The FISK
RADIOLA
MODELS 49 and 164

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Four Valve, Medium Wave, Battery Operated
Superheterodynes

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TECHNICAL INFORMATION
AND SERVICE DATA

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Amalgamated Wireless (Australasia) Ltd

THE FISK RADIOLA, MODELS 49 and 164

Four Valve, Medium Wave, Battery Operated Superheterodynes

TECHNICAL INFORMATION

Electrical Specifications

TUNING RANGE.		ALIGNMENT FREQUENCIES.	
"Standard Medium Wave"	1500-550 K.C.	"Standard Medium Wave"	1400 K.C. 600 K.C.
Intermediate Frequency			460 K.C.
CURRENT CONSUMPTION.		Mantel & Console ("B")	Console ("V")
"A" battery at 2 volts		0.54 amps	
"A" battery at 6 volts			1.2 amps
"B" battery at 120 volts (Mantel)		10 M.A.	
"B" battery at 135 volts (Console "B")		14 M.A.	(Supplied from vibrator power unit)
Replacement fuse		3/8 amp.	3.0 amps.

VALVE COMPLEMENT.

(1) 1C6	Detector-Oscillator	(3) 1K6, I.F. amp., 2nd det., A.V.C. and A.F. Amp.	
(2) 1D5G	I.F. Amplifier	(4) 1D4	Output Pentode
Dial Lamp			2.5 volts, .06 amp.
Loudspeaker	Type AG2	(Mantel)	Type AL2 (Console)
Loudspeaker Transformer	TG53	(Mantel)	TG131D (Console)

General Description

The Mantel model is a four valve receiver housed in a moulded cabinet of compact design. The plate supply (120V) is from dry type "B" batteries and the filament supply either from a 2 volt accumulator or air cell.

The Console model is practically identical in circuit arrangement with the Mantel, except for the feature embodied in it which allows the plate supply to be from dry type "B" batteries or from a vibrator power unit. The conversion from one to the other is quite simple, and full instructions are given on page 10.

Features in the design of these instruments include the following: Air trimmers and inductance tuning ensure permanent alignment and efficiency of delicately tuned R.F. and I.F. circuits; Sensitivity Switch; Fixed condensers and inductances specially impregnated against moisture, thus ensuring sustained efficient performance under all climatic conditions; continuously variable tone control; automatic volume control; automatic dial illumination. The dial may be illuminated only while tuning, lessening battery current drain; Straight line frequency tuning condenser allowing a greater number and more even spacing of call-signs; Chassis of high grade steel heavily plated with cadmium to resist corrosion.

Vibrator Power Unit

The vibrator power unit, if used, supplies the correct socket voltages for the operation of the console model. It contains a plug-in type vibrator, step-up transformer, and an efficient filter system.

Rectification of the high voltage is accomplished by the synchronous vibrator. The complete unit is enclosed in a soundproof case and is rubber-mounted to prevent mechanical noise. The unit has been carefully adjusted at the factory by special equipment to ensure quiet operation over an extensive period of life. No adjustments should be attempted on a vibrator suspected of being faulty. If a fault is suspected, the vibrator should be returned to the company for test or a replacement installed. The plug-in feature affords easy removal or replacement. The case lid is fastened by four screws and when removed gives access to

