STRICTLY CONFIDENTIAL

FOR PHILIPS SERVICE DEALERS ONLY

PHILIPS

SERVICE MANUAL

Four-Circuit

"SUPER-INDUCTANCE"

RECEIVING SET (A.C.)

Type 577 A

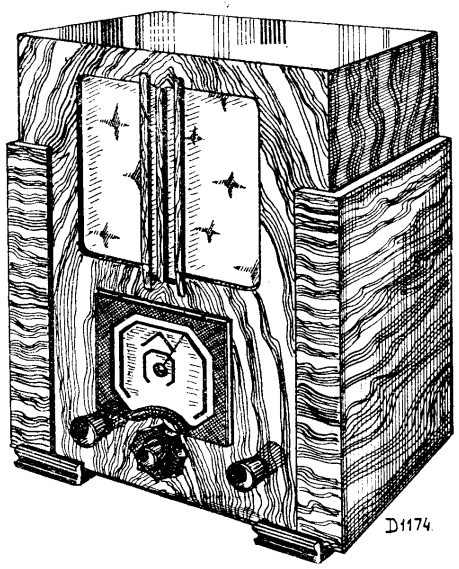


Fig. 1a.

General Remarks.

This four-circuit receiver is constructed on the well-known "Super Inductance" principle, giving great selectivity, good reproduction and steady reception. Of the four knobs on the front panel, the left-hand knob is for volume control, the right-hand knob for the continuously adjustable tone-filter; the two knobs mounted concentrically in the middle are respectively: a circular knob for tuning and a hexagonal knob for operating the mains-switch and waveband switch. The latter knob has four positions: counting from left to right, the receiver is out of action at position I, whilst at II it is connected for medium wave reception, III for long wave reception, IV for gramophone reproduction. Through an aperture in the rear panel a switch is accessible by which the internal loudspeaker may be switched off when not required. A mains socket (safety switch) is provided which automatically renders the apparatus electrically dead when the back is removed.

Wiring System.

When describing circuits, etc., components that serve for one wave-band only, are indicated in brackets.

The first two H.F. circuits C11, S8, S9 (S10, S11, C23) C24 and C12, S12, S13 (S14, C23) have C24 in common (direct capacitive current-coupling) and constitute a band-pass filter. The circuits mentioned are adjusted by the trimmers C39, C15, C16 and C17 respectively for the medium wave-band and by C18, C19, C20 and C21 respectively for the long-wave band. The aerial signal is applied via C35 and then traverses S6 and S9 for the medium wave-band and S7 and S11 for the long-wave band. Hence the coupling of the aerial to the first band-pass filter circuit (direct inductive current-coupling) takes place in S9 and S11 respectively. This method of aerial connection offers the advantage that the greater amplification of the band-pass filter circuits at higher frequencies is practically compensated for by the higher resistance of S6 and S7 respectively for those frequencies, thus giving a practically flat characteristic. The greater amplification, at higher frequencies, of circuits C13, S16, S17 (S18) and C14, S20 (S21) is compensated by potentiometer R2 (which operates automatically together with the 4-gang variable condenser) thereby giving more negative grid bias to L1 and L2 at higher frequencies than is the case at lower frequencies.

The two last-mentioned circuits are trimmed by C16 and C17 respectively for the medium-wave band and by C20 and C21 respectively for the long-wave band. Diode detection takes place after the fourth tuned circuit, so that R15 and R17 are traversed by direct current with superimposed A.C. potentials.

The variations of potentials across R17 are led back via the decoupling R16, C9, R13 to the grid of L1, causing this grid to become more or less negative according to the strength of the incoming signal. More negative grid bias renders the receiver less sensitive, so that a powerful signal is automatically weakened. The result of this is, that with a sufficiently powerful signal, the intensity-variations due to fading are practically non-existent unless the fading is of such a nature that moments of **extremely** weak signal-intensity occur. From the L.F. volume control R17, the signals are conducted via C28 to L4 and, via a stage of resistance amplification, to the pentode output valve. After this valve is the internal loudspeaker which is connected via an output transformer. An extra speaker of high impedance may be connected across the sockets provided. The internal speaker may, when not required, be put out of action by means of a switch connected in series with the speech coil. The tone-quality of reproduction may be adjusted to suit personal taste by means of the continuously adjustable tone-filter, consisting of C23 and R23.

Valves L1, L2, L4 and L5 receive their negative grid bias by a voltage-drop across R9—(R2)—R1—R10 —(R2)—R1—R19 and S5 respectively, whilst L1 is given a variable negative grid bias due to the action of the automatic volume control circuit as explained previously. When the switch is at the medium-wave position the resistance R2 is short-circuited ; therefore the negative grid bias of L1 and L2 is greater on the long-wave than on the medium-wave position. C10 and C40 are dry electrolytic condensers and are therefore polarized like C1 and C2. The connection marked red must therefore be positive with respect to the other.

When placing the waveband switch at the position for gramophone reproduction, the diode is put out of action and the volume is controlled by R20 in the same way as with radio reception. Whilst the 1st, 2nd and 4th circuits are at the long-wave position during gramophone reproduction, the 3rd circuit is at the medium-wave position. This arrangement prevents any interference by radio signals.

One of the special features of this receiver is its internal aerial. When the aerial plug is withdrawn from its socket, one of the mains leads is connected via C44 to C37, so that the H.F. signals now emanate from the mains and hence there is no need for an aerial.

TRIMMING AND ADJUSTING THE DIAL.

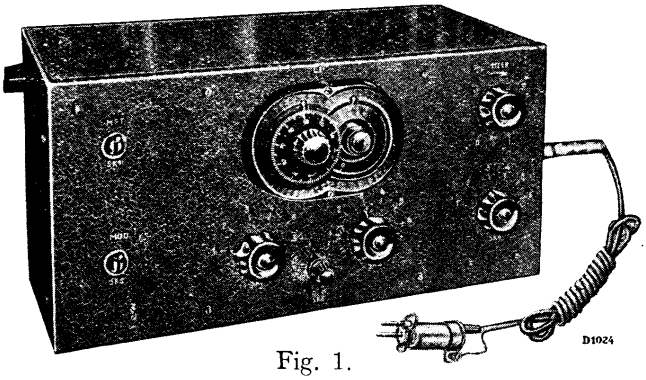


Fig. 1.

If the screened tuning coils, the four-gang variable condenser or the trimmers of the apparatus are changed, or if the sensitivity or selectivity has been diminished in any other way, the H.F. circuits must be re-trimmed. For this the requirements are :

1. A service oscillator, preferably type 4028. C. or G.M. 2880 (fig. 1), prices and particulars can be obtained from Service Dept.
2. An output indicator. This indicator will either have to be substituted for the loudspeaker or be shunted across it according to the type of indicator used. The output indicator in the testing apparatus Type 4256 (fig. 3) is of course quite suitable.
3. An adjusting plate with adjusting balancing tool (fig. 2).
4. A headphone.

Should the apparatus have to be completely adjusted, first trim the medium-wave circuits, adjust the dial if necessary and then trim the long-wave circuits. With certain repairs it is possible to omit some of these manipulations ; for instance, when changing a trimmer, there should be no need to re-adjust the dial. When changing a long-wave trimmer it is, however, advisable to retrim on the medium-wave band. This does not take long and there is a possibility that the apparatus may be slightly out of adjustment after being used for some time.

