Kolster-Brandes A.C.

"Rejectostat" Receiver

Models K-B 428 and K-B 428A

1. SPECIFICATION

1.1. ELECTRICAL SPECIFICATION

Voltage rating	K-B 428. 200-250 volts A.C. 40-60 cycles. K-B 428A. 100-130 volts A.C. 40-60 cycles.
Power consumption	75 watts.
Recommended aerial length	70-100 feet with "Rejectostat" aerial system.
Type of circuit	A.C. double detection superheterodyne receiver incorporating 2 H.F. pentodes, pentagrid frequency changer, double diode and high slope output pentode. A Neon tuning indicator is fitted, and rectification is by a full-wave rectifier valve.
Wave ranges	Medium : 200-570 metres (1500-526 Kc/s.) Long : 900-1950 metres (330-154 Kc/s.) Also ultra-short wavelengths of from 15-80 metres are receivable when a K-B 432 Short Wave Converter is used. No alteration to the receiver is necessary.

1.2. TYPES OF ALTERNATIVE VALVES WHICH ARE APPROVED FOR USE IN THIS RECEIVER

No.	Type	Brimar	Cossor	Mullard	Philips
V1	Variable-mu H.F. pentode ...	9.D.2	13.VPA	—	—
V2	Pentagrid	15.D.1	13.PGA	—	—
V3	Variable-mu H.F. pentode ...	9.D.2	13.VPA	—	—
V4	Double-diode	10.D.1	13.DD.	2.D.13.C	—
V5	High slope output pentode...	—	—	Pen.4.VB	—
V6	Full-wave rectifier	R.3	442.BU	1.W.3	1867

1.3. CIRCUIT DESCRIPTION

Number of high frequency stages ...	One (H.F. pentode).
Input circuit	Tuned.
Type of frequency changer	Pentagrid.
Type of I.F. valve	H.F. pentode.
Number of I.F. stages	One.
Number of I.F. transformers	Two (the output transformer is variable).
Type of second detector and A.V.C. valve	Double-diode, delayed A.V.C.
Output stage	High slope pentode.
Tuning indicator	Neon.
Type of rectifier	Full-wave, thermionic.
Type of loudspeaker	Mains energised, 8″ (200 m.m.) diameter.
Undistorted output	2.5 watts.

Note.—Models K-B 428 and K-B 428A differ only in the supply voltages required for their operation.

1.4. PHYSICAL SPECIFICATION

Height	19½″	(495 m.m.)
Width	16″	(405 m.m.)
Depth over knobs	11″	(280 m.m.)
Nett weight	36 lb.	(16 kilo. 400)
Weight, packed for delivery	45 lb.	(20 kilo. 500)
Weight, packed for export	68 lb.	(31 kilo.)

1.5. FEATURES

These model K-B 428 and K-B 428A receivers are radio receivers of the table type, employing a modern superheterodyne circuit. The front panel is of highly figured walnut with contrasting bands of zebrano. These receivers are designed for use with either an ordinary or a "Rejectostat" aerial system.

Some of the outstanding features are :—

(1) The elimination of electrical interference due to complete screening, and the use of the "Rejectostat" aerial system.

(2) Diode second detection for quality.

(3) Variable selectivity and fidelity.

(4) Double tuned I.F. circuits in bandpass arrangement. The second I.F. transformer is variable.

(5) Tuned H.F. stage prior to frequency changer, giving remarkable sensitivity.

(6) "Fototune" tuning scale, calibrated in wavelengths with illuminated and projected station names.

(7) Visual tuning indicator of the neon type.

(8) Arranged to operate in conjunction with the K-B 432 Short Wave Converter, which may be left permanently connected.

(9) Arranged for operation from gramophone pick-up.

(10) The sensitivity is adequate for all normal purposes, and the selectivity variable to suit requirements so that advantage may be taken of high fidelity transmissions.

2. ELECTRICAL DESCRIPTION OF CIRCUIT

2.1. CIRCUITS EMPLOYED

The aerial and earth are coupled by a high impedance coil to the tuned grid circuit of the H.F. pentode valve (V1), which is followed by a tuned signal frequency H.F. transformer. This circuit is coupled directly to the modulator grid of the pentagrid frequency changer valve (V2). The output from this valve is taken to an intermediate frequency double tuned transformer (L4) and thence to the H.F. pentode valve (V3). L3 is the oscillator coil which, with the aid of the tracking and trimming condensers, and one section of the triple gang condenser, is tuned at a frequency 130 kc/s. higher than L1 and L2, whatever the setting of the gang condenser. The H.F. pentode valve (V3) is followed by a second I.F. transformer (L5).

Provision is made for varying the coupling between the primary and secondary windings of this component. When the "Selectivity-tone" control knob is turned fully clockwise the selectivity is at maximum, owing to the two windings being farthest apart, and the "bandwidth" accordingly being narrowed. In this position the switch (V11) connecting C16 to earth is closed, thus emphasizing the secondary effect of the improved selectivity still more by attenuation of the higher frequencies.

Valve V4 is of the double-diode type. One diode serves as the second detector, capable of handling a very large input without distortion, and its rectified output is fed, via a resistance capacity coupling network and the manual volume control, to the high slope pentode output valve. The remaining diode anode is coupled to the detector diode anode by a very small condenser, C13, and a small part of the signal voltage is rectified, and this supplies the necessary A.V.C. voltage.

V5 is transformer coupled to the dynamic speaker and the undistorted output available is approximately 2½ watts.

A full-wave rectifying valve, V6, is included in the mains circuit which is smoothed by a two-stage filter. (L6, R22, C22, C23 and C24.)

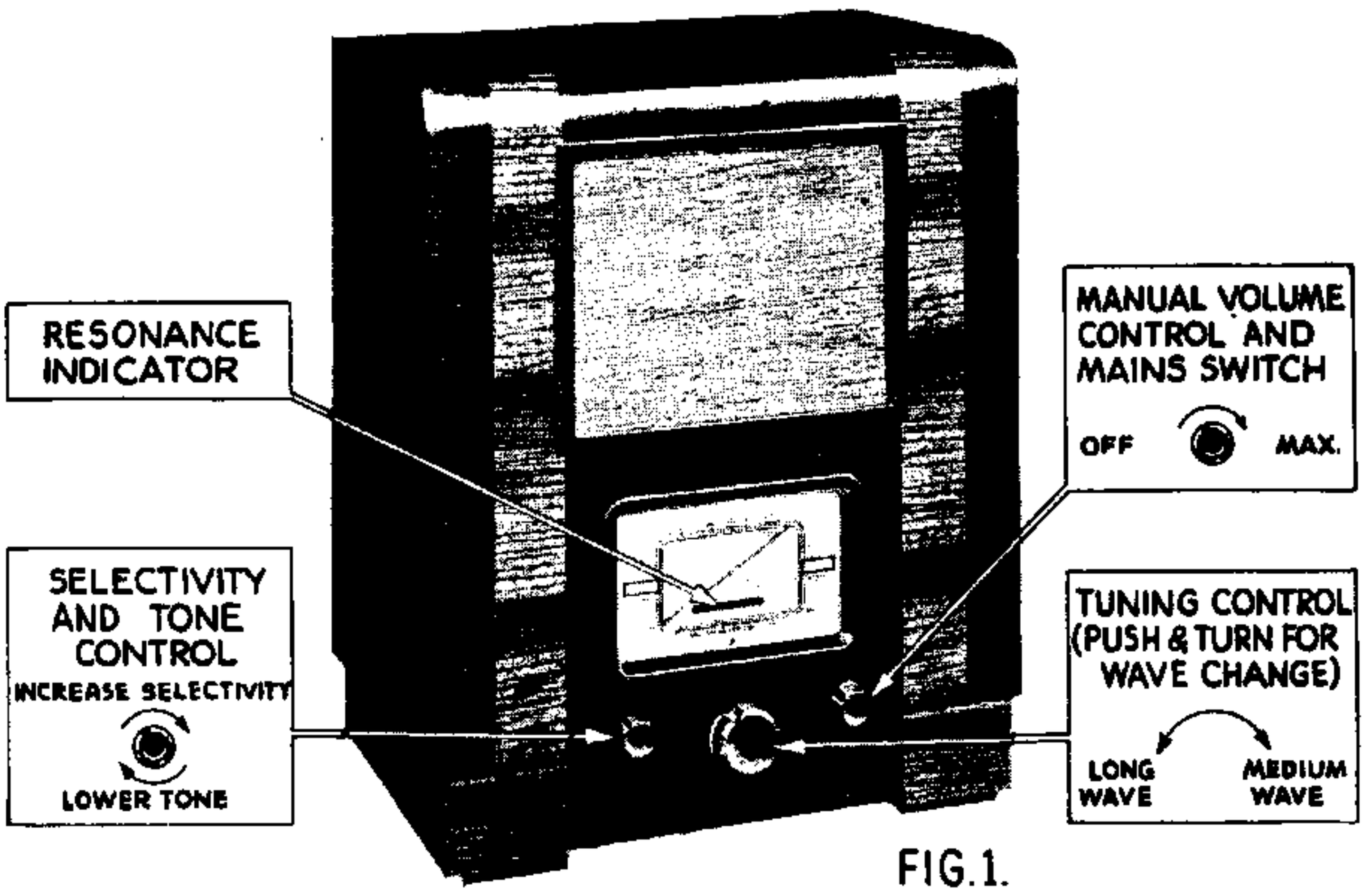


FIG.1.

3. INSTALLATION NOTES

3.1. IMPORTANT NOTE

Before commencing to service a receiver, verify that the instructions given in the instruction booklet supplied with the receiver have been carefully followed.