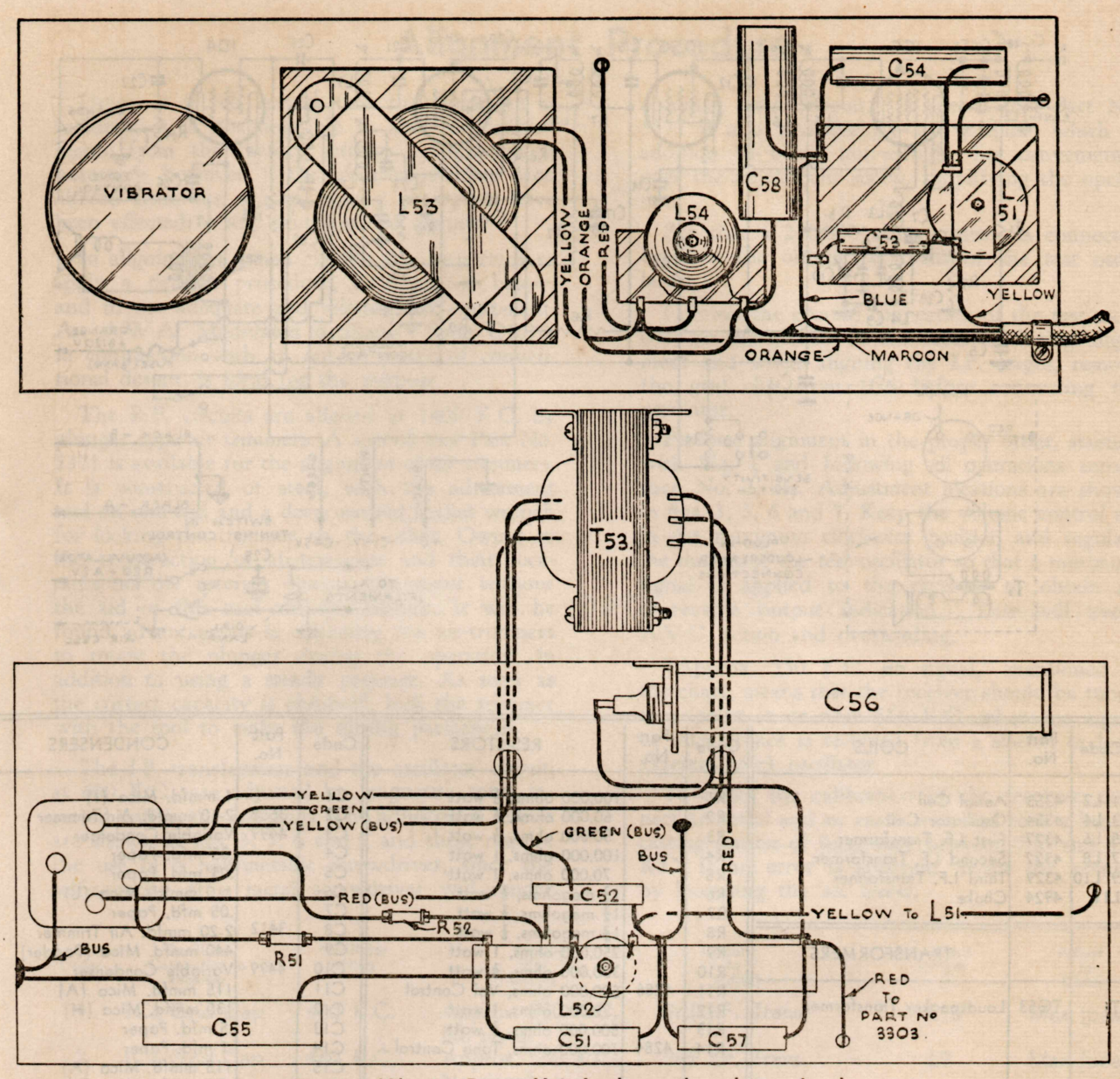


Fig. 1.—Vibrator Power Unit (underneath and top views).

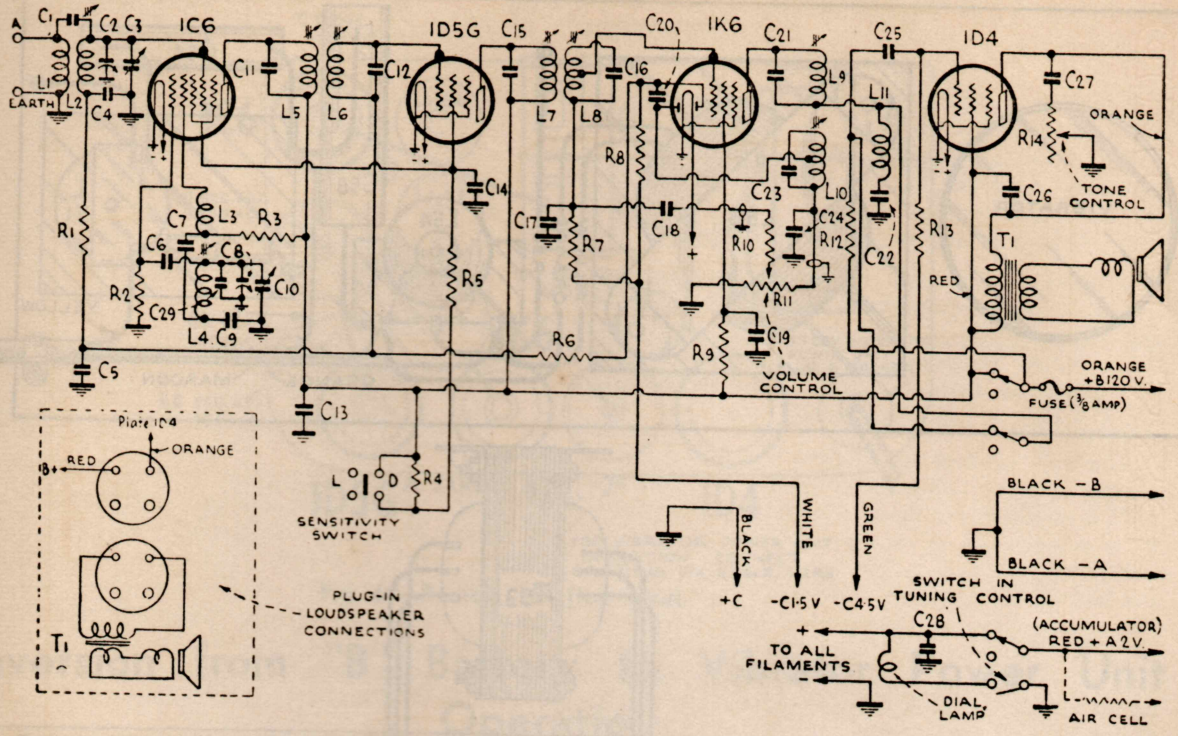
the vibrator. Three screws will be found at the bottom of the case and the removal of these allows the power unit to be completely removed from the case for service.

The instrument is protected by a fuse, which is located in the power unit cable. It is necessary when replacing the fuse to sheath it in the tubing provided before inserting in the fuse holder. If the tubing is not used, the fuse is useless and the installation is deprived of protection. Before inserting a replacement fuse, always examine the installation to determine the fault which caused the fuse to "blow."

Replacement fuse.....3 amp.

Proper connection of the power unit to the receiver unit is essential. In the event of noisy operation, see that the earth lug attached to the cable is firmly connected to the receiver chassis. A tapped hole and screw are provided on the rear of the receiver chassis adjacent to the power unit socket, for the purpose. Do not connect an earth wire to the power unit other than this, as interference will result.

