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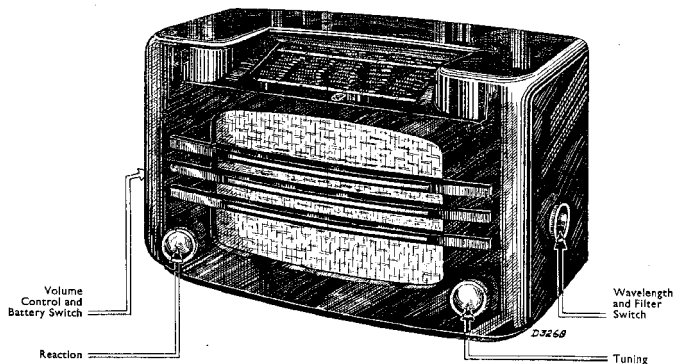
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# PHILIPS

## SERVICE MANUAL

FOR BATTERY RECEIVER

819 B



### GENERAL.

This receiver has the following features:—  
2 tuned circuits.  
1,500 m. wave-trap, switched in circuit as required.  
Variable reaction.  
Electro dynamic loudspeaker.

### Controls.

The knob on the left-hand side panel of the receiver operates the volume control and battery switch. The accumulator and high tension battery are switched off when the knob is turned in an anti-clockwise direction.

The 3-position wavelength and filter switch is on the right-hand side of the cabinet, the positions being, in clockwise direction, M.W., L.W. and L.W. with 1,500 m. wavetrap.

The knob on the right-hand side of the front panel controls the tuning, with reaction on the left.

### Wave Ranges:—

M.W.: 198 to 585 m. (1,515 to 513 K.C.).

L.W.: 900 to 2,000 m. (333 to 150 K.C.).

Weight: Including valves (excluding batteries)  
20 lbs.

Dimensions: width, 20 in. including knobs; height,  
12½ in.; depth, 7 in. including knobs.

**DESCRIPTION OF CIRCUIT.****General.**

The incoming signal passes through a tuned circuit to the control grid of the R.F. amplifier valve L1 (VB2B) for amplification and thence through a second tuned circuit to the control grid of the detector L2 (SP2). The rectified A.F. voltage across the coupling resistance R10 is passed to the control grid of the A.F. amplifier valve L3 (PM22D); the amplified voltage is applied via the speaker transformer to the loudspeaker.

**A. R.F. Section.****I. L.W. Range.**

Aerial circuit: C1, S2, R2, R3, S3, S4, C25, C3.

Grid circuit L1: C8, S5, S6, C4, C6, C14, R4, C5; S3, S4 and S5, S6 are coupled inductively.

Anode circuit L1: R16, S10, S11, C11, R7.

Grid circuit L2: C15, C13, S9, S10, S11, C12, C7, R8, C16, C11.

Anode circuit L2: R17, S7, S8, C10; S9, S10, S11 and S7, S8 are coupled inductively.

**II. M.W. Range.**

Aerial circuit: C1, S2, R2, R3, S3, C3.

Grid circuit L1: C8, S5, C6, C14, R4, C5; S3 and S5 are coupled inductively.

Anode circuit L1: R16, S10, C11, R7.

Grid circuit L2: C15, C13, S9, S10, C12, C7, R8, C16, C11.

Anode circuit L2: R17, S7, C10; S9, S10 and S7 are coupled inductively.

**Note.—**

Aerial socket No. 2 is used for local stations.

S1, S2, C26, C2 comprise the 1,500 m. wavetrap.

R16 and R17 prevent any parasitic oscillation of L1 and L2.

**B. Detector.**

Valve L2 is coupled as grid detector and the rectified A.F. voltage is passed via R.F. filter C18, S12, C19 to the coupling resistance R10.

**C. A.F. Amplifier.**

The A.F. voltage across the coupling resistance R10 is taken by way of C21 and R12 to the control grid of L3 and after amplification passes via S13, S14 to the loudspeaker S15.

**D. Volume Control.**

The volume control R2 fulfils a dual function.

