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# PHILIPS

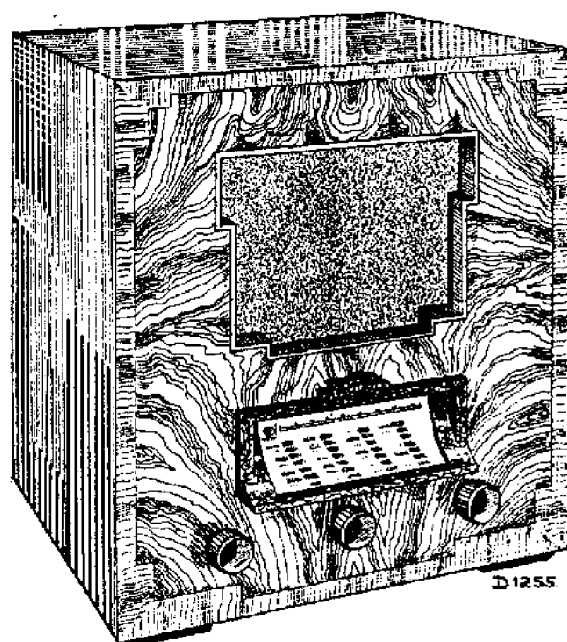
## SERVICE MANUAL

**SUPER-INDUCTANCE**

**RECEIVER**

**FOR A.C. and D.C. MAINS.**

# Type 838U



### GENERAL REMARKS.

This receiver can be connected either to a D.C. or A.C. mains supply within a voltage range of 200—250 volts, and within a frequency range of 25—100 cycles. Three control knobs are provided. The volume control as well as the on/off switch are operated with the left knob, while the centre one is used for tuning. The right-hand knob is marked with a white spot; when this spot points to the left, the set is connected for a wave range from 180—560 metres, while with the spot upright the receiver is connected for a wave range from 760—1900 metres. In some receivers with the spot pointing to the right a filter for a wavelength of 1500 metres is switched in. A mains socket on the back panel (safety switch) is provided which automatically renders the receiver electrically dead when the back is removed.

### Important.

When adjusting, testing or repairing the receiver it is desirable to use an A.C. supply which should have a double wound transformer between the supply and the receiver with the secondary winding not earthed.

### Circuit.

The receiver Type 838U has two tuned circuits, one between the aerial and the H.F. valve and one between the H.F. valve and the detector valve.

The aerial is connected via C17 (1000  $\mu\mu\text{F}$ ) and the coil unit S1, S2, S3 and S4 inductively coupled to the grid circuit of the H.F. valve L1 (VP13A). The anode circuit of L1 is inductively coupled by the coil unit S5, S6, S7 and S8 with the grid circuit of the detector valve L2.

Resistance capacity coupling is used for L.F. amplification. Automatic volume control has been incorporated. The resistance R9, which is connected in the grid circuit of L2, will cause a drop in the grid bias of L1 via R14, R15, when a strong signal causes an increase of the grid current of L2.

The heater circuits of L1, L2, L3 and L4 are connected in series, while the pilot lamp L6 and the barretter L5 are incorporated in the same circuit. L4 acts as a rectifier when the set is connected to A.C. mains, and for D.C. mains L4 is a simple series resistance.

An extra loudspeaker of high impedance can be connected to the special secondary winding of the output transformer.

A resistance, R17, is incorporated in the grid circuit of L3 and is connected close to the valve socket. The connection from the valve socket to the resistance as well as the resistance itself are screened. R17 serves to prevent self-oscillating of L3.

The wave trap S14, S15, C28 is tuned for a wave length of 1500 metres, and attenuates signals on that wavelength.

### Very Important Notes.

As previously mentioned, if the chassis is being handled under a voltage such as when trimming, testing for faults, measuring, etc., there is a possibility of a shock being experienced. It is, therefore, necessary to use a transformer which is double wound and has reasonably good insulation between the windings. On no account should the secondary winding be earthed. If such a transformer is not used it is possible for the chassis to have a voltage to earth and, therefore, touching it then would be dangerous. If, therefore, a double wound transformer having no connection to earth is used the chassis may be earthed direct, and the handling of the chassis is quite safe and is exactly the same as operating an ordinary A.C. set. The earth via the clip is not sufficient as the chassis is then earthed via C.A. If two or more chassis are connected to the same double wound transformer it is essential to connect the same points of the chassis together, otherwise there is a possibility of voltage occurring on the chassis of one of the receivers. Providing, however, both chassis are correctly earthed the secondary side of the transformer will become short-circuited if a faulty connection is made. If dealers require a transformer suitable for testing the universal type of receivers a special type of transformer can be supplied for this purpose. These transformers are supplied in two types, one with an automatic cut-out, Code No. 28.522.470, and one without a cut-out, Code No. 28.522.460. Particulars can be had upon application.

