

Installing the X-Lock-3 in the Drake TR-7

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I have had excellent success in the use of the Cumbria Designs X-Lock products. The first installation was in a Ten Tec Corsair I which employed the X-Lock-2 and that was done in late 2011. I have since sold the Corsair and the next candidate was a Drake TR-7 where I simply moved the X-Lock-2 from the Corsair to the TR-7. That second install too was successful. The Cumbria Designs website featured an X-Lock-2 installation in TR-7, which was done by Ron, WD8SBB. In addition I also found an Internet reference to a similar X-Lock-2 installation by Marinos, SV9RDU. So between the two articles much of the ground had been plowed. I used the SV9RDU interface design from the X-Lock to the TR-7, which differs slightly from that of WD8SBB.

I was so pleased with the TR-7/X-Lock-2 combination that I purchased another TR-7 and the newest version, the X-Lock-3. The purpose of this short paper is to describe what is needed to install the X-Lock-3 in the TR-7. There is a physical difference in the size of the PC Boards which requires adapting the X-Lock-3 boards so that two convenient mounting holes on the underside of the TR-7 chassis can be used to anchor the PC-Board.

As luck would have it, the mounting holes in the X-Lock-2 board have the same exact spacing as the two screws which anchor the TR-7 Motherboard to the daughter board cage assembly. In the first TR-7 install I simply found longer 4-40 screws and used a 6-32 nut as a spacer and called it installed. Mario used a similar approach and modified some ring type crimp on connectors, which were bent at a right angle. The ring part is screwed down on the board using the original 4-40 screws and the vertical portions are fitted into two of the four mounting hole and soldered in place. Ron mounted his board in another location.

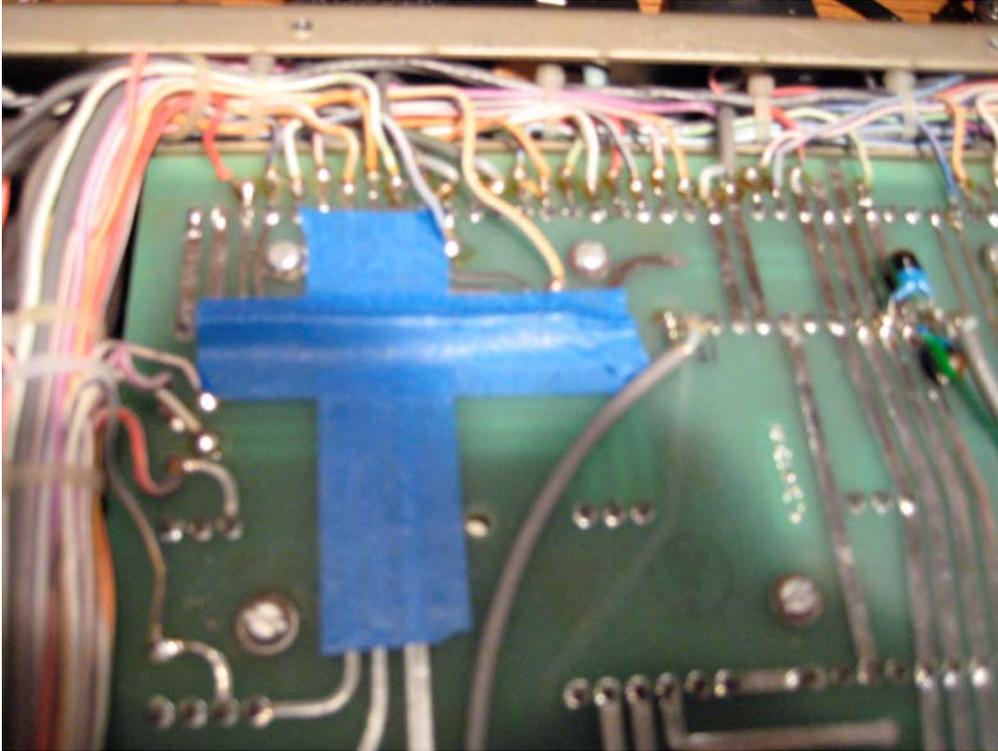
But alas the holes in the X-Lock-3 do not align with the mounting holes in the Motherboard. So at first I thought I would need to use the SV9RDU approach. However in my approach I used #4 solder lugs, which were bent in a "Z" shape so that the large hole is fastened to the chassis using the original 4-40 screws. By using ¼ inch long 2-56 bolts and nuts passed through the smaller hole this arrangement now attaches the PC Board to the TR-7. I was very pleased that it resulted in a very solid mechanical

installation. For the tri-color LED I reversed the color so that RED is lock, versus the Green, and installed the LED in the holder where it normally would have the “Fixed light”. I installed a 3-pin header on the end of the cable that connects with the LED and installed a 3-pin plug on the LED. This is so if I have to make any adjustments to the X-Lock-3 I can simply unplug it from the end of the cable and plug it into the circuit board.

