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PHILIPS

SERVICE MANUAL

RADIOGRAMOPHONE FOR A.C. MAINS 100/250 VOLTS. 50/60 CYCLES.

Type 539A

Circuit Description.

The aerial coupling to the control grid of the octode valve (FC4) is formed by S7 (S8), C27 and the two circuit band pass filters S9 (S10), C30 (C29), S11, C12 and tuned by the condensers C9, C10.
The trimming condensers are C13, C14. The top coupling is provided by C27, C28. The triode portion of the octode valve is connected to the oscillator coils S15 (S16), S13 (S14); the latter coils are tuned by C16 and trimmed by C15, C33.
The padding condensers are C32, C33.
The intermediate frequency is 115 kc. The intermediate transformer circuit S17, S18 trimmed by C17 and C18 couples the octode valve to the valve Type VP4A. The latter valve is again coupled to the 2D4A valve by S20, S21 which are trimmed by C19, C20.
The A.V.C. line is taken from the valve L2 via the condenser C34. This voltage is passed to the control grid of the VP4A via R16 and to the FC4 valve via R17 and R14. The detector portion of the double diode valve is connected via S21, R24, C24 and the volume control R11 to the grid of the low frequency valve 354V. This valve is finally coupled to the output valve by a resistance capacity net work formed by R19, C36, R21, R20.
The output valve Pen. 4VB is coupled by the output transformer S22, S23 to the 10 inch permanent magnet loudspeaker. The tone control is formed by C27, R22, R23, the latter being variable.
Noise suppression is effected by the Resistance R9 which is in parallel with R8, R15.
The grid bias is obtained by the respective resistances R6, R7, R8, R15, R9, R12, R13 and the decoupling condensers C21, C23, C3, C4, C25.

Brief Specification.

The following is a brief specification of the receiver :—
VALVES EMPLOYED. FC4, VP4A, 2D4A, Pen. 4VB, Pilot lamps (2) Type 8046.
VOLTAGE RANGE. 100/250 volts A.C.
FREQUENCY RANGE. 50/60 cycles.
WAVE RANGE. Medium-wave 200/550 metres, long-wave 760/1900 metres.
LOUDSPEAKER. Permanent magnet moving coil, 10 inch.
CONTROLS. In front of the cabinet, combined on/off switch and volume control. Top motor board ; centre lower—noise suppressor and tone control ; top left—wave change and gramophone switch ; top right—tuning control. Back—internal loudspeaker switch.
CONSUMPTION IN WATTS AT 220 VOLTS. Radio 55 watts, gramophone 69 watts.
OTHER FEATURES. Visual tuning indicator, interchangeable station name plate, extra speaker sockets, Q.A.V.C. with noise suppression.

METHOD OF BALANCING.

If any part of the tuned circuit, namely coils, variable condensers or trimmers are changed or if the sensitivity or selectivity has diminished in any way it will be necessary to rebalance the receiver. The instruments required for rebalancing are as follows :—

1. Service Oscillator similar to Type 4028C or GM.2880 (see Fig. 1).

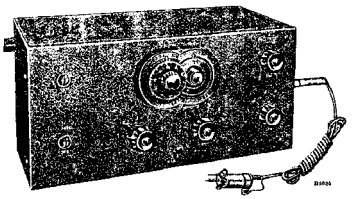


Fig. 1.

2. An output indicator.
3. A combined screwdriver and spanner which is insulated (Code No. 09.991.050), Fig. 2.

Fig. 2.

The method of balancing the I.F. and oscillator circuits is as follows :—

1. Connect G1 of L1 to chassis (oscillator short circuited).
2. Apply a signal of 115 K.C. to the control grid of L1 (FC4) (top cap) via a condenser of 0.1 μF. Connect output indicator to speaker sockets, earth chassis, turn variable condenser to zero and set wave change switch to long-wave.
3. Connect a resistance of 10,000 Ohms in parallel with S17.
4. Trim C18 and C19 until maximum output is obtained.
5. Remove resistance and connect it across S18.
6. Trim C17 and C20 for maximum output.
7. Repeat operation at No. 3 and 4.

Aerial Filter S6, C12.

If either S6, or C12 is replaced it will be necessary to retrim the aerial filter circuit.
The following is the method :—

1. Place a modulated signal of 115 K.C. to the aerial socket via the auxiliary aerial.
2. Place the variable condenser to 1900 metres.
3. Adjust C12 for minimum deflection on the output meter.

Trimming and adjusting the H.F. and oscillator circuits.

