CRYSTAL CONTROLLED OSCILLATORS OS2/12 SERIES

Introduction

Each oscillator in the OS2/12 series operates at a fixed frequency in the range 78-110 MHz and produces a sine-wave output typically between 200 and 300 mV. The frequency is determined by a crystal inside an oven. To cover the specified range the individually-coded item is available with alternative inductor values suited to nominal spreads of 78-95 MHz and 95-110 MHz.

All the coded variants are of similar mechanical construction and are developments of the OS2/12 circuit. Table 1 lists the series and the main differences. The oscillator requires about 20 mA from an external stabilised 12-volt supply, while the oven needs an independent supply the form of which depends on the installation requirements.

Table 1

Code	*Z Out (ohms)*	*Output Terminations*	**Available Oven Temp. Control*	*Earthed Supply Pole*
OS2/12	50	Three coax. sockets	N or C	Pos.
OS2/12E	75	One coax. socket	N or C	Pos.
OS2/12J	75	Lead-through tag plus mon. socket	N or C	Pos.
OS2/12K	75		N only	Pos.
OS2/12L	75		N or C	Neg.
OS2/12M	75		N only	Neg.

*N and C denote *normal* and *close* respectively.

Mechanical Details

Two printed wiring boards are used, one for the oscillator stage and one for the output stages. They are mounted inside a copper box about 3·25 in. by 2·5 in. by 1·5 in. One of the larger faces carries an international octal valveholder into which the oven, containing the crystal, is plugged. The opposite face carries lead-through terminals for external connections.

Circuit Description

Typical circuits for both positive- and negative-earthed supply versions are given in Figs. 1 and 2 respectively; these drawings show also the details applicable to related variants.

TR1 is used in a modified Colpitts oscillator circuit in which the collector circuit, L1, C3 and C4, is tuned to the fifth overtone of the crystal in the emitter circuit. The operating frequency can be varied slightly by adjustment of C5 and C6. Inductors L2 and L5, when fitted, are effectively in parallel with the crystal self-capacitance, to produce a high-impedance circuit which inhibits a tendency to spurious oscillation.

The oscillator-stage output is passed to a two-stage buffer amplifier TR2 and TR3. The tuned collector load of TR3 is arranged to give the required output impedance, via a capacitive tap, by adjustment of both L3 and C12 to maintain resonance at the oscillator frequency.

The heating arrangements for the Salford Electrical Instruments Ltd. oven, Type QC 940B, are indicated in Figs. 1 and 2. For *normal* working a 6·3-volt a.c. supply is connected to terminals 3 and 7 and the temperature is then controlled by the internal thermostat. For *close* temperature control a thermistor is fitted inside the oven and used with an external controller such as the UN1/15. The heater supply from the control unit is connected to terminals 1 and 3 and the thermistor is connected to the control unit via terminals 4 and 6.

Maintenance Notes

Frequency Adjustment

The normal method of adjusting the oscillator frequency is to reset C5. If a change of crystal is necessary, the following procedure is recommended to make allowance for a possible change of crystal characteristics with age and to ensure that oscillation will restart when the power supply is cut and reconnected.

1. Connect instruments to measure output level and frequency.
2. Set C5 to the centre of its range.
3. Adjust L1 over the full range of possible operating frequencies for the particular

