

## CRYSTAL CONTROLLED OSCILLATORS OS2/518 and OS2/519 SERIES

**Introduction**

Each oscillator in these series operates at a fixed frequency in the 52 to 110 MHz range and produces a sine-wave output of at least 100 mV.

The OS2/518 series covers the frequency range in four bands and for each of these the frequency-determining crystal can be either at ambient temperature or inside a temperature-controlled oven. The codes applicable to each version are given in Table 1.

**Table 1**

Frequency Band (MHz)	Ambient Crystals	Oven Crystals
52 to 64	OS2/518A	OS2/518E
64 to 78	OS2/518B	OS2/518F
78 to 95	OS2/518C	OS2/518G
95 to 110	OS2/518D	OS2/518H

The OS2/519 is electrically identical to the ambient-crystal versions of the OS2/518. The main difference is in the dimensions of the printed wiring board which are  $3\frac{1}{2}$  in. by  $2\frac{1}{2}$  in. for the OS2/518 and  $3\frac{1}{8}$  in. by  $3\frac{1}{8}$  in. for the OS2/519.

The mounting arrangements for the crystal oven depend on the application and are part of the mechanical detail of the parent unit.

The oscillator requires about 14 mA from an external stabilised 12-volt d.c. supply and an additional power source is needed for the oven-crystal types.

**General Specification**

Frequency Range	OS2/518 Series: see Table 1. OS2/519: 52 to 110 MHz in four bands, as in Table 1.
Output Voltage	100 mV minimum; typically between 200 and 300 mV.
Output Impedance	Normally 50 ohms but can be adjusted to 75 ohms.

**Frequency Stability**

Ambient crystal types	3 parts in $10^6$ for ambient temperatures 0 degrees C to 40 degrees C.
Oven crystal types	1 part in $10^6$ for ambient temperatures -10 degrees C to 40 degrees C.

**Circuit Description**

The circuit diagram, with details of all variants, is given in Fig. 1.

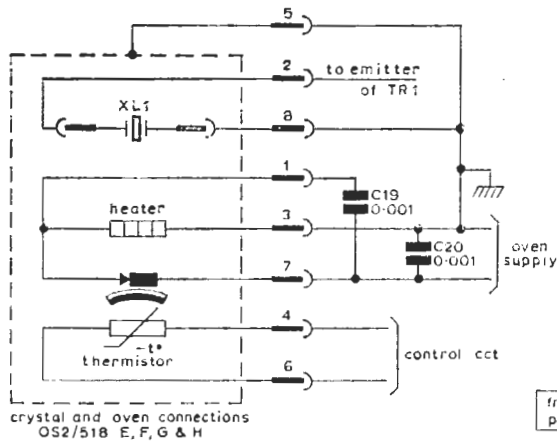
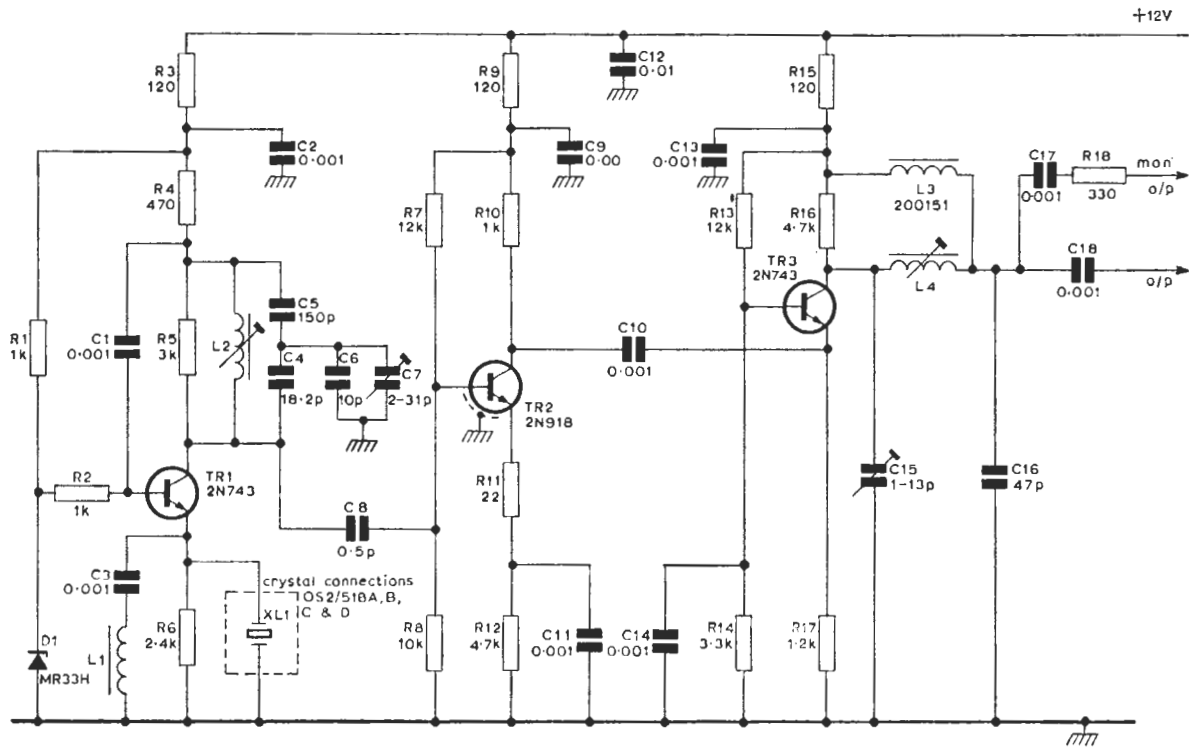
TR1 is used in a modified Colpitts oscillator circuit in which the collector circuit, L2, C4 and C5, is tuned to the fifth overtone of the crystal in the emitter circuit. The operating frequency can be varied slightly by adjustment of C6 and C7 which are effectively in series with the crystal. The crystal self-capacitance and strays are shunted by L1 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 L4 and C15 to maintain resonance at the oscillator frequency.

