Converting a DB6NT 3456 MHz transverter to 3400 MHz

With the announced demise of 3456 MHz in April, I decided I best figure out what I needed to do to my DB6NT transverters to get them to work at 3400 MHz. Since International Crystal is no longer in operation and with just about all deliveries lengthened by COVID, I decided to look at alternatives. I happen to have an extra Leo Bodner Mini GPDSO laying around so I decided to use it for the LO.

I first wanted to get a reference of what the performance was with the original crystal oscillator so I injected -134dBm and got about 1-2 s-units above the noise on my IC-705 IF rig. So now that I had a reference, I dove in.

Instead of using an injection frequency of 135.6667, which is the required oscillator, I decided to just drive the base of the first tripler with 407 MHz making it just a straight amplifier. I happened to have a 120 pf chip cap laying on the bench so I used it to couple the output of the GPDSO to the base of the BFR92A. And as I suspected, nothing. All the tuned circuits were way off so I started back at 414 MHz which is where the LO is for 3456 and dropped one MHz which meant my sig gen needed to be at 3448 and there it was! After tuning the pipe cap filter at the mixer and then adjusting F1, F2 and F3, I was back to my S1-2 reading. Next I got brave and injected 411 MHz and found the signal at 3432 as expected, again after adjusting the pipe cap filer on the mixer, I hit F1, F2 and F3 and everything was back to normal. I then went to 409, repeated all the steps and finished at 407 Mhz which set 3400 MHz at 144 MHz. Last I adjusted the TX pipe cap to get my full tx output.

My DigiLO which is supposed to have a 407 MHz output at index 184 doesn't work so I'll try that when I figure out why it's not working. The Leo Bodner GPDSO was nice because it's completely programmable on the fly with a USB cable to my computer. I'm not sure I could have "found" the signal by jumping directly to 407 from 414. Yes, I could have used my spectrum analyzer to look at each stage and tune them but this was the easiest for me. Plus, with the Mini GPDSO, the GPS is built in, you just use one of the "hockey puck" antennas for the GPS receiver whereas the DigiLO requires an external 10 MHz signal to lock it – it does have an internal oscillator which is good enough except for the "frequency cops" !

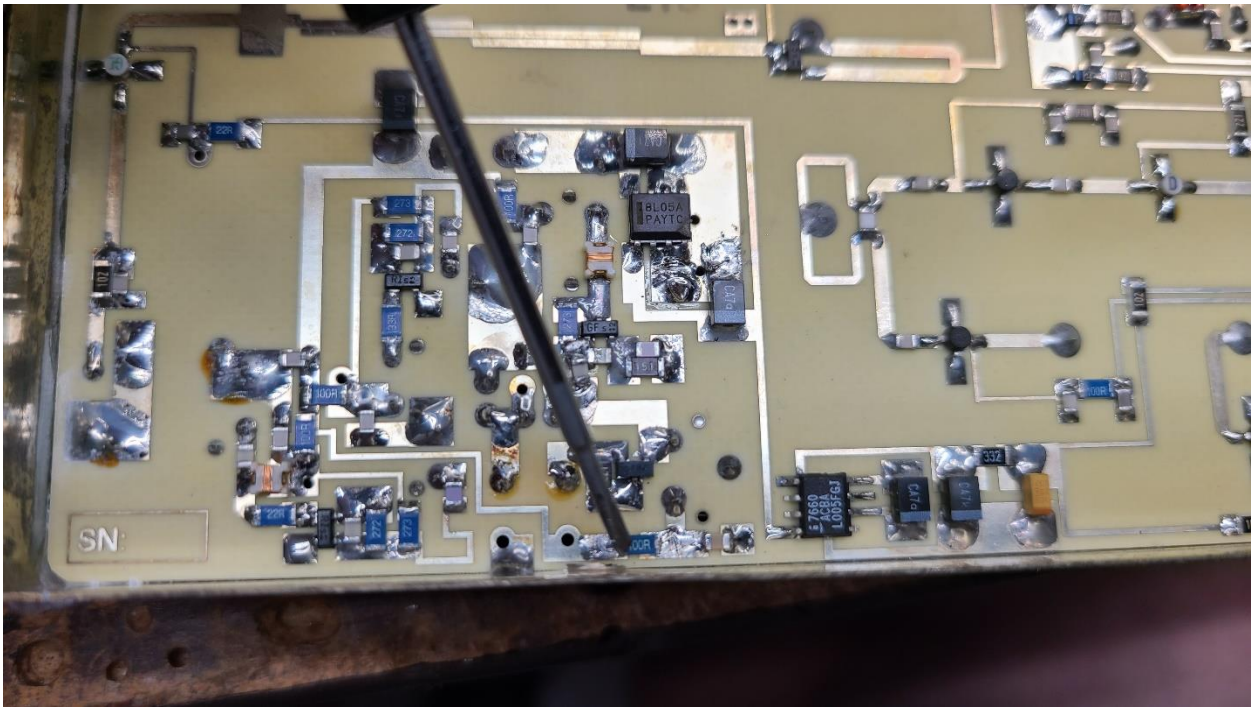
One note on tuning the filters, you first have to break the glue loose on the tuning screws, be VERY CAREFUL so you don't damage the filters! I used a ceramic tuning tool and after I was done, I dropped a little bit of candle wax in each to hold them in place.

