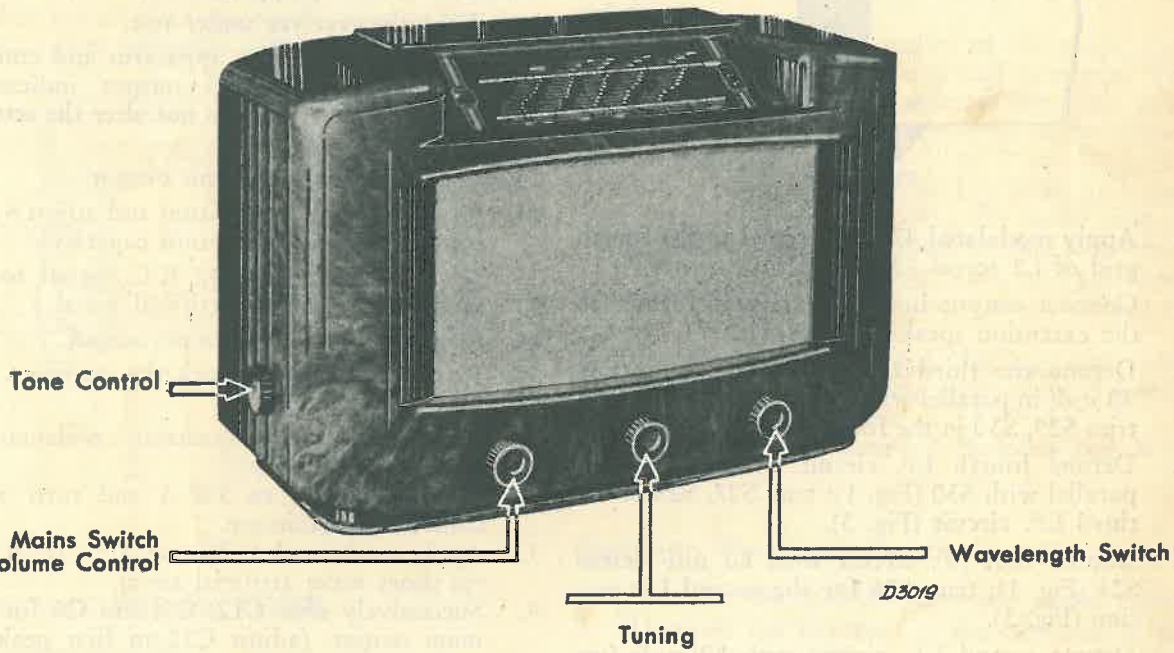
PHILIPS

SERVICE MANUAL

for receiver

650 A-34



For use on Alternating Current mains.

TRIMMING THE RECEIVER.

GENERAL.

For trimming the receiver the chasis is swung out of the cabinet as shown in sheets G, Fig. 5.

The following artificial aerials are used:

1. For the I.F.: 32.000 $\mu\mu$F condenser.
2. For medium waves and long waves: The standard artificial aerial supplied with GM 2880F.
3. For short waves: short wave artificial aerial, i.e., red spot of standard artificial aerial.

Always trim receivers with their own valves.

Before trimming is commenced the wax must be removed from the trimmers with a pair of tweezers, after which the trimmers are moved up and down a few times to remove all traces of the wax. After trimming they are refixed with locking wax, e.g., by holding the wax against a warm iron over the trimmer so that a few drops of wax fall upon it.

If it is necessary to renew C16 one-quarter of C16 must be unwound before trimming.

In all wave ranges, the oscillator frequency is **higher** than the tuning frequency of the R.F. circuits. The I.F. is 470 K.C.

A. Trimming the I.F. Circuits.

1. Set wavelength switch to medium waves and earth the receiver. Turn variable condenser to minimum.
2. Set volume control to maximum and render A.V.C. ineffective by short-circuiting C28 (see Fig. 1).