1. When R2 is turned back, the aerial coil S3, S4 is for the greater part short-circuited by C5 and C3, thus reducing the R.F. voltage induced in these coils.
2. At the same time, the control grid of L1 is raised to a higher negative potential in respect of the cathode. This negative bias is produced by the potential difference across R13, R14.

**E. Feeding.****Voltages for L1:**

Va: Across R7, decoupled by C11.

Vg2 and 4: Across R5, decoupled by C9.

Vg1: Voltage across R13, R14 decoupled by C23. Adjusted to required value by means of R2.

**Voltages for L2:**

Va: Across R10, S12.

Vg2: Across R9, decoupled by C17.

**Voltages for L3:**

Va: Direct from battery (H.T. + 2) via S13.

Vg2: Direct from battery (H.T. + 1).

Vg1: Voltage drop across R13 via R11 and R12.

## TRIMMING THE RECEIVER.

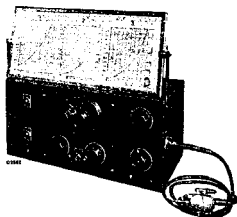


Fig. 1.

**General.**

It is not necessary to uncase the chassis to trim the receiver, as all the trimmers are easily accessible upon removal of the backplate.

**Retrimming is necessary—**

1. After changing coils or condensers in the I.F. or R.F. sections.
2. When the receiver is insufficiently sensitive or selective (see E pages).

**The following equipment is required for trimming—**

1. Service oscillator type 2880F (see Fig. 1).
2. Output indicator: universal testboard types 4256 or 7629.
3. 15° jig for determining the relation between condenser setting and scale.
4. Insulated trimming key 6 mm.

5. Trimming transformer.
6. Circuit tester.

The standard artificial aerial supplied with type 2880F is used as aerial.

**Always trim the receiver with its own valves.**

Before trimming, remove the wax from the trimmers by rotating the trimmer first one way and then the other, causing the wax to break off. After alignment, the trimmers must be resealed with locking wax (for Code No. see page 12) by holding the wax against a warm iron so that a few drops of the wax fall on the centre of the trimmer.

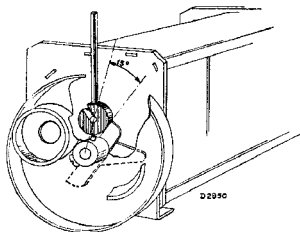
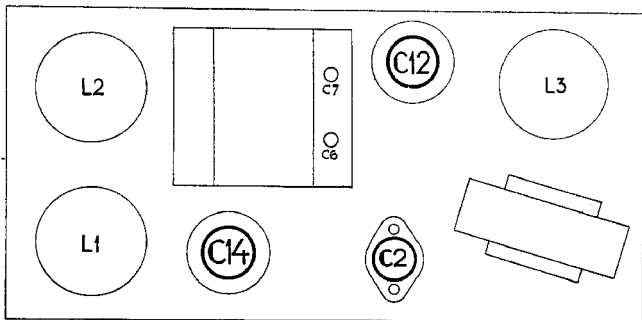


Fig. 2.

**A. Trimming R.F. Circuits.**

1. Set wavelength switch to M.W. and earth the receiver.
2. Fit 15° jig (see Fig. 2) and set the condenser to its (minimum capacity).



D3272

Fig. 3.

3. Turn volume control to maximum and reaction to minimum.
  4. Apply modulated signal of 1442 1450 K.C. across standard artificial aerial to the aerial socket.
  5. Connect output indicator across trimming transformer to the speaker sockets (S15).
  6. Trim C14 and then C12 for maximum output (see Fig. 3) and then repeat.
  7. Remove 15° jig; lock C14 and C12.
- B. Trimming 1,500 m. Filter.**
1. Set wavelength switch to L.W. and apply modulated signal of 1,500 m. (200 K.C.) across standard artificial aerial to the aerial socket.
  2. Connect output indicator across trimming transformer to the speaker sockets (S15).
  3. Tune receiver for maximum output.
  4. Switch receiver to L.W. filter position and trim C2 (see Fig. 3) for minimum output.  
**For this operation use an insulated trimming key.**
- C. Calibration.**
1. Apply modulated signal of 857 K.C. (350 m.) across standard artificial aerial to the aerial socket.
  2. Tune the receiver accurately to the signal.
  3. Adjust pointer to 350 m.