Fig. 8 shows the accumulator connections and it is important that the leads should always be arranged as shown. Do not reverse the blue and black leads and space them as far apart as possible on the connecting strap to avoid vibrator buzz, which might otherwise result if these two leads are joined or touch each other. As the cable is permanently connected to the accumulator, keep it smeared with light grease or vaseline to resist corrosion.



Code	Part No.	COILS
L1, L2	4353	Aerial Coil
L3, L4	4354	Oscillator Coil
L5, L6	4327	First I.F. Transformer
L7, L8	4327	Second I.F. Transformer
L9, L10	4329	Third I.F. Transformer
L11	4924	Choke
		TRANSFORMERS
T1	TG53	Loudspeaker Transformer

Code	Part No.	RESISTORS
R1		100,000 ohms, 1/3 watt
R2		60,000 ohms, 1/3 watt
R3		50,000 ohms, 1/3 watt
R4		100,000 ohms, 1 watt
R5		70,000 ohms, 1 watt
R6		1 3/4 megohms, 1/3 watt
R7		1 3/4 megohms, 1/3 watt
R8		1 3/4 megohms, 1/3 watt
R9		250,000 ohms, 1 watt
R10		300,000 ohms, 1/3 watt
R11	4286	500,000 ohms, Vol Control
R12		70,000 ohms, 1 watt
R13		500,000 ohms, 1/3 watt
R14	4284	100,000 ohms, Tone Control

Code	Part No.	CONDENSERS
C1		4 mmfd. Mica (I)
C2	3658	2-10 mmfd. Air Trimmer
C3	4499	Variable Condenser
C4		.05 mfd. Paper
C5		.05 mfd. Paper
C6		110 mmfd. Mica (L)
C7		.05 mfd. Paper
C8	3412	2-20 mmfd. Air Trimmer
C9		440 mmfd. Mica (Padder)
C10	4499	Variable Condenser
C11		115 mmfd. Mica (A)
C12		130 mmfd. Mica (H)
C13		.5 mfd. Paper
C14		.1 mfd. Paper
C15		115 mmfd. Mica (A)
C16		130 mmfd. Mica (H)
C17		200 mmfd. Mica (J)
C18		.02 mfd. Paper
C19		.1 mfd. Paper
C20		700 mmfd. Mica
C21		115 mmfd. Mica (A)
C22		700 mmfd. Mica (A)
C23		130 mmfd. Mica (H)
C24		200 mmfd. Mica (J)
C25		.05 mfd. Paper
C26		.0025 mfd. Paper
C27		.035 mfd. Paper
C28		.5 mfd. Paper
C29		14 mmfd Mica (C)

Fig. 2.—Circuit Diagram and Code (49).

