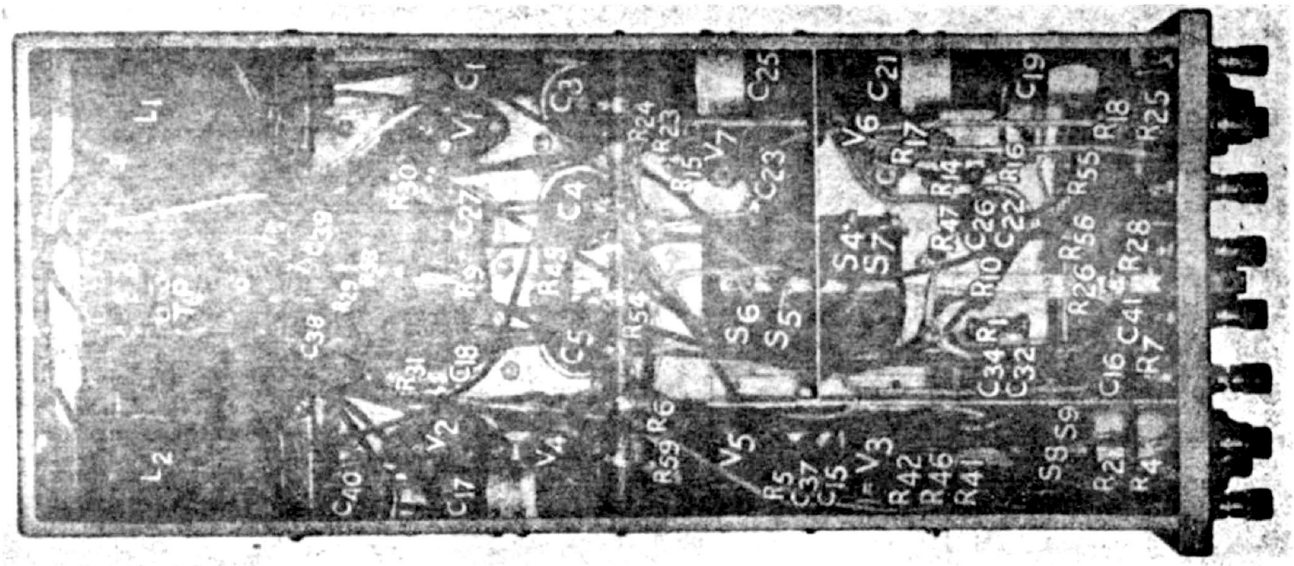

FIG 49. UNDERSIDE OF CHASSIS.

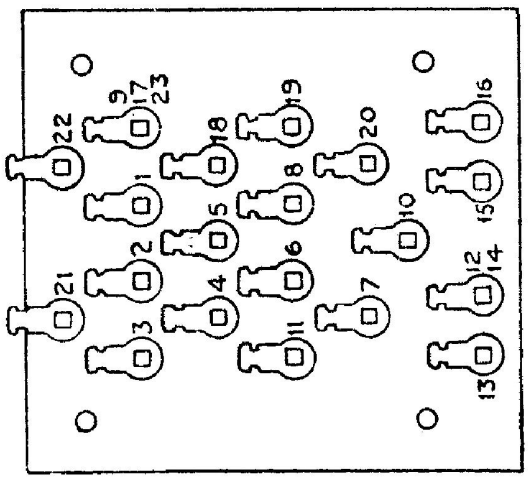

FIG 50. TRANSFORMER TAPPINGS.