### FAULT FINDING IN ACCORDANCE WITH THE "POINT TO POINT" SYSTEM.

If either of the testboard Types 7629 or 4256 is available, faults can be easily localised by making use of the "Point to Point" system. The preliminary operations in this case are practically the same as those mentioned in the E sheets, to which reference should be made, see Paras. I and II. Then proceed as follows:—

1. Disconnect the receiver from the batteries and remove all the valves. Set wavelength switch to L.W., volume control to maximum and reaction to minimum. Connect the universal testboard Type 7629 or 4256 and set the testboard for resistance testing, successively to positions 12, 10 and 9. The positive pin on the test lead should be extended to reach the various points indicated in the table without difficulty, the negative pin being connected to earth socket.
2. The various resistance values between the points indicated in the accompanying table and the chassis are measured by touching the point indicated with the positive pin, the meter deflection being compared with the value given in the table. 2 indicates that the test must be made between the second aerial socket and earth.

11/12 means that the test is to be made between points 11 and 12. Differences of 10 per cent. may be met with, but these do not necessarily indicate that the particular component is defective.

3. When all the resistances have been measured, the testboard switch is set for capacity testing and the various capacities are then measured in accordance with the table.

As practically all circuits are measured in this way, the fault will usually be found and the faulty component can be identified by means of the circuit. The valveholder contacts are numbered systematically in the following manner:—

- 1 & 2 = filament.
- 3 = control grid.
- 4 = contact for metallising (if separate).
- 5 = cathode.
- 6 = extra grid.
- 7 = screen grid.
- 8 = anode.

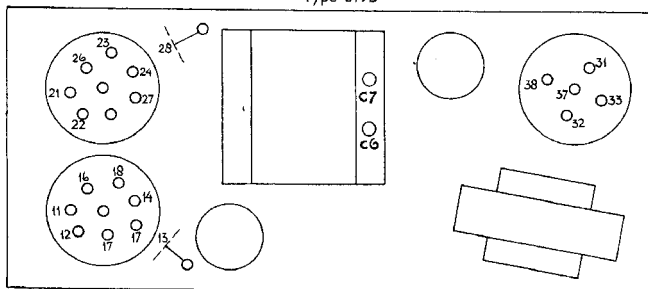
The first figure indicates the valveholder, e.g., screen grid of second valve is 27.

It is necessary for some of the tests to change the setting of the wavelength switch, and this is indicated in the table as follows:—

3 x Aerial 2.

Type 819B

F2



RESISTANCES. (1)

12	11	21	31														
	12	22	32	37													
11	25	25	25	50													
10	3 × 18			38	14	24											
	335	335	335	460	500	500											
9	13	23	33	28	3 × Aerial 2			17	27								
	400	80	180	400	300	300	300	400	300								

CAPACITIES. (2)

12	18	28	Aerial 1	Aerial 1	Aerial 2	13	28	28	HT+2								
	23	33	Aerial 2														
11	50	220	65	65	215	70	355	360									
	27	17	38		HT-												
10	320	300	370	345	300	LT+											
9	HT-			LT-													
	HT+2			HT-													
	425			485													

- (1) All leads interconnected and battery switch closed. Volume control at maximum and reaction condenser at minimum.  
 (2) All leads loose and battery switch closed. Volume control at maximum, reaction condenser at minimum.

## REPAIRS AND REPLACEMENTS OF COMPONENTS.

### General.

The following points must always be borne in mind when making repairs:—

1. Uninsulated leads must always be kept at least 3 mm. apart.
2. All compounded condensers must be soldered at least 1 cm. from the compound and suspended free from all other wiring.
3. Always fit resistances clear of other components (development of heat).
4. Some of the condensers in the circuit are shown by a thin and a thick line, the latter representing the "earth plate" which is connected to the lead on the left-hand side of the stamp on the condenser; replacements must be connected in the same manner as the defective ones (see also circuit).
5. Lubricate moving parts with a little pure vaseline.
6. Rivets which have been removed may be replaced by screws and nuts.
7. When completing repairs always restore wiring and screening to their original positions.