3.2. THE CONTROLS

The large knob in the centre is the combined Tuning Control and Wave-range Switch. The tuning control is used quite normally, but when it is pushed in and turned, long or medium wavelength circuits are brought into operation. Press and turn the knob clockwise for medium waves, or counter-clockwise for long waves.

The right hand knob is the combined Manual Volume Control (VR1) and Mains Switch. Turned fully anti-clockwise it is "off," and clockwise is the direction for increasing volume.

The left hand knob is the "Selectivity and Tone Control." The position of maximum selectivity is when it is turned fully clockwise.

3.3. MAINS VOLTAGE ADJUSTMENT

The mains "tapping" should be connected so that the receiver can be used under its optimum conditions. The receiver leaves these works adjusted to the highest voltage tapping, and if the supply is different from this, the black tubular fuse holder, which is situated on the upper power chassis to the left of the rectifier valve (V6), must be lifted from its sockets and replaced in the correct position which can be verified from the table below :—

Model	Mains voltage from	to	Plug into socket marked
K-B 428	240	250	245
	215	239	225
	200	214	205
K-B 428A	121	130	125
	111	120	115
	100	110	105

3.4. THE FUSE

If a fuse should "blow" at any time the cartridge must be replaced. The two halves of the ebonite plug are pulled apart and the cartridge fuse withdrawn and replaced by another of similar rating. The correct type fuses are obtainable from our Service Department or nearest depot and are priced at 6d. each. The part number to quote when ordering is 21219. The fuse is rated at 1,500 milliamperes.

3.5. AERIAL AND EARTH

When a "Rejectostat" aerial system is used it is necessary to break the permanent connection between "C" and "E" sockets, in order to use the receiver "Rejectostat" under its best operating conditions. If an ordinary aerial is used, verify that "C" and "E" sockets are short-circuited.

3.6. DIAL LAMPS AND HOLDERS

Two dial lamps are provided, one to project the long wave and the other the medium wave station names. The appropriate lamp is connected across the 4-volt heater winding by contacts II and III on the wave-change switch. The lamps are rated at 6.2 volts 0.3 amp., and similar lamps must be used for replacement purposes. Sufficient slack wire is left to enable the lamp-holders to be withdrawn so that lamp replacements may be effected.

If the station names appearing in either aperture appear slightly blurred or out of focus, screw or unscrew the lamp in its holder until the names become sharp and clear. The lamp filament should be at right angles to the dial face.

4. CIRCUIT AND COMPONENT DETAILS

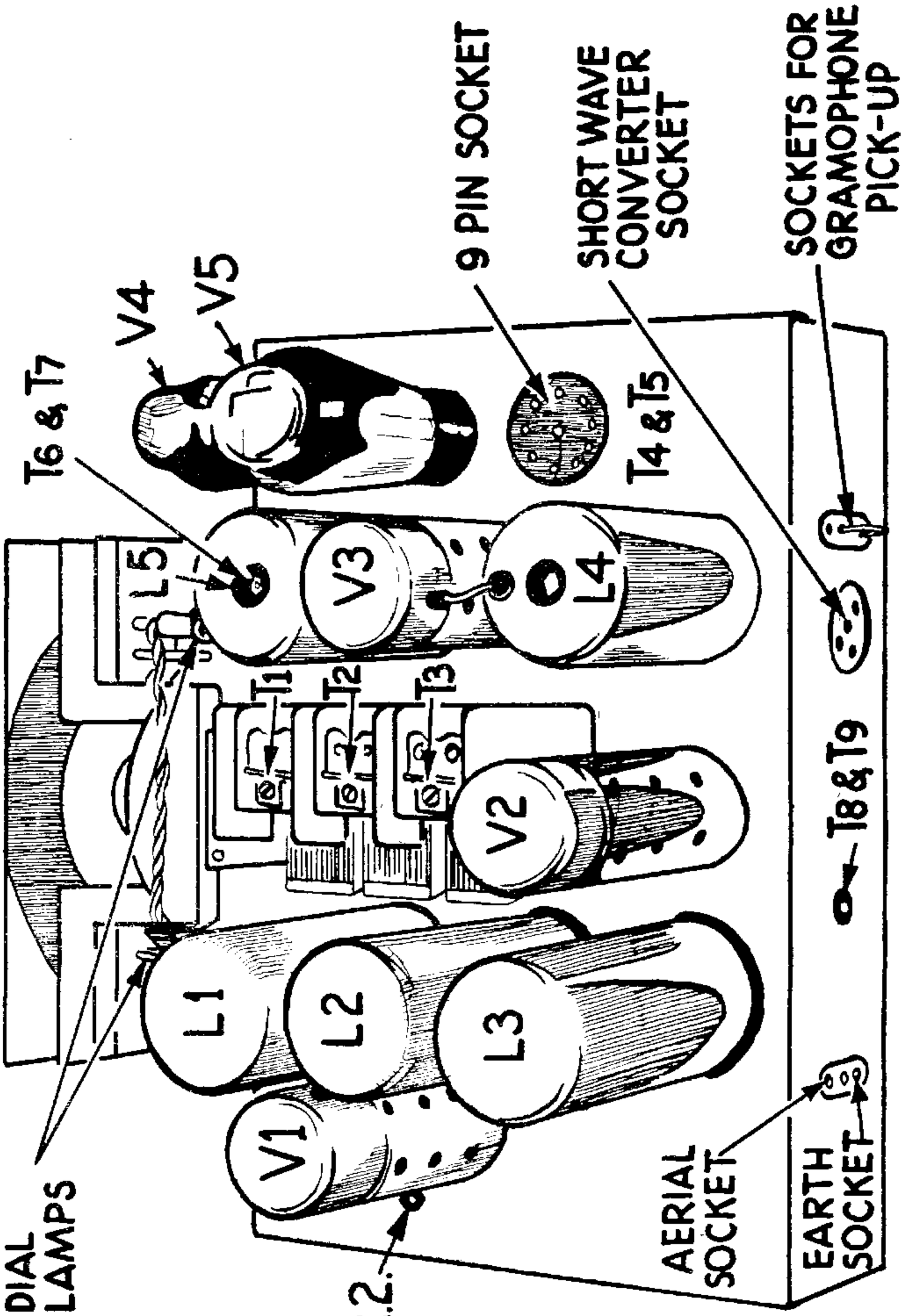


FIG. 2. TOP VIEW OF CHASSIS.

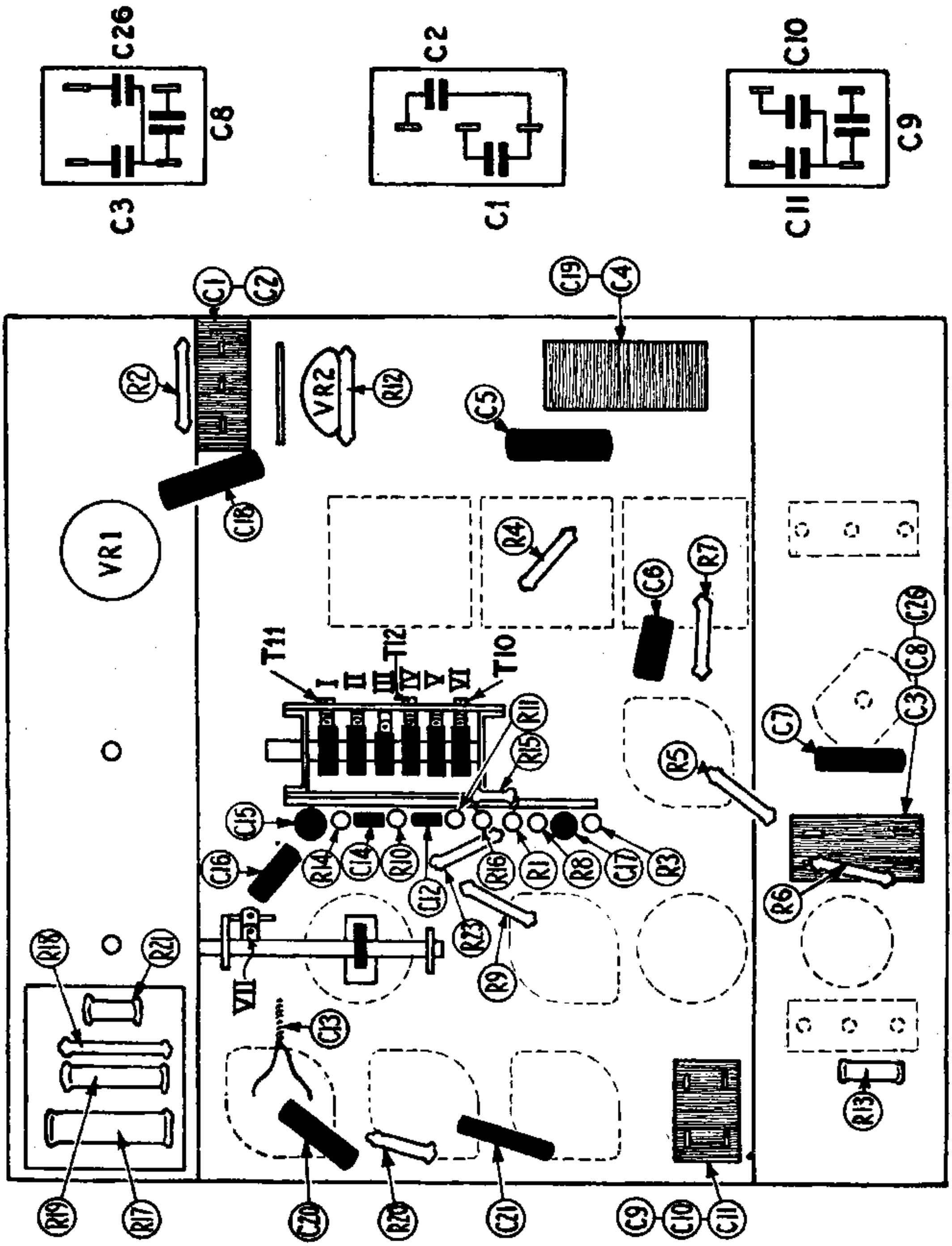


FIG. 3.
VIEW OF UNDERSIDE OF CHASSIS WITH ENDS BENT OUTWARD TO INDICATE POSITIONS OF COMPONENTS.

