Chapter 18

OSCILLATOR UNIT TYPE 334

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LEADING PARTICULARS

Purpose of unit	Second local oscillator for the ILS glidepath receiver
Type of oscillator	Crystal controlled pentode oscillator and frequency doubler
Generated frequency	15·8 Mc/s
Output frequency	47·4 Mc/s
Power supplies:—	
HT	200V at approximately 6 mA
LT	6·3V at approximately 0·3A
Stores Reference	10V/646

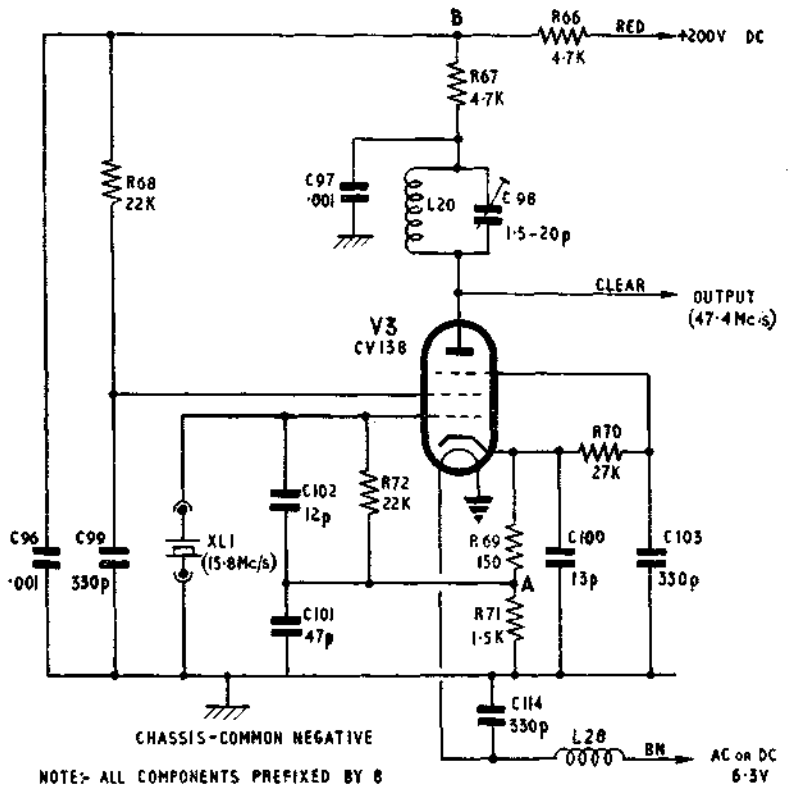

Fig. 1. Oscillator unit Type 334—circuit

INTRODUCTION

1. The oscillator unit Type 334 is the second local oscillator of the ILS glidepath receiver, receiver unit Type 119. The oscillator unit is a crystal controlled pentode oscillator in which a 15·8 Mc/s crystal is used in its fundamental mode. The valve is used also as a frequency trebler, the anode circuit being tuned to 47·4 Mc/s.

2. The oscillator circuit, shown in fig. 1, is a cathode-coupled, crystal excited, triode, the screen grid acting as the triode anode. The multiplier section of the circuit utilizes the pentode connection of the valve. The capacitors C101 and C102 form the coupling network between the crystal and the valve. Bias is provided by resistor R69 and also by the grid current action on C102 and R72. The

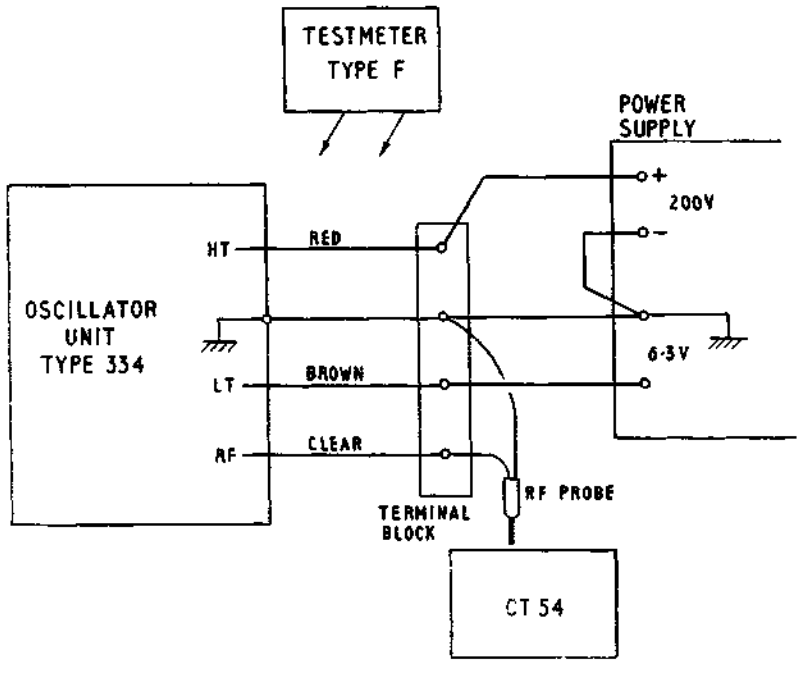

Fig. 2. Test rig connections

suppressor grid potential is held at the same level as that of the cathode by R70. C103 is the suppressor grid bypass capacitor.

3. The tests to be performed on this unit, which is supplied as a complete spare, are to ensure that the general electrical performance of the unit is up to standard.

Test equipment

4. The test equipment required for the complete testing of this unit is :—

(1) Power supply unit giving 6·3V at 0·3A (AC or DC)
(2) Power supply unit giving 200V at approximately 6 mA.
(3) Valve voltmeter CT54.
(4) Multimeter Type 1 (or testmeter Type F)

5. The unit should be connected to the test equipment at the points quoted in Table 1. A suitable test rig circuit is given in fig. 2.

