

P.E. WIDEBAND H.F. COMMUNICATIONS RECEIVER

By R. HIRST S.T.C. LTD.

PART NINE

LOCAL OSCILLATOR

HAVING described the construction of the three modules that make up the Local Oscillator last month, we must now set them up before installing them in the chassis and completing the final wiring up.

SETTING UP INSTRUCTIONS

Equipment required

- (a) Counter having a range of 2MHz to 70MHz.
- (b) Power Supply to give 24 volts at 100mA.
- (c) Valve voltmeter covering the range 2MHz to 70MHz with a sensitivity of 10mV at not less than 1 kilohm impedance.

PROCEDURE

Variable Oscillator Module

Short PL1/e to PL1/f and apply a positive voltage of 24 volts to PL1/g and the negative of the power supply to earth. Check all the potentials at the base, collector and emitter of the transistors to ensure that they correspond with those indicated in Table 9.1. If these voltages are correct adjust VC1 for maximum capacity (capacitor vanes fully meshed) and connect a counter to SK1. Adjust each coil in turn, starting with L1 so that the output frequencies correspond with those indicated in Table 9.2. To do this the link between PL1/e and f must be removed and each pin shorted to PL1/f in turn.

Crystal Oscillator Module

Apply a positive voltage of 24V to the correct terminal and the negative of the power supply to the earth terminal. Check all the potentials at the base, collector and emitter of all the transistors to ensure that they correspond with those indicated in Table 9.1. If these voltages are correct replace the crystal with the capacitor resistor network shown in Fig. 4.4a. Connect the counter to the output socket, SK2 and adjust the frequency with L6 to read 34MHz as near as

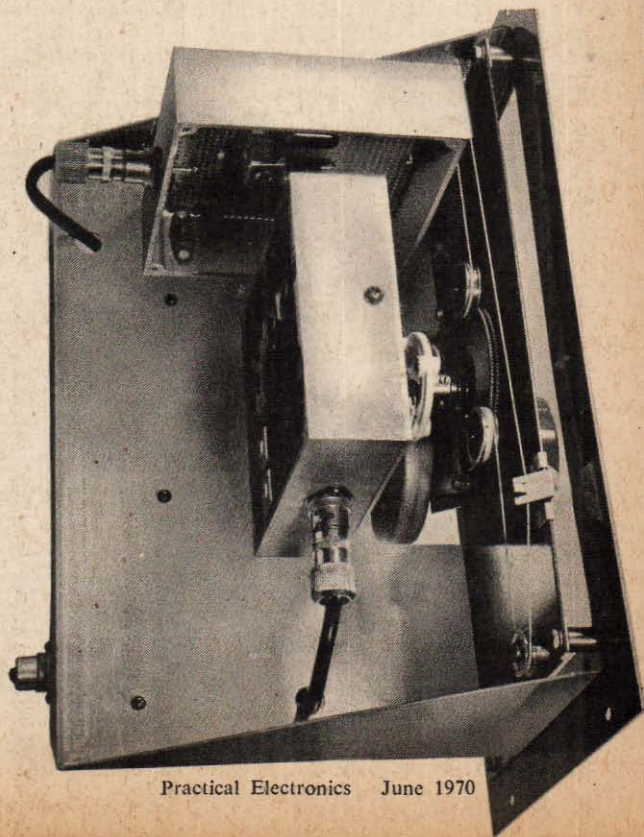
possible. Reconnect the crystal, removing the resistor capacitor network, and check the output frequency. Adjust the capacitor VC2 until the output frequency is as near 34MHz as possible. Finally, the output voltage at SK2 should be checked with a valve voltmeter to ensure that the output is approximately 0.5 volts at 34MHz when terminated in a 50 ohm load.

Mixer Module and High Pass Filter

Apply a positive voltage of 24 volts to the correct terminal and the negative of the power supply to the earth terminal. Check all the potentials at the base, collector and emitter of all the transistors to ensure that they correspond with those indicated in Table 9.1. If these are correct, inject a signal at 34MHz into C14 and adjust L7 and L8 for minimum signal at the output socket SK3 by connecting a valve voltmeter across the output. These adjustments should be carried out two

Table 9.1. D.C. VOLTAGES

Stage	Base	Collector	Emitter
TR1	3V	7.7V	2.3V
TR2	5V	10.4V	4.4V
TR3	1.25V	4.5V	0.5V
TR4	4.5V	7V	3.8V
TR5	7V	9V	6.1V
TR6	4.8V	15V	4.2V
TR7	6.5V	15V	5.8V
TR8	4.1V	13V	3.4V
TR9	13V	8.3V	0.5V
TR10	8.3V	16.5V	7.5V