That's it, see you all on 3400.1 MHz in June !!

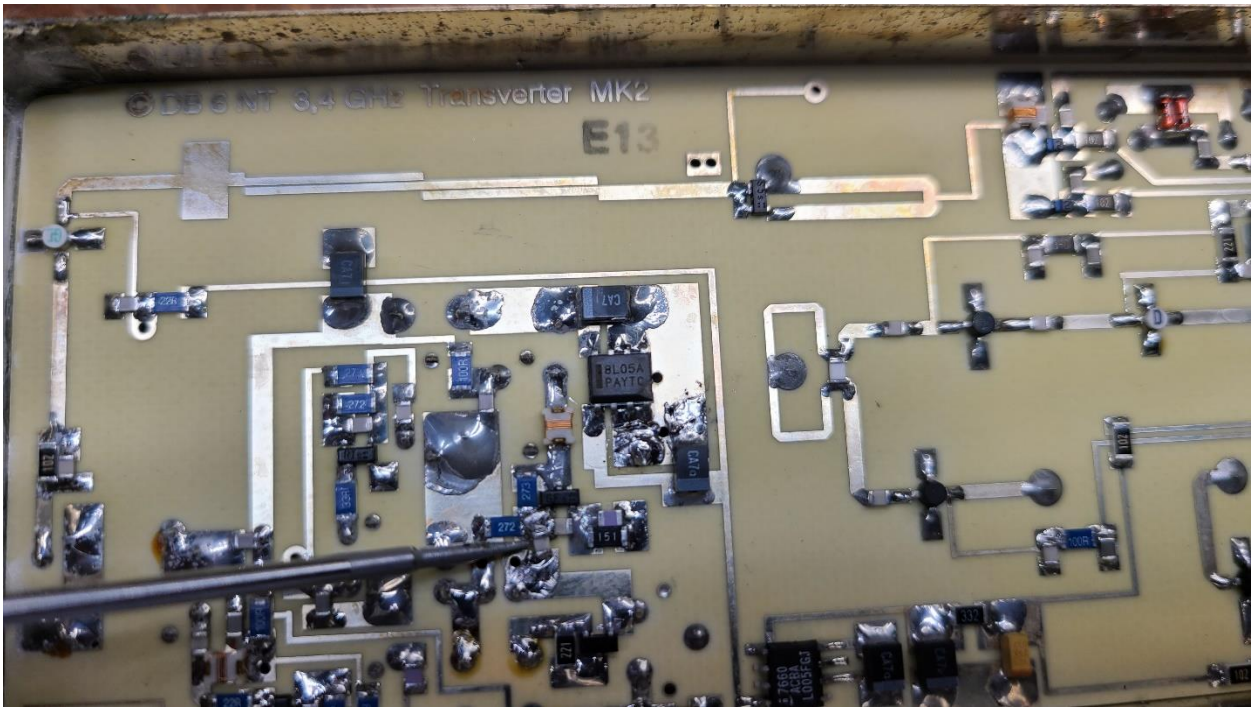
This is a follow up on converting a DB6NT 3456 G1 or G2 to 3400. If your transverter has a pair of pipe cap filters, then it should be able to move it to 3400 with a little work. I've used a Leo Bodner GPSDO and a DigiLO from DEMI/Q5.

First thing I did was test the operation with the original crystal oscillator on both rx and tx as a baseline.

Once you know the rx and tx levels, start by removing the bottom cover. To disable the oscillator, remove the 100 ohm chip resistor at the tip of my pointer.