1. Switch to medium-wave band and connect a resistance of 10,000 Ohms in parallel with S17 (this resistance remains in circuit while trimming). Earth chassis.
2. Turn variable condenser to zero.
3. Place a weak signal of 225 metres via a condenser of 0.1 μF to the control grid (top cap) of FC4.
4. Turn the variable condenser until two tuning positions are obtained, viz., at a frequency of 1333 K.C. + 115 K.C. = 1448 K.C. and another at 1333 K.C. — 115 K.C. = 1218 K.C.
5. The variable condenser should be adjusted to the lowest tuning point.
6. Leave the position of the variable condenser at this tuning point until the adjustment shown at No. 11.
7. Place a signal of 225 metres to the aerial socket via the auxiliary aerial.
8. Trim C13 and C14 for maximum output.
9. Short circuit first grid of FC4 to earth.
10. Switch the receiver to long-wave range, place a signal of 900 metres to the aerial.
    Since the oscillator circuit is short-circuited the intermediate frequency circuit will not function and therefore no amplification will occur.
    It will therefore be necessary to connect a condenser of 25 $\mu\mu$F between the anode of L1 and the aerial socket of a second receiver which is accurately tuned to 900 metres. The band pass circuit can now be accurately trimmed with the aid of the second receiver.
11. Tune the receiver to 900 metres accurately.
12. Remove the short circuit from the grid of L1.
13. Trim for maximum output with C16.
14. Secure the adjusting screws and nuts with sealing wax.

HOW TO TRACE FAULTS.

GENERAL REMARKS.

Fault finding will be considerably facilitated by the use of efficient testing apparatus. Attention is drawn to Philips' Universal Measuring Test Board which enables both A.C. and D.C. voltages and currents, and capacities and resistances to be measured over a large number of ranges. Particulars and prices can be obtained from the Service Dept., Mitcham Junction, Surrey.

1. The following data is as complete as possible but some of the cases may not occur in actual practice.
2. The list cannot be complete as there may be compound faults.
3. In general it may be said that the majority of faults are due to short-circuits in the bare wires or to open or short-circuits in one of the component parts. These are indicated as R. or C. shorted or open-circuited as the case may be.
4. Always carry out, first of all, test measurements so as to find the cause of the fault.

The method of procedure is as follows :—

I. Always carefully check all contacts connected to the removable back, mains 2-pin plate, aerial and earth connection and contacts to valves and voltage adjustment strips.

II. If the valves appear to be operating satisfactorily and no output is obtained from the receiver, it is desirable to replace the valves with **known** good ones. If there is still no output from the radio side, test the receiver on the gramophone side. If it is found to operate satisfactorily proceed from V. onwards, but if unsatisfactory test as shown in III and IV.

III. **Voltage across C2 is abnormal.**

1. C1, C2, C5 short-circuited.
2. S1, S2, S3 open or short-circuited.
3. S5 open-circuited.
4. L6 defective.

IV. **Voltage across C2 is in order, but no reproduction can be obtained from gramophone.**

A. **Abnormal current and voltage at L4.**

1. R5, R19 open-circuited.
2. C35 short-circuited.
3. C3, C40, C8 short-circuited.
4. R12, R11, R28 open-circuited.
5. Screened lead to R11 earthing.
6. Defective contact L4.

B. **Abnormal current and voltage at L5.**

1. S5, S22 open-circuited.
2. C4, C25, C36 short-circuited.
3. R21, R20 open-circuited.
4. R13, open-circuited.
5. Bad contact in valve holder.

C. **Normal current and voltage at L4, L5, but no reproduction from gramophone pick-up sockets.**

1. R11, R28, R26, R27 open-circuited.
2. Screened lead to R11 shorted.
3. Fault in pick-up.
4. C35 open-circuited.
5. C38 short-circuited.
6. Fault in loudspeaker or loudspeaker transformer.
7. Fault in switch at "Gram."

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

A. 1. M1, S20 open-circuited.
2. R1 open-circuited.
3. C6, C7 short-circuited.
4. C23 short-circuited.
5. R16, R18, S18 open-circuited.
6. R2, R4 open-circuited.
7. R3 open-circuited.
8. R8, R25 open-circuited.
9. C22 short-circuited.
10. Defective contact in valve holder.

B. **Abnormal voltage and current at L1.**

1. S17, R6, R7 open-circuited.
2. C21 short-circuited.
3. R14, S11, S12, R15 open-circuited.
4. S15, S16 open-circuited.
5. C11, C15 short-circuited.
6. Defective contact in valve holder.
7. C14 short-circuited.

