LETHAL VOLTAGES ARE PRESENT - GREAT CARE REQUIRED!!

This page describes some simple modifications that were made to this transmitter to allow operation on different frequencies, variable output power, and operation on the 40m band.

The first limitation I encountered with this transmitter was being rockbound on one frequency only. At times a very loud band of QRM sits exactly on QRG and QSO's are impossible. At other times the Fishing boats voice communications on upper sideband SSB (known as "fishfone" and thought to originate from Danish fishermen) drown out all but the strongest stations. Since becoming a FISTS member I could also hear all these FISTS QSO's underway on 3.558MHz but was unable to participate. All of which led to the installation of a second crystal for the FISTS calling frequency 3.558. This crystal used to be a cheap 3.579MHz television colour burst crystal. The case was removed and the crystal surface painted with indellible ink until the frequency was lowered to 3.558MHz. See my crystal penning page for details.

The new 3.558MHz crystal was initially switched from the front panel but I found that the power output from both crystal dropped drastically to only a watt or two. Apparently the length of the wires from the crystals to the front panel switch caused some undesirable effect resulting in the power reduction. My solution was to mount a small relay and the two crystals right next to the valve base, and switch the relay from the front panel. This arrangement worked well and many nice FISTS QSO's followed on 3.558.

The next irritation was that my transmitter output wasn't QRP. I got about 10W when the crystal was pulled to the bottom of its frequency range, but sometimes less at the top of the range (not always). QRP is defined as 5W or less. So all those QRP folks I'd been working on 3.560 the QRP calling frequency, who were QRP, were making me feel guilty for running 10W. To fix this I put an extra switch on the front panel, to select 5W or 10W. The switch added two 47K resistors in series with the 10K pentode grid resistor. Now I could operate QRP and found signal reports almost as good as with my "QRO" 10W.

Still a slight problem though, in so far as sometimes the power would be only 3W in the QRP

mode, depending on how far I was pulling the crystal and also seemingly the mood of the crystal itself. Therefore the switch and two 47K resistors were replaced with a variable 100K potentiometer. Note: this needs to be a reasonably high power potentiometer not your standard miniature kind. Mine is rated 3 watts. This allows continuous variation of the output power from 10W down to around 5W or less. With this control I am able to always hit 5W bang on regardless of what frequency the crystal is tuned to.

After a while I became curious about other bands. I decided to see how well the transmitter worked on 40m (7MHz) and modified my HF receiver accordingly. A 7.030MHz QRP calling frequency crystal was used for the transmitter. With the addition of another relay switched from the front panel it was now possible to select any of the 3 crystals 3.558, 3.560 or 7.030 (see photo below). The pulling range of the 7.030 crystal is more than 1KHz, but at the low end a slight chirp appears. I believe the relatively high capacitor loading for the low end of the range causes more power dissipation in the crystal and the significant heating effect is what drags the frequency slightly.

Operation on 40m requires modification of the output Pi-network, by adding a centre tap to the coil. I used a small relay mounted on the underside of the chassis below the coil, to short circuit half the coil using the centre tap. The tuning procedure is as described previously. In fact due to the harmonic relation of 3.5 and 7MHz, and the fact that I got my centre tap almost exactly mid way, I find that very little re-tuning of the "TUNE" and "LOAD" capacitors is required when changing from the 80m to 40m bands! It is quite possible to change bands without retuning at all, though I always do just to perfect the setup. The TX works great on 40m and produces up to 8W output power, but once again I nearly always reduce the power to 5W using the front panel potentiometer.

The final modification was to fill the 4'th crystal position. 7.030 can also be afflicted by heavy noise, and the lowest 10KHz of the band always seems to be the most active. So I added another 7.030 crystal, with the case removed and penned down to about 7.009MHz. Because this was the 2nd crystal I had penned down, I made a tidier job of it this time. The picture shows the new crystal in a neat new case made from thin brass sheet soldered to the crystal base. The modified crystal works just fine, no noticeable change to stability or output power.

Here's a new circuit diagram showing all the modifications so far:

{gallery}cwtx2{/gallery}