output on the Anode side and to the Offset terminal on the Cathode side. The PTO on the Corsair I has the following 5 terminals along the housing side: 1) RF Out, 2) Regulated Voltage In, 3) Enable (connected to the back connector and supplies a regulated voltage), 4) Offset and 5) Shift. In the case of Offset and Shift, these terminals have the following connections inside the PTO: 10NF to ground, a 100K resistor connected to a varicap Finally to either a 10PF (Offset) connected to the PTO tank circuit or an 18PF (Shift) connected to the PTO tank. The Offset is the port that will be used with the X-Lock. The source voltage from the Offset control located on the Control Board is already isolated with 1N4148 diodes. So there should be no worry about back feeding voltage in to the Offset circuitry. The 1N4152 mentioned earlier serves the same purpose so that the Offset voltage is not fed into the X-Lock. See the diagram below.
4) A piece of double-sided copper PC Board was cut to the same size as the X-Lock Board and holes were drilled in each corner that match the mounting holes in the X-Lock 2 Board. The copper PC Board was fitted to the X-Lock board using 3/16-inch plastic spacers and 2-56 nuts and bolts. The PC board prevents anything for shorting to the underside of the X-Lock 2 Board and serves another purpose. The bottom side of the copper PC board was fitted with a piece of double back tape and the assembly was moved into position near the left side of the PTO box (bottom side up and the panel facing you). The assembly was simply “glued” to the PTO using the double back tape. It is a convenient and protected location for the X-Lock board.
5) Cable ties were used to collect and route the X-Lock wiring to the various connection points on the bottom side of the Corsair chassis.
6) The Normal Offset Min and Max Ranges have been somewhat reduced a result of the steady state correction voltage being supplied by the X-Lock 2 but this is considered a small nit given the dramatic improvement in frequency stability.


X-Lock 2 to Ten Tec Corsair I Interface
+12VDC
From Ten Tec
Aux Terminal
Rear Apron
RF Input to X-Lock 2
X-Lock 2
RF Output
Regulated Voltage
From Ten Tec
Control Board
#80978
Terminal #95
Tri-Color
LED
Ten Tec
Corsair I PTO
Ten Tec #81038
Enable
Offset
Correction
Voltage
Shift
1N4152
Tune
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