C. **Normal current and voltage at both valves.**

Test the receiver from L2 to the aerial socket by means of a modulated signal in series with a small condenser of approximately 25 $\mu\mu$F.

(a) **No reception when passing a signal of 115 K.C. to the anode connection of L2.**

1. C19, C20 short-circuited or out of adjustment.
2. S20, S21 open-circuited.
3. C20 short-circuited.
4. R24, C24 open-circuited.
5. Defective contact in valve holder.

(b) **No reception when a signal of 115 K.C. is passed to the anode of L1.**

1. C17, C19 short-circuited.

D. **Oscillator circuit not operating.**

This can be tested in the following way :—
Connect a fixed condenser of approximately 100 $\mu\mu$F from the grid 1 of the frequency changer valve FC4 to earth.
A rise of current should then be measured at grid 2 of the valve. Should the oscillator circuit be found faulty then the following parts may be defective :—

1. S14, S13, C22, C33 open-circuited.
2. C33, C32, C16 short-circuited.
3. C15, C18 short-circuited.

In cases 2 and 3 oscillation may be experienced at an incorrect frequency.

If it is desired to make sure that the oscillator is operating at the correct frequency tests can be made as follows :—

(a) Connect the anode of L1 via a condenser of 25 $\mu\mu$F. to the aerial socket of another receiver which has been tuned to, say, 300 metres (1000 K.C.).

(b) Tune the receiver to be tested until the oscillator is heard in the speaker at maximum strength. If the receiver which is under test reads 339 metres (884 K.C.) the oscillator should have a frequency of 884 + 115 = 999 K.C. The difference of 1 K.C. (namely 1,000 less 999) will probably be due to a slight out of balance effect which can be adjusted by retrimming. If, however, the dial should read, say, 320 metres (940 K.C.) there is definitely a defect (for instance C10 open-circuited) because an error of 940 + 115 — 1000 = 55 K.C., is not likely to occur. It is preferable to make this test in the middle of the scale, say 350 metres. This would be found to be the most suitable part of the scale to make the test.

E. **The receiver is satisfactory up to this point, but no reception is obtained when the aerial is placed in the aerial socket.**
1. C29, C30 open-circuited.
2. S9, S10 open-circuited.
3. C26, C9, C13, C10, C14, C20, C30 short-circuited.

VI. **Reception on one wavelength only.**

A. **Reception on short wave only.**
1. S8, S10, C30, S14, C16, S16 open-circuited.
2. C13 short-circuited.
3. Wave change switch faulty.

B. **Reception on long-wave only.**
1. Wave change switch faulty.

VII. **Reception not up to standard quality.**

A. **Weak.**
1. Voltage and currents not correct.
2. C12 short-circuited.
3. C27, C28 short or open-circuited.
4. C22, R2, R8, R3 open-circuited.
5. H.F. or I.F. circuits out of balance.
6. Defective output transformer or loudspeaker.
7. C36, R21 open-circuited.

B. **Distorted reception.**
1. One of the valves has excessive grid current, possibly caused by C3, C25, C4 short-circuited, or short to chassis.
2. R21, R20 open-circuited.
3. R13, R12 open-circuited.
4. Fault in loudspeaker.

C. **Excessive Hum.**
1. C1, C2 open-circuited.
2. L.F. by-pass condenser open-circuited.
3. A defective earth connection either inside or outside the chassis.
4. Screened wiring may have the screen broken or disconnected from earth.
5. One half of secondary winding of mains transformer open-circuited.

D. **Crackling.**
1. A defective contact in either the aerial or earth sockets or connections.
2. Defective contact in one of the switches or valve sockets or component part touching chassis.
3. An intermittent contact in one of the soldered joints or two bare wires may be touching one another or making bad contact.
4. A defective contact in one of the moving arms of the variable controls.
5. A loose link on the voltage adjustment plate or bad contact to the mains voltage safety contact.

E. **" Motor-boating."**
1. C6, C7, C8, C41 open-circuited.
2. Screening to top caps of valves open circuited.
3. A defective grid circuit.

F. **Cabinet Resonances.**
A defect of this nature is generally due to some loose part such as valve screen caps, leads, strips, springs, washers or screws. When the vibrating part has been located and is secured, a small piece of felt can be used if necessary for fixing.

REMOVING AND CHANGING OF PARTS.

