Down To Earth

'Easi Build' 80m Transceiver

Part 2. by Bruce Edwards, G3WCE*

IN PART ONE we looked at the overall design and block layout of the transceiver. This month we go on to look in detail at the first building block, the Variable Frequency Oscillator.

VFO

THERE IS NOTHING remarkable about the VFO (**Fig 2**). Similar circuits are to be found in many pieces of equipment. The oscillator transistor is a 2N3819 FET. This operates at a low power level, so the generation of excess heat, the enemy of VFO stability, is minimised. The supply is stabilised at +5V by IC1. The buffer stage consists of two BC108s. I chose these because they are cheap, common, and I have a bag full of them. Most amateurs must have a few lying around. The coil, L1, is wound on a T50-2 toroidal core. Wound with the number of turns specified, you should have a VFO that works on the correct frequency, which might not be the case if any old former and core were used (I don't know of any current source of new coil formers). In practice, frequency stability is quite adequate.

Mention must be made of the tuning capacitor, VC1. The tuning range is determined by the value of this component. 12pF allows coverage of the whole of the CW segment with a little to spare at each end, while 10pF will just cover the required range. As I prefer to have a little overlap, I used 12pF. With the amount of bandspread that this provides, the tuning rate is comfortable without a slow motion drive. This of course simplifies mechanical construction. The value of a variable capacitor can be reduced by removing some of the plates. Actually, it is the number of gaps that determines the value, so if you divide this number into the value, you will know how many pF each gap contributes. The excess plates should be carefully removed with long-nosed pliers, taking care not to damage the remaining ones or over stress the bearings or shaft. So, if you have a component with a value that is a little too high, you can still use it, although I wouldn't recommend trying to reduce the value by more than 50% as the results become less predictable.

It was decided *not* to build the VFO 'dead bug' fashion for two reasons, (1) the rigidity (very important in a VFO) wouldn't be as good as it could be, and (2) thermal stability. With the frequency determining components in contact with the chassis, they would be more prone to sudden changes in temperature than if they were mounted independently. As printed circuits had been ruled out, the VFO was built on a 2¼in x 2½in piece of 0.1in matrix board. This in turn was mounted using two 12mm M2.5 screws, with extra nuts as spacers to keep the board clear of the chassis. See **Fig 3** for the layout of the VFO board.

It turned out to be essential that the VFO be fully enclosed, not for the obvious reason of RF screening but because the slightest draught caused unacceptable drift. Holes are drilled in the screens to allow connections to pass through. Obviously this should be done before assembly. Initially the lid can be left off. Decoupling capacitor C40 should be mounted close to where the lead carrying the RIT voltage enters the enclosure. ♦

To be continued...

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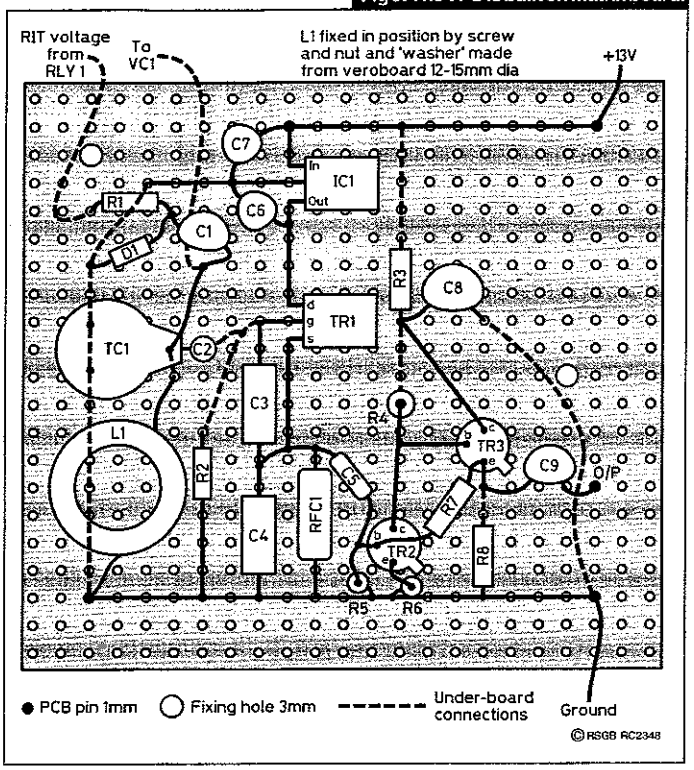
Fig 3: The VFO is built on matrix board.



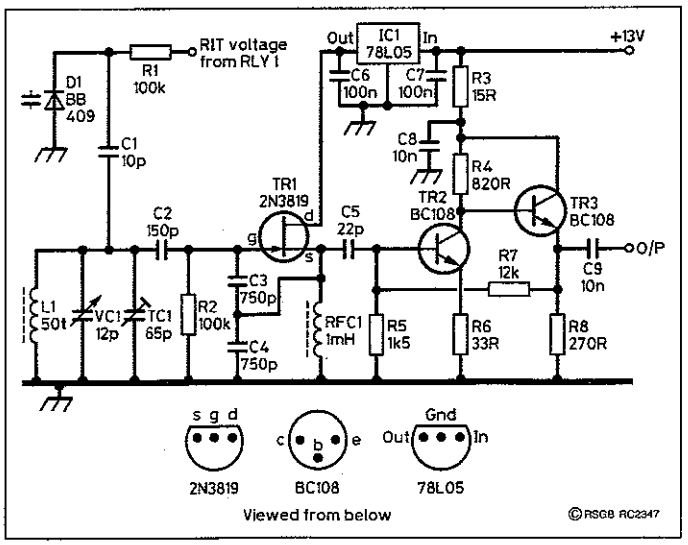


Fig 2: The VFO consists of a buffered Colpitts oscillator.

COMPONENTS

Resistors (all 0.6W metal film)

R1, 2	100k
R3	15R
R4	820R
R5	1k5
R6	33R
R7	12k
R8	270R

Capacitors

C1	10pF ceramic plate
C2	130pF close tolerance polystyrene
C3, 4	750pF close tolerance polystyrene
C5	22pF polystyrene
C6, 7	100nF ceramic disc
C8, 9	10nF ceramic disc
VC1	10 or 12pF (see text)
TC1	65pF (Maplin WL72P)

Inductors

L1	50t, 32SWG, on T50-2 toroidal core
RFC1	1mH

Semiconductors

TR1	2N3819
TR2, 3	BC108
IC1	78L05
D1	BB409