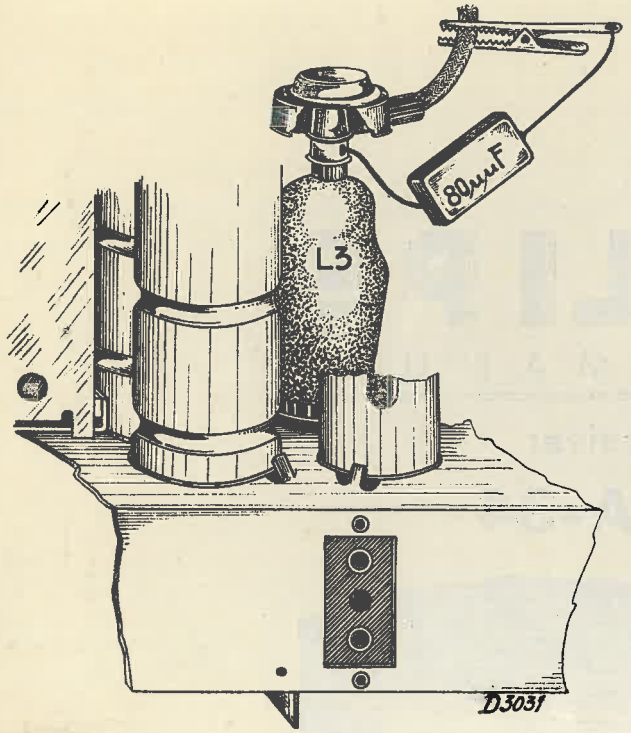


Fig. 2

3. Apply modulated 470 K.c. signal to the fourth grid of L2 across 32,000 $\mu\mu$F condenser.
4. Connect output indicator via transformer to the extension speaker sockets.
5. Detune the third I.F. circuit by connecting 80 $\mu\mu$F in parallel with S27 + S28 (fig. 1) and trim S29, S30 in the fourth I.F. circuit (fig. 3).
6. Detune fourth I.F. circuit with 80 $\mu\mu$F in parallel with S30 (Fig. 1); trim S27, S28 in the third I.F. circuit (Fig. 3).
7. Detune first I.F. circuit with 80 $\mu\mu$F across S24 (Fig. 1); trim S26 for the second I.F. section (Fig. 3).
8. Detune second I.F. circuit with 80 $\mu\mu$F (see Fig. 2) and trim S24 in the first I.F. circuit.
9. Lock the coil cores, remove short-circuit from C28 and disconnect 80 $\mu\mu$F condenser.

B. **R.F. and Oscillator Circuits.**

a. **Medium Wave Range.**

1. Set wavelength switch to medium waves and volume control to maximum.

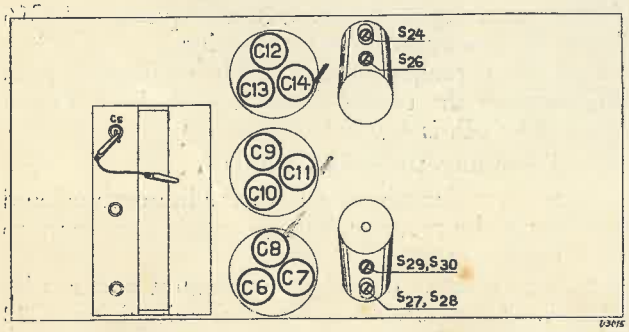


Fig. 3

2. Fit 15° jig and set variable condenser to it (minimum capacity).
3. Connect output meter to extension speaker sockets via trimming transformer.
4. Apply modulated 1442 K.C. signal to aerial socket via standard artificial aerial.
5. Trim C14, C11, and C8 successively for maximum output.
6. Remove 15° jig.
7. Connect auxiliary apparatus to anode of L2 across 25 $\mu\mu$F condenser and connect output meter to output of auxiliary apparatus.
8. Short-circuit oscillator by means of a piece of wire across C5 (Fig. 3).
9. Apply modulated 550 K.C. signal to aerial socket of receiver under test, via normal artificial aerial.
10. Tune auxiliary apparatus to about 550 m.
11. Tune the receiver under test.
12. Disconnect auxiliary apparatus and condenser short-circuit. Connect output indicator to receiver under test. **Do not alter the setting of the variable condenser.**
13. Trim C16 for maximum output.
14. Replace 15° jig in position and adjust variable condenser to it (minimum capacity).
15. Apply modulated 1442 K.C. signal to aerial socket via standard artificial aerial.
16. Retrim C14 for maximum output.
17. Remove 15° jig and lock the trimmers.