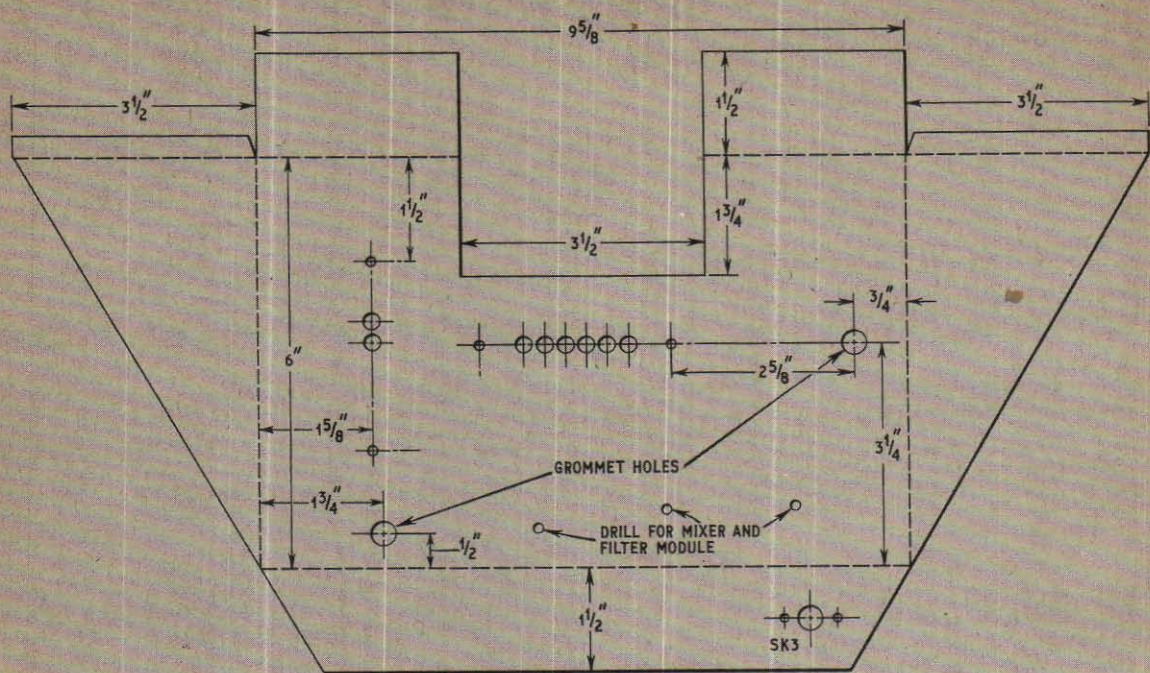


Fig. 9.1. Local oscillator chassis details

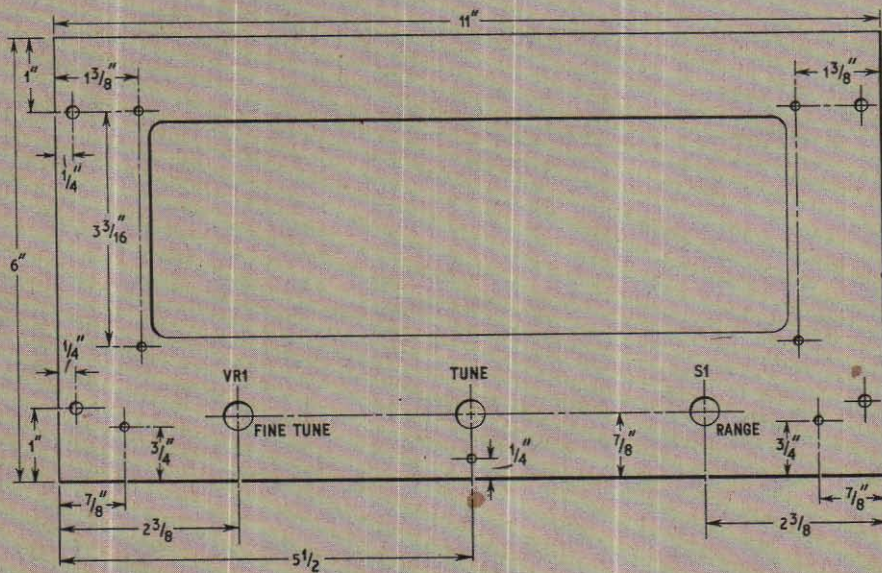


Fig. 9.2. Front panel cutting and drilling details

COMPONENTS . . .