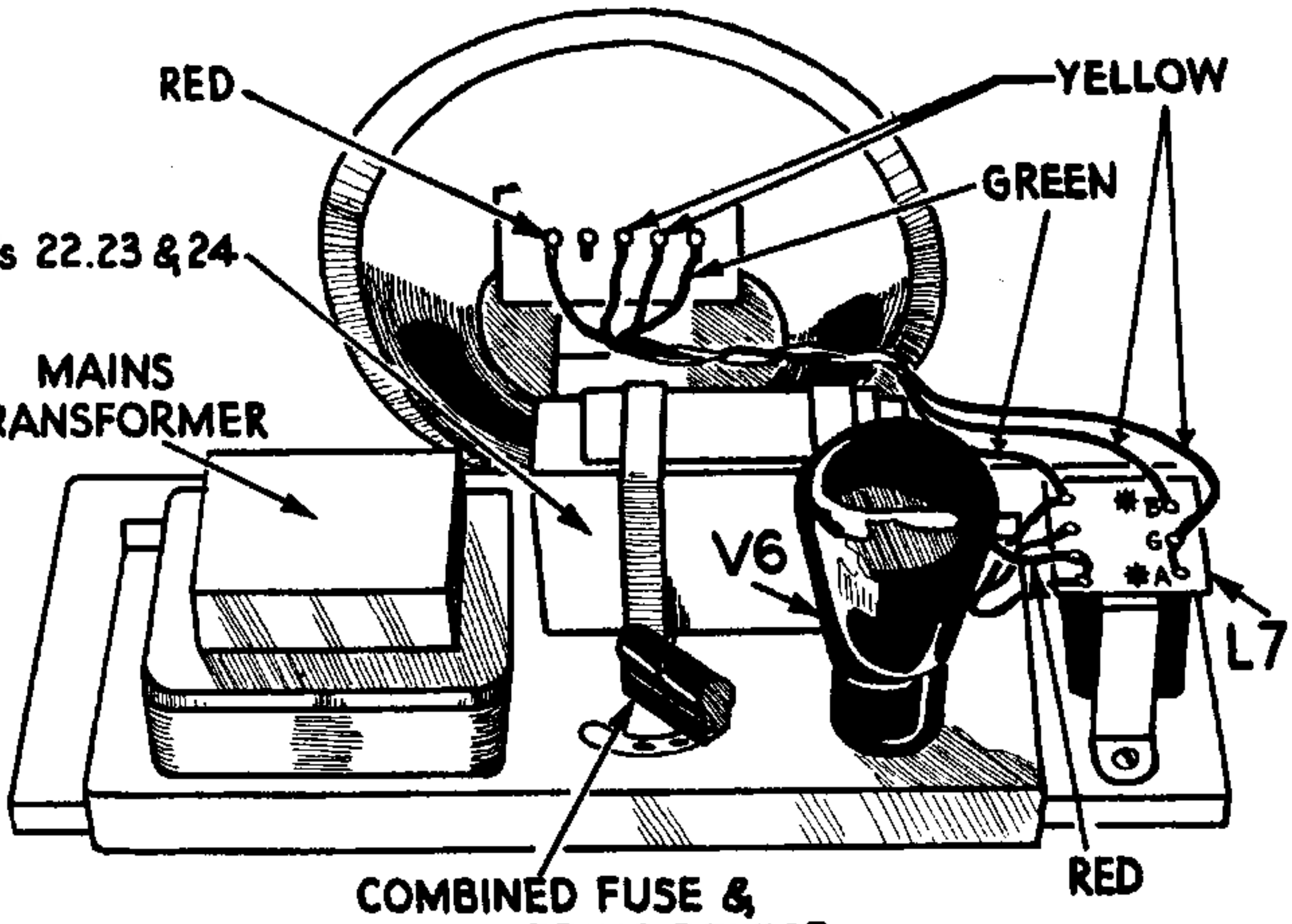
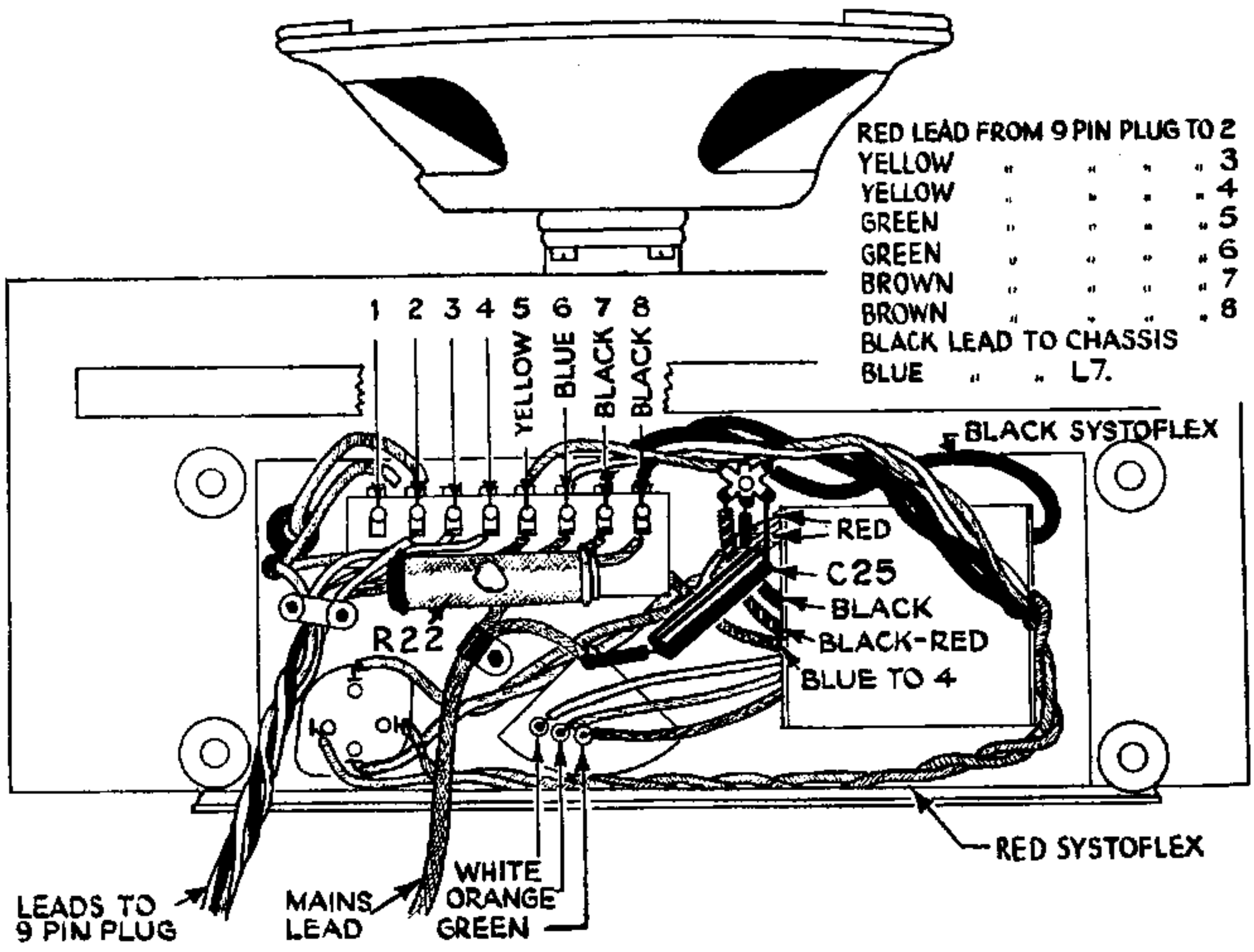
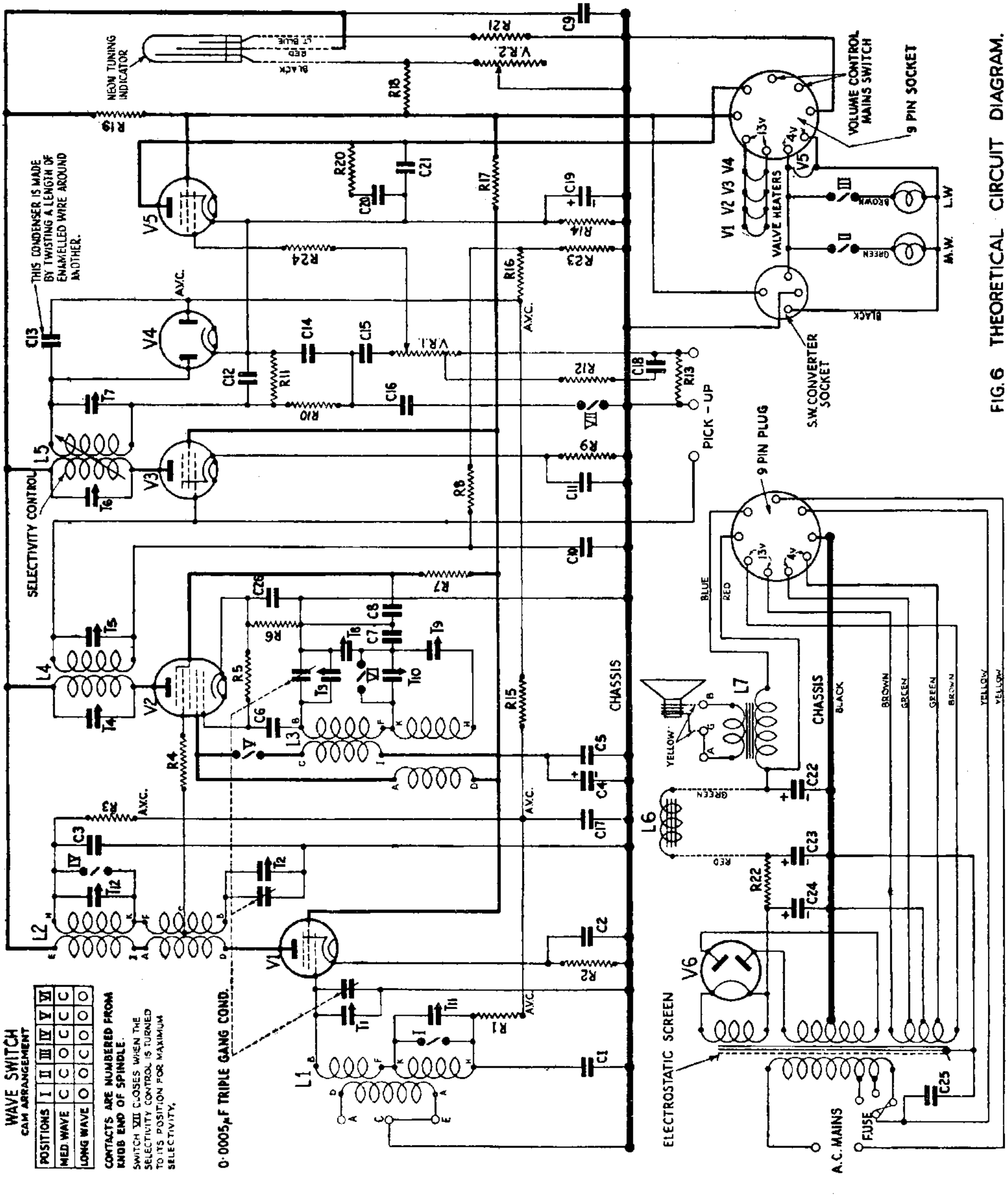