b. **S.W. 1 range.**

1. Fit 15° jig and set variable condenser to it (minimum capacity).
2. Switch receiver to SW 1 and turn volume control to maximum.
3. Apply modulated 21 Mc. signal to aerial socket via short wave artificial aerial.
4. Successively trim C12, C9, and C6 for maximum output. (adjust C12 to first peak from minimum capacity).
5. Remove 15° jig and lock trimmers.

c. **SW 2 range.**

1. Fit 15° jig and set variable condenser to it (minimum capacity).
2. Switch receiver to S.W.2.
3. Apply modulated 6.8 M.C. signal to aerial socket via short wave artificial (red spot on standard artificial aerial).
4. Successively trim C13, C10 and C7 for maximum output (adjust C13 to first peak from minimum capacity).
5. Remove 15° jig and lock trimmers.

C. **Calibrating.**

1. Connect output indicator to input of receiver. Set volume control to maximum and wavelength switch to medium wave.
2. Apply modulated 811 K.C. signal (370 m.) to aerial socket via standard artificial aerial.
3. Tune the receiver.
4. Adjust the pointer carefully to 370 m. by means of the knurled screw.

REPAIRS AND REPLACEMENTS OF COMPONENTS.

TO SWING CHASSIS OUT OF CABINET.

This receiver is so constructed that for most operations to the chassis, the latter need not be uncased, but may be swung out of the cabinet as shown in Fig. 5. To do this:

1. Remove the backplate.
2. Unsolder the earth lead between chassis and cabinet.
3. Take off the knobs (the tone control knob is removed complete with spindle).
4. Take off the four screws holding the baffle to the chassis, at the side of the chassis.
5. Slightly loosen screws A and B (see Fig. 5).
6. Unsolder the loudspeaker.
7. Place the receiver face downwards on a piece of felt.
8. Lift up the chassis (see Fig. 5). Care must be taken not to place too much strain on the control cables, especially cable C.

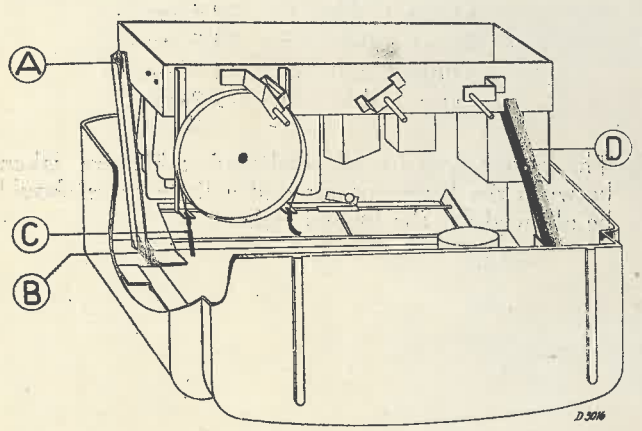


Fig. 5

TO UNCASE THE RECEIVER.

1. Remove backplate.
2. Unsolder the lead between the chassis and the bottom of the cabinet.
3. Remove the knobs. The tone control knob is taken off complete with spindle.
4. Unscrew bracket A (fig. 6) from the pointer.
5. Slightly loosen two nuts D (at each end of scale).
6. Unscrew threaded bushes E. The driving cable is then detached from brackets G.
7. Loosen the cable on the wave-range indicator from pin F.
8. Loosen the nut and threaded bush holding the outer cable of the latter to bracket G, thus separating the indicator cable from this bracket.
9. Unscrew the Magic Eye from bracket G.
10. Take out the eight screws holding the speaker baffle to the cabinet. The chassis can then be taken from the cabinet.

Replacing the Scale.

1. Unscrew bracket G (Fig. 6) from the cabinet. The scale can then be removed from the cabinet.

Pointer.

To ensure a good line of light on the scale, the pointer must move as close as possible to the scale without touching it. The distance between the pointer and the scale is adjustable; when the hex. headed screws H are loosened (Fig. 6), the rods K can be so adjusted that the pointer lies close to the scale.

Wavelength Switch in the Theoretical Circuit.

The switches are drawn as seen from the control end, the receiver being vertical. The various switch units are also numbered from the control end. The position of the stop ball is indicated in the first unit.