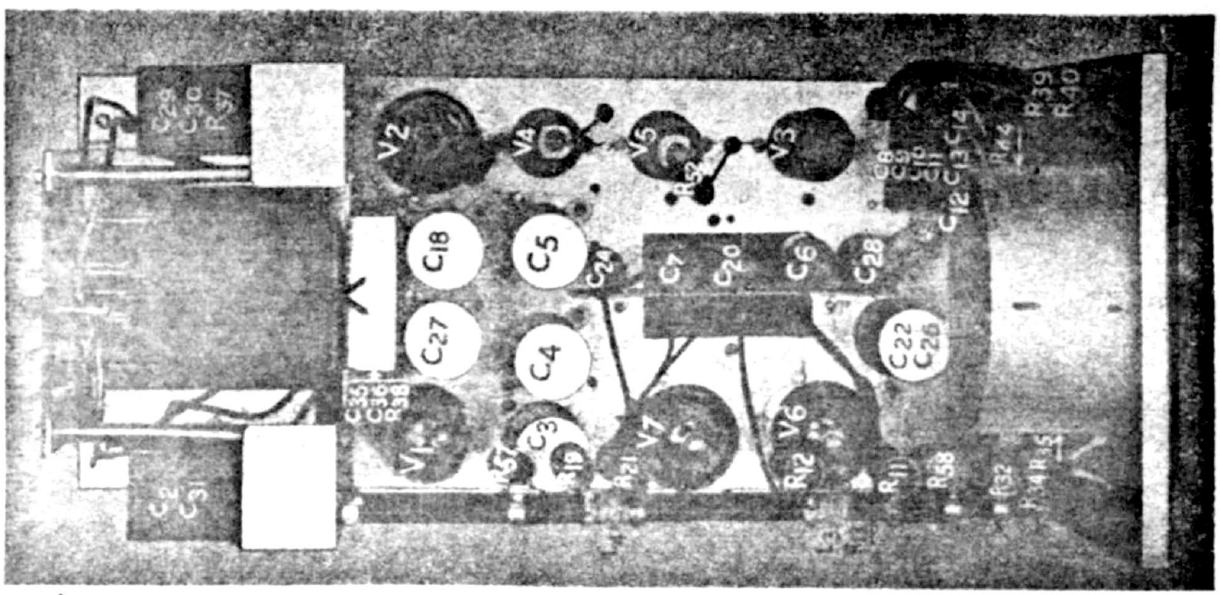

FIG. 48. TOP VIEW OF CHASSIS.

The Amplifier circuits should then be tested. These are usually the most simple. The non-operation of the Amplifier valves may be due to the anode cap coming adrift, producing conditions explained in Section 4.1.1 of Operating Instructions, or occasionally to failure of the Gain controls. Should such a fault remain undetected for any length of time the appropriate amplifier valve will probably have suffered damage. Again, the de-coupling and coupling condensers require close inspection. Any deterioration of the low frequency response by evidence of Phase Shift effects when dealing with frequencies around 50 c.p.s. may be due to defective cathode by-pass condensers C21 and C25, or defective coupling condensers C20 and C24. In this latter case the cause of the trouble may be leakage, which is serious because of the high voltage present on the anodes of the valves and can—in the case of C.20—cause damage to V.7 and premature overloading.

11.4. GENERAL ADVICE.

Care should also be taken when attending to the instrument to avoid altering the position of wires and components, because their positions have been carefully chosen. This applies particularly to the case of condensers C20, C24, C39, C38, C19 and C23. Any displacement of these is accompanied by the risk of moving them into A.C. mains fields due to valve heaters or mains transformer, or A.C. leads at high tension carrying large current near the mains transformer or rectifiers. Some of these effects could have been avoided by screening the components and their attendant leads, but this would restrict the H.F. performance of the amplifiers.

A remaining item is the Amplifier switch. This is the most complicated single item in the instrument because of the different circuits and different potentials rearranged by its action. Because of the stringent requirements in the matter of insulation, resistance, low capacity, etc., care must be taken in handling the various switch wafers to avoid dust and moisture, and above all, to avoid them being soiled by greasy substances, such as are present in many soldering fluxes. Only resin cored solder should be used in re-making any of the connections to the instrument. The same applies to all components fixed on insulating panel strips. Provided there is no mechanical damage and the switch wafers are clean they should give continuous service without attention. The switch contacts are self-cleaning.

It is useful to remember that, because of the heat dissipation within the instrument, the ventilation has had to be carefully planned, and as a result a considerable volume of outside air passes through the instrument in a given time. Consequently, with the fair amount of small dust normally present in the air, it will be noticed that this tends to accumulate around the points of high voltage, and to adhere more firmly at points of high temperature. It is therefore advisable when removing the case to inspect the instrument for one reason or another to take the opportunity of wiping off these particles, as this will avoid eventual accumulation of the dust, which, with the aid of moisture due to occasional condensation of the humidity of the air, may form a semi-conductive path on the high voltage sections of the instrument sufficient in time to interfere with their correct operation, and, in serious cases, to cause a breakdown.

The Cathode Ray Tube and valves age and must necessarily be replaced in due course. Loss of tube emission and thus spot brightness will generally be the determining consideration in the case of the former.