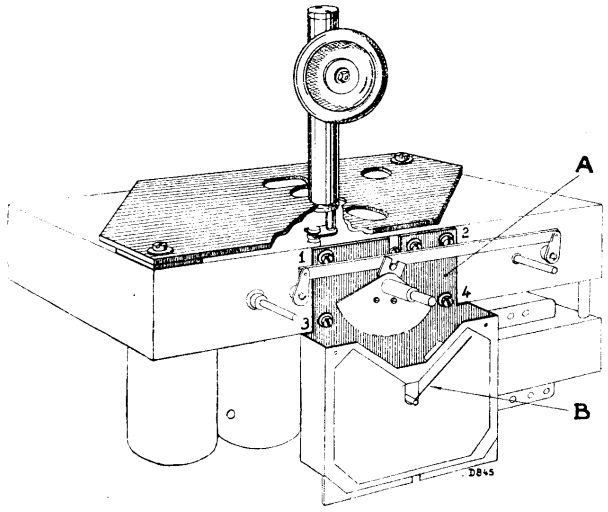


Fig. 2.

For complete balancing, the following adjustments should be made :—

1. Switch on the receiver to the medium-wave band and connect the output indicator.
2. Place the driving plate (fig. 2, A) in the central position.
3. Tighten screws 3 and 4, but leave 1 and 2 loose for the time being.
4. Turn the condenser to the minimum position.
5. Turn the pointer on its spindle to the position at which the pointer is parallel to the bevelled edge of the driving plate (fig. 2, B).
6. Turn condenser until the pointer indicates 225 m.
7. Apply a modulated signal of 225 m. to aerial socket.
8. Trim by means of C39, C15, C16 and C17.
9. If one of the trimming condensers comes into the extreme position before the output indicator shows a maximum deflection, shift the pointer slightly on its spindle, turn the condenser until the pointer again indicates 225 metres and then re-trim.
10. Tune in on a signal of 500 metres. If the pointer gives too high a reading, loosen screws 3 and 4 and move the driving plate slightly upwards ; then re-tighten screws 3 and 4. If the reading is too low, the plate must be moved downwards.
11. Tune again to a signal of 225 metres ; turn the pointer on its spindle until the reading is correct.
12. Tune to a signal of 500 metres again and check the reading ; repeat, if necessary, the manipulations under 10 and 11.
13. Tune to a signal of 350 metres. If the pointer gives too low a reading, loosen screws 3 and 4 and move the driving plate slightly to the right, after which the screws may be refixed. If the reading is too high the plate should be moved to the left. The plate must also be slightly shifted in the direction of the groove in the catch, as otherwise the readings at 225 and 500 metres will show too great a deviation.
14. Tune to 225 metres ; turn the pointer on its spindle until the reading is correct.
15. Retune to 350 metres ; notice if the reading is correct. If not, repeat the manipulations under 13 and 14.
16. Check the reading at 500 metres. Should there be a slight deviation, loosen screw 3, slightly adjust the drive plate round screw 4 and then re-tighten screw 3.
17. Check the three readings.
18. Tighten screws 1 and 2.
19. Change over to long-wave band. Turn the condensers to such a position that the pointer shows 1,000 metres.
20. Apply a signal of 1,000 metres and trim by means of C18, C19, C20 and C21 until a maximum deflection is obtained on the output indicator.
21. Seal all the trimming condensers with sealing-wax.
22. Should the pointer be stopped by the dished part of the large celluloid disc it may be turned with respect to the condenser and pointer until the friction drive strikes the stops at the correct positions.

E 1

HOW TO TRACE FAULTS.

General Remarks.

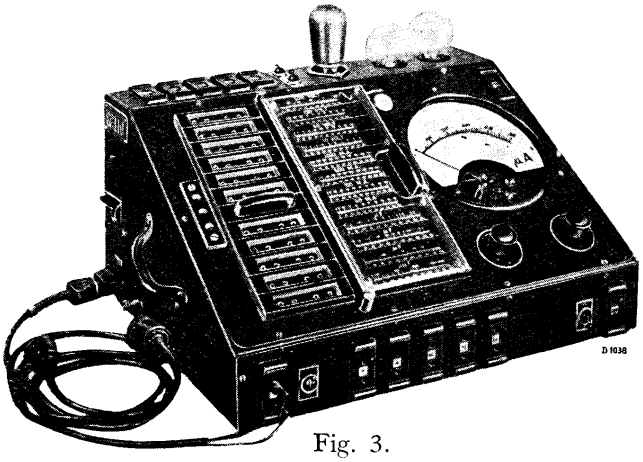


Fig. 3.

1. Fault finding will be considerably simplified by using the universal test board shown at fig. 3. Voltages, currents, resistances and condensers can be measured. It can be used for both A.C. and D.C. measurements, prices and particulars can be obtained from Service Dept.
2. The following data is as complete as possible, but some of the cases may never occur in practice.
3. This list cannot be complete, as there may be compound faults.
4. Most faults are due to short-circuits in the wiring, or to open or short circuits in component parts ; these are indicated as R... or C... shorted or open circuit as the case may be.
5. Always carry out, first of all, test measurements to ascertain the cause of the faults.

The method of procedure is as follows :—

I. **Equip the receiver with valves from a receiver that functions satisfactorily and, if necessary, try a different loudspeaker.** If this gives no result, see under II.

II. **Try whether gramophone reproduction is possible.**
If it is, see under V, if it is not, see under III.

III. **Measure voltage across C2.**
If this voltage is normal, see under IV. If it is abnormal, then look for the following faults :

1. Fault in mains or safety switch ; measure the primary voltage of the transformer.
2. Loose contact-strip on voltage link plate ; measure the primary voltage.
3. Fault in transformer ; measure the secondary voltage.
4. Fault in valve-holder of L6.
5. S5 open circuit.
6. C1 or C2 short-circuited.
7. C5 short-circuited, or short to earth of the primary windings of the 3rd or 4th screened tuning coils ; valve caps of L1 and L2. If the voltage across C2 is too low, R6 if C5 is shorted, may have become defective.
8. Shorting between windings of the loudspeaker transformer.
9. Shorting or open circuit in filament lead of L6
10. Pilot lamp shorting or leads to pilot lamp shorting.

IV. **Voltage across C2 normal, but no gramophone reproduction.**

A. **L4 has abnormal current and voltage.**

1. R8, R20, R19 open circuited; no anode current.
2. C41, C30 short circuited ; no anode current.
3. R4, R7 open circuited ; no screen-grid voltage.
4. C4, C6 short-circuited ; no screen-grid voltage.
5. R1, R2, R3 open circuited ; screen grid voltage too high.
6. C3 short-circuited ; very low screen-grid voltage.
7. C40 short-circuited ; anode current too high.
8. R8 open circuited.

B. **L5 has abnormal current and voltage.**

1. S22 open circuit ; no anode current.
2. R25 open circuited ; anode current too high.
3. R26 open circuited ; anode current too low.
4. C10, C31, C32 short-circuited ; anode current too high.
5. R21, R22, R27 open circuited ; anode current too high.

C. **L4 and L5 have normal current and voltage.**

1. R17 open circuit or bad contact.
2. C28, C31 open circuited.
3. C29, C32, C34 short circuited.
4. Fault in loudspeaker or loudspeaker transformer.
5. R22, R27 open circuited. Should there be parasitic leaks the current may still remain normal.