1. Removing the chassis.

1. Remove the spring clip from the motor spindle and also the turn-table; the six screws and washers from the back and front edge of the motor board can now also be removed.
2. Secure the pick-up to the stand.
3. With the right hand pull the motor board about six inches forward and with the left hand locate the edge of the hole of the motor plate and lift the motor board gently as far as the internal wiring will allow.
4. Insert a suitable length of wood at the edge of the motor board to act as a support.
5. Remove the base screws from each corner; the two lower ones will require a very small screwdriver.
6. Remove the base screen and access can then be obtained to the underside of the chassis with all the controls working.

II. Important points to be noted.

1. In addition to the points shown above special attention is drawn to the following:—
2. It is advisable to use a support when the chassis is repaired and attention is drawn to the universal type shown in Fig. 3 (Code No. 09.991.000).

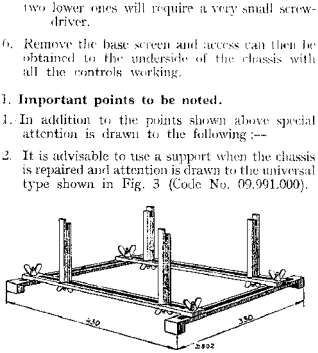


Fig. 3.

3. Do not make any alteration in the wiring or screening plates.
4. Always replace earth connections to their original points.
5. If necessary, make a sketch of the wiring or mark the wires with coloured sealing-wax for clear indication.
6. Make sure that all wires are kept clear of each other; not less than $\frac{1}{8}$-inch.
7. Replace all spring washers, insulating material etc., in their original places. If necessary, rivets may be replaced by screws and nuts.
8. All moving parts may be greased with a little pure vaseline.
9. If necessary, give the contacts a slight mechanical tension.
10. All soldering should be done as quickly as possible in order not to heat various parts.
11. All soldered joints to the leads of compound treated condensers should be soldered $\frac{1}{2}$-inch from the compound in order to avoid overheating. Further, these condensers should be suspended clear of all other wiring.

Electrolytic condensers C1 and C2.

When changing the above types of condensers it is desirable to use a spanner of the type shown at Fig. 4 (Code No. 09.990.760).

Fig. 4.

Electrolytic condensers, C3, C4, C25.

It is important to note that when one of these condensers is replaced, the end which is marked red and therefore positive, should be carefully observed so that it is replaced correctly.

Resistances.

As some of the resistances are likely to get warm during operation they should always be mounted so that contact is not made with any other part.

Tuning Meter.

If a defect occurs in this meter it is desirable to return the complete part to the Service Department for attention. It can easily be removed by unsoldering the two leads and removing the two screws. The receiver can be temporarily used by connecting the two wires together pending the refitting of a new meter.

Driving Mechanism.

The driving band can be adjusted by the screw at the right-hand side at the back. Any slight roughness on the scale pointer can be removed by adjusting the pointer or slightly greasing the guide rod which carries the cursor.

Volume control and Mains Switch.

This is fitted on the front of the cabinet and it will be desirable to fit a complete unit if one of the parts require replacement.

Power Pack.

This part of the receiver is situated at the base of the cabinet and comprises the mains transformer, the primary section of which is brought to the tapping plate and the two electrolytic condensers C1 and C2 each of which are 32 m.f.

Alteration to another voltage is effected by adjusting the links according to the pink diagram disc fixed on the removable back.

After an adjustment has been made to the links it is necessary to alter the disc so that the correct voltage range is shown through the aperture that can be seen on the back.

REMOVING AND REPAIRING THE LOUDSPEAKER.

Method of removal.

The loudspeaker can be removed by releasing the nuts, loosening the five eccentric clamps and unsoldering the leads to the transformer and the loudspeaker switch.

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.

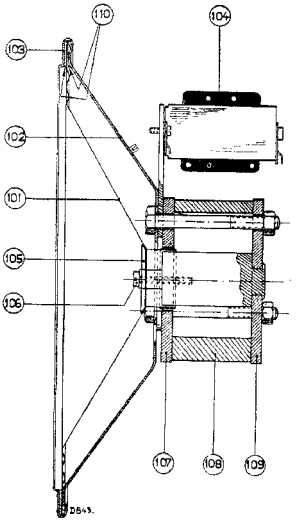


Fig. 5.

2. Under no circumstances should the front and rear plates (item 107 and 109, Fig. 5) be removed from the magnet, as this would impair its magnetism (as also would be the case when working on an iron bench).
3. Replace the cloth cover of the loudspeaker immediately after the repair has been carried out.

Centring the cone.

