LETHAL VOLTAGES ARE PRESENT - GREAT CARE REQUIRED!!

The original version of this CW transmitter for the 40 and 80m bands was based entirely on a d esign by Jan Axing, SM5GNN . It uses a Siemens ECL82 triode/pentode valve (US equivalent 6BM8) and produces up to 10 watts of output power on 80m (3.5MHz). I had no ECL82's in my valve collection , this one was obtained from Jan Wuestens in Germany.{gallery}cwtx1/files{/gallery}CLICK THUMBNAIL above to see the circuit diagram. The Pierce oscillator runs continuously while transmitting so there is no chirp during key down. The bias was adjusted to -24V during keydown at the junction of the 22K, 220K and 100K (var) resistors, in accordance with Jan's instructions . The crystal used was a 3.560 MHz QRP calling frequency crystal in an HC49/U style case; I had some worries that this crystal would not withstand the high powers in a tube circuit but so far it hasn't cracked under the strain. The frequency is variable over a small range by tuning the 50pf variable capacitor in parallel with the crystal, via a knob on the front panel. The frequency can be set between about 3,560,000 and 3,560,500.

The power supply uses a transformer from Maplin Electronics , having 250V a.c. 100mA secondary and a 6.3V a.c. secondary for the valve heaters. Mains power is switched via a control on the front panel. I used packaged bridge rectifiers rated at 600V, 1.5A. To obtain the -100V bias, I used an old trick: isolating the a.c. via a pair of series capacitors (1uF, 400V in the diagram), rectifying, and connecting the positive output of the second rectifier to the negative of the first. This has worked well for me in the past at small currents. The -100V bias rail is on even when not in transmit. A red neon indicator on the front panel warns that the HT is active (and wandering fingers will be treated without mercy).

Transmit/Receive switching is by a 12V relay, operated by a switch in the receiver. One set of contacts switches the antenna between the receiver and the transmitter, the other switches the HT line. During transmit an orange neon lights; these neons are of course both orange in reality, but I use coloured panel mountings (red and white) so that the effect of the neons when lit is red and orange respectively. These panel mountings come from a piece of equipment given to me by my uncle at least 20 years ago, having something like 30 or 40 12V bulbs in. The equipment is long since gone and forgotten but I still have a large number of those bulbs. For this project I removed the bulbs from two of these and replaced them with neon indicators, effectively making a nice panel mount for the neons.

The 100 ohm resistor in the anode of the PA (ECL82 pin 6) is a parasitic suppressor, having 6 turns of 0.56mm diameter wire wound over it. The pi-network is made of two old variable capacitors, each has two gangs of I guess 350pF. For the tuning capacitor I only use one gang, for the load capacitor two in parallel. The coil is 27 turns of 0.56 diameter wire wound over a transparent plastic pot, about the size of a 35mm film canister (approx 30mm in diameter).

I used an old meter from some dismantled audio equipment to monitor the plate current. I measured the full scale deflection of the meter to occur at 240uA, and calculated a 5.7 ohm resistor was necessary to get a full scale deflection of 50mA. This resistor is made from 470, 56, 18 and 10 ohm resistors in parallel. These resistors are small quarter watt types from the junk box, but all other resistors in this project are 2 watt types. Capacitors are high voltage types. The meter was calibrated in decibels (from its audio days), but I was able to open it up, reverse the plastic scale, and draw a new linear scale.

The chassis for the transmitter is made entirely from single-sided PCB material, which is very easy to work with, and cheap. The large components (transformer, 100uF capacitor, ECL82, and pi-network) are mounted in the traditional way on top of the chassis with the other components beneath.

The transmitter is tuned as per Jan's instructions , into a dummy load. The load capacitor is fully meshed and the tuning capacitor quickly dipped from unmeshed until the plate current drops to a minimum. In my case that occured at about 35mA. Then the load capacitor is unmeshed until the plate current rises to no more than 40mA. The ECL82 cannot be operated above 50mA and care must be taken to ensure this doesn't happen, otherwise presumably it will expire pretty quickly.

This transmitter works extremely well and I am continuously receiving great on-air reports, including many comments on the excellent CW tone which is free from any chirp, clicks etc. I had many nice QSO's and ragchews on 80m CW with the transmitter with stations across the UK and Europe.

{gallery}cwtx1{/gallery}

In the rear view, the transmit/receive switching relay can be seen at the bottom right, above the

antenna in/out sockets. The relay has a 12V coil and is socketed. The two large variable capacitors are the Tune and Load capacitors. Connections on the back (left to right) are: Transmit/Receive control, Receiver antenna (Out) and ATU (in).

You can clearly see one advantage of using PCB material for the chassis: it becomes very easy to solder grounded connections direct to the chassis. Notice the crystal at the bottom right of the picture, near the valve base and near the mains cable entry point.

In some of the photos the transmitter sits on my homemade ATU , which includes a 50-ohm dummy load and forward/reverse power meter. The morse key belonged to my Father
and is bolted here onto a small piece of pine for stability

Notice in the close-up of the ECL82 you can just about see the glow from the heater element at the top of the triode and pentode sections of the valve. Mine doesn't glow blue in time with the keying as Jan reported, but it does get very hot to touch.