FIG. 4.



UNDERSIDE OF POWER UNIT.

FIG. 5.



POSITIONS	I	II	III	IV	V	VI
MED. WAVE	C	C	O	C	C	C
LONG WAVE	O	O	C	O	O	O

FIG. 6 THEORETICAL CIRCUIT DIAGRAM.

4.1. COMPONENT DETAILS

Position in Circuit	Description	Part No.	Price £ s. d.
	CONDENSERS		
C1	0.1 microfarad	32008	2 0
C2	0.1 ,, ...	*See* C1	
C3	0.1 ,, ...	32132	2 6
C4	10 microfarads (Electrolytic)... ...	K.E.13	4 3
C5	0.1 microfarad	5/KT.18	2 0
C6	0.0001 ,, ...	KT.2	1 0
C7	0.001 ,, ...	KT.7	1 0
C8	0.1 ,, ...	*See* C3	
C9	0.5 ,, ...	37026	2 6
C10	0.1 ,, ...	*See* C9	
C11	0.1 ,, ...	*See* C9	
C12	0.0001 ,, ...	KT.2	1 0
C13	25 micro-microfarads (twisted wire) ...	—	—
C14	0.0001 microfarad	KT.2	1 0
C15	0.02 ,, ...	KT.14	1 6
C16	0.001 ,, ...	KT.7	1 0
C17	0.02 ,, ...	KT.14	1 6
C18	0.02 ,, ...	KT.14	1 6
C19	25 microfarad (Electrolytic)	*See* C4	
C20	0.01 microfarad	KT.25	1 6
C21	0.0005 ,, ...	KT.24	1 6
C22	8 microfarads (Electrolytic)	KE.7	11 6
C23	8 ,, ,, ...	*See* C23	
C24	8 ,, ,, ...	*See* C23	
C25	0.01 microfarad	KT.13/1/4	1 6
C26	0.1 ,, ...	*See* C3	

Condensers C4 and C19 are combined in a single block.
,, C22, C23 and C24 are combined in a single block.
,, C1 and C2 are combined in a single block.
,, C9, C10 and C11 are combined in a single block.
,, C3, C8 and C26 are combined in a single block.

	RESISTANCES		£ s. d.
VR1	½ megohm potentiometer	33916	10 6
VR2	25,000 ohms (Variable)	41824	3 0
R1	250,000 ohms	—	1 6
R2	600 ,, ...	—	1 6
R3	250,000 ,, ...	—	1 6
R4	400 ,, ...	—	1 6
R5	25,000 ,, ...	—	1 6
R6	300 ,, ...	—	1 6
R7	15,000 ,, ...	—	1 6
R8	250,000 ,, ...	—	1 6
R9	600 ,, ...	—	1 6
R10	100,000 ,, ...	—	1 6
R11	0.5 megohm	—	1 6
R12	20,000 ohms	—	1 6
R13	250,000 ,, ...	—	1 6
R14	140 ,, ...	—	1 6
R15	100,000 ,, ...	—	1 6
R16	0.5 megohm	—	1 6
R17	20,000 ohms (2 watt)	—	2 6
R18	60,000 ohms	—	1 6
R19	3,000 ,, (1 watt)	—	1 6
R20	20,000 ,, ...	—	1 6
R21	0.25 megohm	—	1 6
R22	600 ohms (3 watt)	95/F.2	3 6
R23	100,000 ohms	—	1 6
R24	7,000 ,, ...	—	1 6

Resistances are ½ watt type except where stated.

	OTHER COMPONENTS		£ s. d.
L1	Aerial coil assembly	A.42182-3	6 0
L2	H.F. coil assembly	A33386.-41881	6 0
L3	Oscillator coil assembly	A.42178-9	6 0
L4	I.F. transformer assembly (fixed) ...	A.42193A	7 6
L5	I.F. ,, ,, (variable)...	A.41693	9 6
	Triple gang condenser	A.38897	1 0 0
	Tracking condenser assembly T8 & T9	A.41692	4 0
	Mains transformer (K-B 428) ...	A.41874	1 7 6
	,, ,, (K-B 428A) ...	A.41874/A	1 7 6
	,, ,, (200v. 25 cycles) ...	A.42774	1 15 0
	Valve holder 4-pin	A.27567	10
	,, ,, 5-pin	A.27570	1 0
	,, ,, 7-pin	A.27569	1 6
	Escutcheon	41608/C	1 6
	Fuse (cartridge type)	21219	6
	Fuse holder	A.33980	3 9
	Loudspeaker	A.42097	1 5 0
	Output transformer	A.34388/1	10 6
	Scale and bush assembly	A.42173	2 6
	Pointer assembly	A.41688	6
	Back dial face	41646	9
	Neon tube holder assembly	37048	5 6
	Connection cap	38132	doz. 1 0
	Valve can	38133	1 0
	Valve can cap	38134	7
	Front dial face	41644	2 6
	Dial lamp (6.2v. 0.3 amp.)	27945	9
	Dial lamp holder	37072	9
	Shorting link	41808	2
L6	Field coil	A.39969/B	10 6
	Knob tuning (complete with nut & screw)	41667/C	1 0
	Knob volume (ditto)	38118/C2	9
	Knob selectivity (ditto)	38118/C7	9
	Power supply lead and 9-pin plug ...	A.41886	2 6
	Aerial and earth socket panel	A.41695	1 6
	Wavechange switch and resistance panel assembly. Less resistances and condensers	A.41691	12 6
	*Cabinet	A.41875	2 15 0

*Supplied only as replacement.

Prices which are subject to alteration without notice, are retail, quoted delivered at Sidcup. The usual Authorized Dealers' terms apply.

5. TESTING DATA

5.1. RESISTANCES OF COILS, ETC.

Note.—The resistance of coil windings given below are approximate only and slight variations are allowable.

Coil	Winding	* Tags	Resistance
L1	Aerial coupling	A.D.	11 ohms
	M.W.	B.F.	5 „
	L.W.	K.H.	20 „
L2	Primary	D.A.	9 ohms
	Primary	I.E.	¾ „
	M.W. grid	B.F.	3¾ „
	L.W. „	K.H.	18 „
L3	M.W. anode	I.C.	2 ohms
	L.W. „	D.A.	9 „
	M.W. grid	B.F.	4 „
	L.W. „	K.H.	13 „
L4	Primary	—	70 ohms
	Secondary	—	70 „
L5	Primary	—	70 ohms
	Secondary	—	70 „
L6 Loudspeaker	Field coil	—	1,300 ohms
L7 Output transformer	Primary	—	430 ohms

* See paragraph 3.3, page A3, for key to lettering of tags.

5.2. VOLTAGES AND CURRENTS

Voltages were measured with 225 volts A.C. applied to the 225 volt tapping of a K-B 428 receiver. Similar readings will be obtained with the K-B 428A receiver, but small variations must be expected.

The aerial and earth sockets of the receiver were short-circuited together throughout the measurements of voltages and currents. The volume control was kept in the maximum position.

In order to facilitate the actual measurement when using the "Weston" Selective Analyzer a diagram is given (Fig. 7, page U 12) indicating the numbering of the electrodes and pins of the various valves corresponding to the numbers on the contact jacks of the socket selector.