LOCAL OSCILLATOR

VR1 100Ω wirewound potentiometer
 S1 5 way single pole wafer switch
 Eddystone dial assembly No. 898
 Insulated flexible spindle connector
 Imhoff cabinet and chassis type I690C and BC511
 Knobs to match receiver unit (2 off)
 Coaxial plugs (3 off)
 Coaxial lead

CHASSIS ASSEMBLY

Details for the cutting and drilling of the chassis unit and front panel are shown in Figs. 9.1 and 9.2. The modules are arranged and wired up as shown in Fig. 9.3.

The wiring to the range switch should be kept clear of the chassis and stiff wire should be used to ensure that these wires remain in position. The mixer module, on the underside of the chassis, is also mounted about half an inch away from the chassis, to avoid the introduction of stray capacity due to the proximity of the chassis acting as an earth return. As previously indicated, if it is found to be advantageous to use the 24 volt supply from the main receiver, it will be necessary to fit a two pin plug and socket arrangement to the receiver and the oscillator unit. This had not been included in the diagrams as some constructors may wish to use the local oscillator unit as a signal generator or, if they have an oscillator of the required frequency range, use that as the signal source for the main receiver.

MAIN CHASSIS SETTING UP

Having mounted all the modules and components, the pointer on the dial should be set to the extreme left. The vanes of the capacitor VC1 should be fully meshed and the flexible link connecting the dial assembly to the spindle of VC1 should be locked. It may be desirable to put a counter on the output of the variable oscillator module during this adjustment to ensure that when VC1 is fully meshed the frequencies on each range, with the dial pointer at zero, correspond to those indicated in Table 9.2. It must be remembered that the frequencies coming out of the output socket on the main chassis are 34MHz higher than those coming out of the variable oscillator module or indicated on the dial, in other words the frequency is offset by the value of the first i.f.

Next month: a.g.c. unit and dial calibration

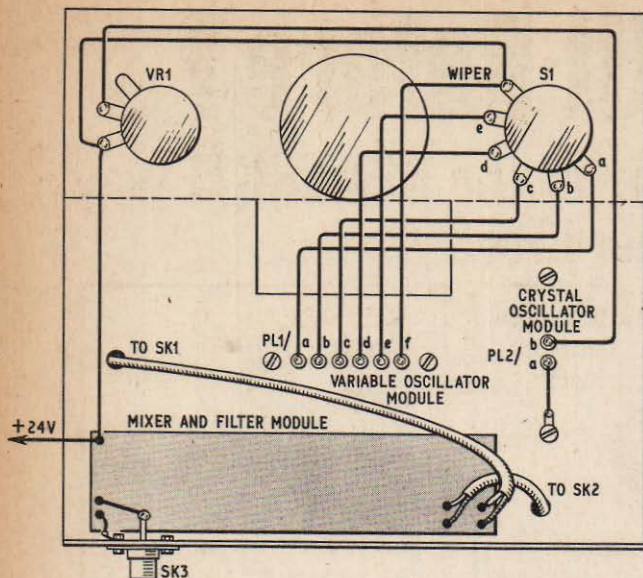


Fig. 9.3. Local oscillator inter-module wiring

or three times as there will be some interaction between the two coils and each successive adjustment should improve the rejection. When this module is finally connected into the chassis assembly the following procedure should be carried out.

Connect the inputs to SK1 and SK2 and then reduce or increase C14 until the output signal, measured with a valve voltmeter across SK3, terminated in a 50 ohm load, is 1dB less than the maximum attainable. This is best carried out when the variable oscillator module is set to 30MHz. Leaving the valve voltmeter connected across SK3, swing the variable oscillator over its full frequency range from 2MHz to 30MHz and ensure that the output voltage at SK3 is not less than 0.4 volts or more than 0.8 volts. If the level is too high introduce a resistor (R19) into the base circuit of TR7 until the signal level at 30MHz—2MHz on the dial—measured across the output socket SK3 is 0.8 volts. If the level of the signal across SK3 at 64MHz—30MHz on the dial—is less than 0.4 volts, introduce C32 and adjust the value until the output at 64MHz is 0.4 volts. Recheck the output at 36MHz to ensure that this has not increased to more than 0.8 volts.

Table 9.2. FREQUENCIES CORRESPONDING TO MAXIMUM VALUE OF VC1

Range	Frequency
A	2MHz
B	3.2MHz
C	5.0MHz
D	8.5MHz
E	16MHz

