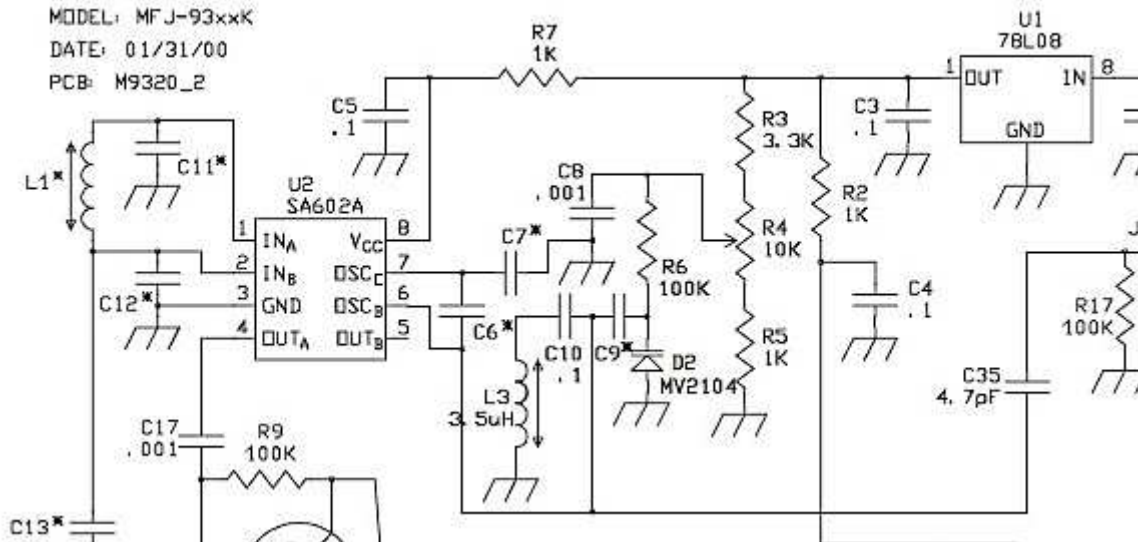
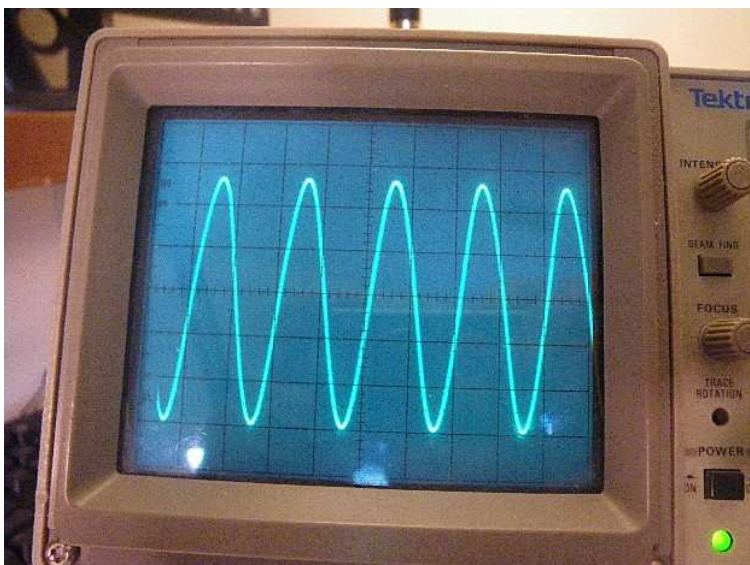


MFJ 9330 Cub DDS VFO Conversion

Now that my stock Cub is working ok, it's time for some modifications. I decided to install the FCC-2 DDS VFO first. After building and aligning the FCC-2, I'm now ready to install it in my MFJ 9330 Cub. First thing I have to do is to take out the analog VFO. I checked this VFO and it drifts like driftwood in the ocean -hi!