It is only necessary, however, to insert the meter leads into the contact jacks bearing the numbers indicated within square brackets in the following table. "CAP" indicates the connection at the top of the glass envelope of the valve (it is the control grid connection in universal heater valves, *not* the anode as in previous types of valves). " EARTH " refers to two contact jacks on the socket selector, which can be connected to the chassis under test by means of the clip-lead provided with the analyzer.

The figures in brackets denote the voltages indicated when an Avometer (Universal model) is used. The current readings are common.

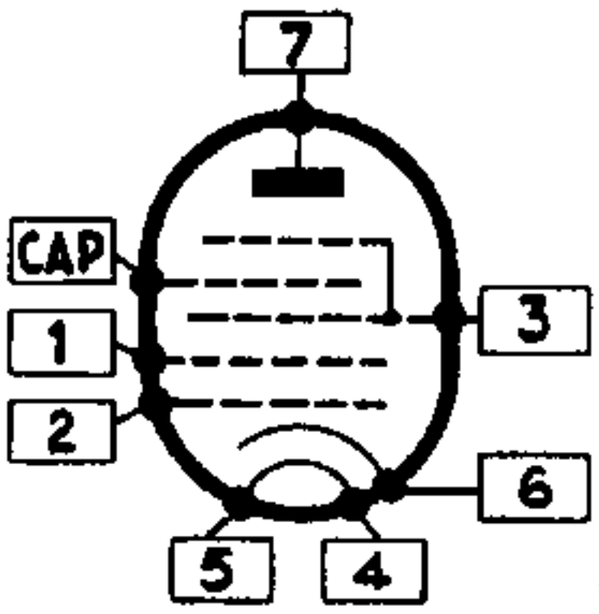
Voltage across resistance, R22 ... 31v (30v)
„ „ output transformer L7 13v (13v)
„ „ field coil L6 ... 75v (72v)

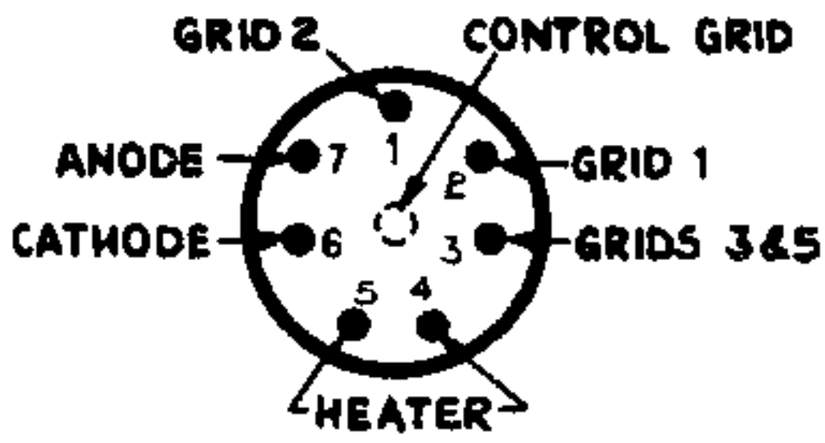
Valve	Chassis (Earth) to :—						Anode current [2] m.a.	Priming grid current [7] m.a.		Heater voltage [4] & [5]
	Anode [2]	Priming Grid [7]	Control Grid [Cap]	Cathode [6]						
V1	210v. (210v.)	85v. (70v.)	0v. (0v.)	3v. (3v.)			4.2	1.0		13v.
	Anode [7]	Grids 3 & 5 [3]	Control grid [Cap]	Cathode [6]	Grid 1 [2]	Grid 2 [1]	Anode current [7] m.a.	Grids 3 & 5 current [3] m.a.	Grid 2 current [1] m.a.	
V2	215v. (220v.)	40v. (35v.)	0v. (0v.)	1.6v. (1.6v.)	-6.4v. (-4.5v.)	85v. (70v.)	0.25	3.0	2.6	13v.
	Anode [2]	Priming grid [7]	Control grid [Cap]	Cathode [6]			Anode current [2] m.a.	Priming grid current [7] m.a.		
*V3	220v. (240v.)	100v. (100v.)	-8v. (-6v.)	2.0v. (1.8v.)			2.1	1.2		13v.
				Cathode [6]	Diode anode [1]	Diode anode [3]				
V4				5.2v. (5.3v)	0v. (0v.)	0v. (0v.)				13v.
	Anode [7]	Priming grid [3]	Control grid [2]	Cathode [6]			Anode current [7] m.a.	Priming grid current [3] m.a.		
V5	220v. (230v.)	230v. (240v.)	0v. (0v.)	5.2v. (5.3v.)			30.0	3.4		4v.
V6	Total current 55 m.a. Voltage across reservoir condenser C24 350v. (350v.).									4v.

* This valve must be decoupled during measurements by connecting a capacity of about 0.1 microfarad between the anode and chassis.

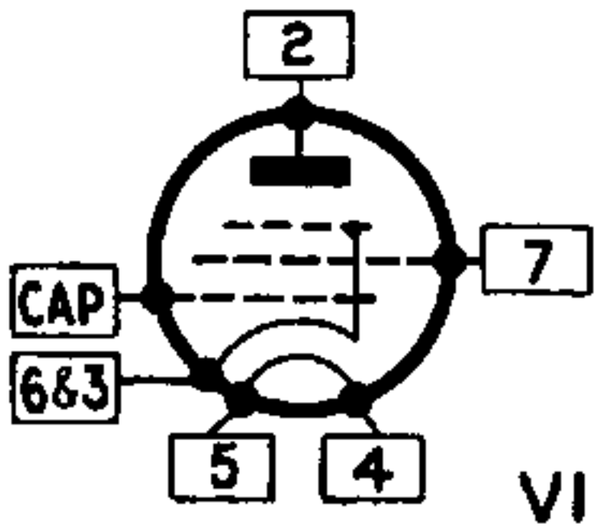
DIAGRAMMATICAL REPRESENTATION OF ELECTRODES.

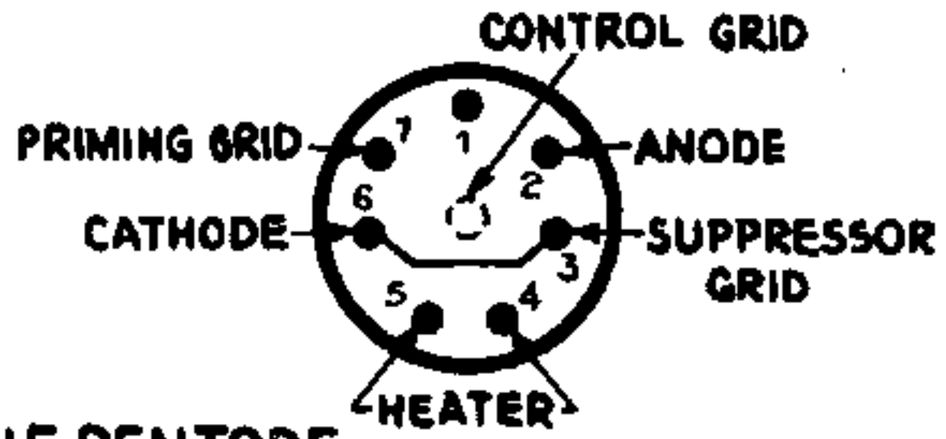
VIEW OF VALVE BASES LOOKING DOWN ON INVERTED CHASSIS.



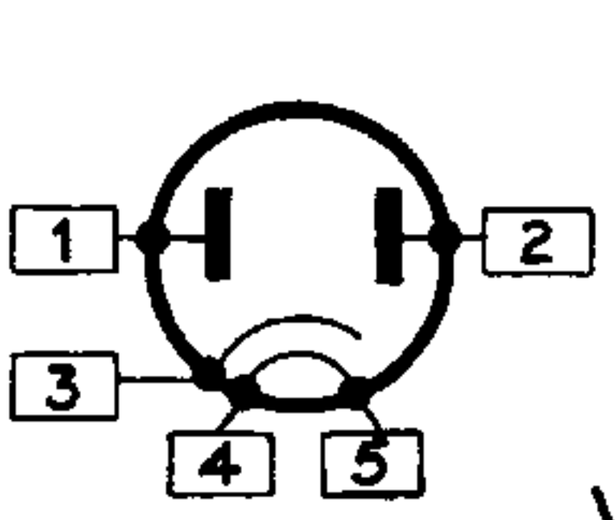


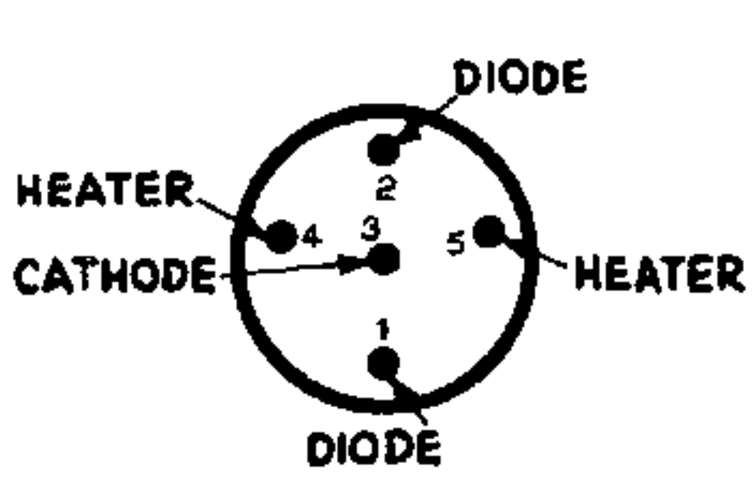
V2. PENTAGRID.