Many users of the instrument are Radio or Electrical Engineers possessing suitable instruments and means for carrying out their own service and maintenance become familiar with this work. Other users, such as Mechanical Engineers, with less experience in this work, may prefer to see the instrument attended to by experts but would like to avoid the expense and delay of returning the instrument to the manufacturer. In such cases it can safely be said that most Service and Maintenance work on the instrument can be entrusted to a well-equipped local Radio Serviceman, because most of them are familiar with the Oscillograph, and are as likely as not to be using one in their own Test work. This same Radio Serviceman will generally be in a position to replace sundry condensers and resistors, when required, by suitable components from stock, and in most cases he is also equipped to test and replace valves. Therefore no difficulty is likely to be experienced in practice in retaining the instrument in best condition.

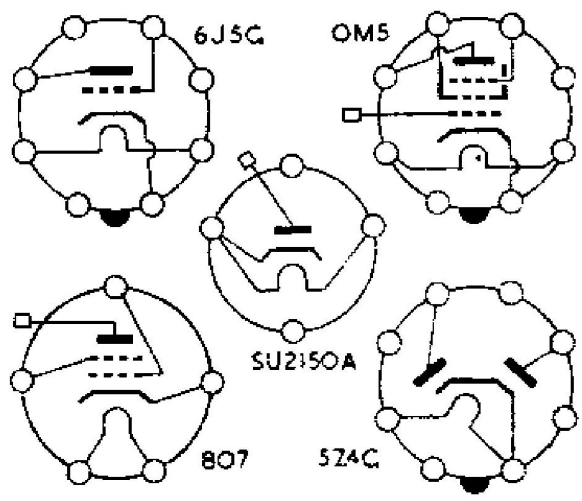

FIG.51 VALVE BASE CONNECTIONS VIEWED FROM UNDERNEATH

12. GENERAL SPECIFICATION.

The figures given are representative of the average. Some differences arising from normal production tolerances must be expected on individual instruments.

POWER RATING.

A.C. mains voltage...	110, 200-250 volts.
A.C. mains frequency	40 to 100 c/s
Power consumption	120 watts approx. (7 valves).
H.T. voltages	Tube 1,100 v. Amplifiers, etc., 500 v

DIMENSIONS (Overall).

Height	13¼"	34 cms.
Width	8½"	22 cms.
Depth	19⅜"	49 cms.
Weight	40 lbs.	20 kgs.

CATHODE RAY TUBE.

Heater	4 v. 1 amp.
Screen diameter	114 mms.
Overall length	375 mms.
Type	Trapezium Corrected High Vacuum Tube
Standard	09 Double Beam Tube.
Non-Standard (as extra)	26 Single Beam Tube.
Fluorescent Screen	" D " type with green response. 10 m.secs. afterglow.
Beam Intermodulation	Maximum 2%.
Sensitivity for Y1Y2	3.1 v. D.C., 1.1 v. R.M.S. (v/mm.).
Sensitivity for X	2.25 v. D.C., 0.8 v. R.M.S. (v/mm.).

INPUT IMPEDANCE.

	Capacity mmF.	*Resistance. Megohms.*
To Input terminals	25	3.0
Direct to Tube Panel	14	As required
Through Amplifier	25	1.0
Synchronisation (added)	25	2.0

CALIBRATION ... ...

50 volts Peak to Peak.
17.75 volts R.M.S.

DEFLECTOR COILS ... ...

Sensitivity. 2 mms./mA. R.M.S.
Maximum current. 60 mA. R.M.S.

Y2 ATTENUATOR.

Maximum Voltage applicable	400 v. A.C. R.M.S.
Frequency range. For A.C only... ...	From 30 c/s to 15,000 c.s Not frequency compensated.
Reduction ratios	x1, x2, x4, x8.

TIME BASE.

Frequency range ... ... 6 to 250,000 c/s

Approximate Sweep Frequency Ranges.

Condenser Switch Position.	*Velocity Control. Min.*	*Max.*
1	Time Base Inoperative.	
2	6	15
3	11	60
4	50	270
5	250	1,000
6	850	3,500
7	3,000	13,000
8	10,000	30,000
9	20,000	70,000
10	50,000	250,000 and above.

AMPLIFIER.

	Gain (approx.)	*Frequency Band in c/s ± 3db.*	*Sensitivity mV. RMS/mm.*
1 stage	28	10-100,000	43.0
2 stage—			
High Gain position	900	10-100,000	1.30
Wide Band position	106	10-2,000,000	10.00

VALVES.

The instrument is fitted with the following Cossor type commercial valves.