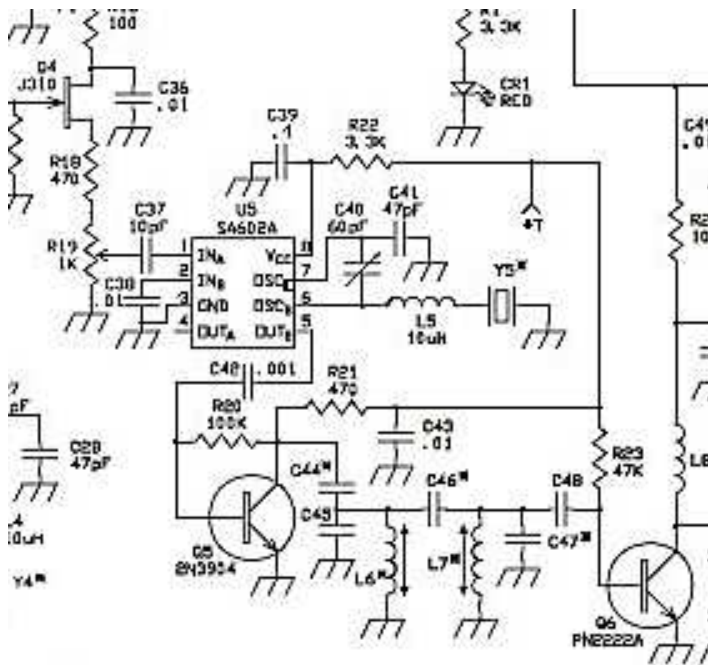
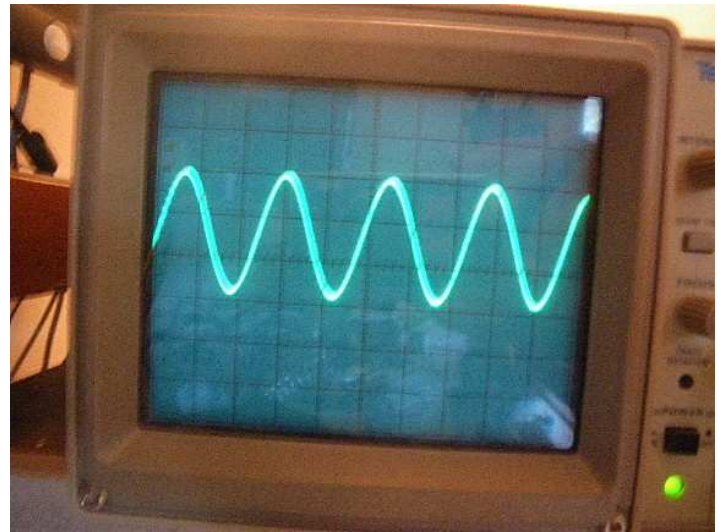
I now proceed to remove VFO components C6, C7, C9, C10 and D2. This isolates VFO U2 pin 6 and pin 7. It also insulates the pot R6 which I might use as a keyer speed adjustment pot. I leave L3 on the board as it's just too hard to remove this coil. I did check the VFO output level before removing the parts and it's about 150mv p/p at U2 Pin 6.



I check the Low -Z Output of the FCC-2, but it's just too much signal there. Even with the gain pot turned completely down I have around 1V p/p output. But, it's a nice clean-looking signal. Now I have to find a lower output or build an attenuator. I also set the FCC-2 to RX-IF and Mode and RX IF =6mhz. This will give me a 4.100mhz to 4.150mhz signal that I need since the cub has a 6mhz IF in it.

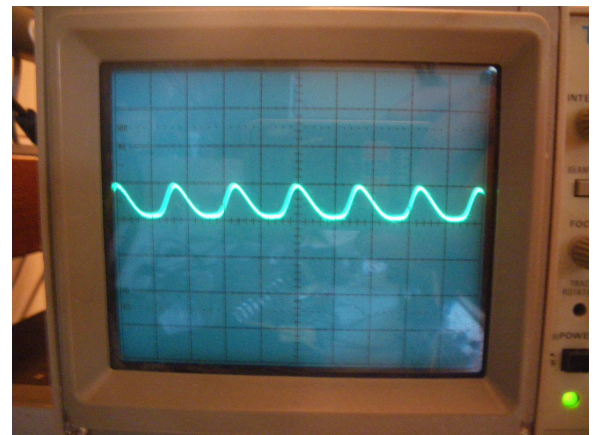
I now look at the HI-Z Unbuffered Output and it's about 300mv p/p. This is more like it. A small piece of RG174U is wired from this output to U2- Pin 6 of the Cub. This produces absolutely nothing! I then add a .01ufd capacitor in the FCC-2 Output Line and now it `s working. I then look more closely at the unbuffered output only to see that is not DC-insolated! The signal below 100mv per scale is the 4mhz signal generated from the FCC-2 DDS VFO. This seems to work fine as I`m now receiving a signal from the signal generator at around the .2uv level. Now I need to adjust the RX IF frequency to 5.997.4mz so it`s dead on frequency.