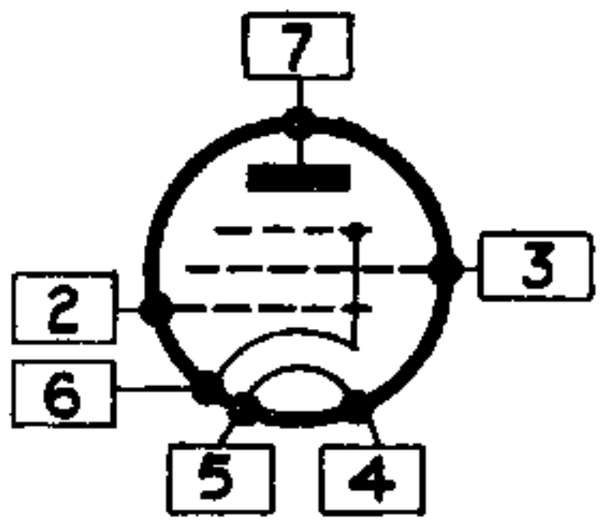


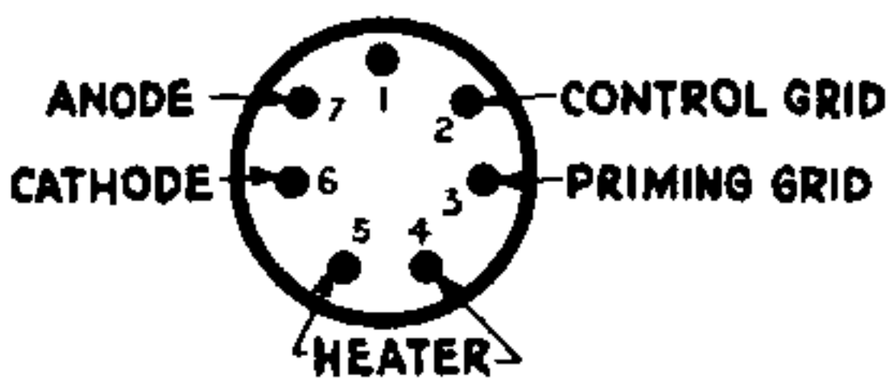
V1 & V3. H.F. PENTODE



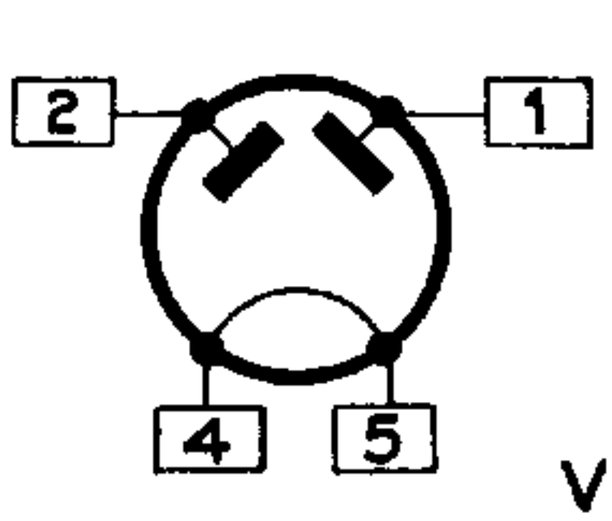


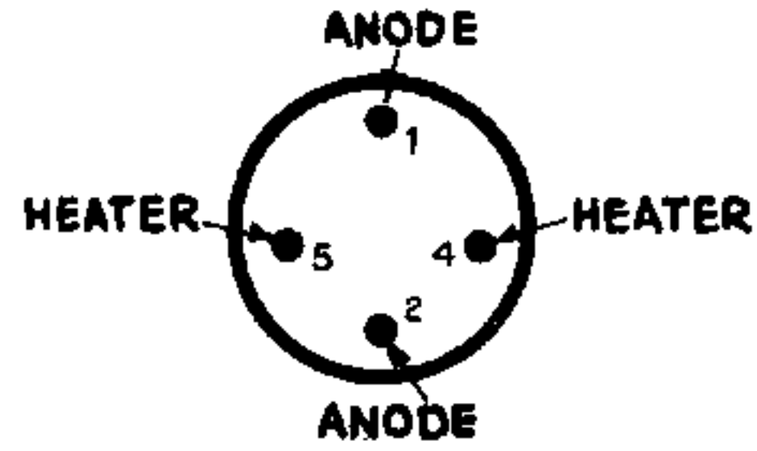
V4. DOUBLE-DIODE





V5. L.F. PENTODE





V6. FULL WAVE RECTIFIER

FIG. 7. VALVE DETAILS.

5.3. TO REMOVE CHASSIS FROM CABINET

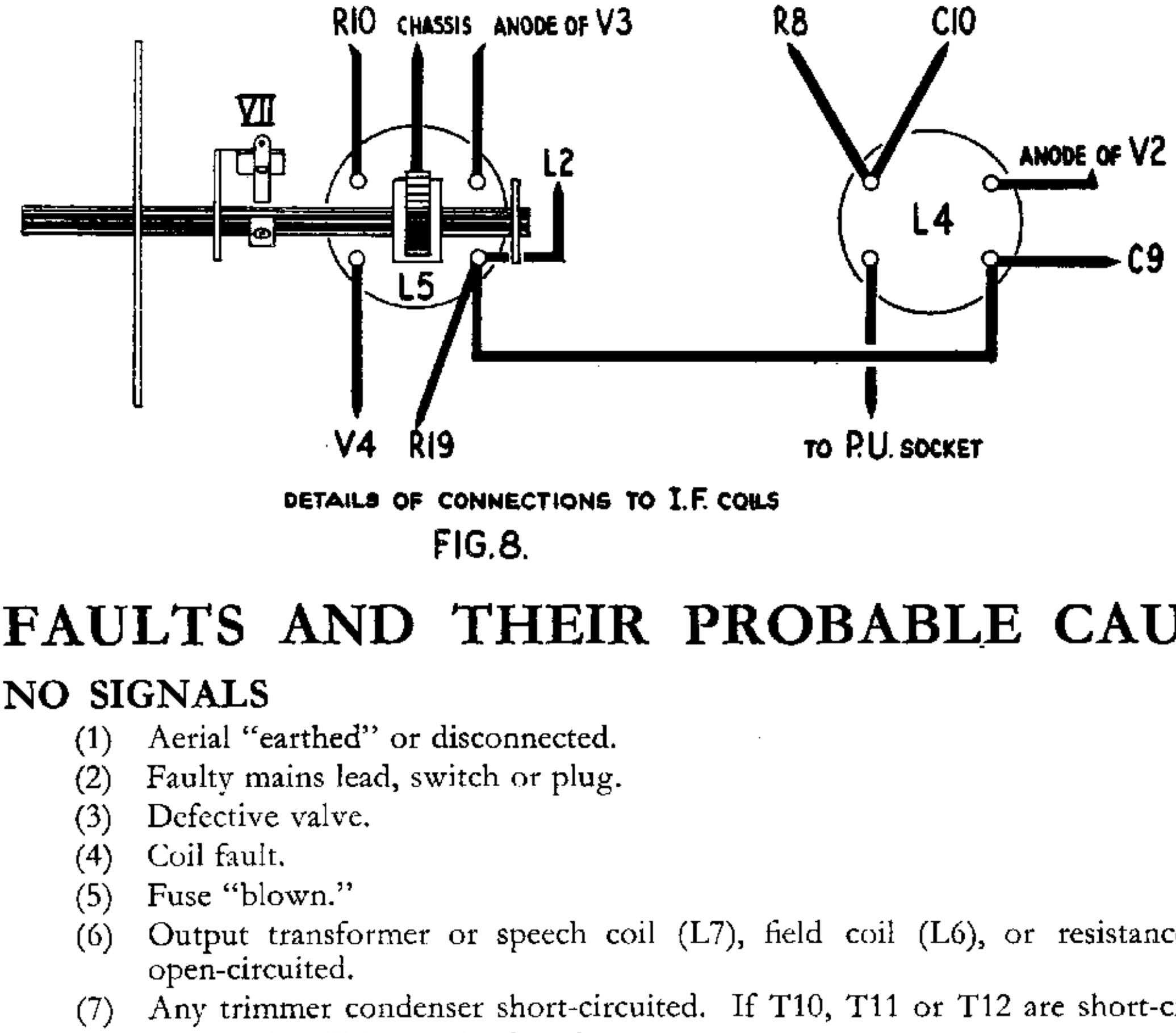
A detachable inspection cover is fitted on the underside of the cabinet, and most service work can be executed without removing the chassis.

The chassis can be removed by taking off back, unscrewing the knobs, which are held on to their spindles by recessed set screws, detaching the two base rails of the cabinet and undoing the four screws passing upwards through the cabinet bottom. The chassis can then be taken out of the cabinet after pulling out the 9-pin plug. The power unit and speaker assembly is freed complete when the four long bolts passing through the wooden battens and wooden supports are removed.

When the chassis is replaced the four holding-down bolts must be screwed up tightly and then loosened three complete turns so that the chassis floats on the rubber washers provided for that purpose. Care must be taken to see that the rubber washers and brass insets are replaced in the positions from which they were removed.

5.4. WIRING AND COILS

The wiring is carried out in accordance with section 3.5 of the General Section. The tags on the coil bases are lettered in accordance with paragraph 3.3 of the same section. Details of the I.F. coils are given below :—



DETAILS OF CONNECTIONS TO I.F. COILS

FIG. 8.