### UNCASING THE CHASSIS.

1. Remove the knobs and loosen the pointer from the driving cable.
2. Slacken off the adjustable guide wheel so that the driving cord can be removed. Attach the latter, keeping it taut, to the volume control support or loudspeaker.
3. Unscrew the chassis bracket as well as the brackets on the speaker chassis and screened lead from the baffle.
4. Remove the 4 screws holding the bottom board to the cabinet.
5. Slide the bottom board with chassis and speaker from the cabinet.

**Note.**—The bracket between the rear of the chassis and the bottom board serves to support the chassis in transit. This is discarded when the receiver is put into use.

### RENEWING COILS.

1. Unsolder the leads to the coil.
2. Slightly open up the lugs holding the coil to the chassis.
3. Remove the coil vertically from the chassis.
4. Fit new coil.
5. Press down the lugs by means of a lever.
6. Restore electrical connections.  
If the lugs are broken off, the coils may be fixed by means of special repair clips.

### WAVELENGTH SWITCH.

This consists of:—

1. One or more switch units.

2. Stop plate for determining the switch settings.

3. Spindles, springs and brackets.

Each switch unit (Fig. 5) comprises a rotor and stator.

- (a) Rotor contacts.
- (b) Contact springs.
- (c) Clips for fixing contact springs to stator.
- (d) Guide brackets.

### WAVELENGTH SWITCH IN THE THEORETICAL CIRCUIT.

Contact springs are represented by circles, and open points on the stator by dots. The outer ring of circles indicates the contact springs on that side which is facing the stop plate and the inner ring of circles those on the remote side. The rotor contacts are represented by arcs and radial lines as full lines on the same side as the stop plate and as dotted lines on the remote side.

Rotor contacts are provided with fixing lugs which fit into the holes in the rotor; these contacts are secured by pressing the lugs flat with a pair of smooth nosed pliers.

### NUMBERING OF ROTOR CONTACTS.

The first figure indicates the number of holes covered and subsequent figures the holes into which the lugs are fitted as seen from the centre of the contact arc with the lugs pointing downwards and counting from left to right. (See page 12).

### LOUDSPEAKER (Type 9606).

Before repairs to the loudspeaker are undertaken, it should be definitely ascertained that the speaker is at fault (try out with other speaker and transformer). Rattling and resonances may be caused by the following:—

1. Loose components in the cabinet.
2. Leads too slack.
3. Leads too taut.

If repairs are found necessary, the following must be borne in mind:—

1. The bench must be quite free from dust.
2. The front and backplates of the magnet must never be removed.
3. The cause of the trouble may be due to:—  
(a) Dirt in the air gap.  
(b) Jammed or distorted speech coil.
4. The dust cover must be replaced as soon as repairs are completed.

Four feeler gauges must be used if the speech coil is to be re-centred in the air gap. For replacement of the speaker chassis or re-centring of the core in the air gap a special centring jig is required.