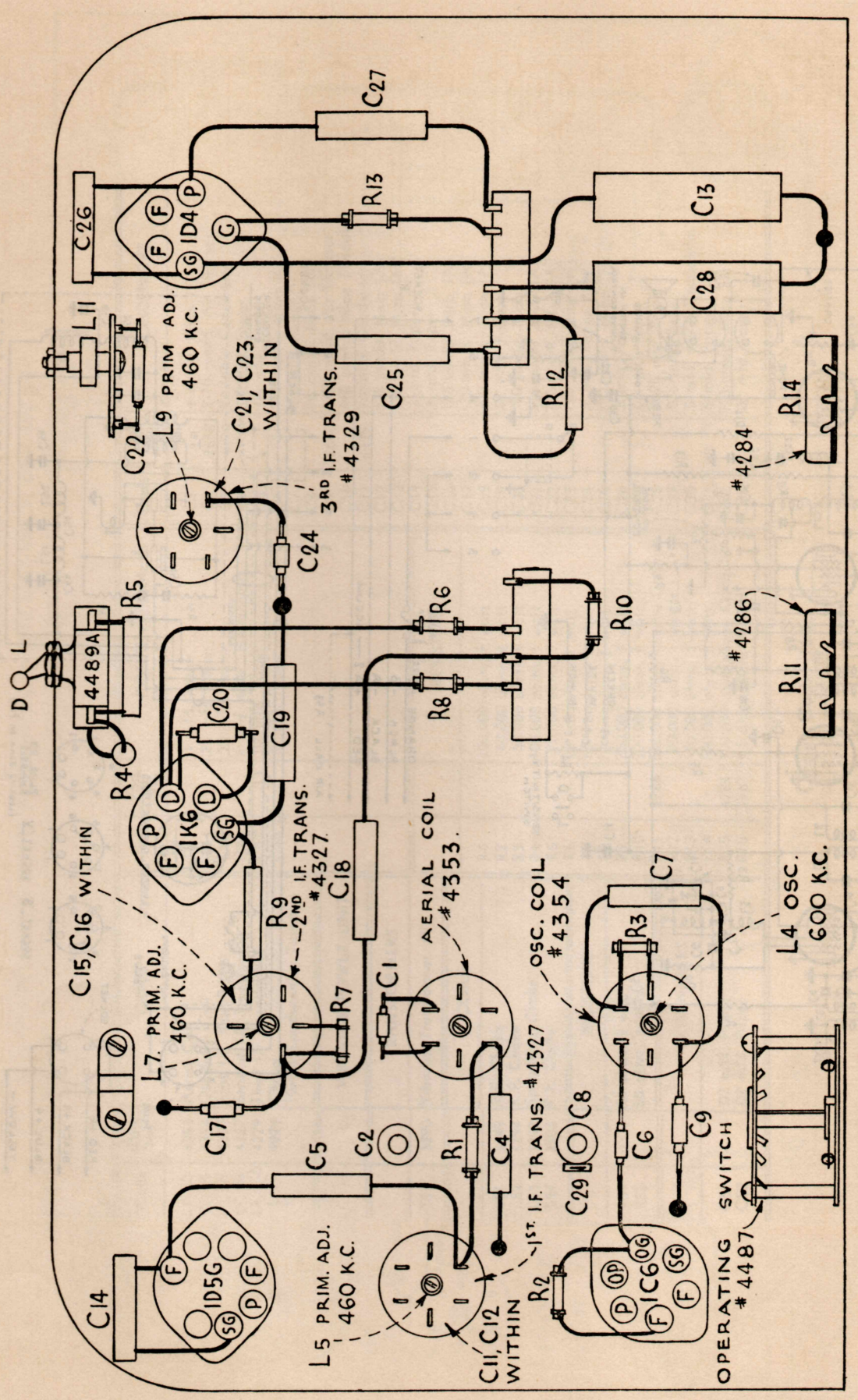


Fig. 3.—Radiola 49 (underneath view).