### Balancing the receiver.

The following instruments and tools will be required :

1. A Service Oscillator Type 4028C which covers a wave range of 100—1500 K.C., or GM.2880, with a wave range of 21 M.C.—100 K.C.
2. An output indicator. For this purpose a unit (GM.2295) containing an adapted impedance with a selenium rectifier can be used, so that a reading can be obtained directly on a sensitive D.C. instrument.
3. A trimming tool.  
It is only desirable to change the variable condenser, screened coil or trimming condensers when a Service Oscillator is available.

### Trimming and Adjusting.

1. The artificial aerial of 200  $\mu\mu\text{F}$  is connected to the aerial socket and output meter to the loud-speaker sockets. The chassis is to be connected to earth. The auxiliary dial, on which the position for 225 metres is given, is fixed on to the chassis. Trimming condensers C12 and C25 are opened as far as possible and the set is switched for the short-wave band.

2. The negative grid bias of L1 is adjusted to negative three volts with the aid of the volume control. (To be measured between the chassis and cathode L1 by means of a moving coil D.C. voltmeter.)
3. The variable condenser is turned to zero, a signal of 180 metres is applied to the set and the trimming condensers C12 and C25 are adjusted until the signal for 180 metres is received.
4. A signal of 225 metres is applied to the set, the variable condenser is now turned to 225 metres (maximum reading on output meter), the screws which keep the driving dial in position loosened, and the dial turned until it shows the correct reading.
5. After this C12 and C25 are re-trimmed for 225 metres.
6. The set is now switched over to long-wave, a signal of 900 metres is applied and the set is tuned in for 900 metres. The trimming condensers C13 and C26 are now adjusted until maximum output has been obtained.

### Repair and Dismantling.

1. Care must be taken that after repair the run of the wiring and the position of washers, screening plates, etc., must be the same. No insulating material should be placed on the bare wiring of the H.F. circuits.
2. Do not alter in any way the run of the wiring. The earth connections should be refixed in the same positions to which they were originally fitted.
3. Rivets may be replaced by screws and nuts. Moving parts may be greased with a little pure vaseline.
4. Always solder quickly so that the parts become heated up as little as possible. Soldering joints on condensers and resistances must be made about 1 cm. from the components. These condensers must be suspended free from the other wiring.

### Electrolytic condensers C1 and C2.

For removing use a box spanner as shown in Fig. 1.



Fig. 1.

### Electrolytic condenser C3.

This condenser is polarised, therefore the side which has a red band is the positive pole.

**Repair and dismantling of loudspeaker. Code No. 28.999.050, Type 4283.**

### Defects.

1. Open or short-circuit in the coil of the transformer ; no sound.

2. Coil jammed in the air-gap ; sound weak or distorted.
3. Rustling ; dirt in the air-gap ; distorted coil, damaged cone, slack connections touching cone.

#### Important points to be remembered during repair.

1. Repair must be effected on an entirely dust-free table (not an iron table), with good tools.
2. The front or rear plate may, under no circumstances, be removed from the magnet, as this would cause the latter to weaken.
3. Immediately after repair the cloth cover must be replaced round the loudspeaker.

When the cone is moved carefully up and down (see fig. 2), no noise must be heard ; a sound might be produced by the coil touching the sides of the air-gap or by dirt in the air-gap. A dirty air-gap is cleaned by means of some stiff material enveloped in wadding soaked in alcohol. Iron particles are removed by means of a flat steel spring.

#### Centring the cone.

This is effected by means of four feelers, 0.2 mm. thick (Code No. 09.990.840), which are placed in the air-gap between the coil and the plate through the perforations of the centring disc. A new cone is centred by means of the four feelers and fixed by means of a special service ring (Code No. 28.445.821). Commence by turning down the tags at 4 points 90° from each other. After all the tags have been bent down the feelers should be removed from the air-gap. The wires to the transformer must be fixed at their correct length, because if they are too tight they interfere with the movement of the cone, and when too slack they touch the cone.