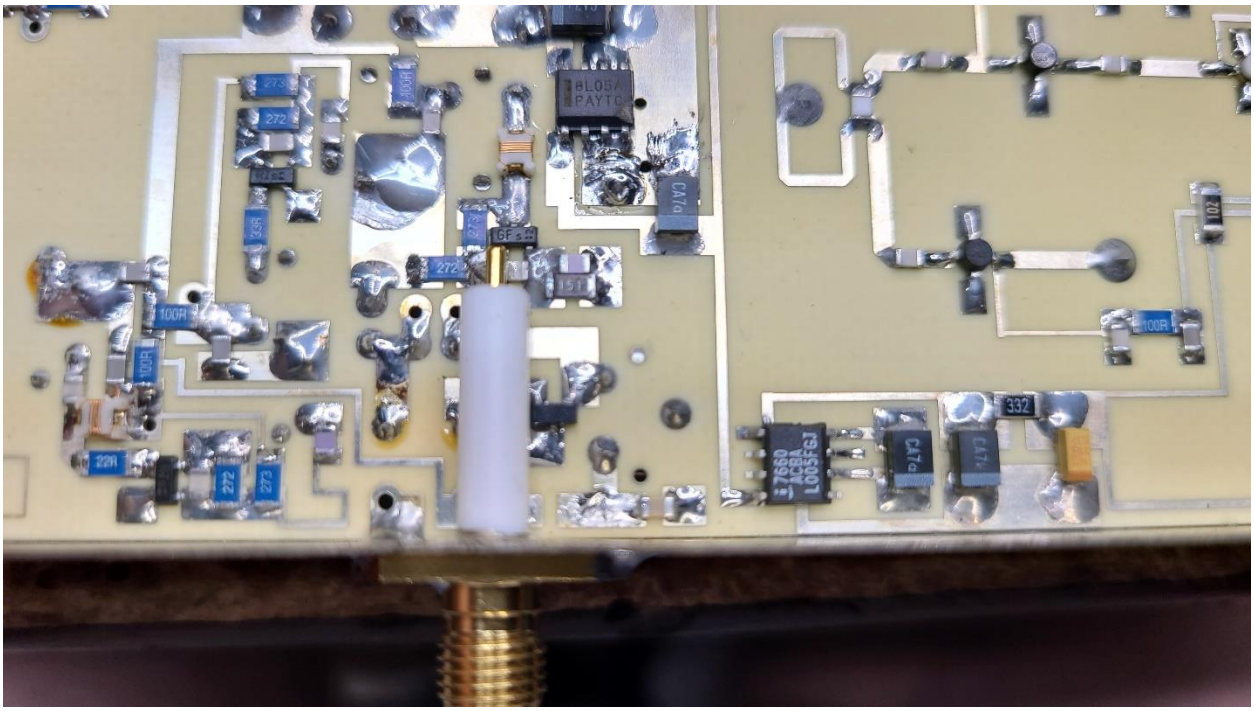


Next, remove the 2p2 chip cap that couples the oscillator into the first multiplier. I have my pointer on it.

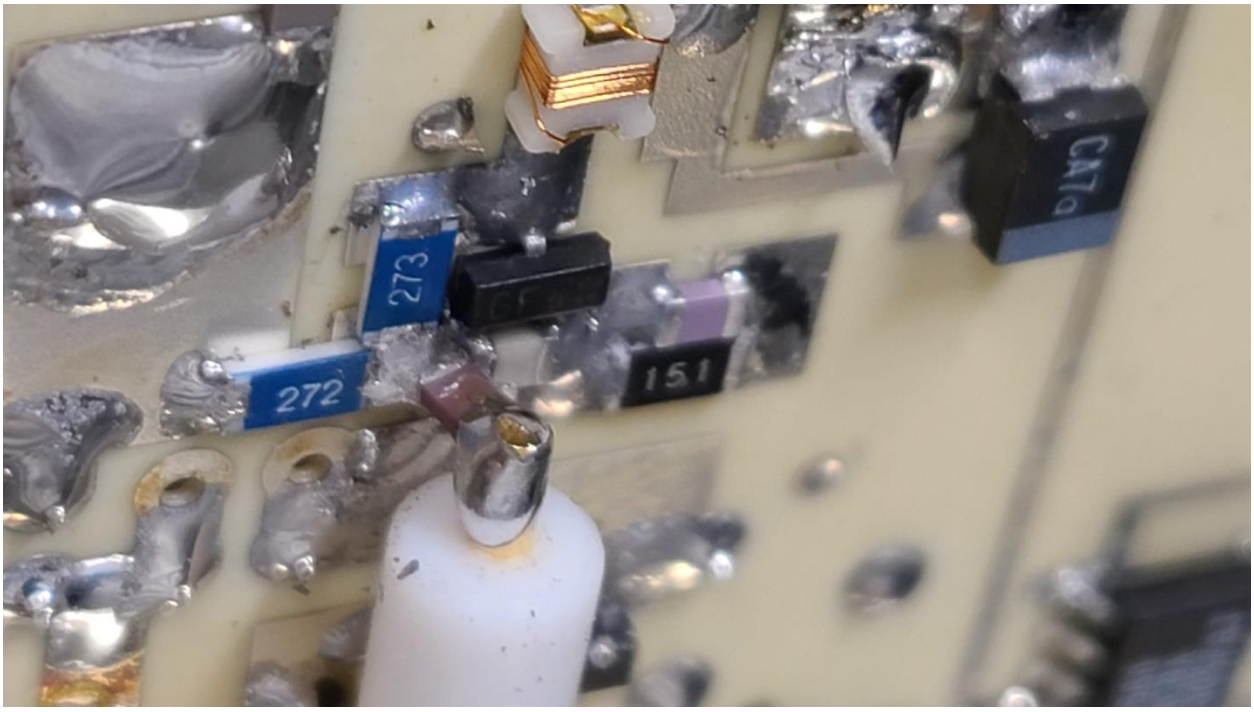


Next I drilled a hole for a female SMA connector with a long pin on it to pass through and soldered it to the case. Make sure you get the hole low enough as to not interfere when you put the bottom cover back on.