Loosen the centring screw, place four feelers of .008-inch thickness (Code No. 09.990.840) through the perforations of the spider into the air-gap. Tighten up the centring screw and withdraw the feelers. No sound should be heard when the cone is carefully moved up and down (see Fig. 6).

Fig. 6.

Changing the cone.

Cut through the clamping ring and loosen the centre screw. The air-gap, if 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 can be fixed with a special service clamping ring (Code No. 28.446.750). Commence by bending the tags at four points positioned at angles of 90° from each other; the feelers are **not** to be removed from the air-gap until all the tags have been bent. The flexible leads of the transformer should be of the correct length. It will be found that if they are fitted too tight they will impede the movement of the cone and if they are too loose they are likely to touch the cone and cause rustling.

Faults.

Before commencing a repair, try a different loudspeaker and transformer in order to make sure that there is actually a defect in the loudspeaker assembly.

No sound.

This may be due to an open or short-circuit in the speech coil or output transformer. Measure with an ohm-meter and check with the values given at the back of the manual.

Sound weak or distorted.

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

Rustling or resonance.

This fault may be caused by loose particles in the loudspeaker assembly or by loose parts attached to the cabinet or chassis. It may also be caused by some hindrance in the movement of the cone, namely, leads too tight or too slack, dirt in the air-gap or the speech coil may have become distorted.

LIST OF SPARE PARTS, TOOLS AND GAUGES, ETC.

When ordering any of these items please state :—

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

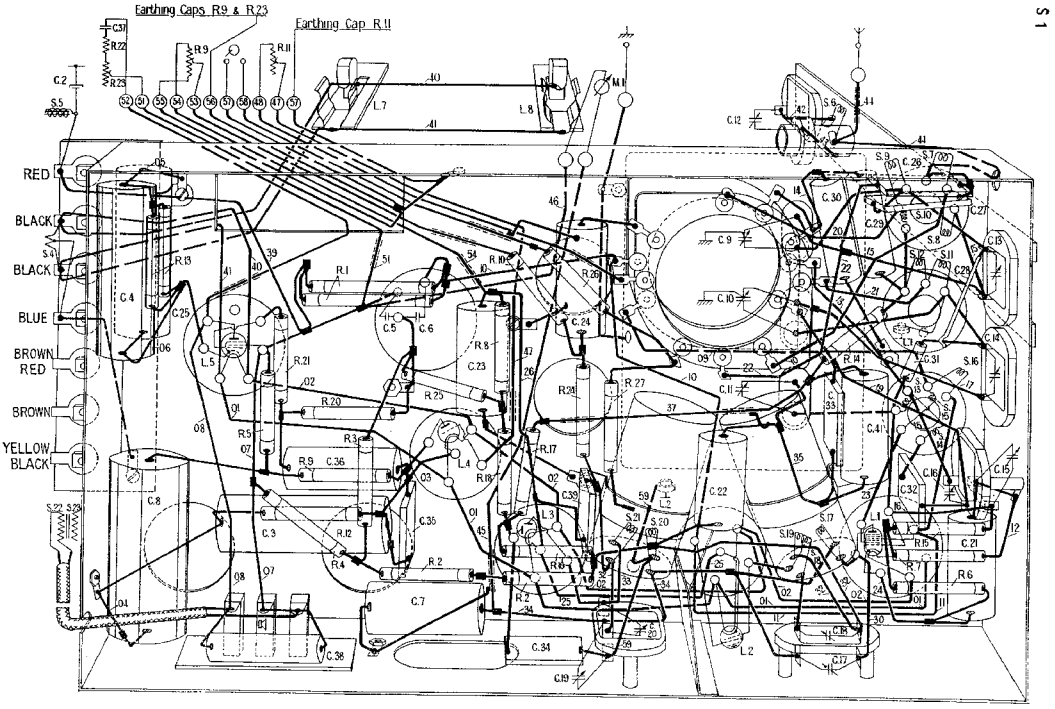
Fig.	Item.	Description of Parts.	Code No.
		Cabinet	28.837.274G.
		Escutcheon...	23.997.530
		Trade mark disc	25.988.610
		Knob for wave change switch	28.853.500
		Round knob, diameter 30 mm.	23.950.011
		Large round knob	23.995.570
		Station scale	28.699.130
		Celluloid cover	28.336.970
		Pointer	28.944.125
		Cursor for wavelength pointer	25.868.640
		Moulded mains socket	25.742.000
		Paper diagram disc for voltage change over	25.599.570
		Mains 2-pin plate	28.864.551
		5-pin valve holder	25.161.330
		7-pin valve holder	28.225.050
		Socket plate for extra loudspeaker	25.787.470
		Socket plate for aerial/earth	28.868.530
		Pilot lamp holder assembly	25.160.450
		Driving band assembly	28.885.090
		Spring for driving band	28.740.050
		Friction drive assembly	28.910.010
		Spindle for friction drive	28.001.060
		Spindle for wave change switch	28.000.620
		Spindle for volume control	28.000.041
		Special nut for electrolytic condenser...	07.093.010
		Mains switch and volume control assembly	28.809.200
		Loudspeaker switch assembly	08.530.000
		Knob for speaker switch.	23.993.100
		Anode cap assembly (Large)	25.771.190
		Grid cap (Small)	28.906.020
		Wavelength switch assembly	08.529.180
		Pulley wheel	28.934.320
		LOUDSPEAKER.	
		Service Clamping ring	28.446.750
		Paper ring	28.445.390
		Clamp for holding loudspeaker...	25.012.210
		Cone and coil	25.741.900
		GAUGES, TOOLS, ETC.	
		Pertinax distance pieces...	09.990.840
4		Special box spanner for electrolytic condensers	09.990.760
		Combined screwdriver and spanner for trimming I.F. circuits ...	09.991.050
		Service oscillator, 200/3000 metres	00.040.280C.
		Screened cable separate	25.980.450
		Artificial aerial for 00.040.280C.	25.730.840
		Service oscillator (complete) 14/3000 metres...	09.991.260
		Universal test measuring apparatus	09.991.030