In the various units the outline of the stator plate at 90° to the left of the stop ball is shown. The rotors are drawn in their extreme left-hand positions as indicated by the right-hand arrow drawn round the hole in the rotor.

Contact springs are represented by circles, and open points on the stator by dots. The outer ring of circles gives the contact springs on that side which is directed towards the stop plate, and the inner ring of circles represents the contact springs on the remote side.

Rotor contacts are indicated by arcs and radial lines, as full lines on the stop plate side and as dotted lines of the remote side.

The switch units are renewed complete (see Sheet 01).

Repairs to Wavelength Switch.

1. Unsolder the leads to the stator under repair.
2. Unscrew the bracket at the rear end of the switch (two of the screws are accessible through holes in the back of the chassis A (see Fig. 9).
3. Remove the flat spindle bar trough hole B at the back of te chassis, taking careful note of the positions of the rotors, stator and stop

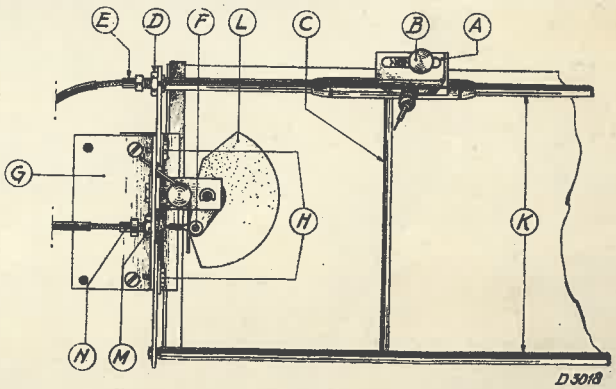


Fig. 6

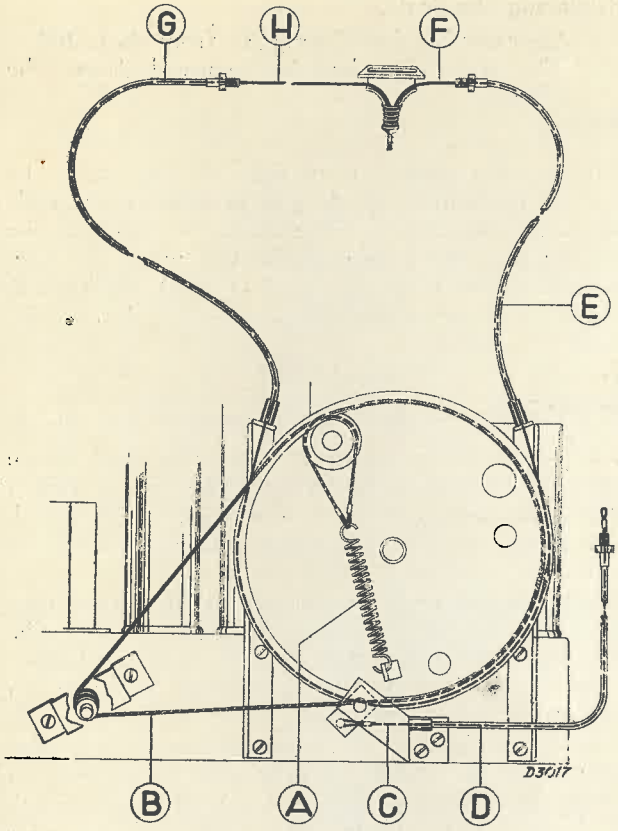


Fig. 7

mechanism so that the parts may be re-assembled as before and not, say, rotated 180° in respect of each other.

4. The stator and rotor in question can now be removed without difficulty.

Control Cables.

These are supplied per metre. Before cutting the cable, tin the wire, using acid free soldering grease, and cut through the centre of the tinned portion. This prevents unravelling.
Cut the outer cable with a pair of cutting pliers and trim with a file; remove burr from the inside. Control cables must always be handled very carefully; a small kink may cause heavy running and backlash.

The arrangement of the cables is shown in Fig. 7.

Length of Cord	B:	71.0 cm.
Length of inner Cable	C:	44.2 cm.
Outer Cable	D:	38.5 cm.
Outer Cable	E:	22.5 cm.
Inner cable	F:	55.5 cm
Outer Cable	G:	44.0 cm.
Inner cable	H:	75.2 cm

The above lengths of cord and cable are taken between the fixing points and a little extra should be allowed for the looped ends.

