

The following sections are added to the HF SSB transceiver 8525B/8528 series Technical Service Manual, Codan part number 15-02036 Issue 6, November 1995.

This information is provided in addition to that existing in Chapter 4, *Local Oscillators*. It explains the operation of the new synthesisers.

Drawings associated with this addendum are:

- RF Mixer and Dual Synthesiser Circuit Diagram 04-03120
- RF Mixer and Dual Synthesiser PCB Assembly 08-05295

Local Oscillators (04-03120)

Two synthesised oscillators are used to drive the first and second mixers. The first oscillator operates between 45.250 MHz and 75 MHz in 2 kHz steps. It converts the 250 kHz to 30 MHz receive signal to 45 MHz for the first IF. The second oscillator operates between 43.350 MHz and 43.352 MHz in 10 Hz steps. It converts the 45 MHz first IF to 1650 kHz second IF.

Each oscillator consists of a:

- voltage controlled oscillator
- phase/frequency detector
- loop amplifier
- filter
- reference crystal oscillator (common)

The division ratios required are provided in serial data form by the microprocessor from data stored in the memory.

The reference frequency crystal Z2 (6600 kHz) is held at a constant temperature by a power PTC thermistor (R100) or by a high stability temperature controlled oven (08-05235). The crystal oscillator provides the reference frequency for the two synthesisers. The reference, after being divided by four (1650 kHz), provides the local oscillator drive to the modulator/demodulator for USB operation.

A 1647 kHz (Z3) crystal oscillator drives the modulator/demodulator stages for LSB operation.

Voltage Controlled Oscillator (VCO)

As VCO1 and VCO2 are very similar, only VCO1 will be described in detail. The differences between the two VCOs are detailed in the table below.

	VCO1	VCO2
Varicaps	D17 to D20	D46 and D47
VCO output to synthesiser input pin 4	Via buffer V41 and coupling capacitor C144	Via R45 and C155
Division ratio	Divides to 2 kHz	1.1 kHz to 2 kHz in 10 Hz steps
Filter components	C127, C129, C181, R79, R99 and C123	C179, R166 and C180
Reference frequency	Reference crystal oscillator (6600 kHz)	6600 kHz obtained from IC2 pin 3 and applied to IC3 pin 1

FET V2 operates as a Hartley oscillator tuned by four varicaps D17 to D20. The output level is kept near constant frequency by a negative bias voltage applied to the V2 gate. This voltage is generated from schottky diode D21 charging capacitor C44.

Unity gain feedback amplifier V3 and V4 provides a buffer between the oscillator and the cascade connected amplifier V5 and V6. The second amplifier provides +7 dBm drive to the ring diode mixer D13. The VCO output is buffered by V41, before being applied to synthesiser IC2 pin 4.

Synthesiser for VCO1

Synthesiser IC2 generates a DC control voltage via the phase/frequency detector and control amplifier. This is applied to the varicaps to lock the VCO1 to the nominated frequency.

The 6600 kHz oscillator, part of IC2, is divided down to a 2 kHz reference frequency. The VCO signal applied to pin 4 of IC2 is also divided to produce 2 kHz when VCO1 is at the nominated frequency. Both of these signals are applied to the phase/frequency detector in IC2.

The phase/frequency detector (IC2) provides two outputs. Pin 14 provides a "go down" pulse. Pin 15 provides a "go up" pulse. These outputs are high (+5 V) when locked, except for a very narrow negative going pulse that occurs simultaneously on both outputs.

V29 and V30 provide a 3 mA discharging current pulse when pin 14 is low. V28, V31 and V32 provide a 3 mA charging current pulse when pin 15 is low.

These current pulses accumulate in the loop filter (C127, C129, C181 and R79). The resulting voltage is applied to the varicaps (D17 - D20) via a filter (R99 and C123). This filter removes any reference components from the control voltage.