CURRENT AND VOLTAGE TABLE.

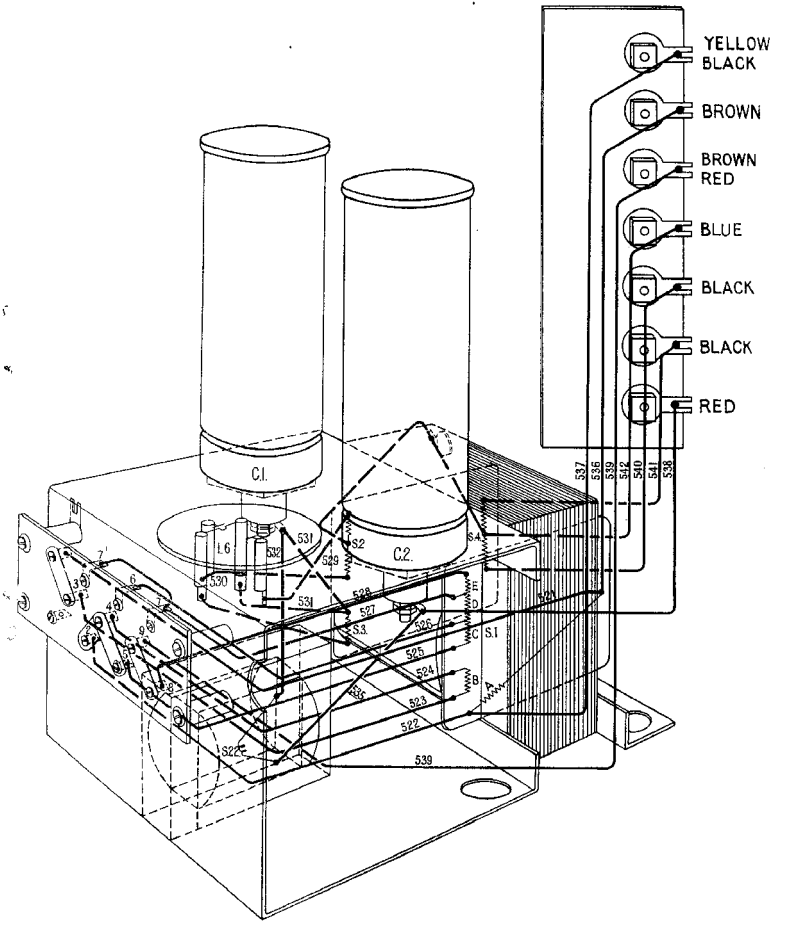
	FC4	VP4A	354V	Pen. 4VB	
Va	255	250	70	245	Volts
Ia	2.0	1.5	1.0	33	mA
—Vg	3.1	3.0	1.5	6.7	Volts

Voltage across Condenser C1 = 286 volts.
" " " C2 = 262 "
" " " C6 = 77 "
" " " C8 = 162 "

The voltages are measured with voltmeters which take practically no current. Moving coil voltmeters give readings depending upon the resistance used and the current consumption of the meter itself. As the values given are the mean of several measurements, some values may differ appreciably without any fault being present.