For changing the cone-carrier a jig is necessary, which has to be placed in the air-gap before the nuts are loosened. This jig may also be used for centring the cone in the air-gap (see Fig. 3).



Fig. 2.

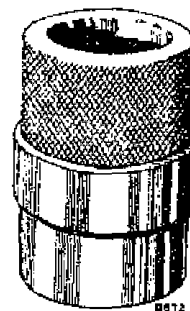


Fig. 3.

# LIST OF SPARE PARTS AND TOOLS.

When ordering spare parts, always mention :

1. Code number.
2. Type and serial number of receiver.
3. Description.

Fig.	Item.	Description.	Code No.
4	1	Cabinet ... ..	28.241.340
4	2	Station dial ... ..	28.698.862
4	3	Escutcheon, colour 026 ... ..	23.999.361
4	4	Driving strip ... ..	28.884.740
5	5	Driving disc ... ..	28.477.080
4	6	Spring for driving strip ... ..	28.740.050
4	7	Needle ... ..	28.944.181
4	8	Sliding support for needle ... ..	25.868.800
4	9	Knob for condenser ... ..	23.995.590
4	10	Knob for switch ... ..	23.995.590
4	11	Knob for volume control ... ..	23.995.590
7	12	Back ... ..	28.868.230
7	13	Moulded socket for safety switch ... ..	25.742.000
		Mains plug ... ..	23.947.000
7	15	Protecting cover for aerial and earth ... ..	23.994.680
5	16	Socket plate for aerial and earth connection ... ..	28.884.420
7	17	Protecting cover for loudspeaker ... ..	23.992.541
5	18	Socket plate for loudspeaker ... ..	28.884.440
7	19	2-pin plug plate for safety switch ... ..	28.864.270
6	20	Holder for dial lamp ... ..	28.837.390
6	21	Milled nut for dial lamp ... ..	07.749.160
7	22	Valve cap ... ..	28.852.050
5	23	Valve holder ... ..	25.161.921
5	24	Spindle volume control, mains switch ... ..	28.884.970
5	25	Spindle wavelength switch ... ..	28.884.960
5	26	Friction drive ... ..	28.910.010
5	27	Spindle for variable condenser ... ..	28.885.570
5	28	Volume control complete... ..	28.809.450
5	29	Mains switch ... ..	08.529.460
5	30	Stator ; wavelength switch with 12 contacts ... ..	25.868.760
5	31	Rotor without contact ... ..	25.439.381
5	32	Contact piece ... ..	25.046.592
5	33	Tube with flange (hub) ... ..	25.104.180
5	34	Spring ... ..	25.668.710
5	35	Lever for " Star " click plate ... ..	25.866.520
		Bottom cover ... ..	28.867.792
5	37	Spring for bottom cover ... ..	28.750.490
		Celluloid envelope for scale ... ..	28.337.051
<b>LOUDSPEAKER.</b>			
		Protecting cap ... ..	28.250.430
		Clamping ring ... ..	28.445.820
		Cardboard ring ... ..	28.445.390
		Clamp for loudspeaker ... ..	25.012.943
		Cone and coil ... ..	25.152.420

## LIST OF SPARE PARTS AND TOOLS—continued.

Fig.	Item.	Description.	Code No.
<b>TOOLS.</b>			
3	Universal support	... ..	09.991.000
	Centring gauge for air-gap	... ..	09.991.022
	Pertinax distance-pieces for centring cone	... ..	09.990.840
1	Box spanner for electrolytic condensers	... ..	09.990.760
	Service oscillator	... ..	09.040.280C
	Screened cable for service oscillator	... ..	25.980.450
	Artificial aerial	... ..	25.730.840
	Combined screwdriver and spanner	... ..	09.991.050

## TABLE OF VOLTAGES AND CURRENTS.

	L1 (VP13A)	L2 (SP13)	L3 (Pen26)	
Va	180/174	28.5	162	Volts
Vg'	85/88	24.5	84	Volts
—Vg	1.7/15.7	—	13.3	Volts
Ia	2.78	0.53	35.5	mA
Ig'	0.9	0.18	4.7	mA

The voltages were measured with voltmeters taking practically no current.  
All measurements are obtained with a mains voltage of 220 volts.

