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SERVICE DOCUMENTATION

3 VALVE RECEIVING SET

(Including Rectifier)

FOR A.C. MAINS.

Type 940A

General Remarks.

This receiver is a two-valve instrument, together with a rectifying valve. There are four knobs on the front of the receiver and they are used for the following purposes:—Top left, volume control; bottom left, wave change and mains switch; top right, tuning control; bottom right, reaction.

The range of wave lengths covered are as follows:—medium wave, 195/575 metres; long wave, 740/1900 metres.

A safety mains socket is fitted to the removable back so that when the latter is removed the instrument will have no voltage applied to it when the valves, etc., are being handled.

Description of Circuits.

The aerial circuit comprises the coils S5 (S6), and the condensers C12, C7, C6. The coil S6 is placed in circuit only when the switch is placed to long wave. S7 is the reaction coil which can be coupled with S5 and S6 so that the receiver can be adjusted to its maximum sensitivity. Further, the selectivity is also affected by the reaction coil and therefore it is less selective when the coupling is loose. Consequently

further volume control can be effected by the use of the condenser C5.

The aerial current passes through C5, C12 and C7 and it is regulated by condenser C5. The condensers C12 and C7 form the coupling between the aerial and the aerial circuit; C7 is short circuited when receiving a powerful local station. This adjustment can be made by the screw with the moulded head which is placed at the rear of the receiver. The H.F. choke coil and the resistance R9 are for by-passing to earth any low frequency fluctuation which may reach the aerial via the mains.

L1 (5P4) is the detector valve and receives its anode and screened voltage via resistance R1, R2, R7 respectively. The voltage from the anode of L1 is passed via C10, R6 to the grid of the pentode output valve L2 (PM24M). The grid bias voltage of the pentode valve is provided by the resistance R3 and is decoupled by the dry electrolytic condenser C4. The latter has two poles and consequently the end which is marked by a red line is the positive. Care should be taken in replacing so that it is connected in the same manner.

C13 and R10 are so designed to ensure a uniform low frequency amplification and also limits the high impedance of S8 to higher frequencies.

HOW TO TRACE FAULTS.

- I. Test the receiver with valves from a receiver which are known to be in good order. Further test the receiver with another loudspeaker.
- II. Place a strong signal on the control grid of L1. If no reception is obtainable measure the voltage across C1.
- III. **Voltage at C1 abnormal.**
- Safety plug at the rear faulty (measure the voltage at the primary of the mains transformer).
 - Measure the voltage across the secondary of the mains transformer.
 - Faulty contact in L3 rectifier valve holder.
 - C1 short circuited.
 - C2 or C9 short circuited. (Check R1 to make sure that no overload has occurred on this).
 - A short circuit or open circuit of heater wiring.
- IV. **Voltage at C1 normal.**
- A. **Abnormal voltage and current at L1.**
- R1, S8, S7 open circuited; no anode current.
 - R2 open circuited; no screened grid voltage.
 - C3 short circuited; no screened grid voltage.
 - R7 open circuited; high screened grid voltage.
 - R8 open circuited.
 - Bad contact of L1 in the valve holder.
- B. **Abnormal voltage and current at L2.**
- S9, R3 open circuited; no anode current.
 - C4, C10 short circuited; high anode current.
 - R5, R6 open circuited.
 - Bad contact of L2 in the valve holder.
- C. **Normal voltage and current at L1 and L2.**
- C8, C11 short circuited.
 - C10 open circuited.
 - Loudspeaker or output transformer defective.
- V. **No reception when aerial is placed in aerial socket.**
- C5, S5, (S6), C12, C7, C8 open circuited.
 - C6, C7, C12 short circuited.
 - R9 or S12 short circuited.