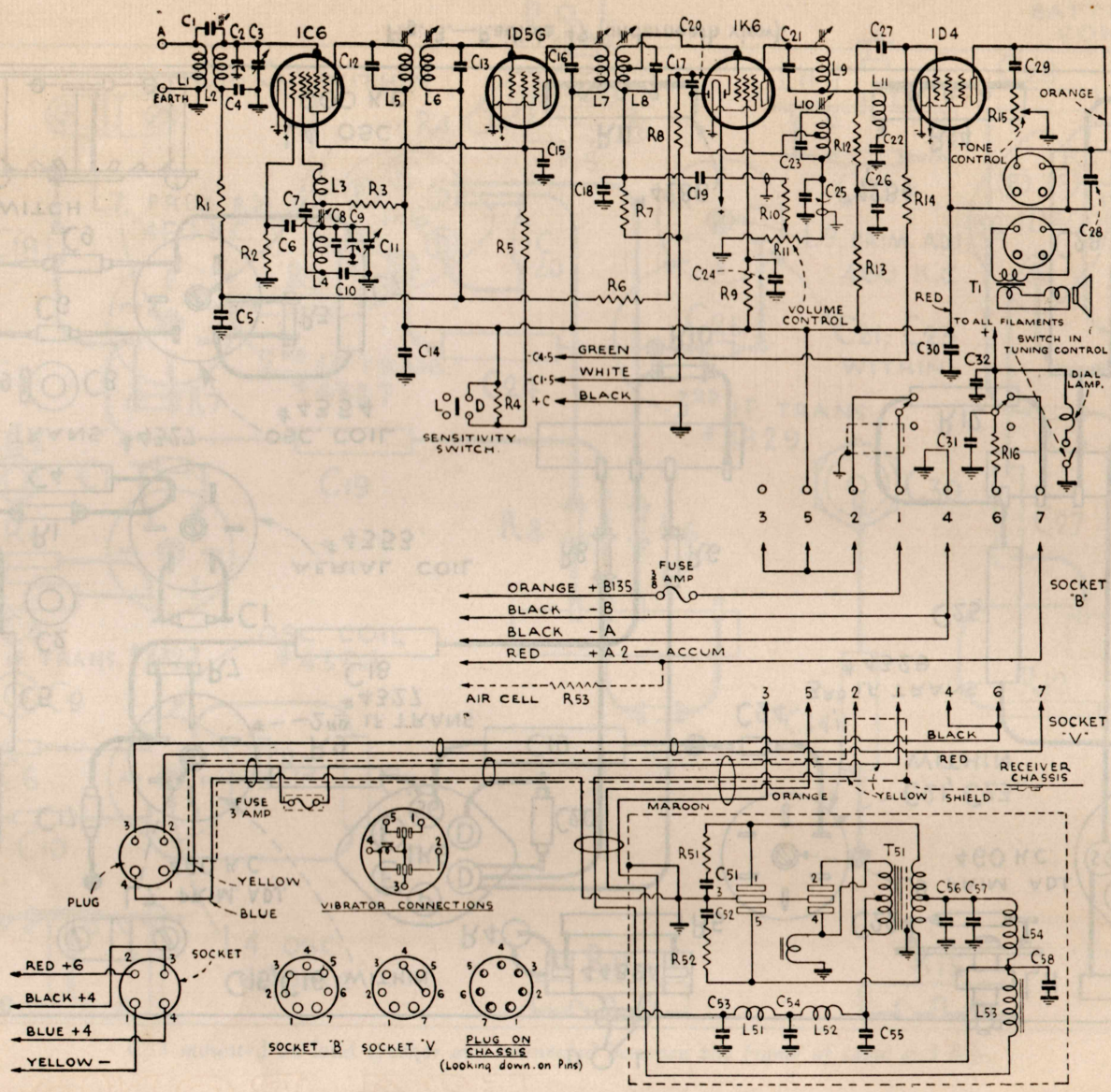


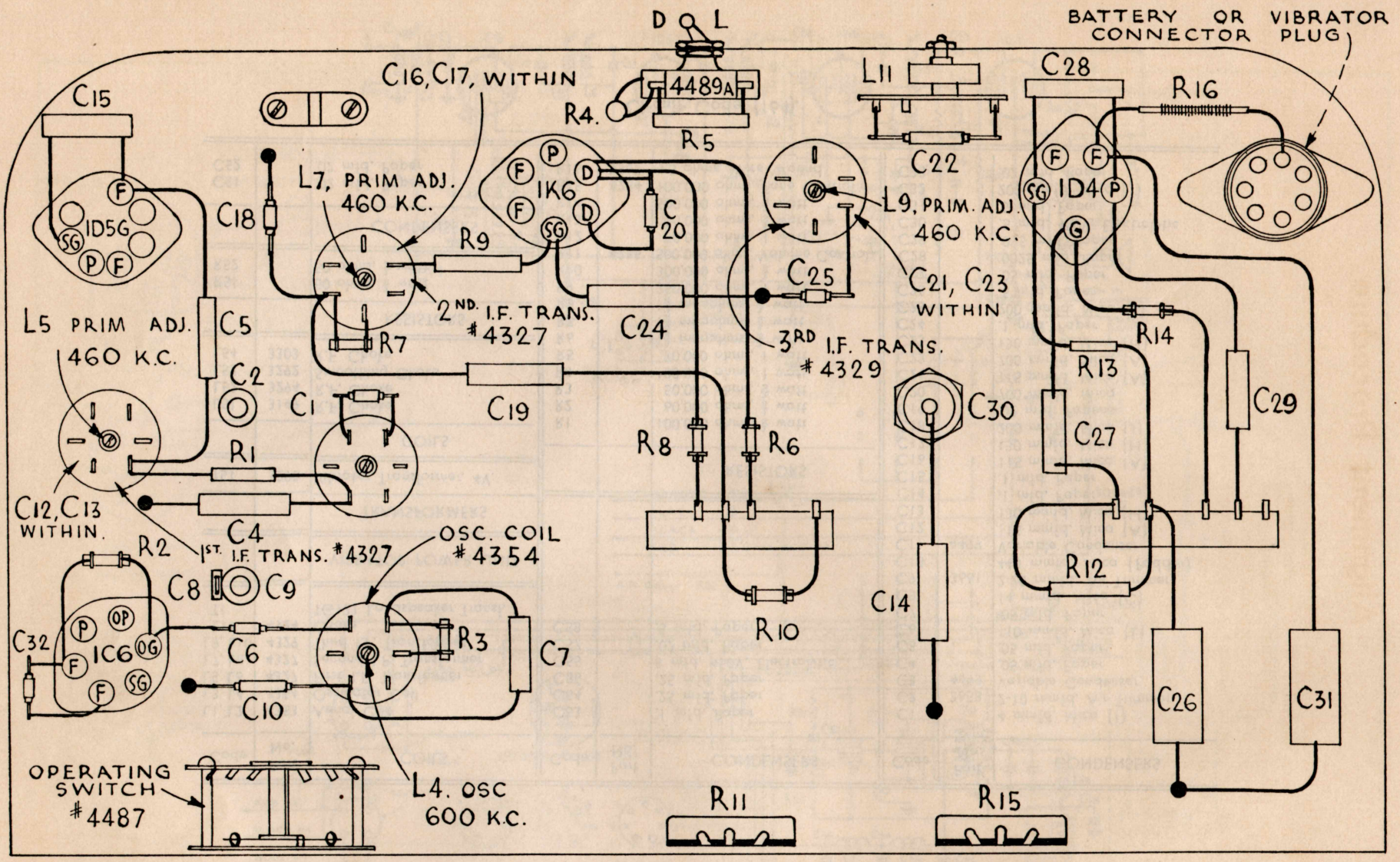
Fig. 4.—Circuit Diagram (164).

Code	Part No.	COILS
L1, L2	4353	Aerial Coil
L3, L4	4354	Oscillator Coil
L5, L6	4327	First I.F. Transformer
L7, L8	4327	Second I.F. Transformer
L9, L10	4329	Third I.F. Transformer
L11	4924	Choke
T1		TG131 Loudspeaker Transf.
		VIBRATOR POWER UNIT
		TRANSFORMERS
T51	3290	Vibrator Transformer, 4V.
		COILS
L51	3149	R.F. Choke
L52	3294	R.F. Choke
L53	3292	Smoothing Choke
L54	3303	R.F. Choke
		RESISTORS
R51		50 ohms, ⅓ watt
R52		50 ohms, ⅓ watt
		CONDENSERS
C51		.02 mfd. Paper
C52		.02 mfd. Paper

Code	Part No.	CONDENSERS
C53		.1 mfd. Paper
C54		.25 mfd. Paper
C55		.25 mfd. Paper
C56		8 mfd. 450V. Electrolytic
C57		.02 mfd. Paper
C58		.5 mfd. Paper
		RESISTORS
R1		100,000 ohms, ⅓ watt
R2		60,000 ohms, ⅓ watt
R3		50,000 ohms, ⅓ watt
R4		100,000 ohms, 1 watt
R5		70,000 ohms, 1 watt
R6		1¾ megohms, ⅓ watt
R7		1¾ megohms, ⅓ watt
R8		1¾ megohms, ⅓ watt
R9		250,000 ohms, 1 watt
R10		300,000 ohms, ⅓ watt
R11	4286	500,000 ohms, Volume Control
R12		70,000 ohms, 1 watt
R13		20,000 ohms, ⅓ watt
R14		500,000 ohms, ⅓ watt
R15	4284	100,000 ohms, Tone Control
R16	3367	4.5 ohms, Wire Wound