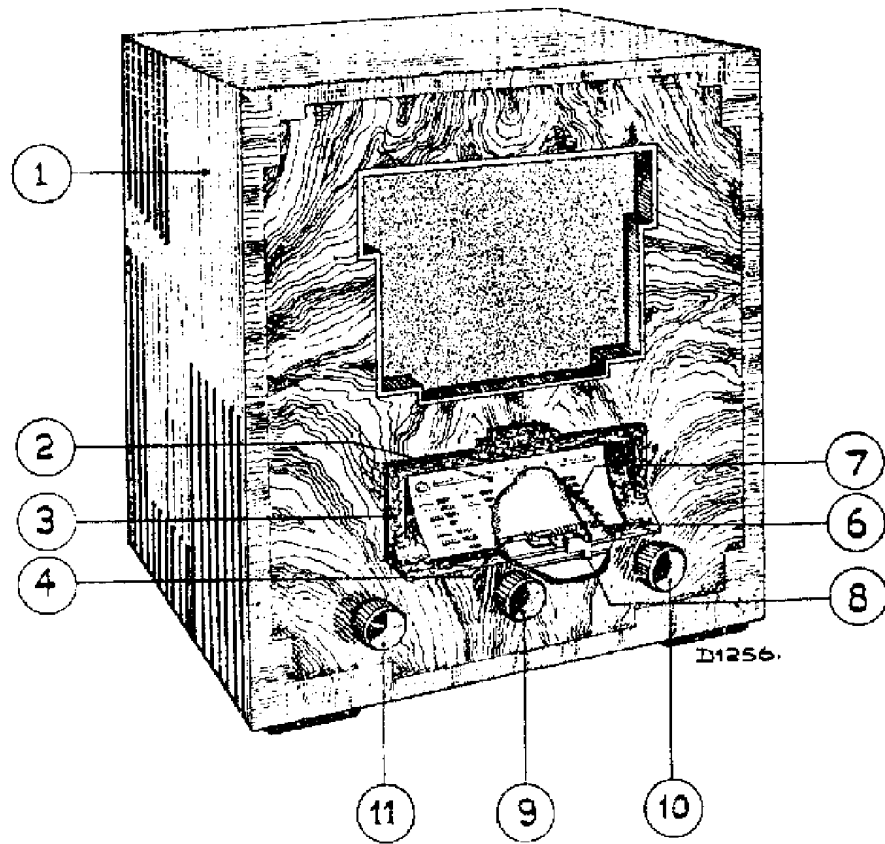


Fig. 4

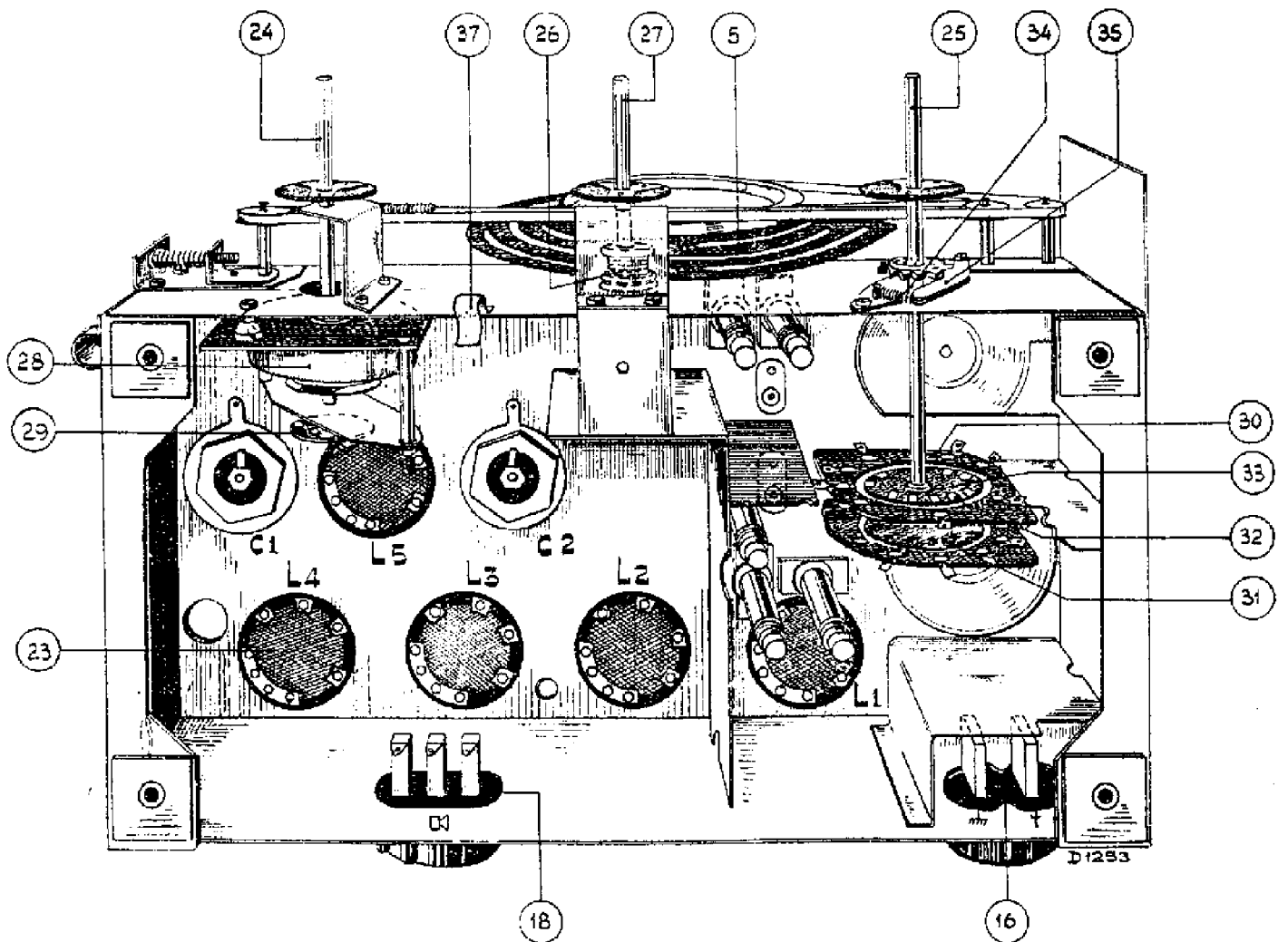


Fig. 5

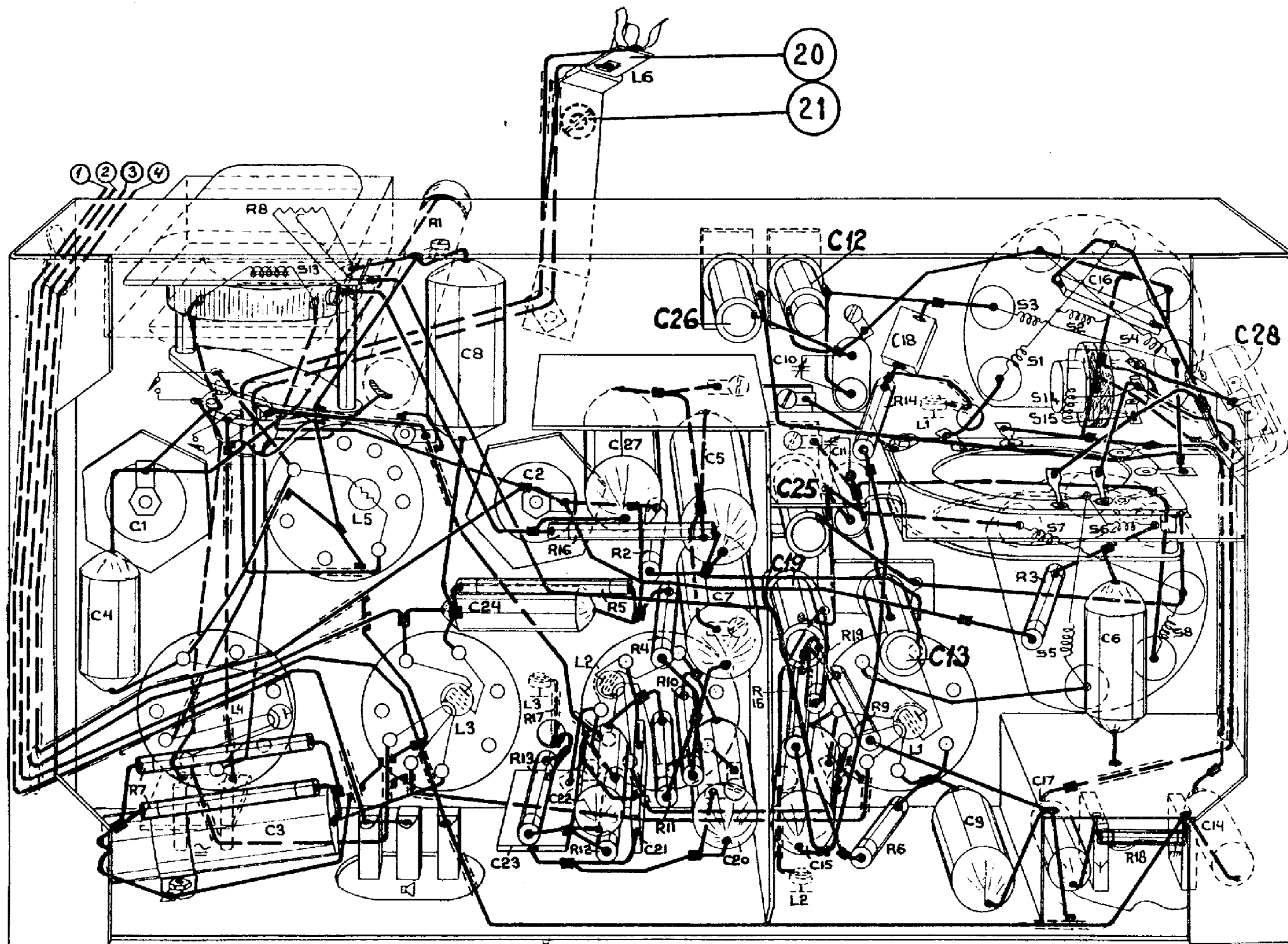


Fig. 6

## RESISTANCES.

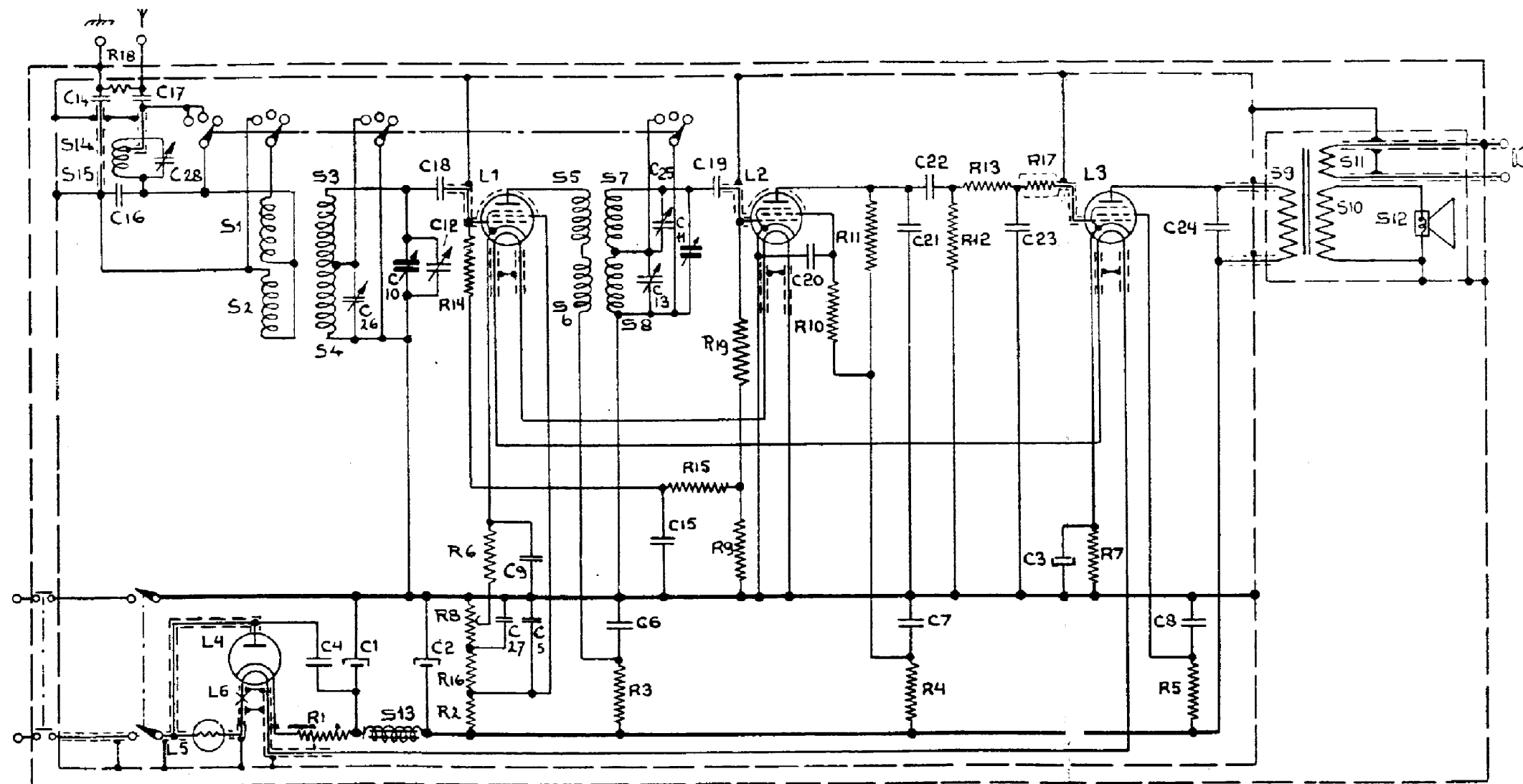
Designation.	Resistances.	Code No.
R1	320 Ohm	28.799.440
R2	20000 Ohm	28.771.030
R3	1000 Ohm	28.770.250
R4	20000 Ohm	28.770.380
R5	20000 Ohm	28.771.030
R6	400 Ohm	28.770.210
R7	640/2 Ohm	28.770.880
R8	6000 Ohm	25.717.770
R9	0.64 M. Ohm	28.770.530
R10	1 M. Ohm	28.770.550
R11	0.32 M. Ohm	28.770.500
R12	0.64 M. Ohm	28.770.530
R13	0.1 M. Ohm	28.770.450
R14	1.25 M. Ohm	28.770.560
R15	0.8 M. Ohm	28.770.540
R16	25000 Ohm	28.771.040
R17	1000 Ohm	28.495.540
R18	0.1 M. Ohm	28.770.450
R19	1.25 M. Ohm	28.770.560