VI. Reception not up to standard.

- A. **Weak.**
- Current and voltage not normal.
 - Reaction not operating satisfactorily throughout.
 - S12 short circuited.
- B. **Hum.**
- One half of S2 open circuited.
 - C1, C2 open circuited.
 - C3, C4 open circuited.
 - S12 open circuited.
- C. **Crackling.**
- Defective contact in the aerial or earth sockets.
 - Defective contact in the voltage change over plate or one of the valve sockets.
 - Intermittent short circuiting in the wiring or dry joint.
 - C9 intermittent short circuit.
- D. **Distortion.**
- C4 short circuited.
 - R8, R5, R6 open circuited.
 - Loudspeaker or output transformer defective.
 - C11 open circuited. (Excessive hum).
 - C13, R10 open circuited. (Higher notes predominating).
- E. **Cabinet resonance or rattle.**
This is usually due to loose parts such as strips, springs, washers, etc. When the vibrating part has been located it should be secured and if necessary, fixed with a felt pad.
- ## REMOVING AND CHANGING OF PARTS.
1. **Removing the chassis from the cabinet.**
The removal of the chassis should preferably be done in the following way.
- Remove the screws securing the back.
 - Remove the valves.
 - Remove the four knobs on the front of the receiver. These are secured by one grub screw in each case.
 - Remove the four base screws from the underside of the cabinet. **Note.**—Take care when replacing the cabinet that the earthed spring is replaced in its original position.
 - The chassis together with the loudspeaker can now be withdrawn from the cabinet.

Special Note.

1. Always replace the wiring and screws in their original position after repairs.
2. Make sure that the bare wires are separated by not less than $\frac{1}{4}$ in.
3. After repairs replace all washers, insulating pieces, etc., in their original position.
4. Rivets may, if necessary, be replaced by nuts and bolts.
5. All moving parts may be greased with a little pure vaseline.
6. If necessary, tighten all contacts and give them a little mechanical tension.
7. Soldering should be done as rapidly as possible in order not to overheat the various parts.
8. All soldered joints of compound-treated condensers should be soldered so as to avoid melting the material. These condensers must be clear of all other wires.

Electrolytic Condensers C1 and C2.

When changing these condensers a spanner shown at figure 1 (code No. 09,990,760) should be used.

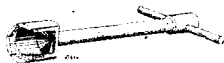


Fig. 1.

Coil Assembly, S5, S6, S7.

When removing this part care should be taken that coil S7 is not removed too far from the interior or turned when removing the assembly.

Altering the Voltage Mains Adjustment.

In order to change to another voltage adjust the links on the change over plate according to the diagram shown on the removable back. In all cases where the voltage plate has been re-adjusted the diagram disc should be altered so that it corresponds with the voltage to which the receiver has been adjusted. The range for which the voltage has been adjusted will appear through the small hole provided for that purpose on the removable back if the voltage diagram is turned to the revised voltage range.

REMOVING AND REPAIRING THE LOUDSPEAKER

Method of removal.

The loudspeaker is mounted on two brackets which are secured to the chassis by four screws. The two leads to the output transformer should be unsoldered and the screws removed.

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 be removed from the magnet as this would impair its magnetism (as would also be the case when working on an iron bench).
3. Always replace the cover of the loudspeaker immediately after the repair has been carried out.

Centreing the cone.

The small insulated baffle can easily be slipped off the cone holder. Loosen the centreing screw and place four distance pieces of .008 in. thickness (code No. 09,090,840) through the perforations of the spider into the air-gap. Refix centreing screw and remove the distance pieces. When the cone is moved carefully up and down no sound should be heard, figure 2.



Fig. 2.

Changing the cone.

Unsolder the connections from the transformer, cut through the clamping ring and loosen the centreing screw. The air-gap when dirty, should be cleaned with a piece of strong material, namely 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. 28,445,810). 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 should be of the correct length (if they are fitted too tight they will impede movement; if they are too slack they will touch the cone and cause rustling). When exchanging the cone support, remove the cone, mark the inner circumference of the cone support on the front plate and place the brass gauge in the air gap, Fig. 3. Afterwards release the three nuts of the cone support and then it can be withdrawn. Do not remove the brass air-gap gauge until the three bolts have been firmly fitted.



Fig. 3.

Faults.

Before beginning with a repair make sure that the loudspeaker is in order by testing with another loudspeaker of a similar type.

No sound.

There is an open or short circuit in the speech coil or output transformer. This can easily be tested and the D.C. resistance values are given at the end of the manual.

Weak or distorted reproduction.

The coil may have become jammed in the air-gap or there may be a partial short circuit in the windings of the output transformer.

Rattle.