V. **Gramophone reproduction but no radio reception.**

A. **L1 has abnormal current and voltage.**

1. R6, S15, R9, R1 (R2) open circuited ; no anode current.
2. R5 open circuited ; no screen-grid voltage.
3. C7 short-circuited ; anode current too high.
4. R13, R16 open circuited.

B. **L2 has abnormal current and voltage.**

1. R6, S19, R10, R1 (R2) open circuited ; no anode current.
2. C8 short circuited ; anode current too high.
3. S16, S17 (S18) R14 open circuited.
If no result is obtained in this way, try the effect of applying a signal via a condenser of about 25 $\mu\mu$F to points that are easily accessible ; for instance, in the anode cap of L1, and in the anode cap of L2. Tune the receiver and commence tests from L2. A headphone may, if necessary, be used for listening.

C. **No reproduction with signal applied to anode cap of L2.**

1. S20, (S21) C27, R15 open circuited.

2. C21, (C38), C17, C14, C27 short-circuited.
3. Fault in waveband switch.
4. L3 makes poor contact in its socket.

D. **Reproduction not obtainable with signal applied to anode-cap of L1, but is obtainable with signal applied to anode-cap of L2.**

1. S16, S17, (S18), C26 open-circuited.
2. C20, (C37), C16, C13, C26 short-circuited.
3. Fault in waveband switch.

E. **Reproduction not obtainable with signal applied to aerial socket, but is obtainable with signal applied to anode-cap of L1.**

1. C35, (C23), C24, C25 open-circuited.
2. C12, C11, C39, C15 short-circuited.
3. S6, S8, S9, S12, S13, (S7, S10, S11, S14) open-circuited.
4. (C18, C19) short-circuited.
5. Fault in waveband switch.

VI. **Reception on only one of the wave-bands.**

A. **Reception on medium waves only.**

1. S7, S10, S11, C23, S14, S18, S21 open-circuited.
2. C18, C19, C20, C21 short-circuited ; (reception on medium waves too weak).
3. Fault in waveband switches.

B. **Reception on long waves only.**

1. S6 open-circuited.
2. Fault in waveband switches.
3. C37, C38 open circuited.

VII. **Reception obtained but unsatisfactory.**

A. **Reception is too weak.**

1. Voltages and currents are not in order.
2. The apparatus is out of adjustment.
3. C25, C26, C27, C31 open-circuited.
4. C23, C24 open-circuited.
5. Fault in loudspeaker or output transformer.

B. **Reception is distorted.**

1. One of the valves has excessive grid current, e.g. owing to shorting of C40 or C10.
2. R18, R21 open-circuit.
3. Fault in loudspeaker or output transformer.

C. **The apparatus hums.**

1. Single-phased rectification ; part of S2 open-circuited.
2. Fault in valve-holder of L6
3. C1, C2 open-circuited.
4. One of the decoupling condensers open-circuited.
5. One of the earth connections is loose.
6. Special screening cap for L4 not fitted.

D. **The apparatus crackles.**

1. Bad contact in aerial or earth lead ; disconnect both these leads from the receiver and examine them.
2. Intermittent shorting in wiring.
3. Bad contact in one of the soldering joints.
4. Bad contact in one of the switches, valve-holders or adjustable resistances.

E. **The apparatus oscillates or motor-boats.**

1. One of the connections is earthed at a wrong point.
2. One of the screening plates is bent.
3. Bottom screening plate not in contact with chassis.
4. C7 or C8 short-circuited.
5. C3, C5 or C36 open-circuited.
6. The mains flex outside the apparatus is too close to the rear panel.
7. The casing of the four-gang condenser is not electrically connected to the chassis.
8. The resistance between coating and cathode is too high (it must not exceed about 5 ohms).
9. Shorting between valve-cap and coating.
10. Screened leads of valve-cap extends as far as the clip only so that a few millimetres between the clip and the cap are left unscreened.

As a rule the faults stated under 4 and 5 may be summarised as : decoupling condenser or grid resistance open-circuited or short-circuited.

If the coil can screws are loose oscillation may be experienced.

F. **Cabinet resonances** due to loose parts of the chassis, cabinet or loudspeaker. Such as valve-caps, screening cans, springs in adjustable resistances, links on voltage changing plate, window-escutcheon, loudspeaker silk, clips, etc.
Having found the resonating part, securely fix it, e.g. by screwing it tight, applying a piece of felt, etc.

VIII. **Condenser Drive Slips.**

1. Pin is slightly askew in catch ; slightly bend the catch.
2. Friction drive is greasy or eccentric.
3. Friction drive too heavy on bearings.
4. Spindle of pointer too heavy on bearings.
5. Small disc must be made rough.
6. Rotatable resistance with wiper runs too heavy.
7. Edge of large celluloid disc not flat.
8. Running surface of celluloid disc is greasy.

G 1

REMOVAL AND CHANGING OF PARTS.

1. Removing the chassis.

The method of removing the chassis should preferably be carried out in the following order :

1. Remove the rear panel.
2. Take out the valves.
3. Unsolder the flex from the loudspeaker transformer and remove it from under the clip.
4. Remove station-chart.
5. Remove the knobs by unscrewing the grub-screws.
6. Take out the four bottom screws on the underside of the cabinet.
7. Take chassis out of its cabinet.

2. Important points to be noted when repairing.

1. The apparatus is constructed as a precision instrument and should be treated as such.
2. The apparatus must never rest on the coil-boxes.
3. Do not make any alteration in the wiring or in the position of the screening plates.
4. Refix all earth connections to the original points.
5. Do not place any insulating fabric round the bare wiring of the circuits, and see that these wires do not touch the insulating fabric of other conductors. In either of these two cases the quality of the receiver would be impaired.
6. See that all bare wires are kept well clear of each other (at least 3 mm. apart).
7. Replace spring washers, insulating material, etc., in their original places after repair ; rivets may as a rule (e.g. when changing valve-holders) be replaced by screws and nuts.
8. All moving parts may be greased with a little pure vaseline.
9. As far as possible and necessary, give the contacts a little more mechanical tension.
10. Solder as quickly as possible to avoid warming components.
11. All soldered joints to the leads of compounded condensers should be soldered $\frac{1}{2}$" from the compound so as to avoid overheating. Further, these condensers should be suspended clear of all other wiring.

We will now deal with such repairs as are likely to involve difficulty :

Stays.

When carrying out repairs it may be necessary to remove the stays which connect the opposite corners of the chassis. This will not involve any difficulty, but care must be taken, when refitting, to fix them at the right positions, as otherwise the chassis might become twisted and the fine adjustment of the circuits would then become impaired. A good method is to place the chassis on a perfectly flat plate and to tighten the stays until the four corners are flush with the plate.

Electrolytic condensers, (C1 and C2).

When changing C1 and C2, use a spanner of the type shown in fig. 4 (Code No. 09.990.760).

C10 and C40 are dry electrolytic condensers and are polarized. The positive conductor is connected to the end that is led out near the red marking.

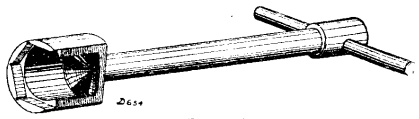


Fig. 4.

Main transformers.