Earthing Caps R9 & R23
Earthing Cap R11
RED
BLACK
BLACK
BLUE
BROWN
RED
BROWN
YELLOW
BLACK

S1


YELLOW
BLACK
BROWN
BROWN
RED
BLUE
BLACK
BLACK
RED
C.1.
C.2.
L6
S2
S4
S3
S1
S22
537
536
539
542
540
541
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531
532
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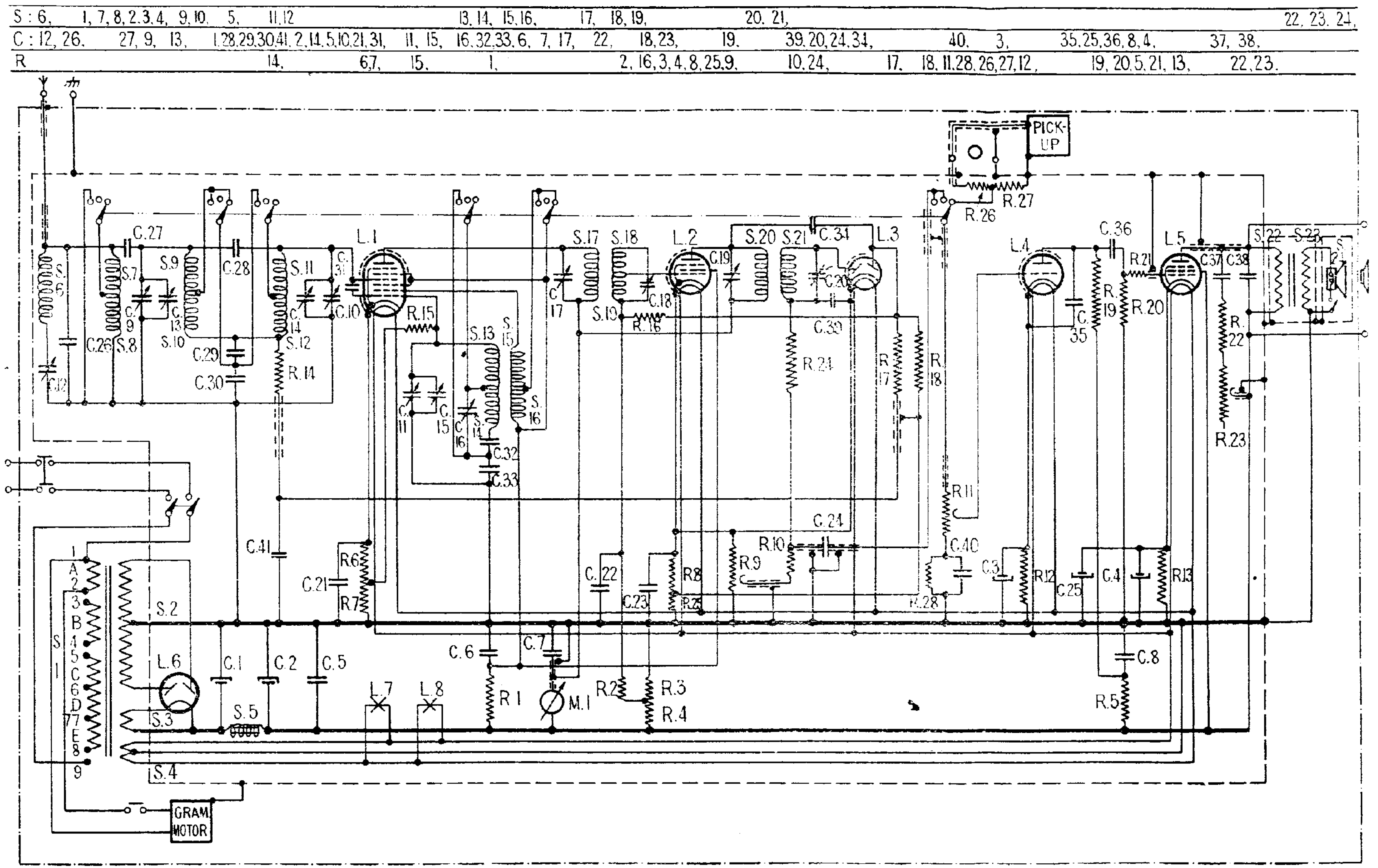
RESISTANCES.

