

CRYSTAL CONTROLLED OSCILLATORS OS2/20 AND OS2/20A

Introduction

The OS2/20 is a fixed-frequency oscillator which can deliver an output typically between 200 and 300 mV at any frequency in the range 78 to 95 MHz. The output impedance is adjusted on test to 75 ohms. The frequency is determined by a series-resonant crystal contained in a temperature-controlled oven. The difference between the OS2/20 and OS2/20A is in the method of controlling

the oven temperature. The unit is constructed in a copper box BX1/4, one side of which carries an octal socket into which the crystal and oven are plugged. A stabilised power supply of 12 volts at about 20 mA is required from an external source.

Circuit Description

The circuit diagram, Fig. 1, shows TR1 in a modified Colpitts oscillator circuit in which the

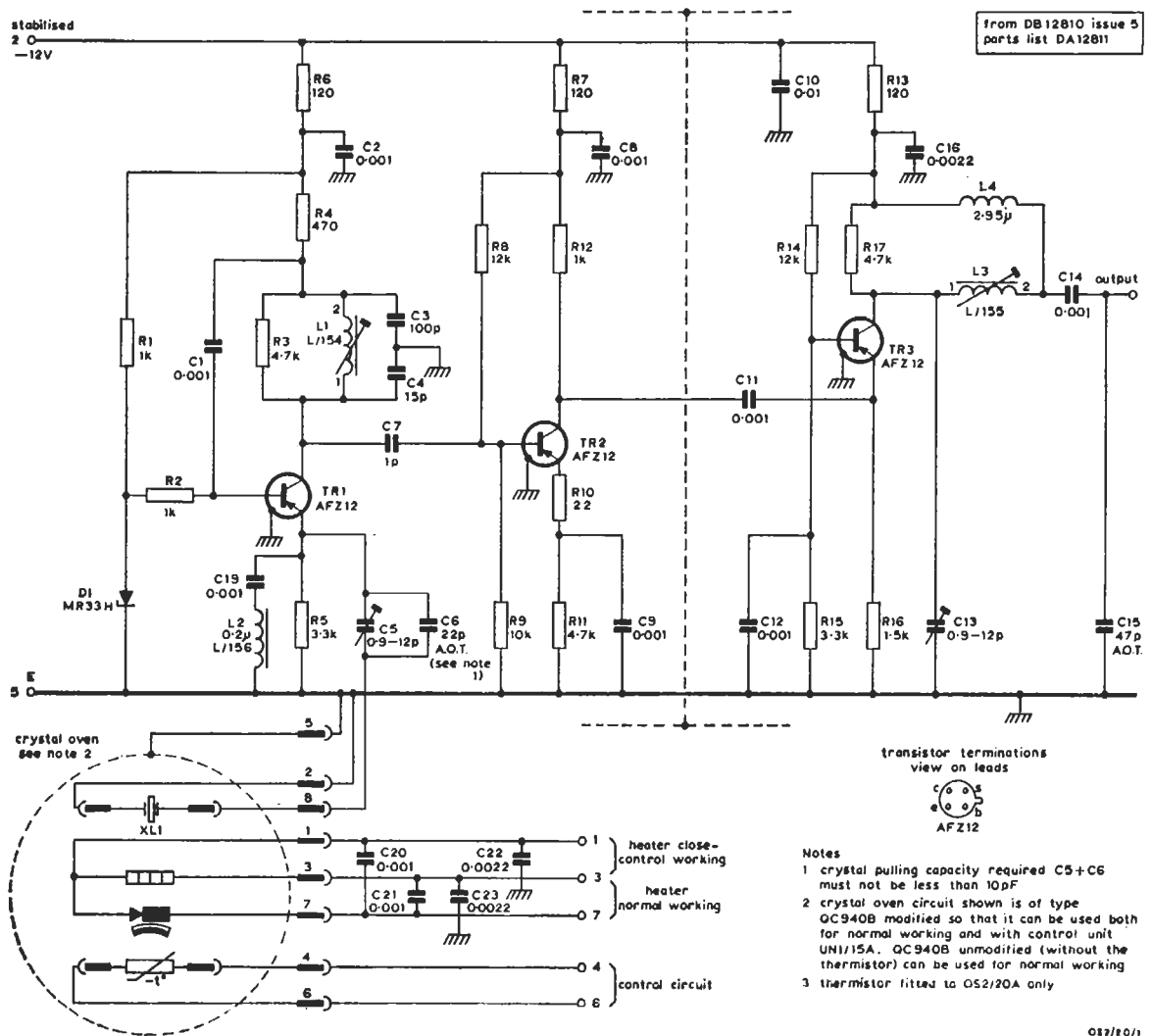


Fig. 1 Circuit of the OS2/20 and OS2/20A

collector tuned circuit, L1, C3 and C4. ensures that the crystal operates on its fifth overtone. L2 is effectively in parallel with stray capacitance and crystal self-capacitance in order to produce a high-impedance resonant circuit which inhibits a tendency to spurious oscillation. A hole in the box lid allows access to C5 for fine frequency adjustment.

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 unit and output impedance of 75 ohms, via a capacitive tap, by adjustment of both L3 and C13 to maintain resonance at the oscillator frequency.

The heating arrangements for the Type QC 940B oven (Salford Electrical Instruments Ltd.) in both the OS2/20 and OS2/20A are indicated in Fig. 1. In the OS2/20 a 6.3-volts a.c. supply is connected to terminals 3 and 7 and the temperature is then controlled by the internal thermostat. The OS2/20A has its oven temperature controlled by an external unit such as the UN1/15. This requires the inclusion of a thermistor inside the oven. The heater supply from the control unit is in this instance 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 aging and to ensure that oscillation will restart when the power supply is cut and reconnected.

1. Connect instruments to measure output voltage 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 crystal in use and plot a curve of output voltage against frequency. This curve should have a shape similar to that shown in Fig. 2 and indicates a rapid fall-off in output at the high-frequency end of the range.
4. If the required output frequency is on the low-frequency side of peak output, the crystal is suitable and L1 can be set to produce the correct frequency. Otherwise, repeat the procedure to find a suitable crystal.

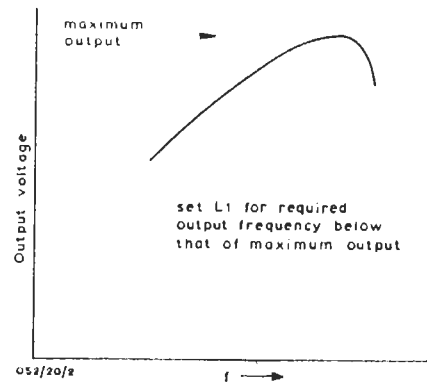


Fig. 2 Typical Voltage/frequency Response Curve for Adjustment of L1

The frequency of the OS2/20A can be varied slightly by changing the oven temperature. If this method is employed, make sure that the oven-temperature is always higher than the likely ambient-temperature maximum, by at least 5 degrees C.

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