## LIST OF COMPONENTS AND TOOLS

When ordering, please always state:—

1. Code No.
2. Description.
3. Type No. of receiver (819B).

Fig.	Pos.	Description.	Code No.		
7	1	Knob for volume control (colour 040) ... ..	M.K.260.090		
7	2	Cabinet (colour 040) ... ..	M.K.240.090		
7	3	Trade Mark Disc ... ..	28.713.271		
7	4	Station Scale ... ..	M.K.697.730		
7	5	Speaker Silk ... ..	06.601.140		
7	7	Knob for wavelength switch (colour 040) ... ..	M.K.260.070		
7	8	Knob for tuning (colour 040) ... ..	23.610.880		
8	9	H.T. + 1 plug ... ..	M.K.930.13		
		H.T. + 2 plug ... ..	M.K.930.11		
		H.T. — plug ... ..	M.K.930.12		
		Spade tag L.T. — ... ..	M.K.930.10		
8	10	Spade tag L.T. + ... ..	M.K.930.09		
		Clip for backplate ... ..	28.752.072		
8	11	Bottom bush ... ..	28.890.240		
8	12	Driving pinion ... ..	28.880.110		
8	13	Spring for driving drum ... ..	28.740.490		
8	14	Aerial connection plate ... ..	M.K.865.050		
8	15	Rubber bush for chassis ... ..	25.655.951		
8	16	7-pin valveholder ... ..	28.838.860		
8	17	Screen plate for scale ... ..	28.367.650		
8	18	Valve cap ... ..	28.855.310		
8	19	Spring for backplate ... ..	28.752.290		
8	20	Pointer Assembly ... ..	M.K.864.800		
8	21	Felt strip ... ..	28.606.741		
		Backplate ... ..	M.K.395.570		
		5-pin valveholder ... ..	28.838.870		
		Rubber bush (10 × 1) ... ..	25.655.460		
		Driving cord ... ..	06.606.290		
		Cord clip ... ..	28.078.611		
		Rotor contact 1.1 ... ..	28.904.161		
		Rotor contact 2.1 ... ..	28.904.260		
		Battery cable assembly ... ..	M.4595		
		<b>SPEAKER COMPONENTS.</b>			
				Chassis ... ..	28.253.803
		Service clamping ring ... ..	25.870.750		
		Paper ring ... ..	28.445.390		
		Cone and coil ... ..	28.220.200		
		Centring jig ... ..	09.992.420		
<b>TESTING APPARATUS TOOLS, ETC.</b>					
1		Service oscillator ... ..	GM.2880F		
4		Universal Testboard ... ..	GM.4250		
		Universal and valve testboard ... ..	(GM.7620)		
		Insulated trimming key ... ..	M.646.565		
2		15° jig ... ..	09.992.440		
		Locking wax ... ..	02.771.340		
		Trimming transformer ... ..	09.992.220		
		Circuit tester ... ..	09.991.590		

Components not listed above will be found in the General Part List.



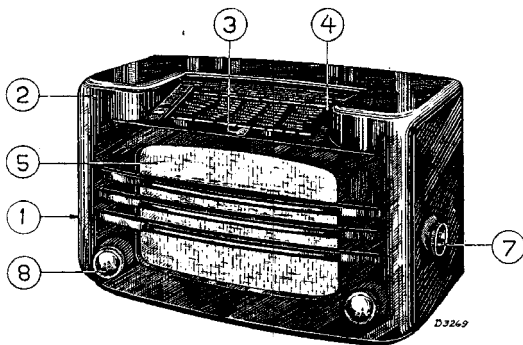


Fig. 7.

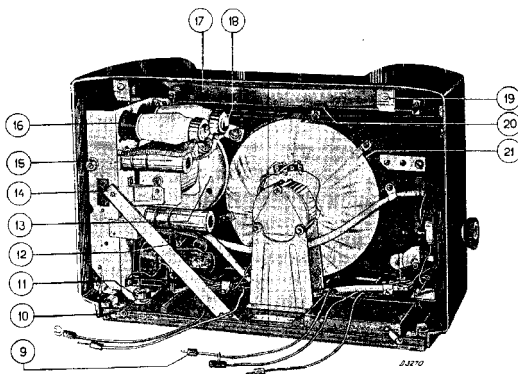


Fig. 8.

## VOLTAGES AND CURRENTS

	L1 (VB2B)	L2 (SP2)	L3 (PM22D)	
Ea	†110	38	112	Volts
Eg2	†74	42	118	Volts
Ia	†.25	.50	3.75	Milliamps
Ig2	†.10	.20	.50	Milliamps

Total filament current 525 milliamps.

Total anode current 6.5 milliamps.

† Maximum volume control, minimum reaction.

The above values are measured with reaction condenser set to minimum. Where 2 values are given these are for minimum and maximum settings of the volume control respectively.

The voltages are measured between the point indicated and the chassis. The above values were obtained with testboard GM4256 or GM7629; the resistance of the voltmeters in these testboards is 2,000 ohms per volt.