Code	Part No.	CONDENSERS
C1		4 mmfd. Mica (I)
C2	3658	2-10 mmfd. Air Trimmer
C3	4499	Variable Condenser
C4		.05 mfd. Paper
C5		.05 mfd. Paper
C6		110 mmfd. Mica (L)
C7		.05 mfd. Paper
C8		14 mmfd. Mica (C)
C9	3661	2-20 mmfd. Air Trimmer
C10		440 mmfd. Mica (Padder)
C11	4499	Variable Condenser
C12		115 mmfd. Mica (A)
C13		130 mmfd. Mica (H)
C14		.1 mfd. Paper
C15		.1 mfd. Paper
C16		115 mmfd. Mica (A)
C17		130 mmfd. Mica (H)
C18		200 mmfd. Mica (J)
C19		.02 mfd. Paper
C20		700 mmfd. Mica
C21		115 mmfd. Mica (A)
C22		700 mmfd. Mica (A)
C23		130 mmfd. Mica (H)
C24		.1 mfd. Paper
C25		200 mmfd. Mica (J)
C26		.5 mfd. Paper
C27		.05 mfd. Paper
C28		.0025 mfd. Paper
C29		.035 mfd. Paper
C30		.5 mfd. 450V. Electrolytic
C31		.5 mfd. Paper
C32		200 mmfd. Mica (J)
C33		.02 mfd. Paper

Circuit Code (164).



C33 mounted on loud speaker and connected between the frame of same and B+.

Fig. 5.—Radiola 164 (underneath view).

Alignment Procedure

Unless it is felt certain that the alignment is incorrect it is not desirable to alter the adjustments from the factory setting. Alignment is necessary, however, if the adjustments have been altered from the original setting or repairs have been effected to any of the tuned circuits.

In aligning the tuned circuits it is important to apply a definite procedure, as tabulated below, and to use adequate and reliable test equipment. An A.W.A. Modulated oscillator, Type C1070, in conjunction with an output meter of conventional design, is ideal for the purpose.

The R.F. circuits are aligned at 1400 K.C. by plunger type air trimmers. A special tool Part No. 5371 is available for the alignment of air-trimmers. It is constructed of steel, with the adjustment tool on one end and a deep centred socket wrench for locking the trimmer on the other. Owing to the construction of air-trimmers and their locations on the receiver chassis, alignment without the aid of this tool will be difficult. It will be found advantageous in adjusting the air-trimmers to rotate the plunger during the operation, in addition to using a steady pressure. As soon as the correct capacity is obtained, lock the trimmer with the tool to make the setting permanent.

The I.F. transformers and the oscillator circuit, at 600 K.C., are adjusted by magnetite cores inserted within the windings. The adjustment screws are shown in figs. 3, 5, 6 and 7 and these require the use of a non-metallic screwdriver, since the self-capacity of a metal screwdriver will render accuracy most difficult. A special tool Part No. 5372 is also available for this purpose, which in addition to being non-metallic fits conveniently over the adjustment screw, simplifying the operation.

See that a 250,000 ohms resistor is connected between the output terminals of the test oscillator.

Connect the ground connection of the test oscillator to the chassis of the receiver during alignment and when aligning the I.F. stages, remove the grid clip from 1C6 before connecting the oscillator.

Perform alignment in the proper order, starting with No. 1 and following all operations across, then No. 2, etc. Adjustment locations are shown in figs. 3, 5, 6 and 7. Keep the volume control set in the maximum clockwise position and regulate the output of the test oscillator so that a minimum signal is applied to the receiver to obtain an observable output indication. This will avoid A.V.C. action and overloading.

"Approx. 550 K.C. no signal," mentioned in the chart, means that the receiver should be tuned to a point at or near 550 K.C. where no signal or interference is received from a station or local (Heterodyne) oscillator.

To check the calibration of the receiver, connect an aerial and an earth wire and tune a broadcasting station of frequency between 700 and 550 K.C. If an error is apparent, re-set the pointer by loosening the set screw.

Alignment Order	Oscillator Connection to Receiver	Oscillator Setting	Receiver Dial Setting	Circuit to Adjust	Adjustment Symbol	Adjust to Obtain
1	1C6 Grid Cap	460 K.C.	Approx. 550 K.C. No signal	3rd I.F. Trans.	L10	Max. (peak)
2	1C6 Grid Cap	460 K.C.	Approx. 550 K.C. No signal	3rd I.F. Trans.	L9	Max. (peak)
3	1C6 Grid Cap	460 K.C.	Approx. 550 K.C. No signal	2nd I.F. Trans.	L8	Max. (peak)
4	1C6 Grid Cap	460 K.C.	Approx. 550 K.C. No signal	2nd I.F. Trans.	L7	Max. (peak)
5	1C6 Grid Cap	460 K.C.	Approx. 550 K.C. No signal	1st I.F. Trans.	L6	Max. (peak)
6	1C6 Grid Cap	460 K.C.	Approx. 550 K.C. No signal	1st I.F. Trans.	L5	Max. (peak)
			Repeat the above adjustments before proceeding.			
7	Aerial Term.	600 K.C.	600 K.C.	Oscillator	L4 OSC. 600 K.C.	Max. (peak) Max. (peak)
8	Aerial Term.	1400 K.C.	1400 K.C.	Oscillator	C8 (49) C9 (164)	Max. (peak) Max. (peak)
9	Aerial Term.	1400 K.C.	1400 K.C.	Detector	C2	Max. (peak)
10	Aerial Term.	600 K.C.	600 K.C.‡	Oscillator	L4 OSC. 600 K.C.	Max. (peak) Max. (peak)
			Repeat adjustments 8 and 9 to conclude.			