6. FAULTS AND THEIR PROBABLE CAUSES

6.1. NO SIGNALS

(1) Aerial "earthed" or disconnected.
(2) Faulty mains lead, switch or plug.
(3) Defective valve.
(4) Coil fault.
(5) Fuse "blown."
(6) Output transformer or speech coil (L7), field coil (L6), or resistance (R22) open-circuited.
(7) Any trimmer condenser short-circuited. If T10, T11 or T12 are short-circuited, no signals will be received on long waves.
(8) Condenser broken down.

6.2. LOW VOLUME

(1) Defective valve.
(2) Receiver out of alignment.
(3) Poor aerial (gives excessive noise).
(4) Low mains voltage.
(5) Field or speech coil turns shorted.

6.3. POOR TONE

(1) Defective speaker.
(2) Faulty valve.
(3) Receiver oscillating.
(4) Speech coil out of centre and fouling gap.
(5) Check condensers C19 and C20 for open-circuit.
(6) Check emission of output valve.

Note.—In the section given below it is assumed that only the fault under discussion is apparent, and that other voltages, etc., are O.K.

If the voltage between a valve electrode and the chassis is "high" or O.K., but the valve is not passing any current, either the valve has lost its emission or its bias resistance is open-circuited. If the voltage is low it is possible that the current will be found excessive, due to the short-circuiting of a resistance. Alternatively, the valve may be soft.

6.4. V.1. NO OR LOW VOLTAGE TO:—

ANODE—Test primary of L2 for continuity.
Check R19.

SCREENING GRID—Test R17.
Check voltages on other screening grids and on oscillator anode of V2.

6.5. V.2. NO OR LOW VOLTAGE TO:—

ANODE—Verify that primary of L4 is continuous.
Check R19.

SCREENING GRID—Test R17 and R7.

OSCILLATOR ANODE—Test R17 for value, and see that windings of L3 are in order.
Verify that C4 or C5 have not broken down.

6.6. V.3. NO OR LOW VOLTAGE TO:—

ANODE—Check continuity of L5 and R19.

SCREENING GRID—The high tension supply of this electrode is common with that to the similar electrode of V1.

6.7. V.5. NO OR LOW VOLTAGE TO:—

ANODE AND PRIMING GRID—Check continuity of output transformer (L7).
The priming grid is fed directly from the smoothed H.T. line.
Test C20 and C21 for breakdown.

6.8. NO VOLTAGE TO ANY VALVE

Verify that the mains supply point and switch are in order.
Test R22 for continuity.
Test L6 and L7 for continuity.
Check fuse.
Check condition of rectifier valve.
Test all electrolytic condensers for breakdown (see paragraph 3.4, page A3).

7. LACK OF SENSITIVITY

If after the foregoing tests no fault has been found, and the set is insensitive, particularly over certain parts of the tuning range, the receiver must be reganged.

7.1. ALIGNMENT OF CIRCUITS

Unsatisfactory performance of this receiver, due to improper adjustment of the I.F. bandpass and oscillator circuits, will not be indicated by any readings made with a voltage and current testing set, and the use of a signal generator is the only really reliable method of alignment.

With this receiver it is not necessary to remove the chassis from the cabinet to adjust the various trimmers, as the I.F. trimmers T4 and T5, T6 and T7, are accessible through holes in the tops of the respective coil screens. The condenser trimmers (T1, T2 and T3) are on the top side of the triple gang condenser. The medium and long wave tracking condensers (T8 and T9) can be reached through a single hole in the back of the chassis, and the remaining three long wave trimmers (T10, T11 and T12) will be accessible when the base inspection cover is removed. In the case of the I.F. trimmers, the primary trimmer is adjusted by moving the *screw* and the secondary the *nut*.

The *nut* of the dual tracking condenser (T8 and T9) at the back of the chassis adjusts the medium wave, whilst the *screw* adjusts the long wave.

A special bakelite box trimming spanner is available from our Service Department, price 1/6 nett.

It is essential that the operation of "lining up" the receiver be carried out strictly in the order indicated and, unless otherwise stated, it is detrimental to go back to an earlier adjustment after subsequent operations have been carried out.

See that the tuning pointer is horizontal when the triple gang condenser is fully "open."

When the receiver is switched on, and the tuning knob turned clockwise until the pointer is in a horizontal position, an illuminated "line" will be visible in the station name aperture. This "line" must absolutely line up with the pointer. The station name plate can be adjusted when the small screws in its fixing bush are loosened.

Also verify that the two small marks, one at each inside end of the station name apertures, are in line with the pointer when it is in a horizontal position. Any error here can be corrected by moving the dial itself. Finally, the mechanical adjustments are completed by ascertaining whether when one end of the pointer is set at 370 metres the other points to 1380 metres.

Adjust signal generator to deliver a considerable output at the intermediate frequency of 130 kc/s, and switch on the receiver with an output meter connected to the loudspeaker. Turn the wave change switch to long waves and the volume control to maximum. The selectivity control should be turned fully clockwise to its position for maximum selectivity.

Set the gang condenser to maximum capacity and take leads from the signal generator to :—

(*a*) The chassis (centre socket of panel marked "A," "C," "E")

and

(*b*) through a condenser of capacity 0.1 microfarad to the control grid of V1, the frequency changer valve. (The control grid is the cap on the top of the valve.)

(1) Adjust all the four I.F. trimmers till they are quite loose and the minimum capacity is reached.

(2) Turn the nut (T7) which adjusts the secondary trimmer of I.F. output transformer until maximum output is indicated.

(3) Adjust the I.F. output transformer primary trimmer screw (T6) in exactly the same way.

(4) Repeat for the I.F. input transformer secondary trimmer (T5).

(5) And for the primary trimmer (T4) of the same coil.

(6) Adjust the signal generator to 1200 kc/s. and supply the output to the sockets marked "A" and "E" of the triple socket panel.

(7) Turn the wave switch to "medium waves" and the gang condenser so that the scale pointer is in line with the small mark to be found at 250 metres.

Note.—Some of the earlier models were aligned at 1400 kc/s., and on these the trimming mark is common with the Short Wave Converter mark.

(8) Fully unscrew (counter-clockwise) the oscillator trimmer (T3) and fully screw in the bandpass and aerial trimmers (T2 and T1).

(9) Now screw down the oscillator trimmer (T3) until a signal is received and adjust for the greatest output.

CAUTION.—Care must be taken when screwing down the oscillator trimmer that a weak signal is not missed, as it is possible to receive a signal in two positions of this trimmer. The first reached when screwing down is the required beat ; the other is the "second channel."

(10) Unscrew the bandpass trimmer (T2) to give the highest output.

(11) Adjust the aerial trimmer (T1) similarly.

(12) Return to the oscillator trimmer (T3) and attempt to improve the output by careful readjustment.

(13) Tune the signal generator to 600 kc/s. and tune to this by the tuning control of the receiver.

(14) Adjust the medium wave tracking condenser (T8) for the best output at the same time moving the tuning control of the receiver to get the final reading. Set the pointer so that 500 metres is indicated. This can be moved by loosening the two screws which will be found on the main spindle immediately behind the back dial plate bush.

(15) Repeat adjustments (2 to 7) and (9 to 12) in an attempt to obtain improved results, after reducing the output from the signal generator.

(16) Adjust the signal generator to 175 kc/s. and tune the receiver to this.

(17) Now adjust for highest output by the long wave padding condenser (T9) at the same time rocking the tuning control and noting length of glow in neon tuning indicator.

(18) Finally set the signal generator for 300 kc/s. and turn the receiver tuning pointer until it reads exactly 1000 metres. Then adjust trimmers T12, T11 and T10 for maximum output. The long wave readings should then be correct over the whole range.

7.2. TRIMMERS AND THE FREQUENCY AT WHICH THEY ARE ADJUSTED

T1	Aerial trimmer...	Trim at 1,200 kc/s.
T2	Bandpass trimmer	„ „ 1,200 kc/s.
T3	Oscillator trimmer	„ „ 1,200 kc/s.
T4	I.F. input transformer primary trimmer	„ „ 130 kc/s.
T5	I.F. input transformer secondary trimmer	„ „ 130 kc/s.
T6	I.F. output transformer primary trimmer	„ „ 130 kc/s.
T7	I.F. output transformer secondary trimmer	„ „ 130 kc/s.
T8	Medium wave tracker	„ „ 600 kc/s.
T9	Long wave tracker	„ „ 175 kc/s.
T10	Aerial coil long wave calibration trimmer	„ „ 300 kc/s.
T11	Bandpass coil long wave calibration trimmer	„ „ 300 kc/s.
T12	Oscillator coil long wave calibration trimmer	„ „ 300 kc/s.

8. OTHER POSSIBLE FAULTS

8.1. INSTABILITY

This fault may be due to a faulty valve or an open-circuited by-pass condenser. If the instability only occurs at the bottom of the medium wave band, incorrect adjustment of the oscillator and H.F. trimmers is indicated.

If an extension loudspeaker is used, proximity between its leads and the aerial and earth leads will sometimes cause instability.

8.2. MICROPHONICITY

This is a howl set up at high volume levels by acoustic feed back. It can be caused by a faulty valve in the V1, V2 or V3 positions, or by a faulty loudspeaker. Verify that the tuning condenser assembly, and the complete chassis are freely mounted.

8.3. NOISY BACKGROUND

When using a receiver incorporating A.V.C., a noisy background will frequently be apparent if the aerial "pick-up" is insufficient. The remedy here is to use an aerial as long as practicable and incorporate a K-B "Rejectostat" system.