Now it`s on the transmitter and getting the FCC-2 DDS VFO working with the Cub. I could drive the transmitter directly with the FCC-2, but taking out the transmitter parts would be tricky so I decide to use the Cub`s transmit mixer. Once again this has a 6mhz oscillator so I set the FCC-2 to the TX+IF Mode and the TX IF= 6mhz. This gives me a VFO that produces a 4.100mhz to 4.150mhz signal - just what I need to produce a 10.100 to 10.150mhz output frequency.



The DDS VFO 4mhz signal from the FCC-2 goes to Q4 and then to transmit gain pot R19. From there into TX Mixer U5. Here the 4mhz signal mixes with the 6mhz signal to produce a 10mhz signal. I did not change anything in this circuit. I did have to adjust R19 in the Cub down a bit, but not much. I also retuned L6 and L7, but they really didn`t need it.

The picture to the right is the transmit mixer 6mhz signal. Not a pure sine wave, but good enough as it works fine.



I now just touch up C40 so it's dead on at 10.116mhz. At this point I have a working Cub with a FCC-2 DDS VFO wired to it with the analog VFO taken out of the rig.

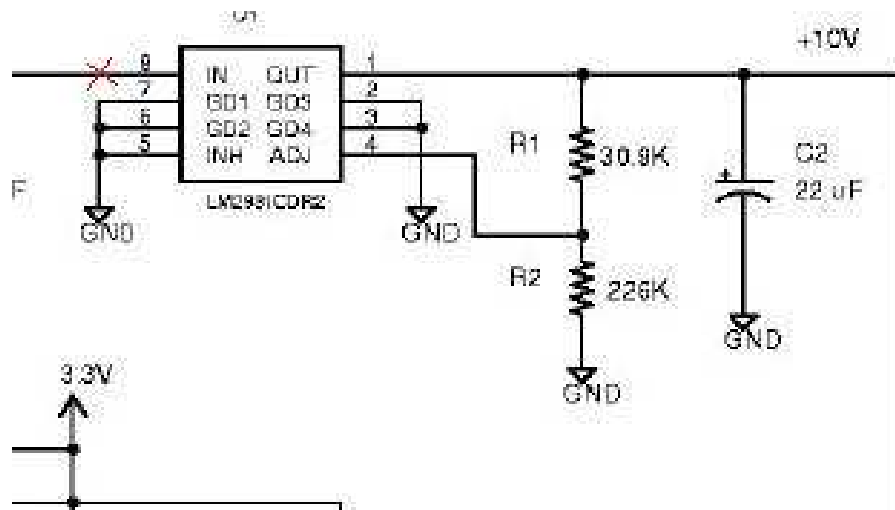


It seems to work fine with my Elecraft KX1, but I'll still need to make an on-the-air contact to confirm it works fine.

I decided to do some power management with the FCC-2. I notice that there are two op amps U6 and U4 that feed the LO-Z Buffered Output of the FCC-2. Since I'm not using this output, I'll shut it down.

I cut the PCB run at J1 Pin 9. This cuts off the input voltage to the +10VDC Regulator feeding these op amps. This saved me 15ma of current from my +12.1 VDC power source.

Total current draw on receive is now around 65ma. One additional benefit is that I no longer have any interference from the Lo-Z Output as I did before around 10.000mhz.



I now decide it's time to mount the FCC-2 DDS VFO to the MFJ Cub top cover. I find that the top cover of the MFJ Cub is hard steel. It takes me about one



hour of cutting with my Dermal Tool to cut a rectangular box out for the FCC-2 Display. I also drilled holes for the function switches and mounting holes. I also drill a hole for the encoder shaft of the FCC-2. The half hole you see at the bottom of the display is a hole that was predrilled for the stock MFJ Cub. I think it was there for a speaker. Cutting and drilling all the openings in the precise positions takes some time as all must be on target as little error is tolerated for all components to fit. I find this harder than playing around with the electronics -hi! It's now time to install some modifications to the

MFJ Cub Main Board.

I decide to keep the 10K pot on the main board and use it as a speed pot for the K12 Keyer. Another 10K resistor is soldered across the pot so I now have 5K-ohm of speed adjustment. The red power LED will be used for the K6XX CW Indicator. I remove the SMD 3.3K resistor as this isolates the LED from the PCB. I will install another resistor after I cut the circuit run in series to the LED. Another new resistor will be installed over this cut so I can watch the LED blink to the CW as I tune on a signal. More later...!

72,
Kangaroo Ed, WA3WSJ