box eventually mounts on its left side in a vertical position.

One of the problems we experienced with this part of the design was with the slow motion drive. It would have been nice to use a good flywheel driven gearbox reduction as used in many of the Black boxes. They are available, but we did not think poeple would want to pay about £40 for this item alone! To get the overall reduction required, which is about 216:1 (or more if you can manage it), we eventually used two Jackson 6:1 epicyclic drives in series, coupled with the 6:1 reduction already present in the capacitor itself.

We do not recommend using the Jackson combination 6-36:1 drive as the torque of the 6:1 section is considerably higher than that of the 2-drive combination and is not pleasant to use.

The drilling dimensions shown for the mounting of the VFO capacitor underside may need slight amendment to get the drives to align exactly with the capacitor. All four of the screw holes on the underside should be used for mechanical stability. The pcb mounts on a couple of 6BA half nuts to space it from the box.

The stability of the finished unit should be excellent — certainly within +/— 100Hz/Hr after a small warm up period. The linearity is also good with this circuit giving a fairly constant tuning increment over the whole range.

The VCO unit

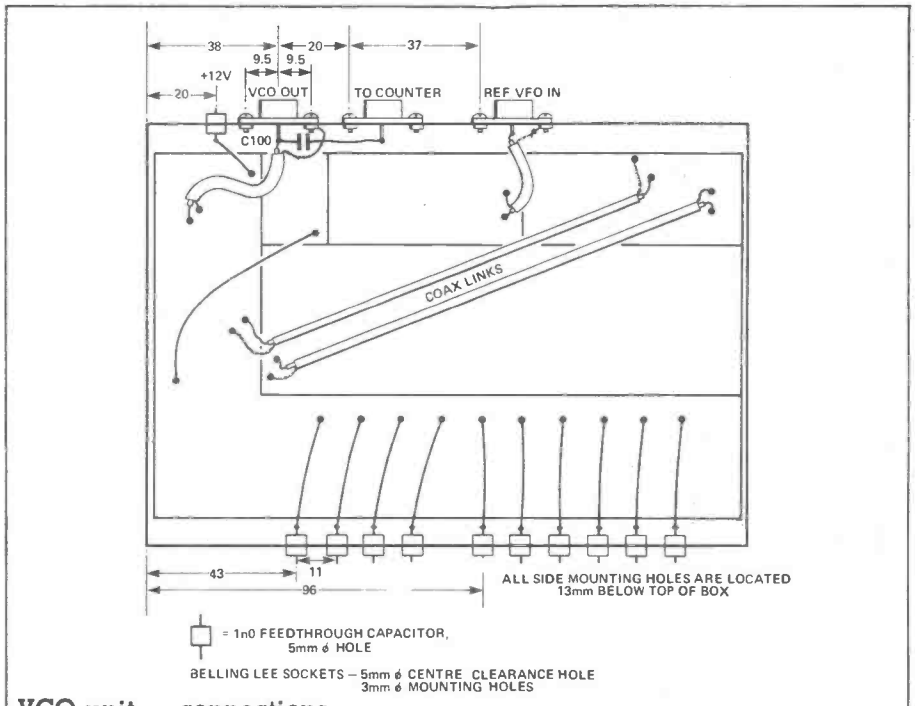
The remainder of the PLL system is constructed on one double sided pcb, with suitable interstage screening made from tinplate. These screens are essential and should not be omitted.

In order to ease problems, the board is built up in stages, with each section being tested as far as possible before starting on the next.

General

1. Insert and solder all (20) connection pins.

2. Make up an L-shaped (or use two separate pieces) tinplate screen 20mm high to fit the section between the crystal oscillators/VCO's and the left hand side of the loop filter. It should be soldered exactly along the broken lines marked on the pcb upper surface.



VCO unit — connections

Crystal oscillators

Three instructions assume that all the bands are going to be used and that all crystals are to be soldered into place at once. If only a few crystals are to be used initially, you will not want to have to remove the pcb from its box to put more in later. The only problem in not having all bands in at once is that each VCO requires a crystal in place to align it so this will have to be done in stages as crystals are available.

There are two alternatives — either use small cage jacks (these are miniature spring loaded sockets) into which wire ended crystals can be plugged (obtainable from Ambit — type CG2), or cut a rectangular hole in the underside of the diecast box along the line of the crystal mountings to allow a soldering iron to be used later (the box mounts against the final chassis so screening won't be affected).

1. Insert and solder Q's 14-23 (2SK55) observing case orientation. Make sure each centre (source) lead is soldered to the top foil.

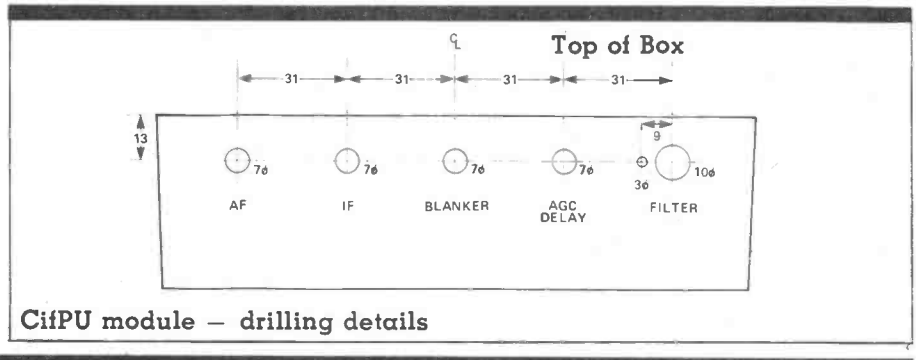
2. Insert and solder all the fixed resistors associated with the oscillators. ie, R's 43-52 (33k), 33-42 (220R), and 69,70. Mount the bodies of vertical resistors in the positions shown.

3. Likewise, mount and solder all fixed capacitors ie, C's 34-43 (10n), 44-53 (see list), 54-63 (2p2), 64-67 (27p), and 83,84,85,98.

4. Next the diodes (D12-21), observing orientation.

5. Insert and solder RFC7 (10uH — marked 100 followed by a letter).

6. Now wind T4 and T5. T4 is wound as a straight transformer with separate primary and secondary using 0.25mm en Cu wire (primary requires a length 12cm long, secondary 4cm). To help you remember which end is which when soldering in, leave the lead slightly longer on the earthy end when stripping off



CifPU module — drilling details