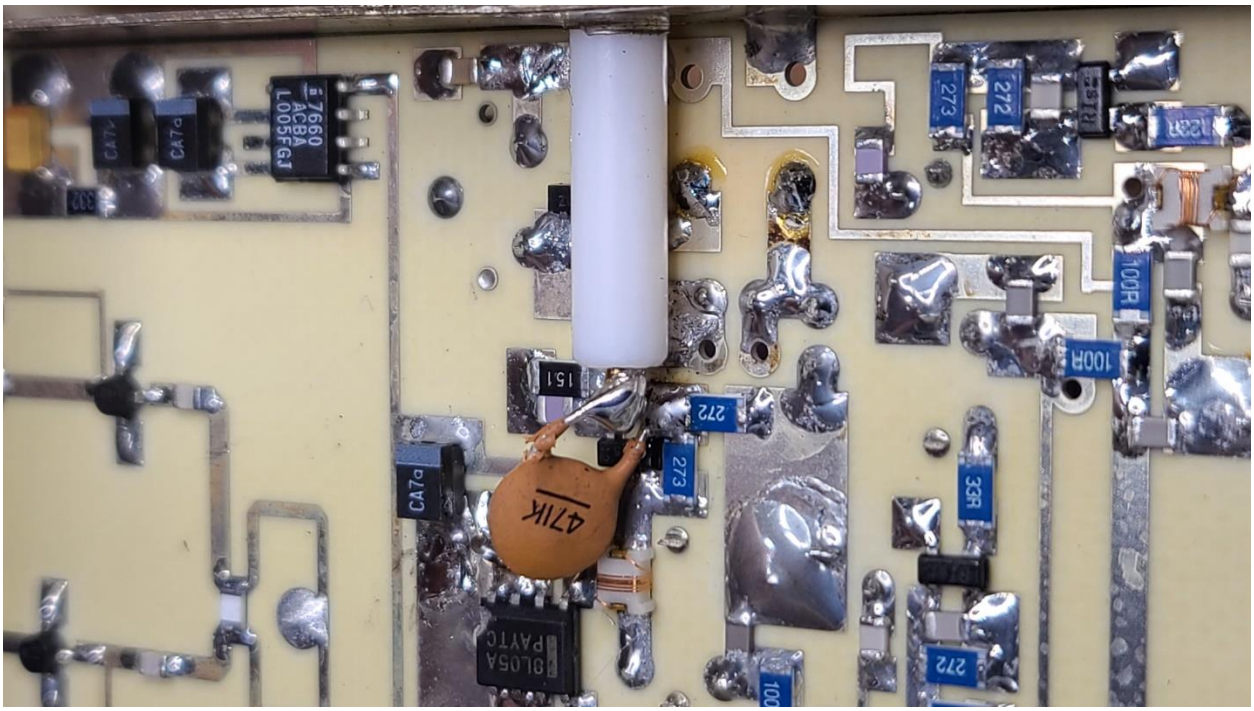
Insert the connector and it should be directly over the pad that is the input to the first multiplier.



Next install the coupling cap from the SMA to the pad, my first attempt was with a nice 0603 chip cap. BAD mistake, the pix looks great but the small amount of flexing the case allows when I screwed on the LO cable promptly cracked the cap causing the output to drop WAY down.



So not as pretty but 100% foolproof is a good old ceramic disk cap.



The 470pf seemed to work fine and provided the correct amount of drive from the DigiLO (5 dBm on mine).

Tune up –

I am lucky enough to have a couple of signal generators so I set one to be the LO and one to be the signal source. I began with 414, the original LO just for a head check and everything was as it was with the crystal oscillator. As the first time I did the mod using the Leo Bodner, I dropped the LO from 414 to 412 MHz and set my sig gen to 3440 MHz and tweaked the LO multipliers and the rx pipe cap for max receive. I then transmitted and peaked the tx pipe cap and touched up the multiplier coils. I continued this combination by changing the LO 2 MHz at a time and then re-tweaking everything. Once I got the LO set to 407, I connected the DigiLO and finished tweaking the multiplier stages, the rx and tx pipe caps and re-installed the bottom cover. That's it, a bit time consuming but the 2nd and 3rd units I did afterward only took about 15min per.