## CONDENSERS.

C1	32 $\mu$ F	28.180.130
C2	32 $\mu$ F	28.180.130
C3	25 $\mu$ F	28.180.020
C4	0.1 $\mu$ F	28.199.910
C5	0.5 $\mu$ F	28.199.160
C6	0.1 $\mu$ F	28.199.090
C7	0.5 $\mu$ F	28.199.160
C8	0.5 $\mu$ F	28.199.160
C9	0.1 $\mu$ F	28.199.090
C10	11—450 $\mu\mu$ F	28.210.510
C11	11—450 $\mu\mu$ F	
C12	0—27 $\mu\mu$ F	25.115.410
C13	0—27 $\mu\mu$ F	25.115.410
C14	0.1 $\mu$ F	28.199.850
C15	0.1 $\mu$ F	28.199.090
C16	80 $\mu\mu$ F	28.190.120
C17	1000 $\mu\mu$ F	28.199.650
C18	64 $\mu\mu$ F	28.190.110
C19	25 $\mu\mu$ F	28.210.040
C20	0.1 $\mu$ F	28.199.090
C21	125 $\mu\mu$ F	28.190.140
C22	20000 $\mu\mu$ F	28.199.020
C23	125 $\mu\mu$ F	28.190.140
C24	4000 $\mu\mu$ F	28.199.710
C25	0—27 $\mu\mu$ F	25.115.410
C26	0—27 $\mu\mu$ F	25.115.410
C27	0.5 $\mu$ F	28.199.160
C28	60—160 $\mu\mu$ F	28.210.720



S:	14, 15,	1, 2, 34, 13,	5, 7, 6, 8,						9,	10,	11, 12
C:	14, 18, 16,	4, 17, 12, 6,	10, 2, 18, 12, 9, 5, 27,	6, 13, 5,	11, 19, 25	20,	21, 7, 22,	23, 3,		8, 24,	
R	18	1,	6, 14, 8, 16, 2	3,	15, 19, 9,	10, 11,	4, 12, 13,	17, 7,		5,	