‡ Rock the tuning control back and forth through the signal.

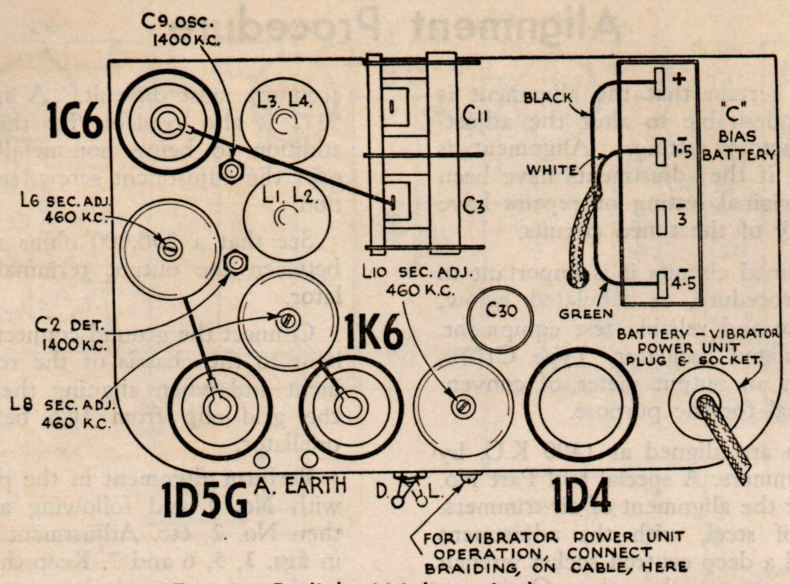


Fig. 6.—Radiola 164 (top view).

Conversion from "B" Battery to Vibrator Power Unit Operation

To convert Console ("B") to vibrator power unit operation, proceed as follows:—

(a) Disconnect the battery cable from the chassis and remove the "A" and "B" batteries.

(b) Place the vibrator power unit in the lower compartment of the cabinet, where holes are provided for mounting, and mount, using the screw supplied.

(c) Connect the vibrator power unit socket to the plug on the chassis, see fig. 6, and refer to fig. 8 for instructions in connecting the accumulator.

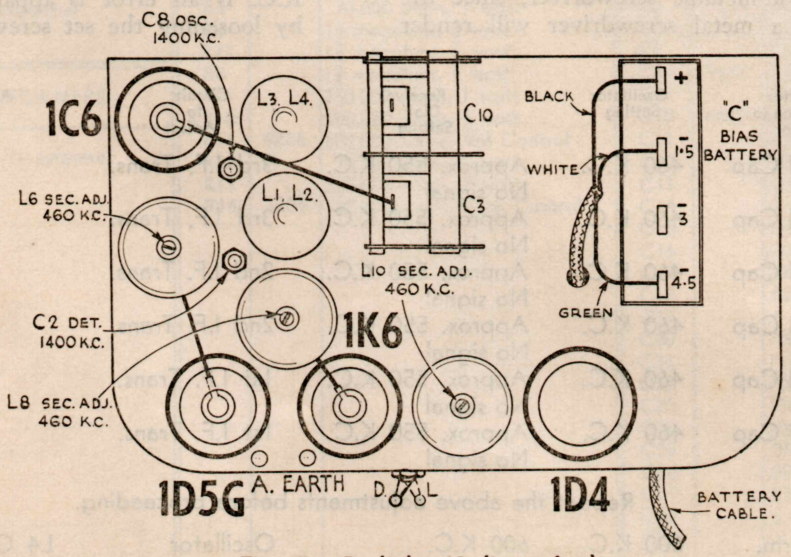


Fig. 7.—Radiola 49 (top view).

Conversion from Vibrator Power Unit to "B" Battery Operation

To convert a Console ("V") to "B" battery operation, proceed as follows:

(a) Disconnect the vibrator power unit cable from the chassis and disconnect and remove the accumulator.

(b) Remove the vibrator power unit from the cabinet.

(c) Connect the battery cable socket to the plug on the chassis, see fig. 8, and refer to the instruction book for instructions in installing and connecting the "A" and "B" batteries.

RESISTANCE MEASUREMENTS.

The resistance values shown in fig. 9 have been carefully prepared so as to facilitate a rapid check of the circuit for irregularities. To obtain the full benefit from this diagram it is advisable to consult the circuit and layout diagram when conducting the check. Each value should hold within ±20%. Variations greater than this limit will usually be a pointer to trouble in the circuit.

CIRCUIT MODIFICATION.

Prior to 1/3/38 the capacity of condenser C22 was 115 mmfd and the inductance of L11 was of a different value.

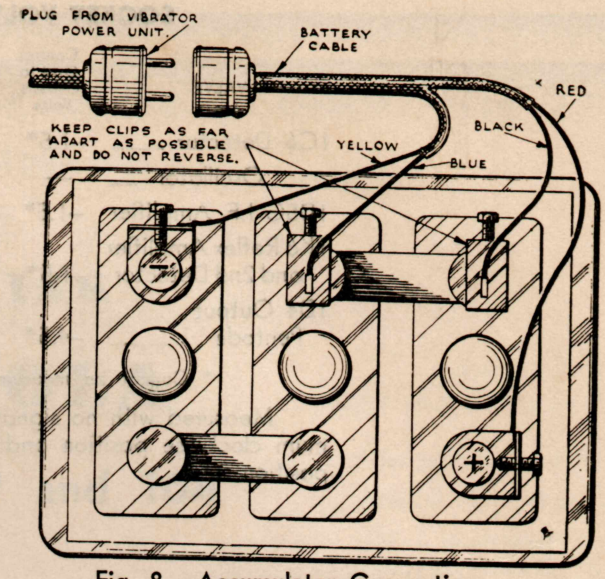


Fig. 8.—Accumulator Connections.