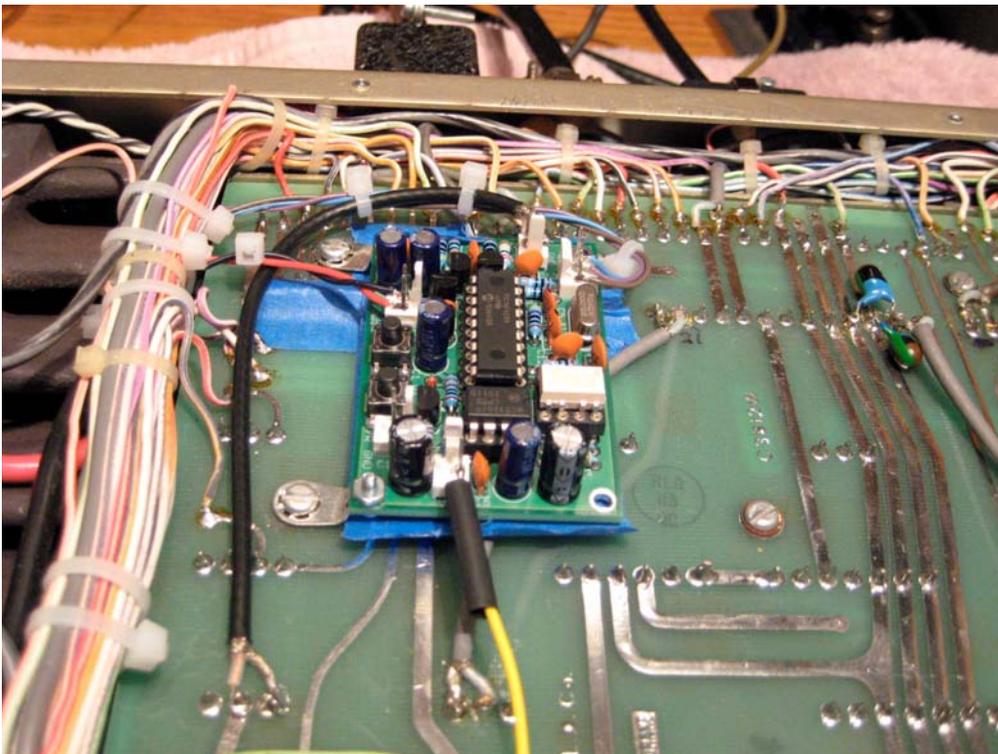
Shown below are the details of the installation.