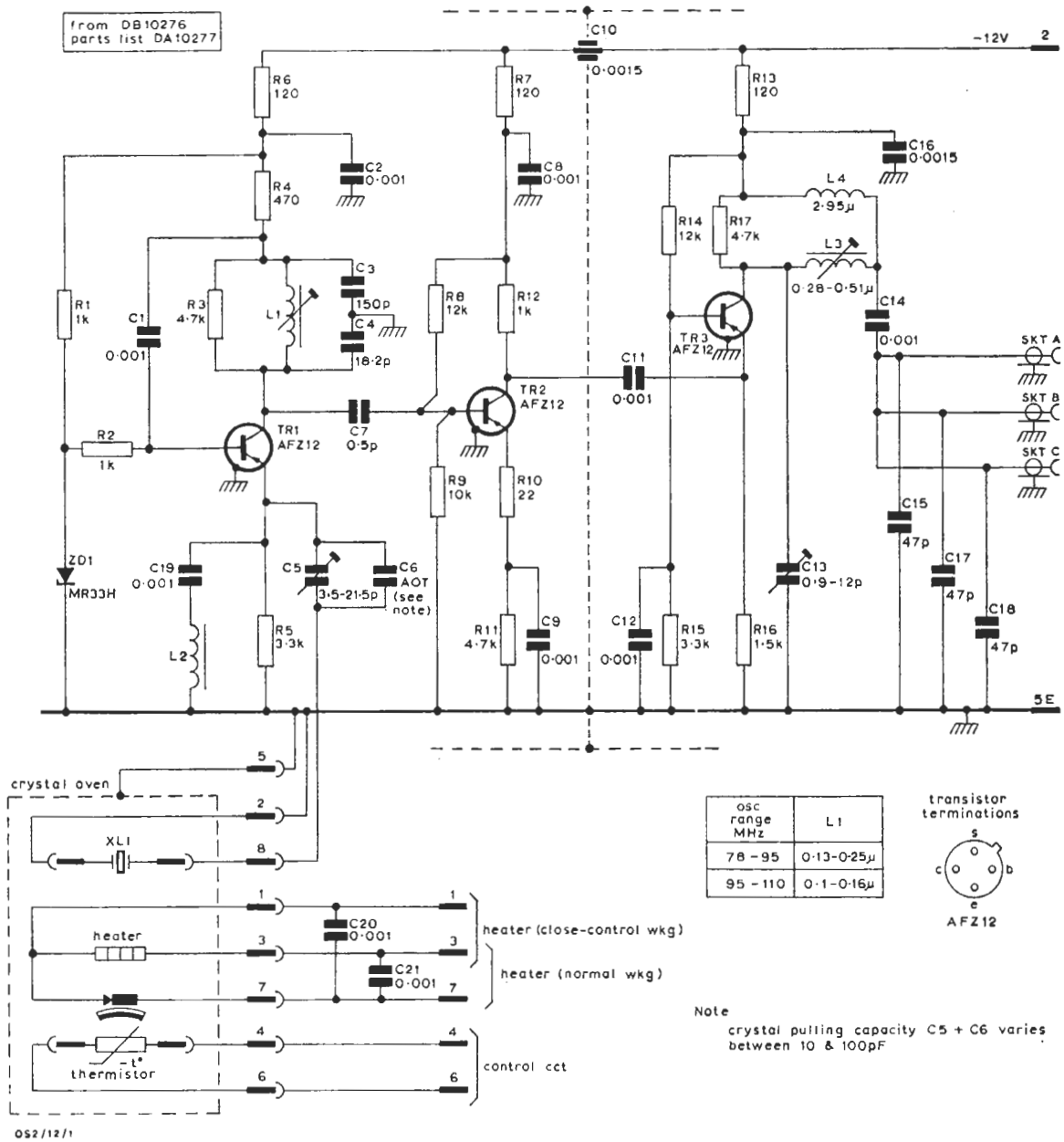
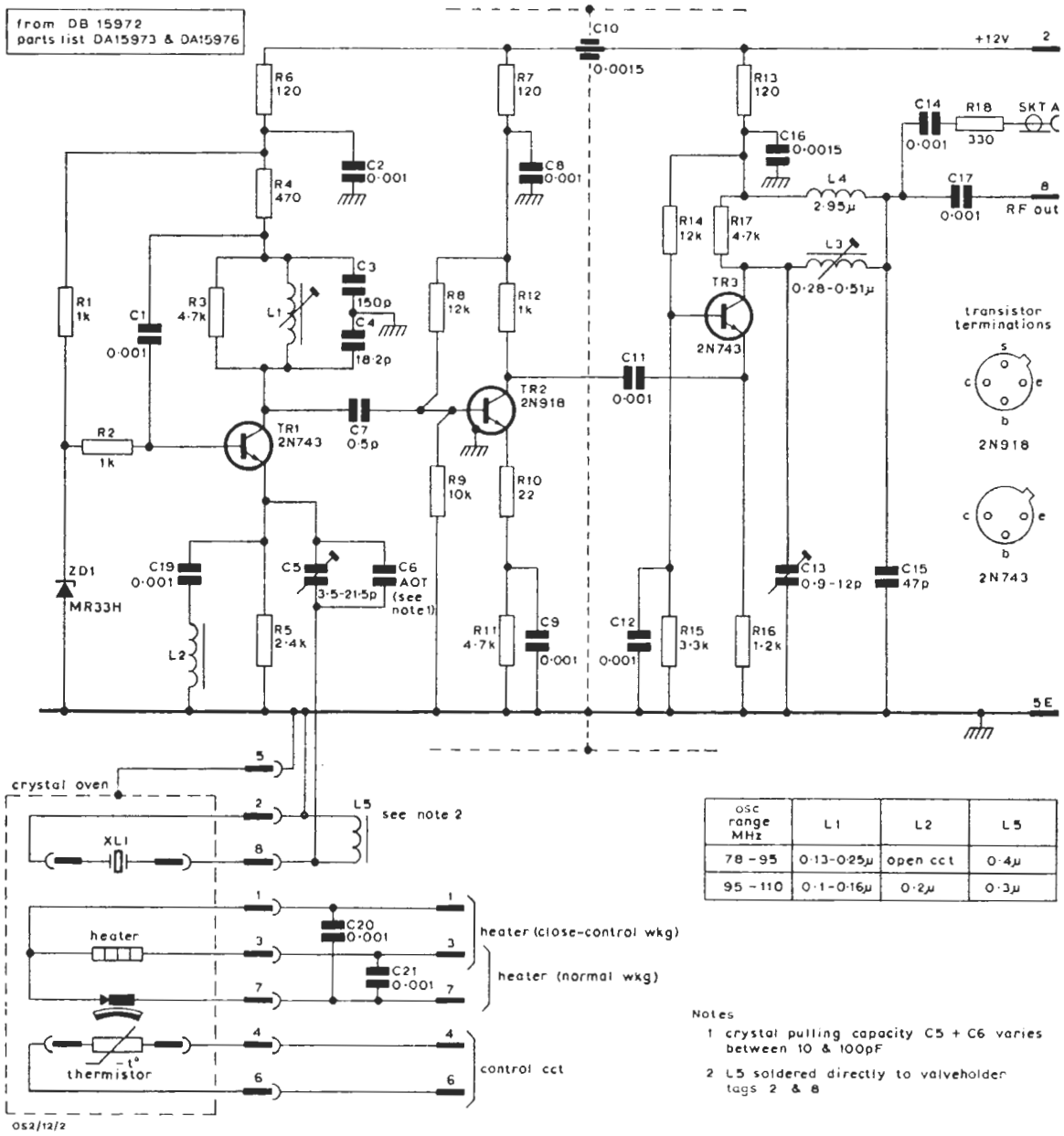


