Construction

A double sided PCB is used to provide good electrical stability and simplicity of construction. Components that require an earth connection (which are not connected to the emitter pads) are soldered to the earth plane in the underside of the PCB. Components that are connected to the track have their leads soldered directly to the top of the PCB, as illustrated in **Fig. 2**. As in

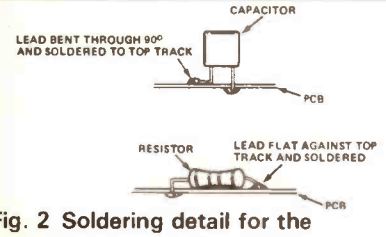

Fig. 2 Soldering detail for the resistors and capacitors.

all RF circuits it is important to keep all component leads as short as possible; lay resistors directly on the board, keep capacitor leads to a minimum and mount transistors Q2 and Q3 with lead lengths 3-4mm.

The suggested order of construction is as follows:

1. Fit and solder the through board links around the emitter leads. Form two pieces of brass strip around the PCB inside the transistor hole to connect the emitter leads of Q1 to earth see **Fig. 3**. Solder these to the PCB making certain that they are not likely to raise the emitter leads.
2. Wind L1 and L3 and solder in position.

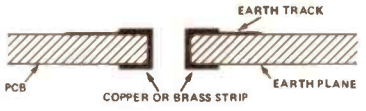

Fig. 3 How to earth the PA transistor emitter leads.

3. Fit the other components with the exception of Q1, RL1, RL2, C3, C4, L2 and the coax link, taking note of the orientation of the transistors, diodes and C17.
4. Cut the coax to the dimensions shown in **Fig. 4** and fit to the PCB.
5. Cut two pieces of brass strip approximately 1.5 x 3cm and solder about 5mm to the underside of the board by the input and output points.
6. Insert the PCB assembly in the case, bending the two pieces of strip to the shape of the case. Score the shape of the socket holes onto the strip and, using tin shears, cut them to form earth tags.
7. Bolt the PCB loosely into the box as shown in **Fig. 5**.
8. Trim the base and collector leads of the Q1 to 8mm. (Warning: the PT8811 contains berillium oxide, the dust of which is highly toxic). Lightly smear some heatsink compound onto the face of the stud and bolt the transistor into position. Solder the leads, making sure that they are not under any stress.
9. Tighten up the fixing screws and the transistor nut. Solder C3 and C4 in position keeping their leads as short as possible.
10. Carefully wind the coil L2, using a former of the correct diameter (5mm drill bit etc,) and solder it in position on the board.
11. Solder the relays in position on

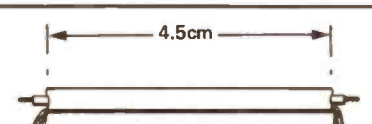

Fig. 4 the coaxial link cutting detail.

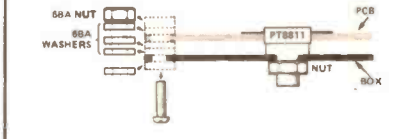

Fig. 5 Bolting the PCB into the box.

the edge of the PCB and connect the upper tags of both the relay coils to earth. Some silicon rubber compound between the relays and the case will provide extra mechanical stability for mobile applications.

12. Fit the BNC sockets making sure that the earth tags make a good connection.
13. Solder two pieces of brass strip approx 20cm x 0.5cm to form the input and output connections from the PCB to the BNC sockets.
14. Fit the power leads and include an in-line fuseholder on the positive side.

Testing

Before applying any power, thoroughly check the amplifier for solder bridges, incorrect components etc.

With no DC power applied check that the RF power loss through the amplifier is not more than 1dB (it should be less than 200mW in 1 watt). Connect a dummy load and a DC power supply set to 12V. Monitor the output power and the DC input current which, at this stage, should be negligible. Set the trimmer capacitor to mid position and switch on the transmitter. The relays should operate and the current drawn increase. Adjust C1 and C2 for about 1 amp of supply current and peak C5 and C6 for maximum output power. Increase the supply voltage to 13.8V and adjust C1, C2, C5 and C6 for maximum output power. Keep the transmit time as short as possible whilst adjusting.

Check that the stud of Q1 (PT8811) does not get excessively hot (greater than 70°C); if it does, the almost certain cause is that it is not secured tightly enough to the case. In normal use, you can expect the amplifier and case to get quite warm — 40°C or so — but this is perfectly safe, so long as Q1 is not very much hotter than the case. If the amplifier is to be used in a confined space with little ventilation, a heat sink may be bolted to the box to improve dissipation. Prototypes have been run continuously at 12 watts output for two hours or more.