Fig.	Pos.	Description	Code No.
		Clamping ring for speaker	25 871 81.0
		Grub screw 4 × 5 mm.	07 354 05.0
		Mains lead	33 981 08.0
		Mains plug	08 280 35.0
		Paper ring for speaker	28 451 54.0
		Anti-directional cone	23 666 66.0
		Centring jig for speaker	09 991 53.0
		TOOLS	
		Service oscillator	GM 2880F
		Universal testboard	GM. 4256
		Universal and valve testboard	GM. 7629
		Insulated trimming spanner	23 685 66.0
		15° trimming jig (see sheet C2)	09 992 44.0
		Locking wax	02 851 36.0
		Trimming transformer	09 992 22.0
		Tuning tester	09 991 59.0

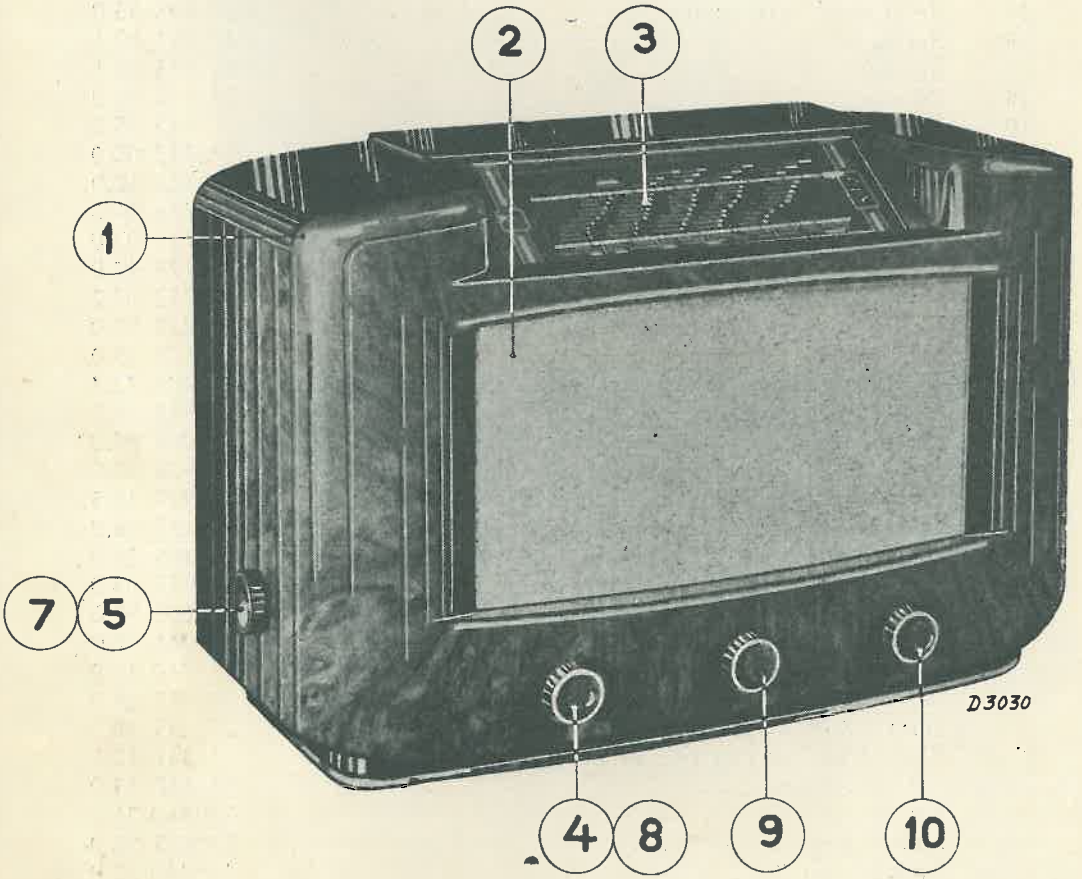


Fig. 8

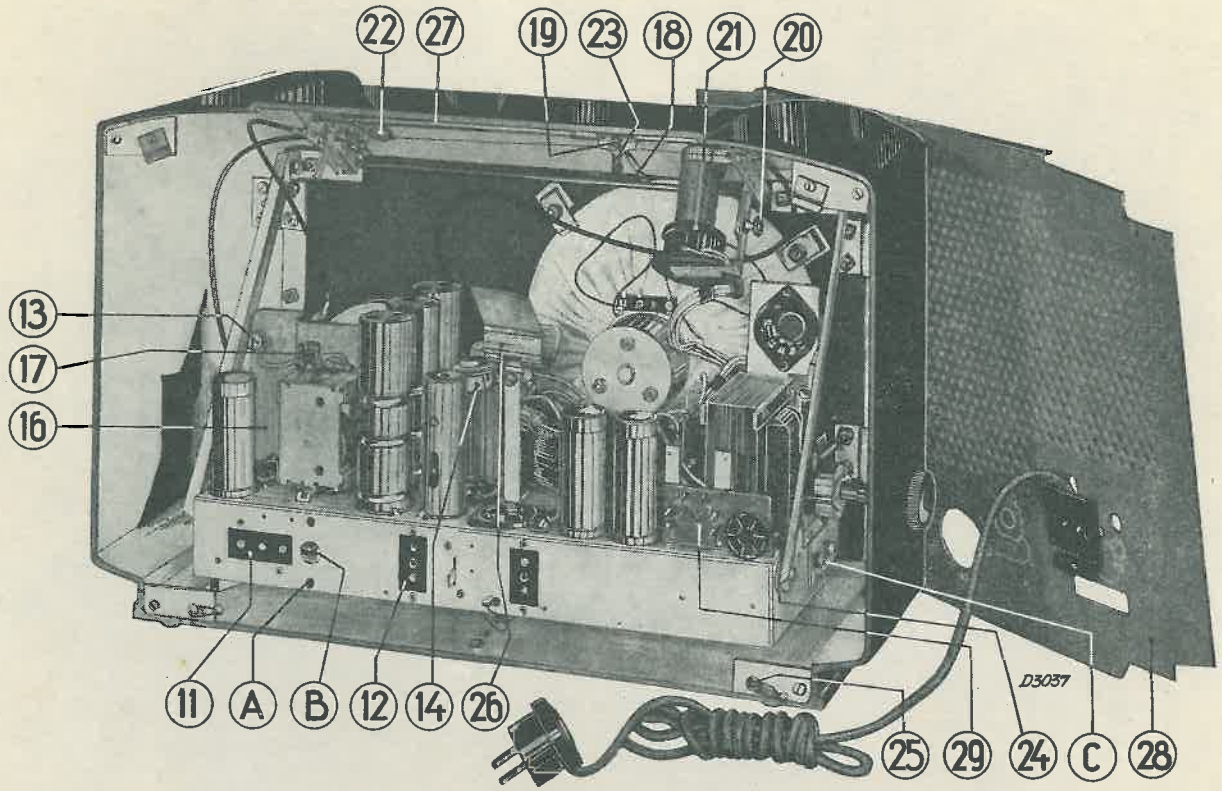


Fig. 11

Note: The indication „Fig 8" on page O 2 must be „Fig. 10".

RESISTANCES