If the noise persists when the aerial and earth wires are removed the probable cause is either a loose connection in the chassis or mains lead, or a faulty valve. A loudspeaker speech coil that is out of centre and touching the "gap" will cause noises. Verify that "C" and "E" sockets are short-circuited when the K-B "Rejectostat" system is not used.

8.4. HUM

Hum may be due to the use of an inefficient earth connection, or a faulty valve, or because "C" and "E" sockets are open-circuited even though the "Rejectostat" aerial system is not being used. If it occurs only when A.C. mains are used and only when a carrier wave is tuned in, then it is known as "modulation hum" and may usually be overcome by inserting the mains plug the other way round. A defective rectifier valve has been known to cause this trouble.

Test electrolytic condensers.

8.5. CONNECTING LINK BETWEEN "C" AND "E" SOCKETS

If a "Rejectostat" aerial system is in use the link must be broken, and it should be broken, even though a "Rejectostat" is not in use, in cases of severe interference or modulation hum *which is aggravated by the addition of the earth lead.*

9. ADDITIONAL INFORMATION

9.1. GRAMOPHONE PICK-UP

At the back of the receiver on the extreme right is a triple socket panel with a metal link bridging the two lower sockets. This is the normal position for reception of radio programmes.

When it is desired to use an electrical pick-up, the metal link should be removed and plugged into the centre and upper sockets. The pick-up and volume control should then be connected to the middle and lower sockets. Alternatively, one lead may be connected to the lowest socket of the three, and the "earthy" pick-up lead (and screening) to the "C" socket on the aerial and earth panel assembly. The "C" socket is, of course, connected to earth (chassis). When the link is in the pick-up position it short-circuits the control grid of the H.F. pentode intermediate frequency valve to "earth," and prevents break through.

If the pick-up is provided with screened leads the screen should be connected to one of the wires, if this is not already done, and this wire must be connected to the middle socket.

If a volume control having three terminals is employed, the two outer terminals are connected to the pick-up. The centre terminal of the volume control is connected to the lower socket, and the "earthy" side of the pick-up to the middle socket.

As the output voltage from the pick-up is fed, via its volume control to the grid of the output pentode valve (V5), it is necessary to use a pick-up with a good output. Needle-armature types are unsuitable, but the piezo-crystal types are satisfactory.

Care must be taken to see that the resistance of the volume control used is as specified by the manufacturers of the pick-up.

When using a pick-up the manual volume control of the receiver, right hand knob, should be turned counter-clockwise to the position for minimum volume without, of course, operating the mains switch, otherwise attenuation of the higher frequencies will occur.

9.2. SHORT WAVE CONVERTER (14-80 metres)

The valve holder socket on the back of the chassis is provided so that a K-B 432 Short Wave Converter can be used in conjunction with the receiver without any alteration to the latter. Instructions for using the converter with this receiver are supplied with the converter.

9.3. NEON TUNING INDICATOR

If at any time the neon tuning indicator is replaced, the operating conditions may be incorrect for the new tube. The "glow" should show for about ¼-inch along the tube when no signal is being received. The "glow" length can be varied by turning VR2, a semi-variable resistance, a small distance either way with a screwdriver until the desired result is obtained. The position of VR2 is indicated in Fig. 2.

9.4. EXTERNAL LOUDSPEAKER

The output transformer (L7) is mounted on the upper platform to the right of the rectifier valve. The former has a small terminal board on one side of which are three sockets marked "A," "G" and "B." Sockets "A" and "G" are bridged by a piece of wire. An external permanent-magnet type loudspeaker may be driven from this receiver by connecting the leads from its speech coil to sockets "G" and "B." The wire connection between "A" and "G" can be replaced by an ordinary Q.M.B. on-off switch, and it is then possible to use the extension loudspeaker when required without disturbing any connections.

The speech coil of the additional loudspeaker must have an impedance of from 1-5 ohms at 1,000 cycles per second. Fig. 4 gives details of the loudspeaker and output transformer.

The K-B 435 loudspeaker is designed to operate with this receiver.

K-B SERVICE MANUAL

CHANGES AND CORRECTIONS

No. 3.

Issued November, 1936

To be inserted at the front of your Service Manual, and the following alterations, corrections and additions made in the appropriate sections.

N.B.—This sheet replaces that issued in October, 1934, which should be destroyed.

PAGE.	PARAGRAPH.	DETAILS.
B 3	1.3 (3)	For "present reaction" read "preset reaction."
B 4	2.8, last line	For "20,000 ohms," read "10,000 ohms."
B 7	4.01 anode current of output pentode	For "23.0" read "33."
B 8	Fig. 3	For "Oscillator trimmer" read "aerial trimmer," and for "aerial trimmer" read "oscillator trimmer."
B 10	Key to Circuit Diagram	For "VR . . . 20,000 ohms" read "VR . . . 10,000 ohms."
C 1	1.1 Valve Table	Add VMP4 under "Osram" against "high frequency valve" and "I.F. valve."
C 5	2.09 Tone Control	For "50—2,500 microfarads" read "50—2,500 micro-microfarads."
C 10	Key to Circuit Diagram	For "C4 . . . 0.1" read "C4 . . . 0.5 . . . ."
C 10	" " " "	Add "25 volts, electrolytic" after "C6 . . . 25 microfarad."
C 10	" " " "	Delete "25v. (electro)" after C16, C17 and C18.
C 10	" " " "	After L5, for "transformers" read "transformer."
C 11	Circuit Diagram	End of aerial coupling winding joined to socket A, for "I" read "A."
C 16	7. Price List	Coil assembly, I.F. transformer unit, for "A.33396" read "A.33376."
C 17	7. " "	Special box spanner for trimmers, for "1s. 0d." read "1s. 6d."
E 9	4.01, D.C. resistance of coils	L.2 L.W. secondary K.H. for "14" read "20."
E 20	7. Price List	Coil assembly, for "L.F. input transformer" read "I.F. input transformer."
E 21	7. " "	Add "per Yard" after :— "Screened insulating sleeving 21140 . . . 7½d. . . ." and "Insulating sleeving ¼" dia. 8040-1 . . . 4d. . . ."
E 21	7. " "	Condenser, 0.0001, 28323, for "9d." read "1s. 0d."
F 14	7. " "	0.1 condenser, 34535, for "1s. 6d." read "2s. 0d."
H 11	5. " "	0.5, C2, 33955, for "2s. 6d." read "2s. 3d."
L 4	2.06 H.T. Supply	For "iron-cored choke (L6)" read "iron-cored choke (L8)."
L 5	2.09 Mains Filter	For "H.F. choke, L7 and L8," read "H.F. choke (L9) and (L10)."
L 5	3.1 Aerial and Earth	In the 4th paragraph, for "As the sensitivity cannot. . . ." read "As the selectivity cannot. . . ."
L 7	4.1 Resistance of Coils	The resistance of coils for L6, L7 and L8, to read L8, L9 and L10 respectively.
L 8	4.2 Voltages and Currents	For "Choke L6" read "Choke (L8)."
L 12	Key to Circuit Diagram	For "C20 . . . 0.0006," read "C20 . . . 0.006." (See note in paragraph 7.3.)
L 22	Key to Circuit Diagram	Delete "325v. electrolytic" after C.8. Add "325v. electrolytic" after C.10.

(Continued overleaf)

PAGE.	PARAGRAPH.	DETAILS.
L 19	Price List, triple condenser block	For "C8, C9 and C10" read "C8, C9 and C12."
M 8	Fig. 3	For "H.F. auto transformer" read "L.F. Auto transformer."
M 11	5.	For "1500 metres" read "1500 Kc/s."
P 14	Key to Circuit Diagram	R.7 and R.25 for "meghom" read "megohm."
P 16	4.03	For "postion" read "position."
P 19	6.07	For "KB.383" read "KB.383-A."
S 10	Fig. 6	C.8 is omitted from circuit diagram. This 0.1 microfarad condenser is connected between the common connection between R4 and R8 and the chassis.
S 14	5.2	The last three trimmers specified should be :— T.10 Oscillator coil long wave calibration trimmer—trim at 300 Kc/s. T.11 Aerial coil long wave calibration trimmer—trim at 300 Kc/s. T.12 Bandpass coil long wave calibration trimmer—trim at 300 Kc/s.
S 16	6.	Correction. When the link between A and B is broken, the *internal* loudspeaker is disconnected.
T 17	7.2	The last three trimmers should be :— T.10 Oscillator coil long wave calibration trimmer—trim at 300 Kc/s. T.11 Aerial coil long wave calibration trimmer—trim at 300 Kc/s. T.12 Bandpass coil long wave calibration trimmer—trim at 300 Kc/s.
T 19	8.3 External loudspeaker	The final sentence of the first paragraph under this heading should read :—"The wire connection between "A" and "G" can be replaced by an ordinary Q.M.B. on-off switch, and the internal loudspeaker can then be disconnected when and as required."
U 16	7.2	The last three trimmers should be :— T.10 Oscillator coil long wave calibration trimmer—trim at 300 Kc/s. T.11 Aerial coil long wave calibration trimmer—trim at 300 Kc/s. T.12 H.F. coil long wave calibration trimmer—trim at 300 Kc/s. In the T.2 description "H.F." should be substituted for "bandpass."
U 18	9.4 External loudspeaker	The final sentence in the first paragraph should read as correction for page T.19 given above.
V 11	7.1	Connecting an External Loudspeaker, final sentence of paragraph should read :— "The connecting tags are indicated on the diagram below."
W 5		Please note also that in models KB.426, KB.427 and KB.428 trimmers T1, T2 and T3 are once more trimmed at 1400 Kc/s. V.1 Anode Voltage should be 170v. (168v.).