Designation.	Resistances.	Code No.
R1	64000/2 Ohm	28.771.080
R2	2×5 M. Ohm	28.770.620
R3	32000 Ohm	28.770.400
R4	0.32 M. Ohm	28.770.500
R5	0.1 M. Ohm	28.770.450
R6	250 Ohm	28.770 190
R7	250 Ohm	28.770.190
R8	4000 Ohm	28.770.310
R9	50, to 80000 Ohm	28.809.360
R10	0.125 M. Ohm	28.770.460
R11	0.5 M. Ohm	28.809.200
R12	1600 Ohm	28.770.270
R13	320 Ohm 400 Ohm in series	28.770.200 28.770.210
R14	0.5 M. Ohm	28.770.520
R15	50000 Ohm	28.770.420
R16	2.5 M. Ohm	28.770.590
R17	0.5 M. Ohm	28.770.520
R18	0.32 M. Ohm	28.770.500
R19	0.1 M. Ohm	28.770.450
R20	0.64 M. Ohm	28.770.530
R21	0.1 M. Ohm	28.770.450
R22	100 Ohm	28.770.150
R23	50000 Ohm	28.808.290
or	64000 Ohm	28.808.520
or	80000 Ohm	28.808.530
R24	0.64 M. Ohm	28.770.530
R25	1000 Ohm	28.770.250
R26	6400 Ohm	28.770.330
R27	4000 Ohm	28.770.310
R28	1 Ohm	28.770.550

CONDENSERS.

C1	32 μF	28.180.130
C2	32 μF	28.180.130
C3	25 μF	28.180.020
C4	25 μF	28.180.020
C5	0.5 μF	
C6	1 μF Con. Box	28.160.210
C7	0.1 μF	28.199.090
C8	0.5 μF	28.199.160
C9	0—430 μμF	
C10	0—430 μμF	28.210.140
C11	0—430 μμF	
C12	40—145 μμF	28.210.540
C13	7—55 μμF	28.210.420
C14	7—55 μμF	28.210.420
C15	7—55 μμF	
C16	7—55 μμF	28.210.440
C17	40—145 μμF	
C18	40—145 μμF	
C19	40—145 μμF	28.210.550
C20	40—145 μμF	
C21	50000 μμF	28.199.060
C22	0.1 μF	28.199.090
C23	0.1 μF	28.199.090
C24	50000 μμF	28.199.060
C25	25 μF	28.180.020
C26	80 μμF	28.190.120
C27	10 μμF	28.190.030
C28	0.5 μμF	28.205.860



S : 6, 1, 7, 8, 2.3.4, 9.10, 5, 11.12 13.14, 15.16, 17, 18.19, 20.21, 22.23.24,
C : 12, 26. 27, 9, 13, 1.28.29.30.41, 2.14.5.10.21.31, 11, 15, 16.32.33.6, 7, 17, 22, 18.23, 19. 39.20.24.34, 40, 3, 35.25.36.8.4, 37, 38,
R 14, 6.7, 15, 1, 2, 16, 3, 4, 8, 25.9, 10.24, 17, 18, 11.28, 26, 27, 12, 19, 20.5.21, 13, 22.23.

OHMIC RESISTANCE OF COILS

Coil.	Resistance (Ohms).	Code No.
S5	450	28.545.190
S6	130	28.561.270
S7 ; S8 ; S9 ; S10	25 ; 90 ; 4 ; 40	28.564.270
S11 ; S12	4 ; 40	28.561.030
S13 ; S14 ; S15 ; S16	10 ; 25 ; 4 ; 11	28.561.040
S17 ; S18 ; S19	130 ; 70 ; 55	28.565.050
S20 ; S21	130 ; 130	28.564.300
S22 ; S23	300 ; 0.5	28.520.910
S24	7	28.741.900

CONDENSERS.		
C29	25000 $\mu\mu$F	28.199.030
C30	25000 $\mu\mu$F	28.199.030
C31	2 $\mu\mu$F	28.205.880
C32	930 $\mu\mu$F	28.190.290
C33	1810 $\mu\mu$F	28.190.300
C34	64 $\mu\mu$F	28.190.110
C35	250 $\mu\mu$F	28.190.170
C36	50000 $\mu\mu$F	28.199.060
C37	32000 $\mu\mu$F	28.199.800
C38	2000 $\mu\mu$F	28.199.680
C39	100 $\mu\mu$F	28.190.130
C40	0.2 μF	28.199.120
C41	0.1 μF	28.199.090
M1	Tuning Indicator	28.820.660