# OHMIC RESISTANCE OF COILS.

Coil.	Resistance (Ohms).	Code No.	Coil.	Resistance (Ohms).	Code No.
S1 ; S2 ; S3 ; S4	110 ; 110 ; 2 ; 30	28.564.780	S12	5	25.152.722
S5 ; S6 ; S7 ; S8	10.5 ; 60 ; 2.4 ; 27	28.564.520	S13	700	28.550.760
S9 ; S10 ; S11	250 ; 0.8 ; 1100	28.525.800	S14 ; S15	10.5 ; 30	28.565.060

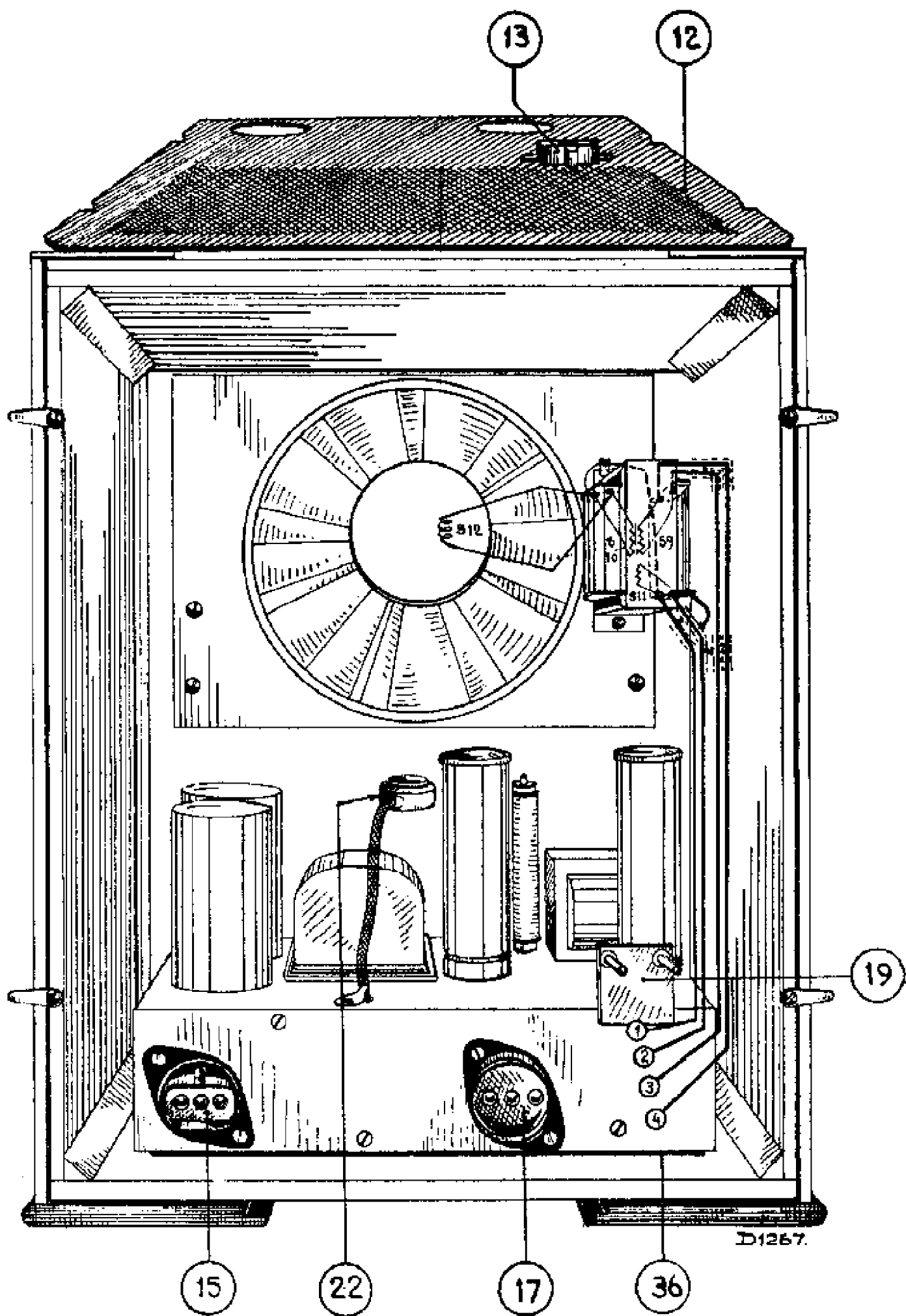


Fig. 7