If meters are used of which the internal resistance is lower, the readings will, generally speaking, also be lower.

The above values are averages taken from a large number of receivers and discrepancies may be met with which, however, do not necessarily indicate a fault.

Moving coil voltmeters give readings which depend upon the resistance in circuit and the current consumption of the meter itself. The values given are the mean of several measurements, therefore some readings obtained may differ appreciably, particularly as variations may arise due to the tolerance 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.

COILS.		
Designation.	Resistance.	Code No.
S1	18 Ohm	28.587.040
S2	18 Ohm	
S3	30 Ohm	
S4	100 Ohm	
S5	4.5 Ohm	28.572.041
S6	45 Ohm	
C14		M.K.560.170
S7	12.5 Ohm	
S8	100 Ohm	
S9	1.8 Ohm	
S10	3 Ohm	
S11	45 Ohm	28.564.771
C12		
S12	350 Ohm	
S13	2,000 Ohm	
S14	> 1 Ohm	M.K.510.220
S15	4 Ohm	28.220.200

CONDENSERS.		
Designation.	Value.	Code No.
C1	2,000 $\mu\mu\text{F}$	28.190.260
C2	0—30 $\mu\mu\text{F}$	28.212.450
C3	0.1 $\mu\text{F}$	28.201.180
C4	20 $\mu\mu\text{F}$	28.206.370
C5	0.1 $\mu\text{F}$	28.201.180
C6	11—490 $\mu\mu\text{F}$	28.212.390
C7	11—490 $\mu\mu\text{F}$	
C8	100 $\mu\mu\text{F}$	28.206.270
C9	0.1 $\mu\text{F}$	28.201.180
C10	0—200 $\mu\mu\text{F}$	M.K.205.020
C11	0.1 $\mu\text{F}$	28.199.090
C12	0—30 $\mu\mu\text{F}$	See Coils
C13	50,000 $\mu\mu\text{F}$	28.199.060†
C14	0—30 $\mu\mu\text{F}$	See Coils
C15	20 $\mu\mu\text{F}$	28.206.370
C16	0.1 $\mu\text{F}$	28.201.180
C17	0.1 $\mu\text{F}$	28.201.180
C18	100 $\mu\mu\text{F}$	28.192.430
C19	250 $\mu\mu\text{F}$	28.190.170
C20	50,000 $\mu\mu\text{F}$	28.199.060
C21	10,000 $\mu\mu\text{F}$	28.201.080
C22	2,000 $\mu\mu\text{F}$	28.198.920
C23	50 $\mu\text{F}$	28.182.320
C24	8 $\mu\text{F}$	28.182.370
C25	100 $\mu\mu\text{F}$	28.206.270
C26	106 $\mu\mu\text{F}$	28.194.430