The heating arrangements for the Salford Electrical Instruments Ltd. oven, Type QC 940B (modified), are indicated in Fig. 1. For *normal* working a 6.3-volt a.c. supply is connected to terminals 1 and 7 and the temperature is then controlled by the internal thermostat. For *close* temperature control the thermistor fitted inside the oven is used with an external controller such as the UNI/15. The heater supply from the control unit is connected to terminals 3 and 7 and the thermistor is connected to the control unit via terminals 4 and 6. With this arrangement the maximum controlled temperature is limited by the thermostat. If a higher temperature is required the thermostat can be disabled by short-circuiting terminals 1 and 7.

**Maintenance Notes****Frequency Adjustment**

The normal method of adjusting the oscillator frequency is to reset C7. If a change of crystal is



from D19697 A3  
parts list D19698 A4

ambient  
temp crystals

oven temp  
crystals (75°C)

OS2/518	f(MHz)	L 1	L 2	L 4
A	52-64	L/714	L/658	L/662
B	64-78	L/350	L/786	L/662
C	78-95	L/748	L/885	L/663
D	95-110	L/223	L/689	L/663
E	52-64	L/350	L/658	L/662
F	64-78	L/748	L/786	L/662
G	78-95	L/223	L/885	L/663
H	95-110	L/156	L/689	L/663

transistor  
terminations



OS2/518/2

Fig. 1. Circuit of the OS2/518 and OS2/519

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 C7 to the centre of its range.
3. Adjust L2 over the full range of possible operating frequencies for the particular crystal in use and plot a curve of output voltage against frequency. This curve should have a shape similar to that of Fig. 2, 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 L3 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

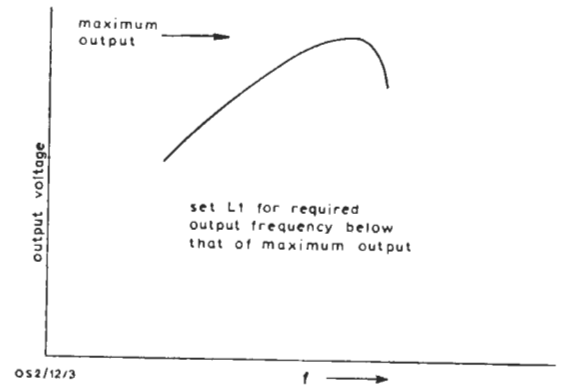


Fig. 2. OS2/518 and OS2/519 Series: Output Voltage/Frequency Characteristic obtained by Adjustment of L2

that the oven temperature setting is always higher than the likely maximum ambient temperature by at least 5 degrees C.

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