Description.	*Cossor Type*
Half Wave Voltage Rectifier... ... ... For Cathode Ray Tube H.T. Supply ...	SU2150A
Full Wave Voltage Rectifier ... ... For Time Base and Amplifier H.T. Supply.	5Z4G
Triode ... ... Time Base Discharge Valve.	6J5G
H.F. Pentodes ... ... (*a*) Time Base Charging Valve. (*b*) Time Base Auxiliary Discharge Valve.	OM5
Output Pentodes ... ... Two Amplifier Valves.	807

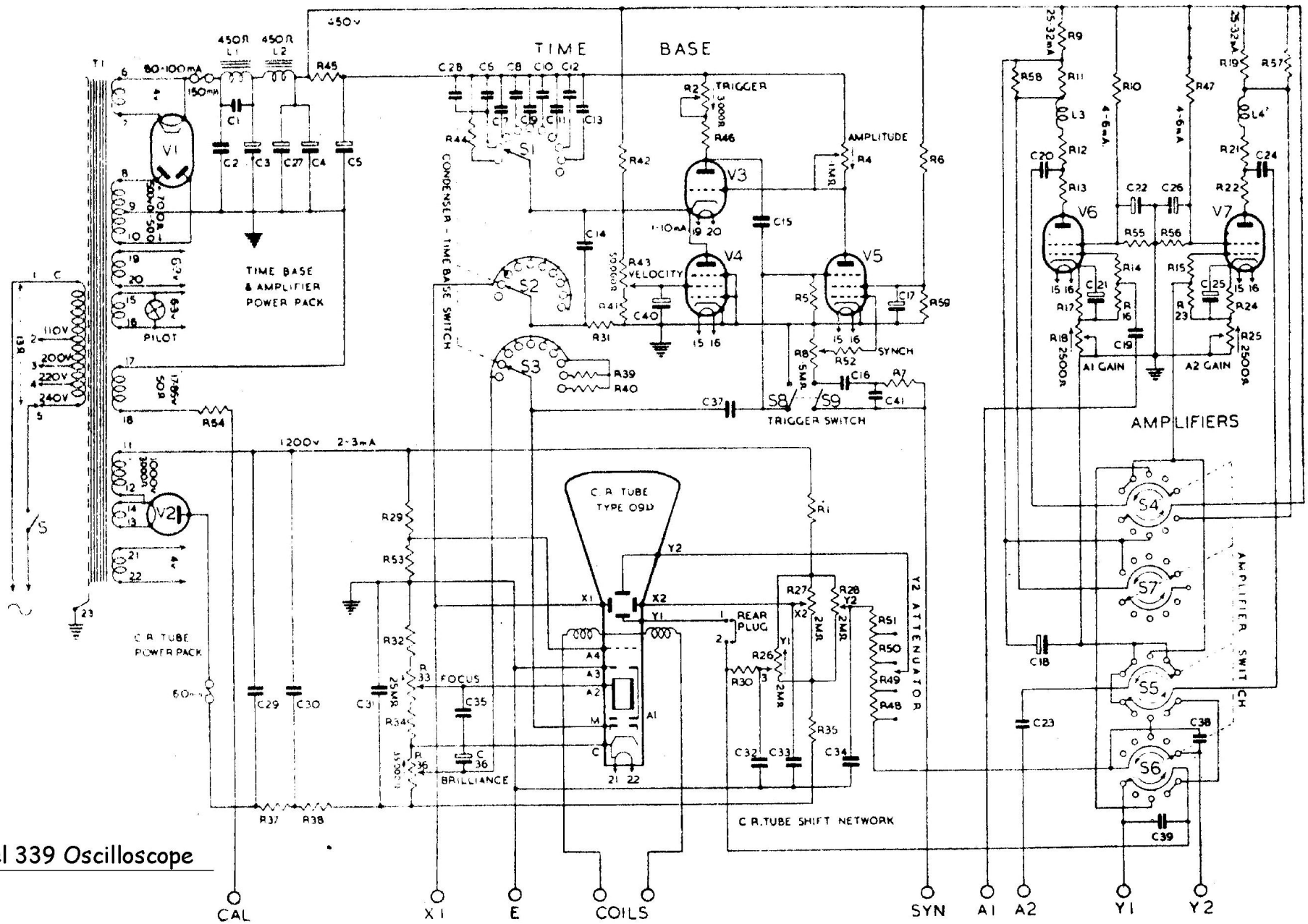

FIG. 47. CIRCUIT DIAGRAM.

VALVES: V1 - 5Z4G. V2 - SU2150A. V3 - 6J5G. V4, V5 - OM5. V6, V7 - 807.

Cossor Model 339 Oscilloscope