Adaptation to different mains voltages is effected by placing the strips on the change-over plate at the positions indicated for the voltage in question according to the diagram on the indicator disc.

Whenever the voltage has been altered always remember to turn the indicator disc until the correct voltage range appears at the hole in the removable back.

Valve-cap or screening wire.

If the screening wire is to be changed the other end will also have to be unsoldered from the clamp. **It is important that the screening wire enters the hole of the valve cap so as to ensure satisfactory screening.**

REMOVING AND REPAIRING THE LOUD SPEAKER. Code No. 28.951.60. Type 4283.

Method of removal.

The loudspeaker can be removed by merely loosening the 3 eccentric clamps. When changing the loudspeaker silk it will be necessary to unscrew the entire board on which the loudspeaker is fixed.

Important points to be considered when repairing.

1. See that the repair is carried out with good tools on a table or bench (not an iron one) free from dust or filings.
2. Under no circumstances may the front and back plates (fig. 5, item 107 and 109) be removed from the magnet, as this would impair its magnetism (as would also be the case when working on an iron bench).
3. Replace the cover of the loudspeaker immediately after the repair has been carried out.

Centreing the cone.

Loosen the centreing screw (item 106); place 4 distance pieces of 0.2 mm. thickness (Code No. 09.990.840) through the perforations of the spider (item 105) into the air-gap. Refix the centreing screw and withdraw the distance pieces. No sound should now be heard when the cone is carefully moved up and down (fig. 6).

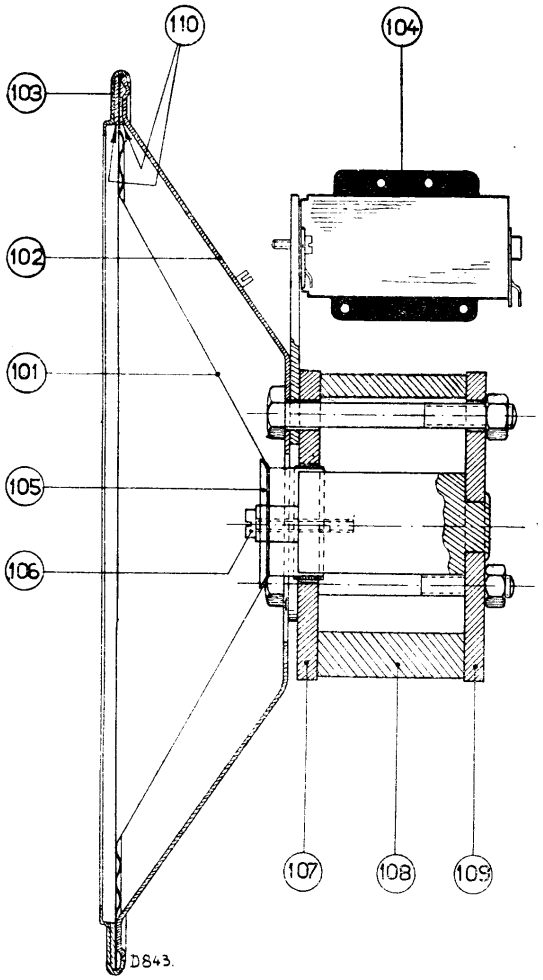


Fig. 5.

Changing the cone.

Unsolder the connections from the transformer (item 104), cut through the clamping ring (item 103) and loosen the centreing screw. An air-gap, when dirty, should be cleaned with a piece of strong material (e.g. brass, pertinax, etc.) wrapped in wadding that has been moistened with alcohol. Any iron particles should be removed from the air-gap by means of a steel plate-spring. The new cone is to be centred as indicated above and fixed with a special service clamping ring (Code No. 28.445.820). Commence by bending the tags at 4 points positioned at angles of 90° from each other; the distance-pieces are not to be taken from the air-gap until all the tags have been bent. The flexible leads of the transformer are to be fixed at the right length (if too taut they will impede movement; if too slack they will touch the cone and cause rustling).

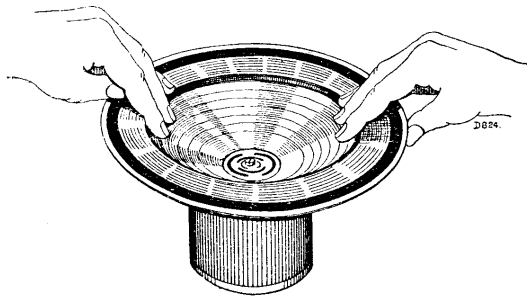


Fig. 6.

Changing the cone-holder.

A gauge is required of the type shown in fig. 7 (Code No. 09.991.022). Remove the cone and place the

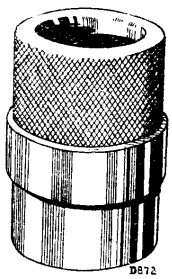


Fig. 7.

gauge in the air-gap. Now mark out the internal circumference of the cone-holder as well as possible on the front plate (item 107), unscrew the nuts of the 3 bolts and stand the loudspeaker on the back plate (bearing in mind point 2). When mounting, do not withdraw the gauge from the air-gap until the 3 draw-bolts have been securely tightened. A gauge will also be required if the core is no longer accurately centred in the aperture of the front plate.

Faults.

Before commencing a repair, try a different loudspeaker and transformer in order to make sure the fault is not to be found in the receiver.

No sound.

There is an open or short circuit in the speech coil or output transformer. Measure up with an ohm-meter; the resistances are stated on the folder at the back of the manual.

Sound weak and/or distorted.

The coil has become jammed in the air-gap (test as shown in fig. 6) or there is a partial short in the windings of the speech coil or transformer.

Rustling and resonance.

This may be caused by loose particles (possibly also from the cabinet) or by some hindrance in the movement of the cone, e.g., connections too taut or too slack, dirt in air-gap or distortion of the speech coil. The glued joint may also be loose at one part, or the cone may be torn.

LIST OF SPARE PARTS, TOOLS, GAUGES, ETC.