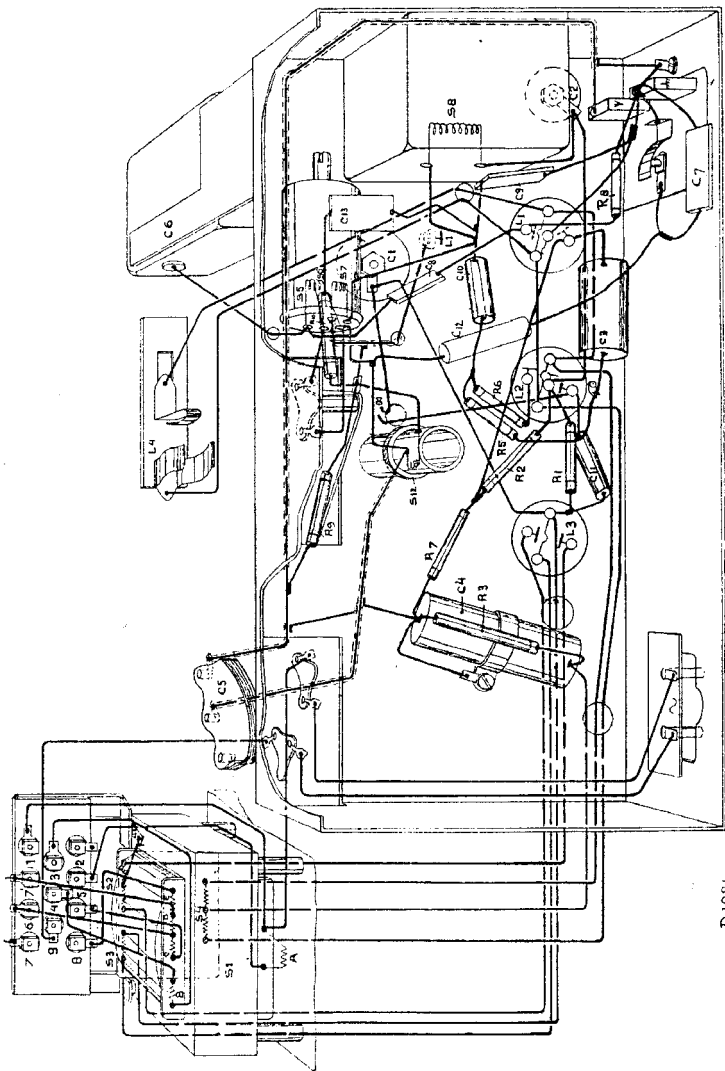
This fault may be due to one or more loose parts or obstruction of the cone movement, e.g., connections too tight, bad centreing, dirty air-gap or distorted speech coil.

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 of Parts.	Code No.
		Knurled nut for attaching back	07.744.060
		Washer for knurled nut	07.891.001
		Washer for spindle	07.891.011
		Mains switch	08.528.220
		Wave length switch	08.528.231
		Knob, diameter 30 mm., colour 007	25.950.011
		Knob, diameter 30 mm., with pointer	25.950.440
		Pilot lamp Holder	25.190.450
		Valve holder with 4 contacts	25.161.320
		Valve holder with 5 contacts	25.161.330
		Rubber washer for chassis	25.197.640
		Diagram disc	25.599.570
		Mains socket (safety contact)	25.742.060
		Friction coupling	25.747.171
		Valve cap	25.771.191
		Adjustable plate for transformer	25.787.650
		2-pin plate for safety switch	28.864.270
		Cabinet	28.867.060
		Spindle, 33 mm.	28.000.961
		Spindle, 73 mm.	28.000.820
		Window (cellon)	28.305.410
		Rear panel	28.306.341
		Spindle, 47 mm.	28.615.180
		Spindle, 75 mm.	28.615.190
		Spring for quick break switch	28.730.010
		Aerial and earth plate with filter switch	28.807.890
		Baffle for loudspeaker	28.864.540
		Coupling bar between switches	28.883.140
		Wave length dial	28.883.160
		Boss of wave length switch	28.926.250
		Loudspeaker	28.951.320
		Cone with coil	25.152.441
		Cone support	28.256.440
		Service clamping ring	28.445.810
		Paper ring	28.445.400
TOOLS.			
1		Tubular spanner for electrolytic condenser	09.990.760
3		An-gap gauge	09.991.021
		Pertinax feelers	09.990.840



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Fig. 5.

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RESISTANCES.