Fig. 1. Circuit of the OS2/12

Note: The E, J and K versions are similar; for details see Table 1



osc range MHz	L1	L2	L5
78 – 95	0·13-0·25μ	open cct	0·4μ
95 – 110	0·1-0·16μ	0·2μ	0·3μ

Notes

1 crystal pulling capacity C5 + C6 varies between 10 & 100pF

2 L5 soldered directly to valveholder tags 2 & 8

Fig. 2. Circuit of the OS2/12L
Note: OS2/12M differs only in omission of thermistor

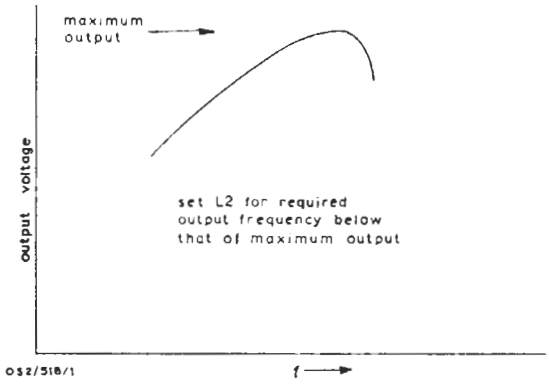


Fig. 3. OS2/12 Series: Output Voltage/Frequency Characteristic obtained by Adjustment of L1

crystal in use and plot a curve of output voltage against frequency. This curve should have a shape similar to that of Fig. 3, illustrating a rapid fall-off in output at the high-frequency end of the range.

4. If the required output frequency is on the low side of peak-output frequency the crystal is suitable and L1 can be set to produce the correct frequency. Otherwise repeat the procedure to find a suitable crystal.