TABLE 1

Connections to oscillator unit

(1)	Red lead	HT+200V
(2)	Brown lead	LT (live) 6·3V AC or DC
(3)	Chassis	common HT–LT connection
(4)	Polythene covered lead	"Live" probe terminal of the CT54 valve voltmeter "earth" terminal to chassis

TEST PROCEDURE

6. Set the FUNCTION switch of the CT54 to RF PROBE and the RANGE switch to 24V.

7. Switch on the power supplies to the unit and CT54; insert the 15·8 Mc/s crystal into the sockets on the unit.

8. Rotate the trimmer C98 through the whole of its travel and ensure that the vanes of the trimmer do not short-circuit at any position. This may be observed by watching the CT54 meter whilst rotating the trimmer, if the reading of RF output voltage should fall suddenly, then it is likely that the trimmer vanes are shorting at that point.

9. Rotate the trimmer C98 again through the whole of its travel and ensure that there are two distinct positions at which the CT54 meter reading reaches a maximum value. The reason for this is that if there is only one "maximum" position, for example, at the fully-meshed position of the trimmer, then it is highly probable that the true tuning point requires a capacitance greater than that provided by the trimmer.

10. Adjust the trimmer to the position which gives a maximum reading on the CT54 and ensure that this reading is greater than 13V RMS.

11. The unit is suitable for inclusion in a receiver unit Type 119 if it passes all the above tests.

FAULT DIAGNOSIS

12. If the unit fails to give the correct results when subjected to the tests described in para. 7 to 10, first ensure that the power supplies are at the correct levels, next, test the crystal fitted to the unit.

13. To test the crystal, set up a crystal activity tester, test set Type 193A, as follows :—

(1) Set the X scale 7 K.
(2) Adjust the amplitude control to give a convenient reading on the tester meter, for example 50 μA.
(3) Set the selector switch to 30 pF.
(4) Plug the crystal to be tested into the two-pin socket and note the reading on the meter; this must not be less than the reading to which the test set was adjusted in (2).

14. Crystals giving a reading lower than the reference reading in para. 13 should be rejected as unserviceable.

15. One possible cause of low output from the unit is squegging, which may be due to an unserviceable crystal. One further cause is poor contact between the crystal and its holder or the valve 8V3 and its holder. A further, though less likely cause, is an increase in the value of the resistor R72; this should be 22K but an open-circuit or high value could cause squegging.

Circuit operating voltages

16. The voltages to be expected in a serviceable unit are listed in Table 2. The circuit reference points used in this Table correspond with those marked on the circuit diagram of fig. 1. The points "A" and "B" are shown ringed on fig. 3, the component layout diagram.

TABLE 2

Circuit operating voltages

Test point	Fig. 1 reference	Voltage
HT feed	Point B	176V
Anode	Pin 5	170V
Suppressor	Pin 6	0
Screen	Pin 7	150V
Cathode	Pin 2	8V
Cathode cct tap	Point A	7·2V
Heater	Pin 3	6·3V
Heater	Pin 4	0

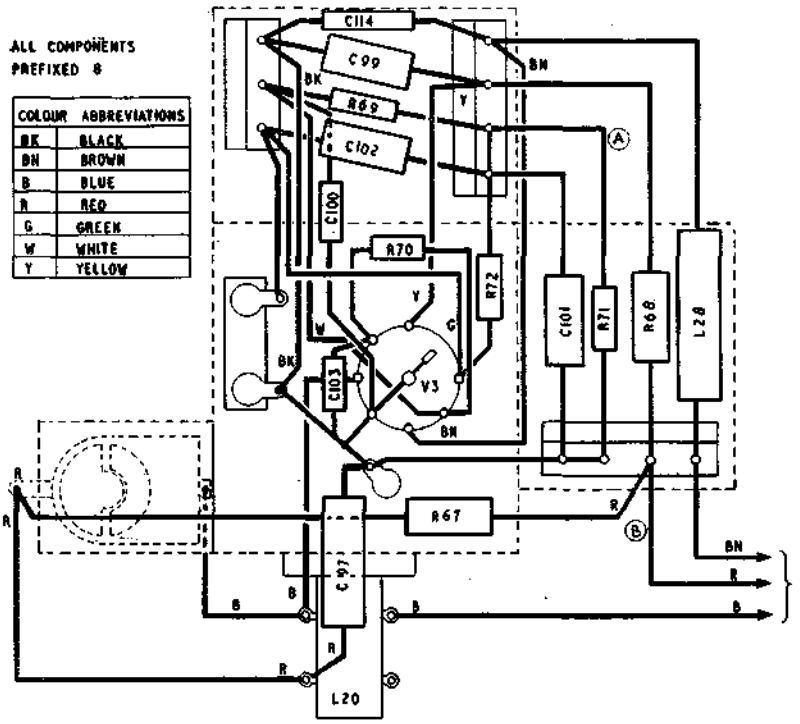

Fig. 3. Layout of components

RF voltage tests

17. As an aid to the tracing of faults in the unit the following test figures to be expected in a serviceable unit have been included. Tests should be made with a valve voltmeter CT54 using the RF probe and the shortest possible connections.

18. The voltage at the cathode connection should be of the order of 2V RMS. The voltage at the grid, pin 1 of the valveholder should be of the order of 5V RMS.

Renewal of components

19. Owing to the small size of the chassis and components used in the oscillator unit, when removing a faulty component, the wire to the component should be cut rather than unsoldered as the latter process may result in damage by heat to other components of the unit. This is particularly important in the case of the valveholder which is not readily renewable.

20. The fitting of any new part to the chassis should be followed by the tests and adjustments described in para. 7 to 10.