When ordering any of these items, please state :—

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

Fig.	Item.	Description.	Code No.
8	1	Cabinet	28.240.980
8	2	Escutcheon (Colour 026)	28.884.020
8	3	Celluloid window	28.697.260
		Station dial	28.698.530
8	4	Knob, diameter 30 mm. (Colour 026)	23.950.011
8	5	Knob, diameter 25 mm. (Colour 026)	23.950.190
8	6	Octagonal knob	23.950.343
9	7	Interconnecting strip on tapping plate	25.258.230
9	8	Holder for dial lamp	25.160.481
9	9	Valve cap for L1 or L2	25.771.191
10	10	Loudspeaker fixing clamp	25.012.210
10	11	Clip for fixing rear panel	25.673.860
		Clip for fixing rear panel (top)	28.740.040
10	12	Plug two-pin for safety switch	28.864.270
10	13	Conical screening for L4	28.836.170
10	14	Backplate	28.395.605
10	15	Indicating disc	28.698,030
10	16	Mains safety socket	25.742.000
10	17	Knob for loudspeaker switch (Colour 111)	23.993.100
10	18	Loudspeaker switch	08.527.420
11	19	Crank and clamping boss	25.980.362
11	20	Spindle for volume control	28.000.750
11	21	Contact spring for variable resistance (complete)	25.866.740
11	22	Large celluloid disc	25.815.961
11	23	Spindle for friction drive	28.615.960
11	24	Pointer	28.944.112
11	25	Friction drive	25.747.171
11	26	Pulley of friction drive	25.809.161
11	27	Spindle for R23	28.000.820
11	28	Spring for earthing of bottom screening	25.672.720
11	29	Rubber suspension washer for chassis	25.644.820
11	30	Rotor with 6 contacts	25.866.730
11	31	Stator with 6 contacts	25.866.720
11	32	Stator with 2 contacts	25.866.620
11	33	Rotor with 4 contacts	25.866.630
11	34	Catch plate for " star " click plate	28.866.520
11	35	Plug socket plate for aerial-earth connection	28.864.400
11	36	Rotor with 7 contacts	25.866.640
11	37	Clamping boss for rotors	25.104.180
11	38	Spring for click plate	25.668.710
11	39	Stator with 7 contacts	25.866.650
11	40	Valve holder with 5 contacts	25.161.330
11	41	Plug socket plate for gramophone pick-up	25.789.570
11	42	Nut for electrolytic condenser	07.093.010
11	43	Plug-socket plate for loudspeaker	25.787.471
11	44	Soldering tag for electrolytic condenser	08.531.801
11	45	Valve holder with 6 contacts	25.161.730
11	46	Reduction ring	28.445.940
11	47	Valve holder with 4 contacts	25.161.320
11	48	Unit complete with stators and rotor of mains switch	08.527.980
11	49	Springs for quick-break switch	28.730.010

LIST OF SPARE PARTS, TOOLS, GAUGES, ETC.—continued.

Fig.	Item.	Description.	Code No.
		LOUDSPEAKER.	
5	102	Protecting cap	28.250.431
5	103	Service clamping ring	28.445.821
5	110	Paper ring with same external diameter as cone	28.445.390
		Cone and coil	25.152.421
		TOOLS, ETC.	
		Service oscillator with screened aerial lead (200–3,000 m). ...	00.040.280
		Screened aerial lead (separate)	25.980.450
		Artificial aerial	25.730.840
1		Service oscillator 14–3,000 m.	09.991.260
2		Adjusting plate	09.991.160
2		Adjusting balancing tool	09.991.100
3		Universal measuring apparatus...	09.991.030
4		Box spanner	09.990.760
		Pertinax distance pieces for centreing cone and coil	09.990.840
7		Centreing gauge for air gap	09.991.022

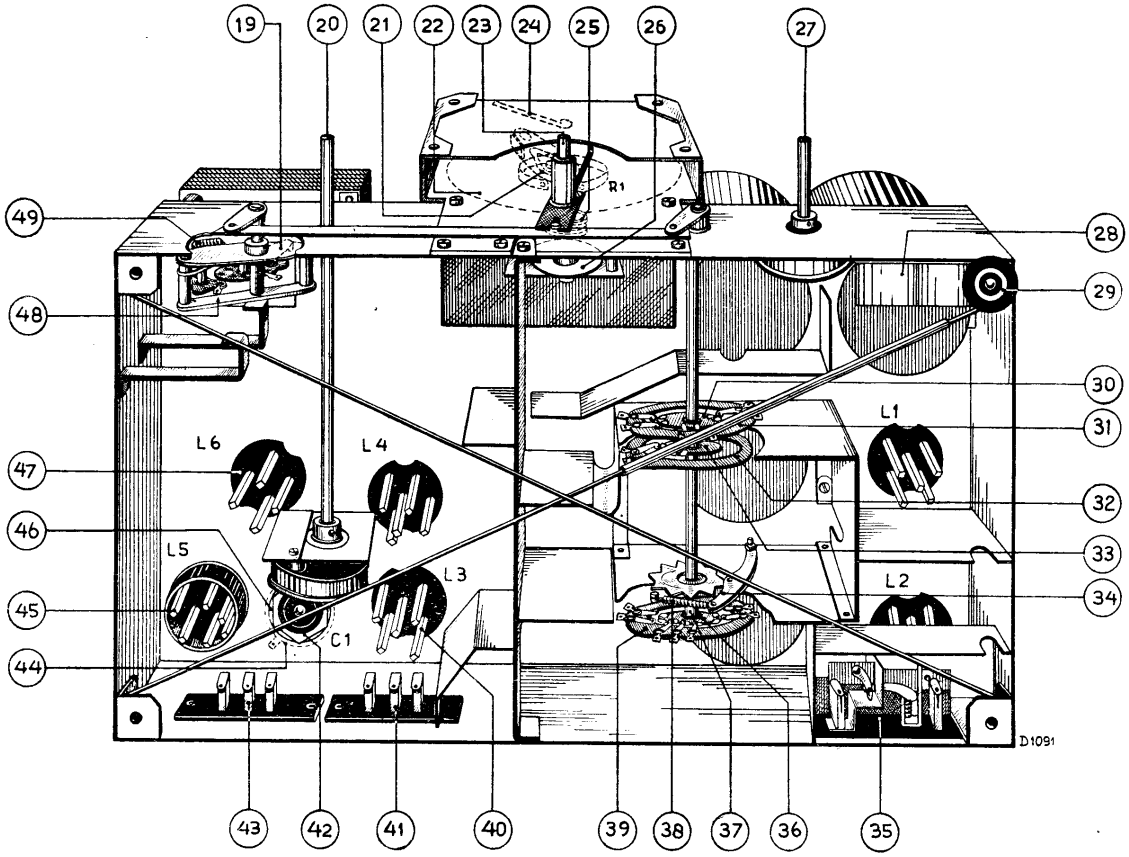

19
20
21
22
23
24
25
26
27
R1
49
28
48
29
30
L1
31
L6
L4
47
32
46
L5
L3
33
L2
45
34
C1
44
D1091
43
42
41
40
39
38
37
36
35

Fig. 11

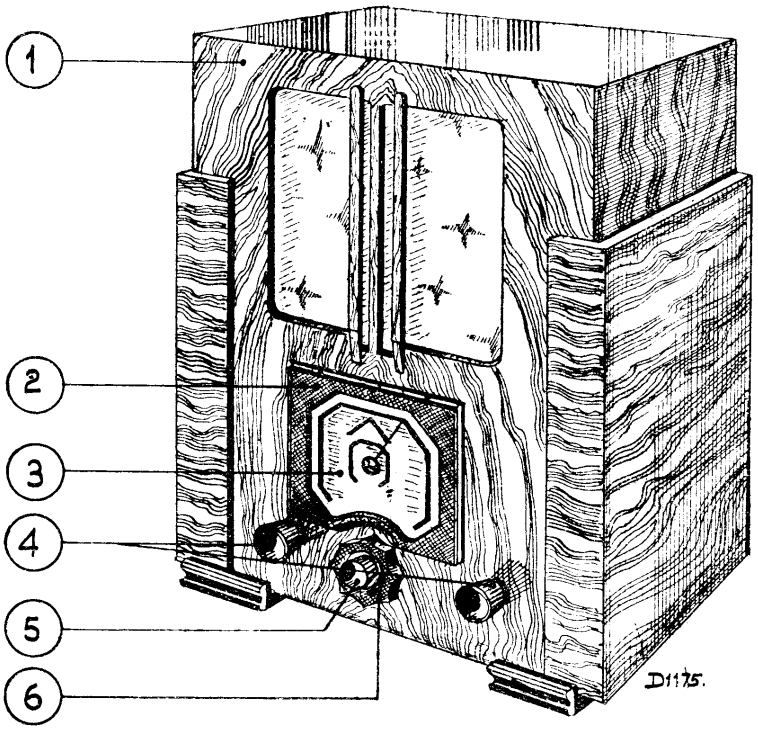

1
2
3
4
5
6
D1175.