The frequency can be varied slightly by changing the oven temperature in oscillators used with *close* control. If this method is employed, make sure that the oven temperature setting is always higher than the likely maximum ambient temperature by at least 5 degrees C.

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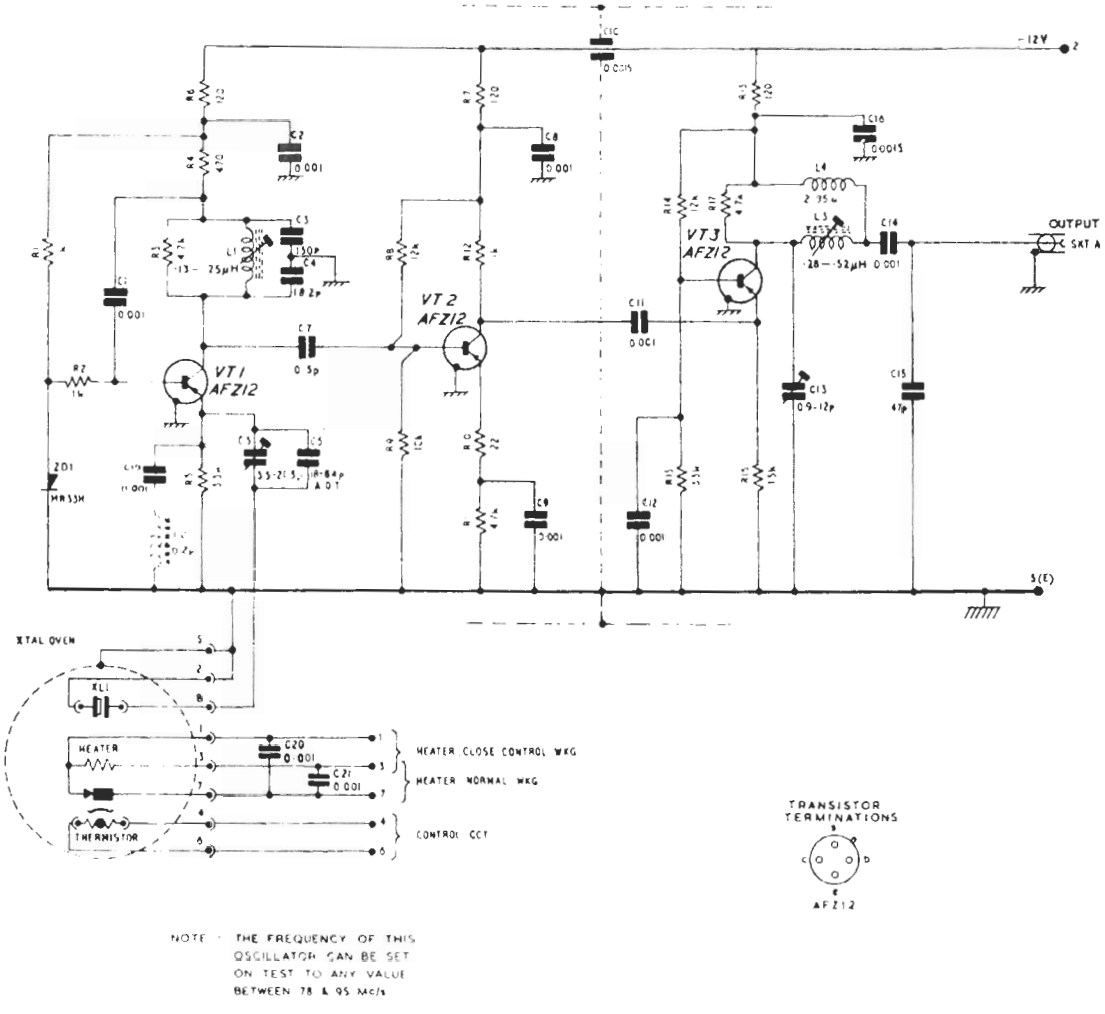
FIG I
(AUG 64)



NOTE : THE FREQUENCY OF THIS OSCILLATOR CAN BE SET ON TEST TO ANY VALUE BETWEEN 78 & 95 Mc/s

FIXED FREQUENCY OSCILLATOR OS2/12E