



The VCO module within the synthesiser module.

turns of 36 swg wire tapped at six turns for connection to the collector of Q3. The voltage is stabilised by ZD1, a 30V combination made up of a 27V and 3.3V device in series.

With reference to IC1, the components TRA, TCA, TCB and TCC set up the conditions of the high accuracy analogue phase comparator. Their value depends on the VCO gain (MHz/V) and the step size. In the circuit shown, the values are respectively 18K ohms, 4700pF, 1000pF, 47nF. It is important that the capacitors should be of low leakage variety such as polystyrene.

When altering the synthesiser step interval, in the case of this circuit 1kHz, then the comparator components will also require alteration to produce the best control loop damping.

With regard to Fig 7, the display circuitry, the digit drives are enabled from the digit select outputs on IC2 via PNP emitter followers. A single 4511 connected to the A program bus provide

segment decoding for the common cathode LED display digits. Note that a high pulsing current flows from pin 16 of the 4511 through the LED display to the collectors of the PNP digit drivers which are at ground potential. There should be just two power connection points to the display circuitry: directly to the electrolytic capacitor terminals bridging the synthesiser 10V regulated supply rail. In particular, the integrator circuitry shown in Fig 5 should be separated as far as possible from the display decoding and driving circuitry. Because the VCO has a very high gain — just one millivolt of ripple on the VCO control line will produce 1kHz of frequency modulation on the VCO carrier — the circuitry must be kept away from any stray electrostatic,

magnetic or ground loop fields.

With this one proviso layout is uncritical although good RF practice needs to prevail in the construction of the VCO, buffer amps and ECL prescaler circuitry. For the rest, the prototype was built on matrix pinboard using a wirewrap system.

The raw DC supply to the synthesiser 7" x 4" x 2" in its metal diecast box is 15V from a standard three terminal regulator. It is re-regulated internally using a 5V three terminal device with a 4.7V Zener diode between the ground terminal and ground. This combination provides the 10V required by the synthesiser circuitry and completely isolates the unit from external supply variations. For instance, those which occur during transmit. The synthesiser unit draws around 300mA of current, most of which goes towards operating the display **Part 2, the receiver section, next month together with parts list for the synthesiser module. PCBs will be available in due course.**