Fig. 8

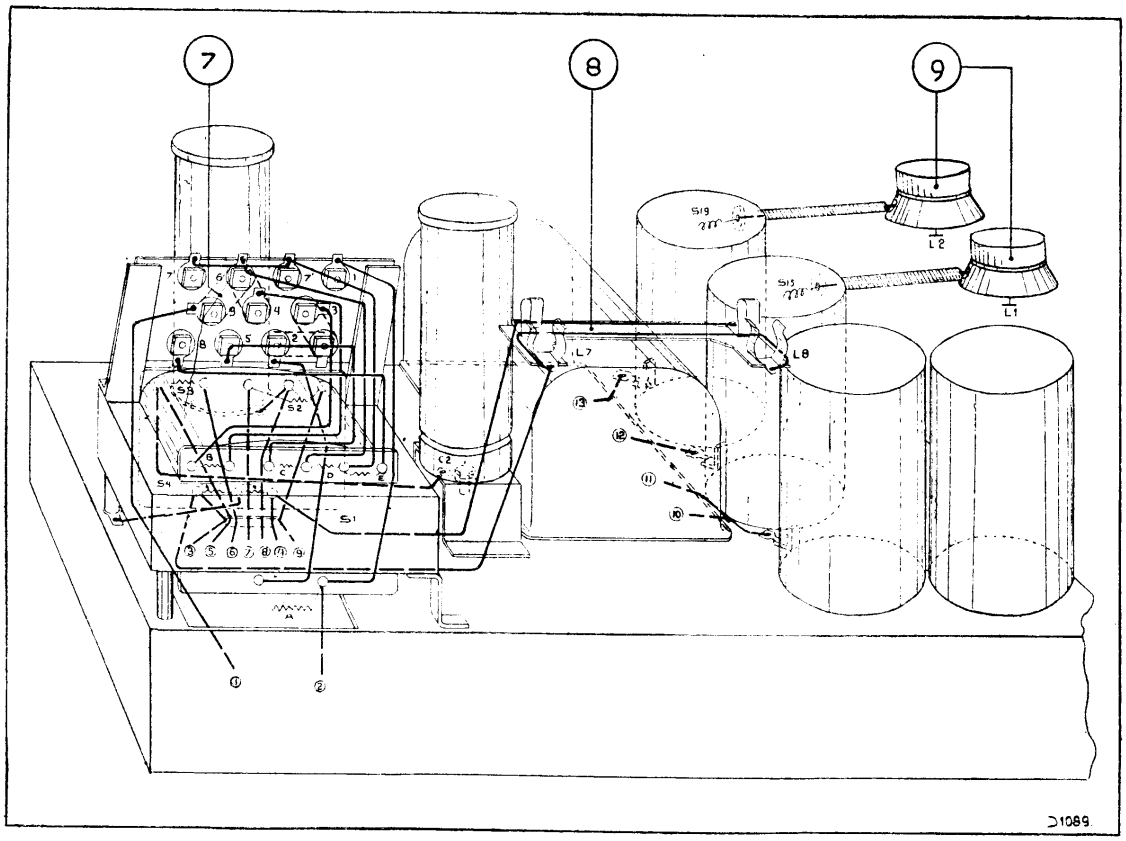


Fig. 9

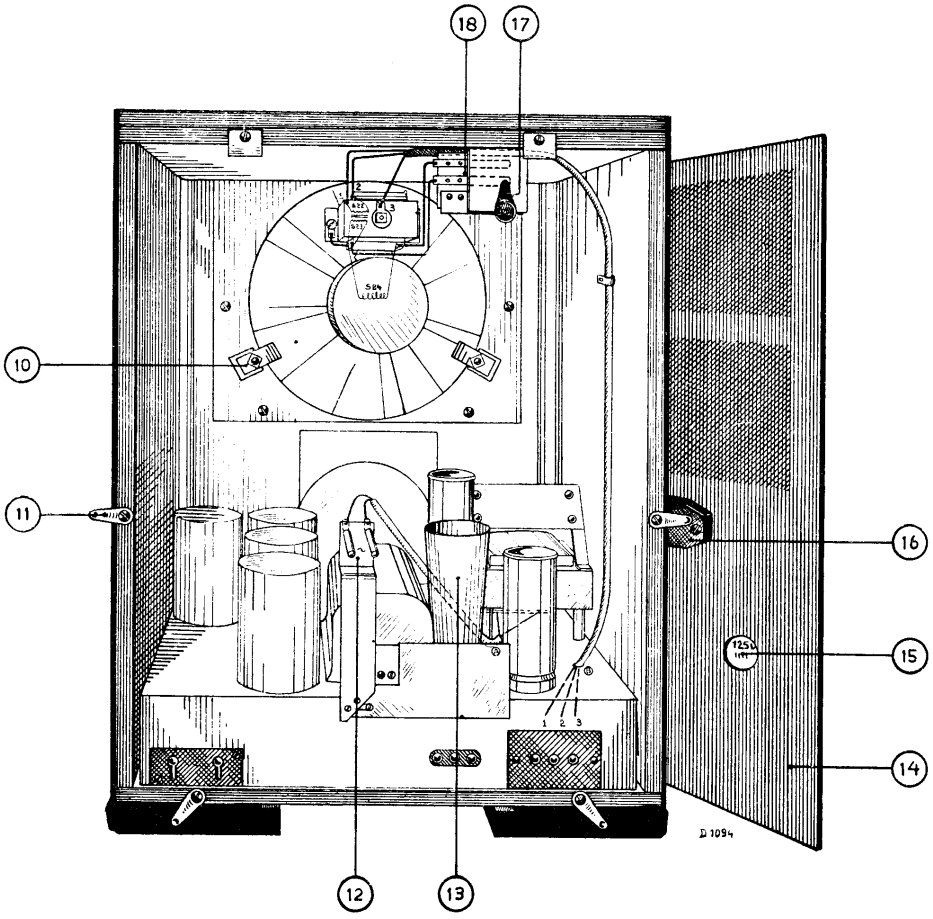


Fig. 10

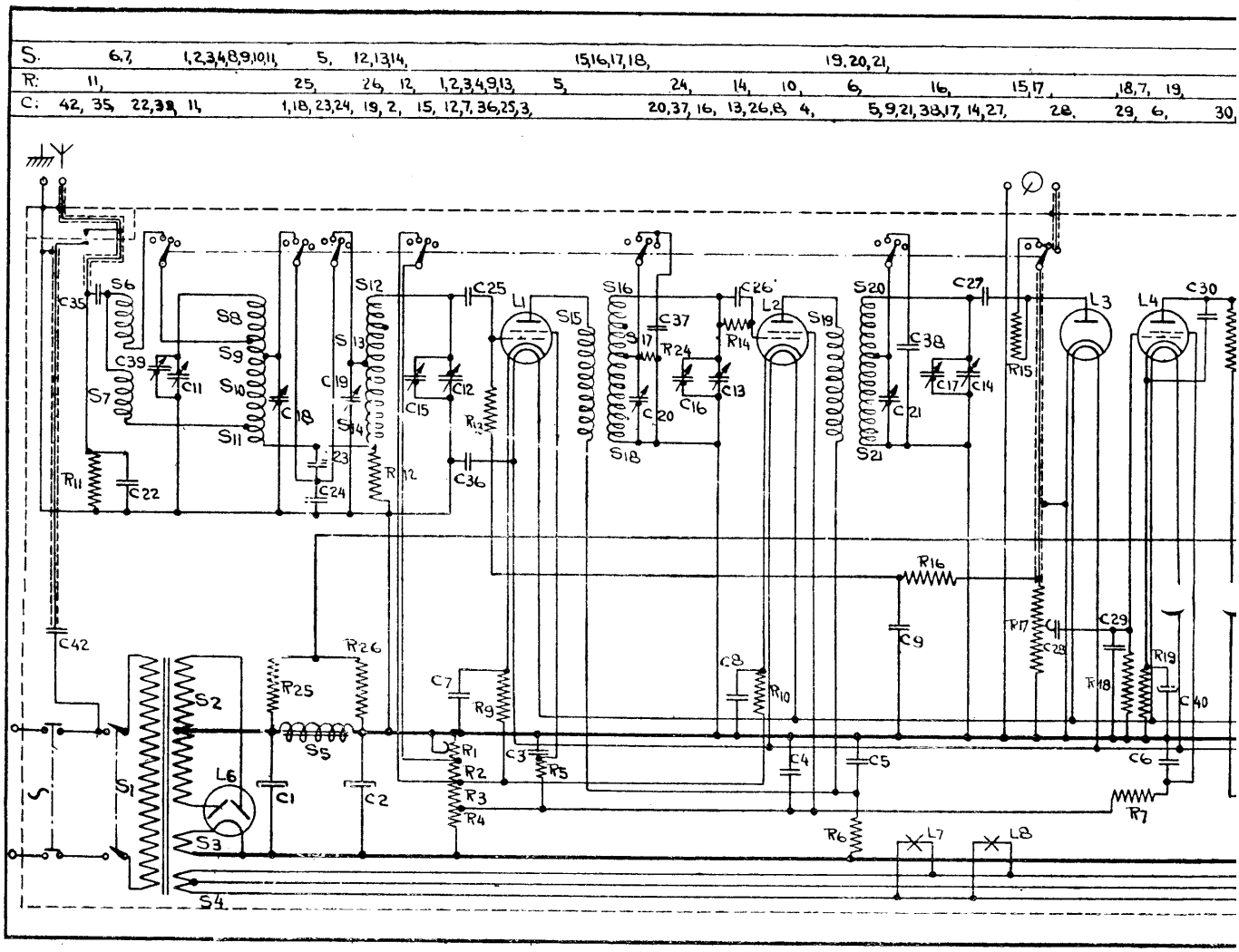
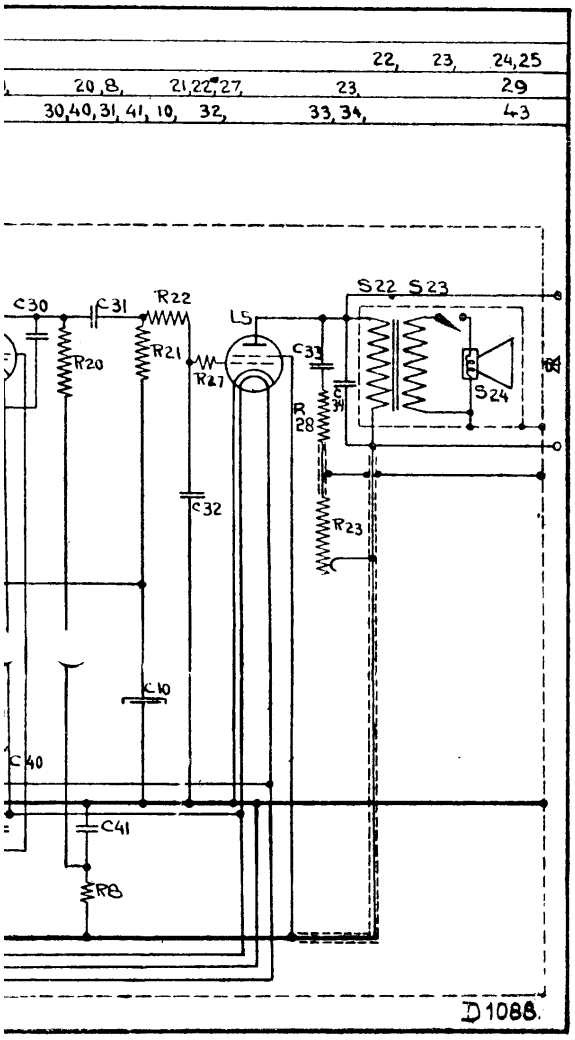


Fig. 12

NOTE :—R7 may be connected to H.T. positive direct and not through R4.

RESISTANCES

Designation.	Value.	Code No.	Designation.	V
R1	680 Ohm	28.808.285	R16	1 M
R2	160 Ohm	28.770.170	R17	0.5 M
R3	32000 Ohm	25.771.050	R18	1 M
R4	64000/2 Ohm	25.771.080	R19	40(
R5	1000 Ohm	28.770.250	R20	0.32 M
R6	1000 Ohm	28.770.250	R21	0.5 M
R7	1 M. Ohm	28.770.550	R22	0.1 M
R8	0.1 M. Ohm	28.770.450	R23	500(
R9	500 Ohm	28.770.220	or	640(
R10	500 Ohm	28.770.220	or	800(
R11	32000 Ohm	28.770.400	R24	0.32 M
R12	3200 Ohm	28.770.300	R25	160(
R13	1 M. Ohm	28.770.550	R26	640(
R14	1.6 M. Ohm	28.770.570	R27	10(
R15	0.32 M. Ohm	28.770.500	R28	1(



ı R4.

Value.	Code No.
1 M. Ohm	28.770.550
0.5 M. Ohm	28.808.610
1 M. Ohm	28.770.550
4000 Ohm	28.770.310
0.32 M. Ohm	28.770.500
0.5 M. Ohm	28.770.520
0.1 M. Ohm	28.770.450
50000 Ohm	28.808.290
64000 Ohm	28.808.520
80000 Ohm	28.808.530
0.32 M. Ohm	28.770.500
16000 Ohm	28.770.370
64000 Ohm	28.770.430
1000 Ohm	28.770.250
100 Ohm	28.770.150

