achieved by unbalancing the DBM with a small DC current provided by R10, a 33K resistor keyed to the +12V rail. The keying current allows a direct transfer of RF from the VFO/LO direct to the PA strip. As an untried modification, it would be possible to make R10 variable with a much higher nominal value to allow amplitude modulation of the TX if this should be required for any reason. Another modification is to make the +12v keying voltage variable, which will then act as a CW drive control.

The PA strip uses a single bipolar transistor connected as a Class A voltage amplifier coupled to the gate of Tr4, a 2N6657 power MOSFET. Note that the inductance of L2, an RF choke, has been chosen to resonate with the input capacitance of the MOSFET at about 3.6MHz. The bias control RV1 should be set to provide about 100mA of standing current in Tr4. This will rise to around 600mA on key down or speech peaks.

When using the transceiver in the DSB (phone) mode it is important not to drive the output stage too hard if a distortion free output is to be maintained. The optional metering circuit shown in Fig. 1 works by detecting negative voltage swings on the drain of Tr4 which come within a couple of volts of ground. In use, the DSB drive level should just produce a movement on the output meter, but no more. For CW, the output can be wound up as high as it will go.

The MOSFET should see a load of about 12 ohms to develop its 4W of RF at a 12V supply line. Ferrite transformer T1, wound with 2:1 turns ratio, raises the output impedance to the 50 ohms required by the preselector/output filter circuitry. Diodes D5, D6 protect the DBM against high level pulses of RF which can occur at changeover from transmit to receive. Ideally, S1 should be of the break before make type. Many of the small relays and switches are make before break and temporarily connect the transmitter output to the input of the DBM. We discovered this the hard way having ploughed through three devices before the cause of the problem dawned. There have been no more casualties since the diodes were fitted but the correct changeover switch/relay type has to be preferrable.

The MOSFET output stage is

almost totally bomb proof. However, the transceiver will only develop its maximum power when matched into a 50 aerial system or load.

Preselector

The preselector circuit L4, L5 is a symmetrical network designed to handle signals going in both directions. It covers the whole of the 80m band without the need for retuning; the turns ratio and coupling level have been carefully chosen to give a fairly flat top response. However, if a particular part of the band is of interest, for instance the CW end or the top part of the phone band, then the component values could be usefully adjusted to narrow the bandwidth. This action has no bearing on the selectivity of the receiver or its perceived performance, it simply reduces the possibility of swamping from out of band high level broadcast signals or whatever. As an example, the facility could be useful if you lived at a place called Rugby... Remember though that the network has to pass the entire output of the transmitter and that small cores may saturate.

VFO

The design, using the correct cores and capacitor types shown, is very stable maintaining frequency without retuning for the duration of a half-hour QSO. The oscillator circuit of Tr1 will also function with a crystal replacing L1. For reasonable crystal control, you also need to remove C2 and C3 to enable the entire series resonating capacity to reside in C1 which would then become a fine tuning control. The authors envisaged this small transceiver as being ideal for mobile use, particularly with fixed frequency nets. Crystal control, particularly with a switched bank, would be very useful. The preset capacitor, C4, determines the frequency shift on CW transmit. It should be adjusted for about 800Hz increment. Be careful when substituting Tr2, the buffer transistor for an alternative type. A device such as a 2N3819 would not have enough current drive available for the DBM. A 2SK55, with a transconductance of between 5 to 7 mA/V is about the minimum acceptable. A J310 is best of all. Still on the subject of substitution, be wary of using any DBM other than the SBL1-8. Although several other devices including the SBL1 are specified from 1MHz upwards and should therefore be suitable for use at 3.5MHz, performance tends to fall off within an octave of the stated band edge. At 0.1MHz minimum frequency, the SBL1-8 has a particularly good operating margin. Remember too that the balanced nature of the DBM keeps out much of the MW broadcast interference. It is good to have a device which operates as effectively at the interference frequencies as it does at the signal frequency.

Construction

For those of you with little or no experience of printed circuit board construction, this section is fairly important and hence comprehensive. Those more experienced in wielding the soldering iron can probably ignore the next few paragraphs.