OSCILLATOR AND MULTIPLIER OS2/511

Introduction

The OS2/511 is a crystal controlled oscillator for use in Band IV and Band V. It gives an output of approximately 1 volt r.m.s. from a 50-ohm BNC socket on the front panel.

The unit is built on a printed board mounted in a screened plug-in chassis type CH1/39A, with index pegs 16 and 21.

General Specification

Output across 50 ohms	Adjustable to 1 volt r.m.s.
Output Frequency	Between 500 and 900 MHz
Frequency Stability, 0°C to 55°C	±10 kHz on nominal frequency
Level Stability, 0°C to 55°C	±1·5 dB
Spurious Signals	More than 50 dB down on 1 volt r.m.s.
Power Requirements	25 volts, 50 mA, −ve earth
Weight	2¼ lb.

Circuit Description

The circuit diagram is given in Fig. 1 on page 3. TR1 is a Colpitts type oscillator. C3 and C4 control the feedback and the crystal determines the frequency in the range 50 MHz to 75 MHz. The output is adjusted to be a maximum by varying L2. Capacitor C5 approximately matches the oscillator to the 6dB 50-ohm pad consisting of R5, R6 and R7. The output from the pad is about 0·5 volt r.m.s. across a 50-ohm load.

TR2 is a multiplier stage, doubling for Band IV and tripling for Band V. The gain of this stage is controlled by TR4, which acts as a variable resistance between the emitter of TR2 and ground. TR4 also provides some temperature compensation for TR2, offsetting a decrease in output with increasing temperature. The compensation occurs because of increasing leakage current with temperature in TR4. This leakage current, passing through R19, increases the forward bias on TR4 thus lowering its effective resistance. The output from the multiplier stage is about 1 volt r.m.s. across 50 ohms in the range 125 MHz to 225 MHz.

TR3 is a common emitter amplifier which drives a varactor quadrupler stage. An output of about 2·5 volts across 50 ohms is provided. There is a test point for monitoring purposes.

The varactor stage, which is built round the diode D3, has a highly non-linear current-voltage relationship. The input drive at frequency f is matched into the diode by means of L13, C25 and C38 with some temperature compensation by C26. L14 and C27 form a parallel circuit resonant at the output frequency 4f so that the input circuit of the stage does not shunt the diode at the output frequency. Similarly, L15, C28 and C43 prevent the output circuit (4f) from shunting the diode at the input frequency (f). C29, D3 and L16 are series resonant at 2f. The output circuit consisting of C30, L17, C32 and C31 matches the diode to 50 ohms at 4f. The output of the varactor circuit is about 1·2 volts r.m.s. into 50 ohms. A monitoring test point is provided.

The output bandpass filter, consisting of L20, C35, L21 and C36, has a loss of about 1 dB so that the signal level at the output terminal of the unit is normally about 1·1 volts r.m.s. into 50 ohms.

Maintenance

Not required.

References

Designs Department Specification No. 6.112(66)
AIB 10/68

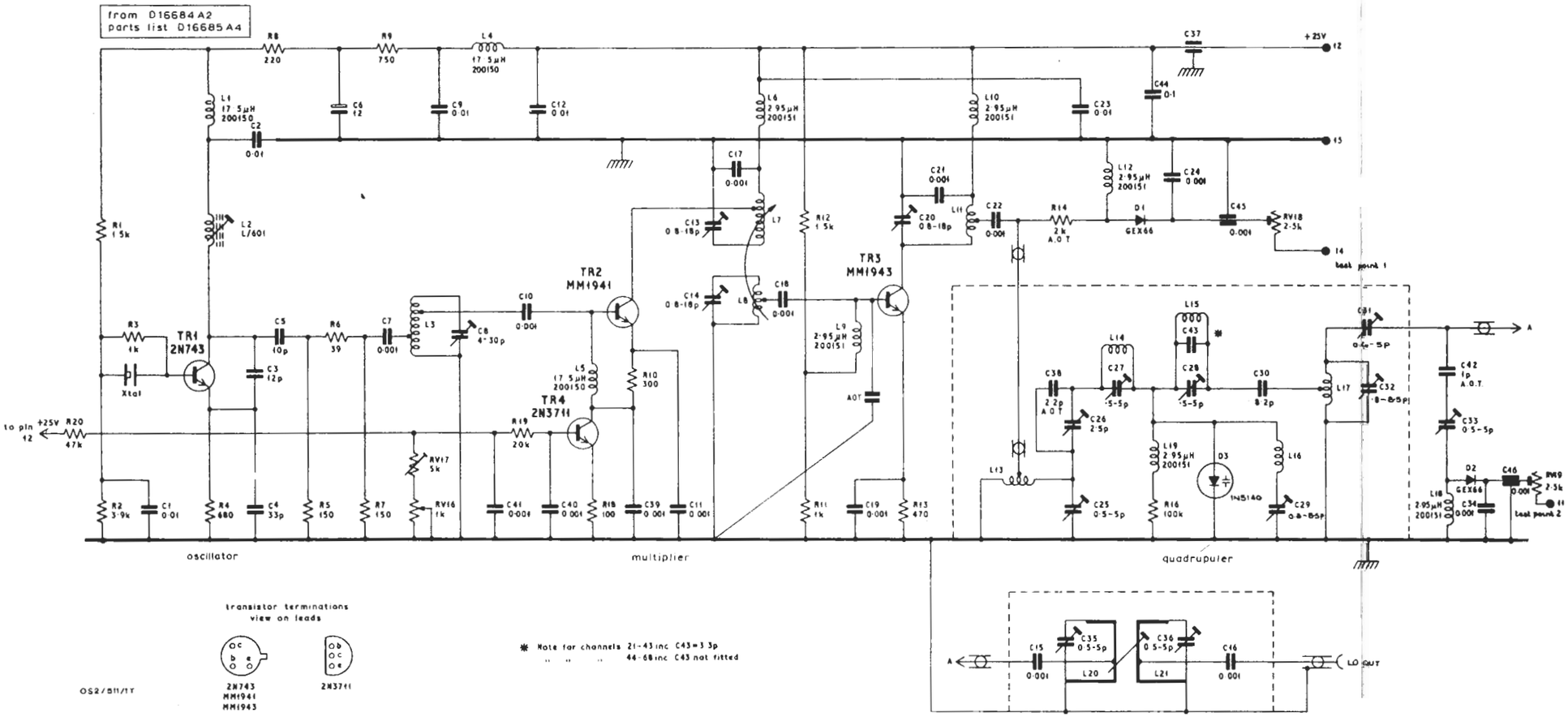

Fig. 1 Circuit of the OS2/511