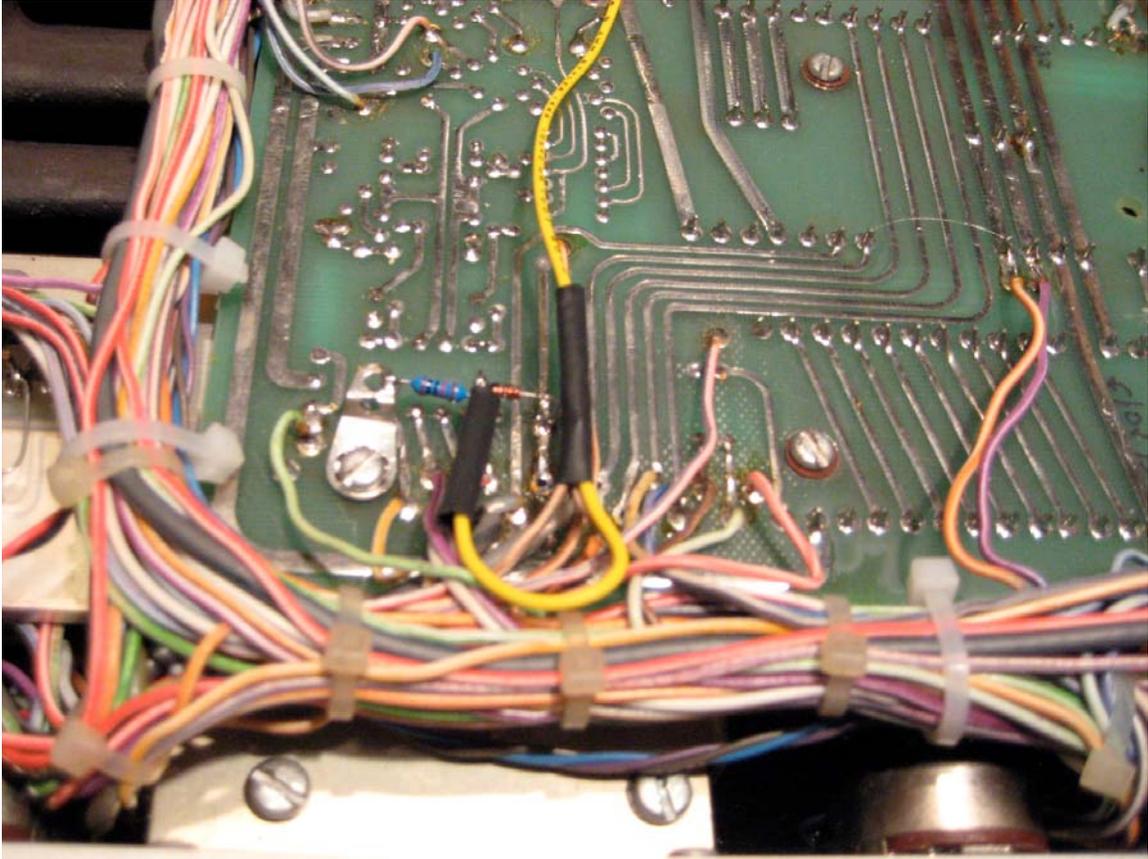


The #4 solder lug is bent into a “Z” shape using a pair of needle nose pliers. For attachment to the PC board, ¼ inch long 2-56 screws are used. This forms a very stout mechanical connection.



I used 3M masking tape to provide a barrier so the PC Board would not short to the Motherboard traces.





As a final comment on the effectiveness of this addition, I noted that when using PTT that the “Lock” light would flicker briefly upon the “break” action of the relay. The TR-7 display would not change frequency but there was that brief “flicker.” I put a frequency counter on the PTO and observed that there was a brief change of about 80 Hz upon the “Break” action. This same situation is observed on both of my TR-7’s and was confirmed by Ron, WD8SSB on his TR-7 that has been fitted with an X-Lock-2. So this must be a common issue with the TR-7’s.

I also noted that the same condition (the flicker) exists with VOX that has been set up for a short VOX time. If however one lengthens the VOX delay then no flicker is observed and audibly the TR Relay sounds like a “soft break” versus a “clank sound” such as you would have with a quick VOX time constant. I am only guessing but with a longer delay on break there is some sort of exponential decay of the voltage being applied to the TR switching. At first I thought there was a problem with the “snubbing diode”, a 1N4005 placed across the TR relay coil. But that is not the case since it is evident on at least three TR-7’s.

Later I discovered that others have seen this same issue with the TR-7 as documented in an email I received from Joe Pyles, KC9LAD who provided an explanation for the apparent “flicker and loss of lock” on the TR-7.

When you are in receive, Q1, Q2, and Q3 send voltage through RFC2 and when you transmit, Q4, Q5, and Q6 send voltage through RFC2 which turns on CR9 and CR10 which act as electronic switches allowing the PTO signal into the radio. The problem is caused when the voltage drops on RFC2 it's magnetic field collapses and induces a spike in the circuit between the PTO and the translator board causing the X-Lock to (momentarily) lose lock. Adding a 10 Ufd cap (in parallel with C1 on the main board) lets the voltage on RFC2 drop slowly eliminating the spike. This is usually not a problem with the X-Lock as it remembers the last frequency and tries to maintain it as it would if you were using RIT.

I contacted Ron Taylor, G4GXO, the designer of the X-lock and he affirmed that any time the X-lock detects a frequency change the ‘wheels are put in motion’ to correct for that frequency. So that is a bonus with the device that it is “on guard” to correct for any frequency deviation, even that caused by TR switching.

As a test of the X-Lock-3 capabilities I put the TR-7 on a specific frequency at 7:00PM one evening and left the radio powered on all night. The next morning at 7:00 AM I checked the TR-7 and it was on the same frequency as the evening before. I had run the same test with the other TR-7 and the X-Lock-2 and it was the same result. So the X-Lock is a great addition to the venerable TR-7 transceiver.