followed by the six feed through connections, which connect various pads on the track side to the ground plane. It is firmly suggested that component leads are not bent over significantly on the track side of the board during soldering, as in the event of a mistake, this can make component removal very difficult and possibly cause permanent damage to the pcb. Use IC sockets. This allows progressive testing of the circuitry rather than the "apply power to everything and hope" approach. The printed circuit layout used is rather unusual in that a lot of component leads are soldered directly to the ground plane. This is deliberate as it is good rf practice, keeps the pcb cheap due to the lack of plated through holes, and allows the board to be made at home if desired. Keep the leads on all monolithic bypass capacitors to the absolute minimum possible length.

Minimising stray capacitance in the test circuit is important, as it appears in parallel with the load and can very slightly upset measurements at high frequencies and high SWRs. It can be minimised by mounting the following components away from the ground plane by 1-2mm (a) D5 and the associated 100pf and 47K (b) D6 and the associated 100pf and 47K and (c) the two 100 ohm test circuit series resistors.

Before mounting the band switch, remove the nut and lock washer and move the washer with the end stop pin so that the pin goes into hole position 5. This limits the switch rotation to five positions. Then place the switch into the printed circuit board so that pin 1 is next to the tuning capacitor body. This should be possible, using one of the two holes provided in the pcb for the locating pin on the switch body. Unfortunately, there are many variants of this single pole 12 position rotary switch design and at any one time it may not be possible to obtain exactly the same unit from our suppliers. If you cannot get pin 1 to sit next to the tuning capacitor, hence keeping all switch connections as short as possible, then please drill another 3mm diameter locating hole in the pcb for the locating pin on the switch body.

Double-check all your soldering and component orientation/values very carefully, particularly those which will appear under the LCD when mounted. Finally, mount the LCD, spacing it away from the main PCB by 5-6 mm with a thin piece of polystyrene foam or similar. Use thin flexible tinned copper wire (0.5 mm dia) to interconnect these two boards - this will allow the LCD to be hinged away from the main board if there is an error or omission. Position the display correctly first, by just inserting the two outside connecting wires between the display and main board, and then soldering these to lock the display into final position. Then drop the central wires through the display and main board holes, soldering and trimming each wire in turn.

The main board is then mounted on the front panel. It is supported at one end using countersunk screws and 10mm long nylon spacers, while the other end is supported by the two test terminals. The bottom of the case will need to be relieved so that the knob on the main tuning capacitor can protrude from the side of the case. Likewise the case bottom must be drilled to accommodate the miniature fine-tuning potentiometer, which mounts next to the batteries in the case bottom. Complete all wiring to the two switches, the battery holders, and the fine frequency adjusting potentiometer. Attach the battery holders to the case bottom with contact adhesive or double sided tape. Note that the unit requires a supply of 12 VDC. This means 8 @1.5V zinc carbon batteries must be used in the battery holders supplied. If you wish to NiCd or NiMH rechargeable cells (1.2 VDC) then 10 cells must be provided and the case bottom needs to be fitted with a 10 cell holder (not supplied) which will just fit the case if the reinforcing ribs at either end of the case are carefully removed (use a sharp wood chisel). This completes all work on the case.

SET UP AND TESTING

With all ICs unplugged, apply 12 volt to the PCB. Check the output of the 5Volt regulator with a multimeter (4.75- 5.25VDC). The contrast pot should be adjusted so that the top line of the LCD displays all black squares. If you have an oscilloscope (50MHz or more preferred), fit it with a correctly set up X10 probe and monitor the emitter of Q7. Note that an X1 probe, which is really around 1 meter of coaxial cable with convenient connectors on each end, will totally wreck instrument operation due to excessive capacitive loading. A clean sine wave at a level of 600mV p-p +/- 10% should be present at Q7 emitter, independent of the frequency selected. Likewise, 3 volts peak to peak of rf at the "hot" rf test circuit terminal, or the junction of Q12 emitter/ Q11 collector, shows the oscillator and buffer amplifier are