	Value	Code No.
R1	0.8 M.Ohm	28 773 99.0
R2	200 Ohm	28 770 18.0
R6	32 Ohm	28 773 55.0
R7	0.8 M.Ohm	28 773 99.0
R8	50.000 Ohm	28 770 42.0
R9	50,000 Ohm	28 771 07.0
R10	5,000 Ohm	28 802 70.0
R11	400 Ohm	28 770 21.0
R12	20,000 Ohm	28 770 38.0
R13	1.25 M.Ohm	28 770 56.0
R17	320 Ohm	28 770 20.0
R18	50.000 Ohm	28 770 42.0
R20	0.5 M.Ohm	28 770 52.0
R21	50.000 Ohm	28 770 42.0
R22	0.35 M.Ohm	49 500 02.0
R24	5 M.Ohm	28 771 27.0
R25	0.64 M.Ohm	28 770 53.0
R26	2 M.Ohm	28 771 23.0
R27	0.64 M.Ohm	28 773 98.0
R28	1 M.Ohm	28 770 55.0
R29	1,000 Ohm	28 773 70.0
R30	160 Ohm	28 770 17.0
R31	200 Ohm	28 770 83.0
R32	100 Ohm	28 773 60.0
R33	50.000 Ohm	49 470 01.1
R34	50 Ohm	28 773 57.0
R36	50.000 Ohm	28 770 42.0
R37	2,000 Ohm	28 770 28.0