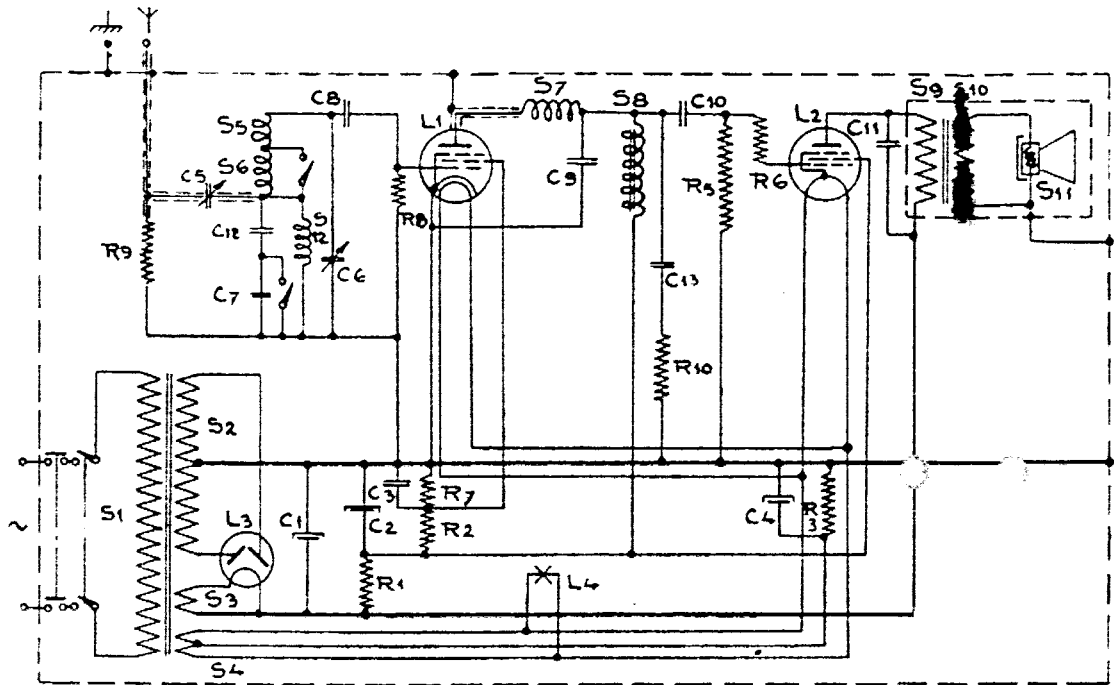
Designation	Resistances.	Code No.
R1	4000 Ohm	28.770.310
R2	0.2 M.Ohm	28.770.480
R3	640 Ohm	28.770.880
R5	1 M.Ohm	28.770.550
R6	0.1 M.Ohm	28.770.450
R7	40000 Ohm	28.770.410
R8	2 M.Ohm	28.770.580
R9	0.2 M.Ohm	28.770.480
R10	0.4 M.Ohm	28.770.510

CONDENSERS.

C1	32 μ F	28.180.011
C2	32 μ F	28.180.011
C3	0.1 μ F	28.199.090
C4	25 μ F	28.180.020
C5	0-500 $\mu\mu$ F	25.867.080
C6	0-630 $\mu\mu$ F	28.210.200
C7	1000 $\mu\mu$ F	28.190.230
C8	50 $\mu\mu$ F	28.190.100
C9	125 $\mu\mu$ F	28.190.140
C10	20000 $\mu\mu$ F	28.199.020
C11	1000 $\mu\mu$ F	28.199.650
C12	10000 $\mu\mu$ F	28.198.990
C13	800 $\mu\mu$ F	28.190.220

VOLTAGES AND CURRENTS

	L1 (SP4).	L2 (PM24M).	
V_a	202	203	Volt
V_{g1}	27.5	197	Volt
$-V_g$	—	15	Volt
i_a	0.73	21.2	mA
i_{g1}	0.26	4.3	mA



OHMIC RESISTANCE OF COILS (Approx.).

Coil.	Resistance (Ohms.)	Coil.	Resistance (Ohms.)
S1 ; S2 ; S3 ; S4	120 ; 900 ; 0.1 ; 0.1	S9 ; S10	550 ; 0.6
S5 ; S6 ; S7	4.5 ; 45 ; 5.5 ;	S11 ; S12	5 ; 55
S8	15,000		