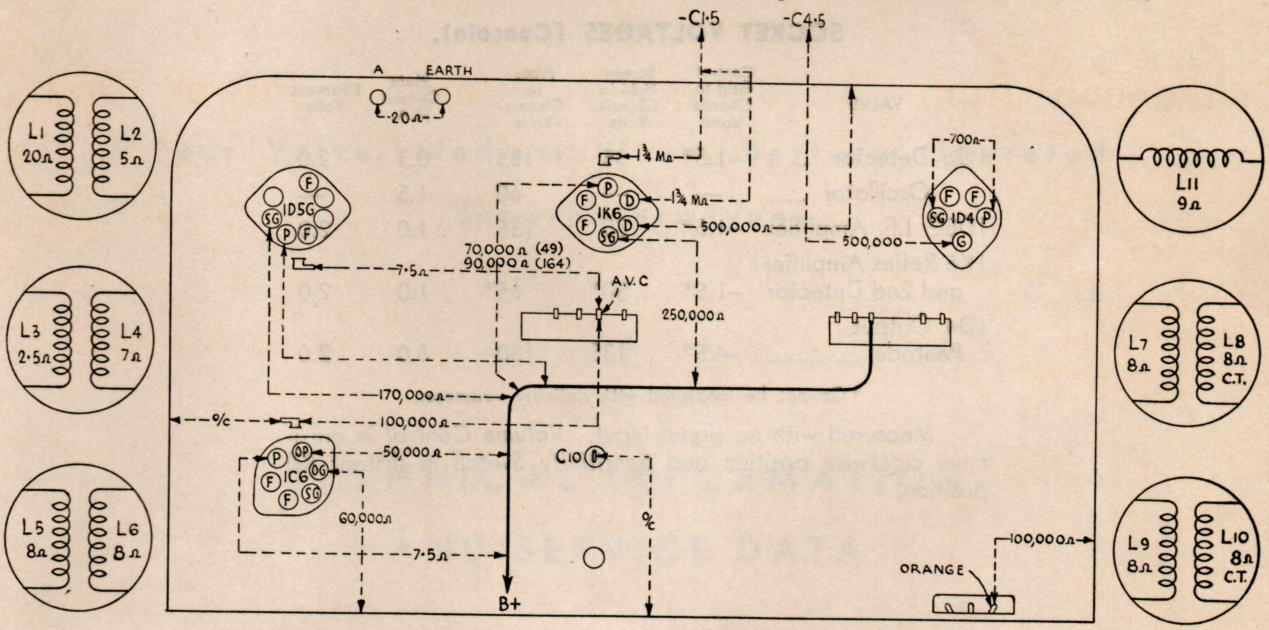


Fig. 9.—Resistance Diagram.

Resistance values were taken with valves removed, batteries disconnected, variable condenser in full mesh, volume control set at maximum clockwise and sensitivity switch at local (L).

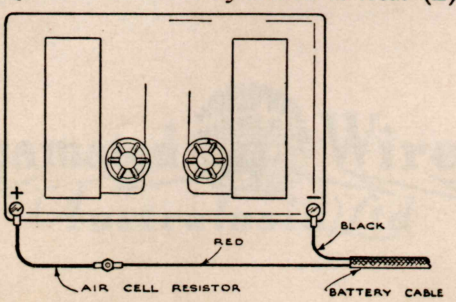


Fig. 10.—Air-Cell Connections (49 and 164B).

NOTE. The correct air-cell resistor (part no. 4764) is coloured green so that it may be positively identified.

SOCKET VOLTAGES (Mantel).

VALVE	Control Grid to Chassis Volts	Screen Grid to Chassis Volts	Plate to Chassis Volts	Plate Current M.A.	Filament Volts
1C6 Detector	–1.5*	30	120	0.25	2.0
Oscillator	—	—	55	1.25	—
1D5G I.F. Amplifier	–1.5*	30	120	0.75	2.0
1K6 Reflex Amplifier and 2nd Detector	–1.5*	48*	60*	0.85	2.0
1D4 Output Pentode	–4.5*	120	115	4.0	2.0

* Cannot be measured with ordinary voltmeter.

Measured with no signal input, *Volume Control* in maximum clockwise position and *Sensitivity Switch* in distant (D) position.

SOCKET VOLTAGES (Console).

VALVE	Control Grid to Chassis Volts	Screen Grid to Chassis Volts	Plate to Chassis Volts	Plate Current M.A.	Filament Volts
1C6 Detector	–1.5*	35	135	0.3	2.0
Oscillator	—	—	60	1.5	—
1D5G I.F. Amplifier	–1.5*	35	135	1.0	2.0
1K6 Reflex Amplifier and 2nd Detector	–1.5*	50*	65*	1.0	2.0
1D4 Output Pentode	–4.5*	135	130	6.0	2.0

* Cannot be measured with ordinary voltmeter.

Measured with no signal input. *Volume Control* in maximum clockwise position and *Sensitivity Switch* in distant (D) position.