CONDENSERS

	Value	Code No.
C1	28 μF	28 182 54.0
C2	32 μF	28 182 40.0
C3	11-490 μμF	
C4	11-490 μμF	28 212 48.0
C5	11-490 μμF	
C6 to C14	See Coils	
C16	200 μμF	28 212 08.0
C17	80 μμF	28 206 26.0
C18	100 μμF	28 206 27.0
C19	0.1 μF	28 199 09.0
C21	100 μμF	28 206 27.0
C22	0.1 μF	28 199 09.0
C23	0.1 μF	28 199 09.0
C24	32 μF	28 182 40.0
C25	50 μμF	28 206 24.0
C26	5750 μμF	28 195 69.0
C27	2050 μμF	49 080 89.0
C28	0.1 μF	28 199 09.0
C29	See Coils	
C30	See Coils	
C31	50,000 μμF	28 199 06.0
C32	50,000 μμF	28 199 06.0
C33	See Coils	
C34	See Coils	
C35	8 μμF	28 206 33.0
C36	50 μμF	28 206 24.0
C37	50,000 μμF	28 199 06.0
C41	20,000 μμF	28 199 02.0
C42	50,000 μμF	28 201 64.0
C45	20 μμF	28 206 37.0
C46	25 μF	28 182 24.1
C47	2,000 μμF	28 201 48.0
C49	50,000 μμF	28 199 06.0
C50	50,000 μμF	28 199 06.0
C60	2 μμF	28 206 61.0
C61	400 μμF	28 190 19.0
C62	20,000 μμF	28 201 65.0

VALVE

L1	L2	L3	L4	L5	L6	L7
EF8	EK2	EF9	EBL1	AZ1	8091D-00	EM1

COILS

	Resistance	Code No.		Resistance	Code No.
S1			S18	< 1 Ohm	
S2	400 Ohm		S19	1 Ohm	
S3	< 1 Ohm	28 536 51.1	S20	8.5 Ohm	
S4	< 1 Ohm		S21	3.5 Ohm	
S5	280 Ohm	28 546 08.1	S22	19 Ohm	28 574 33.2
S6	3.5 Ohm		S23	3.5 Ohm	
S7	< 1 Ohm		C12	30 µµF	
S8	28 Ohm		C13	30 µµF	
S9	5 Ohm		C14	30 µµF	
S10	100 Ohm	28 574 31.1	S24	7.5 Ohm	
S11	45 Ohm		S26	7.5 Ohm	
C6	30 µµF		C29	103 µµF	28 573 64.1
C7	30 µµF		C30	109 µµF	
C8	30 µµF		S27	4.5 Ohm	
S12	2.5 Ohm		S28	3.5 Ohm	
S13	< 1 Ohm		S29		
S14	280 Ohm		S30	5 Ohm	A1 035 29.0
S15	5.0 Ohm		C33	91 µµF	
S16	470 Ohm	28 574 32.2	C34	100 µµF	
S17	45 Ohm		S31	640 Ohm	
C9	30 µµF		S32	0.6 Ohm	28 536 26.0
C10	30 µµF		S33	4 Ohm	28 220 51.0
C11	30 µµF				

VOLTAGES AND CURRENTS

	L1 (EF8)	L2 (EK2)	L3 (EF9)	L4 (EBL1)	L7 (EM1)	
Va	265	190	260	235	260	V
Vg2	190	180	90	260	—	V
Vg3.5	—	90	—	—	—	V
Vcath.	0.8	4.4	1.8	14.5	—	V
Ia	4.3	2.2	6.4	34	0.1	mA.
Ig2	0.1	3.5	2	5.5	0.3	mA.
Ig3.5	—	1.3	—	—	—	mA.