CONDENSERS

Designation	Value.	Code No.
C1	32 μF	28.180.130
C2	32 μF	28.180.130
C3	0.1 μF	28.199.090
C4	0.1 μF	28.199.090
C5	0.1 μF	28.199.090
C6	0.1 μF	28.199.090
C7	50000 μμF	28.199.060
C8	50000 μμF	28.199.060
C9	0.1 μF	28.199.090
C10	25 μF	28.180.020
C11	0–430 μμF	28.210.131
C12	0–430 μμF	
C13	0–430 μμF	
C14	0–430 μμF	
C15	0–27 μμF	25.115.410
C16	0–27 μμF	25.115.410
C17	0–27 μμF	25.115.410
C18	0–27 μμF	25.115.410
C19	0–27 μμF	25.115.410
C20	0–27 μμF	25.115.410
C21	0–27 μμF	25.115.410
C22	80 μμF	28.190.120
C23	25000 μμF	28.198.400
C24	32000 μμF	28.198.410
C25	25 μμF	28.190.070
C26	25 μμF	28.210.040
C27	7 μμF	28.210.190
C28	10000 μμF	28.198.990
C29	320 μμF	28.190.180
C30	250 μμF	28.190.170
C31	10000 μμF	28.198.990
C32	100 μμF	28.190.130
C33	32000 μμF	28.199.800
C34	2000 μμF	28.199.680
C35	500 μμF	28.190.200
C36	0.1 μF	28.199.090
C37	25000 μμF	28.198.400
C38	25000 μμF	28.198.400
C39	0–27 μμF	25.115.410
C40	25 μF	28.180.020
C41	0.1 μF	28.199.090
C42	500 μμF	28.190.200

CURRENT AND VOLTAGE TABLES

	L1.	L2.	L4.	L5.	
Va	245–241	245–241	162–176	224	Volt
Vg'	110–85	110–85	38–28	250	Volt
–Vg	4.7–1.82	4.9–2.12	1.53–1.24	20	Volt
Ia	0.74–2.5	0.99–2.85	0.29–0.24	35.7–32.7	mA
Ig'	0.34–1.1	0.47–1.28	0.125–0.098	4–3.65	mA

In some cases the currents and voltages may deviate considerably from the above values without necessarily indicating an error, as these figures are mean values obtained by measurements on a large number of different receivers. The voltages were measured with voltmeters taking practically no current.
Lower values will, of course, be arrived at when measuring with moving-coil voltmeters when resistances are in circuit. The results will then depend on the internal consumption of the meter. The two values stated refer respectively to the minimum and maximum position of the variable tuning condenser when placed to the minimum and maximum of the wave length range.
The negative grid bias of L1, L2 and L4 was measured across C7, C8 and C40 respectively.

OHMIC RESISTANCES OF COILS

Coil.	Resistance (Ohms).	Code No.
S1 ; S2 ; S3 ; S4	35 ; 300 ; 0.1 ; 0.1	28.523.420
S5	480–575	28.545.191
S6 ; S7	33 ; 119	28,560.961
S8 ; S9 ; S10 ; S11	2.2 ; 1.0 ; 10.7 ; 15.6	28.560.585
S12+S13 ; S14	3.2 ; 24	28.560.613
S15 ; S16+S17 ; S18	62 ; 3.2 ; 25	28.560.625
S19 ; S20 ; S21	62 ; 3.2 ; 25	28.560.954
S22 ; S23	620–720 ; 1–1.25	28.518.271
S24	4.3–5.3	25.152.422

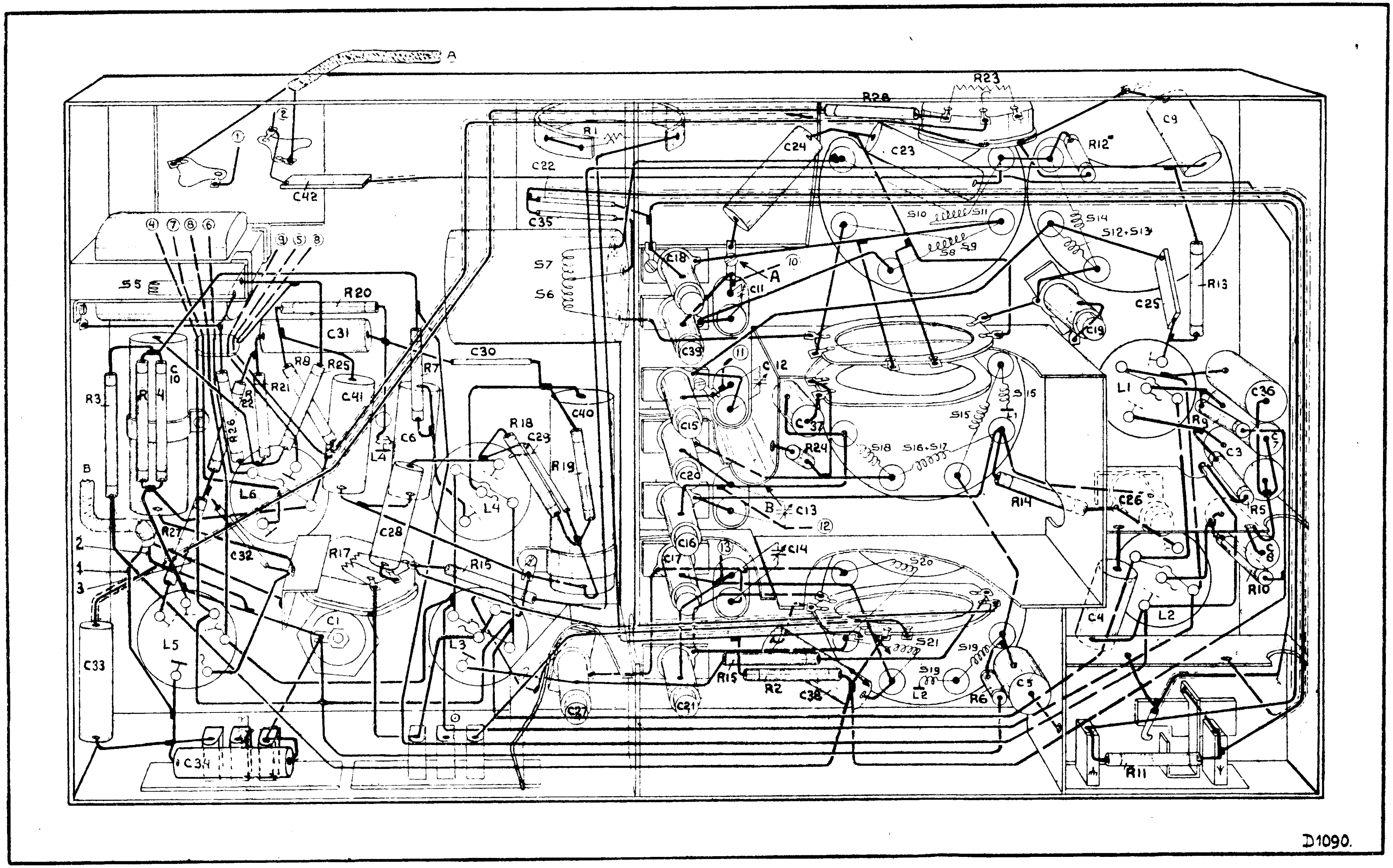

A
R23
R28
R1
R12
C9
C24
C23
C22
C42
C35
S10
S11
S14
S12+S13
S8
S9
S7
S6
S5
C18
C11
A
C25
R13
R20
C31
C19
C39
C30
R7
R8
R25
R21
R22
R26
R3
R4
C10
C41
C6
L4
R18
C29
C40
R19
C12
C37
C15
S15
S16+S17
S18
R24
C20
L1
C36
R9
C3
C7
R5
B
L6
L4
C28
C13
B
R14
C26
C16
C17
C14
S20
R27
C32
R17
R15
C8
R10
L5
C1
L3
C4
L2
S21
C33
S19
R15
R2
C38
L2
R6
C5
C27
C21
C34
R11
D1090.

Fig. 13