

Corrections and Improvements for Simple and Cheap Multiband Microwave Transverters

Paul Wade W1GHZ ©2018

w1ghz@arri.net

Almost inevitably, mistakes sneak into PC board layouts, and large setup charges for PCB fabrication make it unattractive to toss them out if fixes are possible with soldering iron and X-Acto knife. Other changes might be needed if parts become unavailable or new parts offer better performance. Eventually, these changes migrate to new revisions when more boards are ordered. Many of the problems are found by users and reported back – many thanks. If I have missed any, please let me know and I'll add them.

10 GHz Multipliers and Personal Beacon

This fix is simple – the proper bias resistance for the NLB-310 MMICs is about 60 ohms. I use 50 plus 10 ohms, with placement just like the 10 GHz transverter, as shown in the photo. The 10 GHz x9 multiplier layout is identical to the Personal Beacon board, except that it is on 1/32" thick PCB rather than 1/16 inch thick. The thinner board has far less radiation than the thicker, so the thicker version is discontinued.

The NLB-310 is no longer available from distributors, but can be purchased direct from www.gorvo.com. I am told that the NLB-400, available from Mouser, will also work. In two instances, bad NLB-310 devices were found when installed on the multiplier boards. DC voltages and currents looked right, but they didn't amplify, which makes troubleshooting difficult.

Locked VCXO for Microwave Local Oscillator

When I added an improvement to this board, a separate voltage regulator for the phase detector chip, I got the silk screen symbol for U9 backwards on boards marked "2014b". Then I fixed the silkscreen on the next batch, marked "2015c", but the U9 ground pin, in the center, is not connected. The fix for this is to bend the pin over to the ground plane rather than cutting it off. You'll have to scrape away some soldermask to expose copper for soldering to the ground plane.

Smart Fool-resistant Conditional Sequencer (Mark 4)

One error, on board marked “2017” – R23 is not wired correctly. The fix, shown in the photo (Figure 3 in the paper) is to move R23 so that the end marked in silkscreen as nearer the center of the board connects to pad “A” near Q8.

An Even More Fool-Resistant Conditional Sequencer (Mark 3)

On boards marked “SEQ3a”, a sloppy error – one pad of R42 is shorted to an adjacent copper trace. These are easily separated with an X-Acto knife, and I believe that I did this to all boards.

An earlier version of the board has a few more errors – contact me if you are building one.

1296 MHz Transverter

The receive amplifier, an SGA-3586z MMIC, is no longer available, and I haven’t found a replacement that works as well. The latest PC revision, marked “2016d”, has MMIC footprints for the newer SOT-89 package, so a good alternative is the Minicircuits GALI-39. The noise figure is a dB or two worse.

Some other MMIC changes can improve transmit performance – see the 2016 Update.

1152 MHz Local Oscillator

Some of the 64 MHz computer oscillators have low output which results in low output at 1152 MHz. This can be improved by adding another MMIC, perhaps a MAR-6, after A2 – note that the ground pads are already in the PC board. A bit of surgery is required to cut the transmission line for the MMIC and for a blocking capacitor between A2 and the new MMIC. A pad for a bias resistor is already in the PC board – 270 ohms is good for a MAR-6; bend the lead over to the transmission line, and add a bypass capacitor on the bottom of the board.