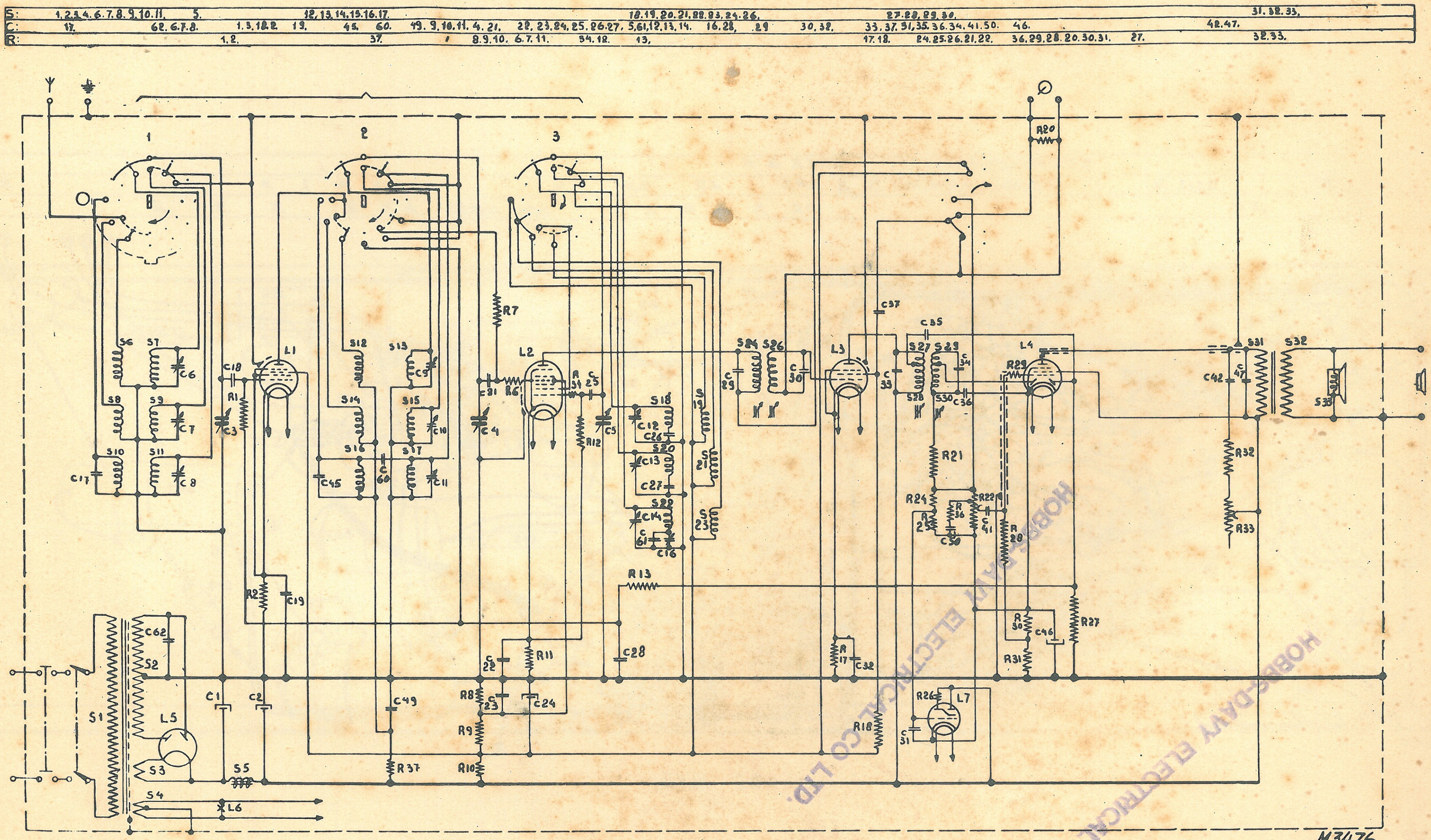
290 V. = Voltage across C1)
275 V. = Voltage across C2 (primary consumptoin = 55 Watts.

The voltages are measured with voltmeters having a resistance of 2,000 ohms per volt. Moving coil voltmeters give readings which depend upon the resistance used and the current consumption of the meter itself.
The values given above are the means of several measurements, therefore some readings obtained may difer appreciably, due to the tolerances of the components as well as the valves. Before finally deciding that a valve is defective, it is recommended that a replacement test with the same type of valve is made.

3895

Wavelength switch at „SW 1". Gram switch at „Radio".

650 A - 34



M3476

Fig. 12