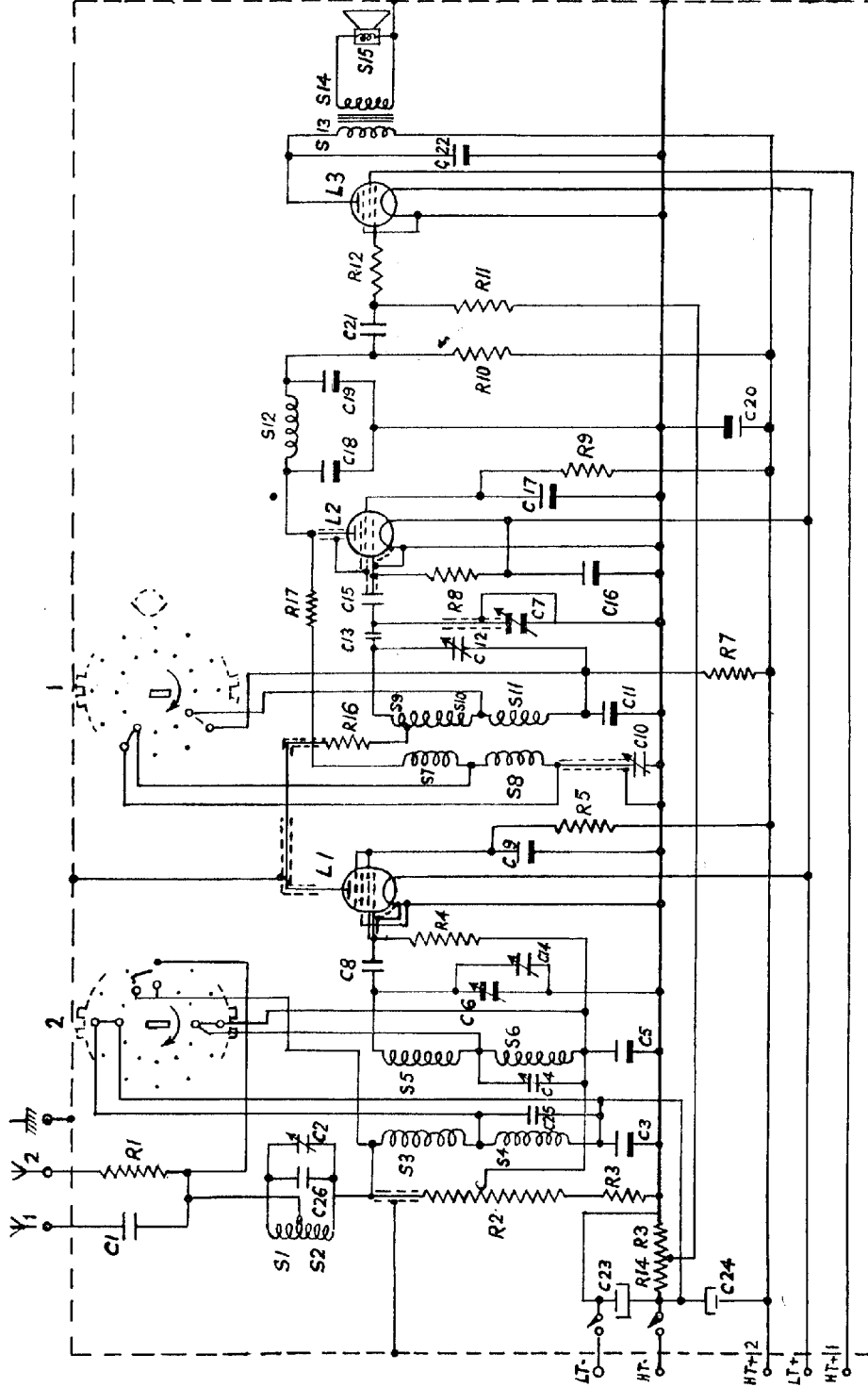
† or 28.201.150.

## VALVES

L1	L2	L3
VP2B	SP2	PM22D

Type 819B

3	1, 2, 3, 4, 5, 6	7, 8, 9, 10, 11	12	13, 14	15
C	2, 3, 24	1, 2, 6, 7, 3, 25, 4, 5, 6, 14, 8	9	10, 11	12, 13, 7, 15, 16, 17, 18, 19, 20
F	4, 13, 1, 2, 3	4	5	16, 7	8, 17, 9
					10, 11, 12



## RESISTANCES.

Designation.	Value.	Code No.	Designation.	Value.	Code No.
R1	0.25 M. Ohm	28.773.940	R9	0.25 M. Ohm	28.773.940
R2	50,000 Ohm	M.K.808.080 or M.K.808.090	R10	0.1 M. Ohm	28.773.900
R3	8,000 Ohm	28.773.790	R11	0.5 M. Ohm]	28.773.970
R4	1 M. Ohm	28.770.550	R12	0.2 M. Ohm	28.773.930
R5	0.1 M. Ohm	28.773.900	R13	320 Ohm	28.773.650
R7	10,000 Ohm	28.773.800	R14	1,000 Ohm	28.773.700
R8	2 M. Ohm	28.771.230	R16	200 Ohm	28.773.630
			R17	200 Ohm	28.773.630

S:	12.	13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
R/C:	12.	13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

