The FISK

RADIOLA

MODEL 259

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Five Valve, Two Band, Battery-Operated Superheterodyne

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TECHNICAL INFORMATION AND SERVICE DATA

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Amalgamated Wireless (Australasia) Ltd

THE FISK RADIOLA, MODEL 259

Five Valve, Two Band, Battery-Operated, Superheterodyne

TECHNICAL INFORMATION

Electrical Specifications

Tuning Range		Alignment Frequencies	
"Standard Medium Wave" (a)	1500-550 K.C.	"Standard Medium Wave" (a)	1400 K.C. 600 K.C.
"Short Wave (b)	16-50 metres	"Short Wave" (b)	18 metres

Intermediate Frequency .... 460 K.C.

Current Consumption	259B	259V
"A" battery at 2 volts	0.78 amp.	
"A" battery at 6 volts		1.2 amps
"B" battery at 135	14-16 M.A.	(Supplied from Vibrator power Unit)
Replacement Fuse	$\frac{3}{8}$ amp.	.3 amp.

Valve Complement

(1) 1C4 .... R.F. Amplifier
(2) 1C6 .... Detector-Oscillator
(3) 1C4 .... I.F. Amplifier
(4) IK6 .... Det. A.V.C. and A.F. amp.
(5) 1D4 .... Output Pentode

Dial Lamp .... 2.5 volts .06 amp.

Loudspeaker (Permanent Magnet) ...... Type A.L.1

Loudspeaker Transformer .... T.A. 31Y

The Radiola 259 is a five valve, two band battery-operated receiver. The plate supply may be from dry "B" batteries or from a Vibrator Power Unit. Instructions for changing from one to the other are given in this booklet.

General Circuit Description

An R.F. stage is used employing a 1C4 valve as an amplifier. The control grid of the valve is coupled to the aerial circuit by the aerial coil T1 or T2 which is tuned by the variable condenser C5. The plate circuit of the 1C4 R.F. amplifier is coupled to the control grid of the 1C6 Detector-Oscillator by the R.F. coil T3 or T4 which is tuned by the variable condenser C13. Within the 1C6, the incoming signal is combined with a local oscillator signal 460 K.C. higher in frequency. The oscillator coil, in conjunction with the variable condenser C26 and padding condensers C24 and C25 maintain this frequency separation throughout the tuning range. The padding adjustment is in the form of a magnetite core inserted within the Medium Wave (band "a") oscillator coil and is adjustable at the top of the coil shield.

The I.F. amplifier stage comprises two transformers with a 1C4 valve as an amplifier. The primary and secondary windings of the transformers are provided with magnetite cores for alignment purposes. The signal from the I.F. Amplifier is fed to one diode within the 1K6 for rectification across resistors R12 and R13. A signal is also fed from the primary of the second I.F. transformer to the other diode within the 1K6 and a D.C. potential is produced across resistors R14 and R15 which is used for automatic volume control.

When the Radiola is operating on the "Medium Wave" band (band "a"), A.V.C. voltage is fed to the control grids of the R.F., detector-oscillator and I.F. amplifier valves. On short waves A.V.C. is removed from the 1C6 and -3 volts fixed bias applied; also, a lower A.V.C. voltage is applied to the I.F. Amplifier on short waves. The grid bias changes are effected by the range switch.

Portion of the range switch is also used to increase the screen grid voltage on the 1C6 I.F. amplifier on short waves, to boost the sensitivity.

The desired amount of audio signal is selected by the movable arm of the Volume Control and fed via C35 to the control grid of the 1K6 for amplification.

After amplification by the 1K6, the audio signal is resistance capacity coupled to the 1D4 output pentode and then transformer coupled to the permanent magnet loudspeaker.

Bias voltages are supplied by a 4½ volt bias battery, which is mounted in a clip on the chassis and connected by a short cable. All connections to the "a" and "b" batteries or to the Vibrator Power Unit terminate in a six pin plug, mounted on the chassis.

Alignment Procedure

Unless it is felt certain that the alignment of the Radiola is incorrect, it is not desirable to alter the adjustments from the factory setting. However, when repairs have been made to I.F. or R.F. circuits or tampering is suspected, alignment becomes necessary.

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 C.1070, is ideal for the purpose. Visual indication of the output from the Radiola is also necessary, any output meter of conventional design being suitable.

Connect the ground connection of the Modulated Oscillator to the Radiola chassis, and for I.F. alignment remove the grid clip from the IC6 before connecting the oscillator. See that a 250,000 ohms resistor is connected between the output terminals of the Modulated Oscillator.

During alignment set the volume control in the maximum clockwise position and regulate the output of the Modulated Oscillator so that a minimum signal is applied to the Radiola to obtain an observable indication. This will avoid A.V.C. action and overloading.

The I.F. adjustments are approached from above and below the chassis — see figs. 2 and 3, and should be adjusted with a non-metallic screwdriver, since the self-capacity of a metallic driver will upset the adjustment. The Padding adjustment, referred to in the chart, is situated on the top of the oscillator coil shield. The R.F. circuits are aligned by plunger type air trimmers. 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 air trimmer to make the setting permanent.

"Approx. 550 K.C. No Signal" means that the Radiola 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.

The term "Dummy Aerial" means the device which should be connected between the output cable of the Modulated Oscillator and the aerial terminal of the Radiola, on short waves only, to simulate the characteristics of the average aerial. The "Dummy Aerial" in this case is a 400 ohms non-inductive resistor.

To check the calibration of the Radiola, connect an aerial and an earth wire and tune a broadcasting station of wavelength between 450 and 550 metres. If there is an error in the calibration, reset the pointer by loosening the mounting screws. Then, repeat instructions 6, 7 and 8 of the chart.

Alignment Order	Oscillator Connection to Radiola	Dummy Aerial	Oscillator Setting	Radiola Dial Setting	Circuit to Adjust	Adjustment Symbol	Adjust to obtain
1	1C6 Det.-Osc. Grid Cap	—	460 K.C.	Approx. 550 K.C. No Signal	2nd I.F. Trans.	Secondary	Max (peak)
2	1C6 Det.-Osc. Grid Cap	—	460 K.C.	Approx. 550 K.C. No Signal	2nd I.F. Trans.	Primary	Max (peak)
3	1C6 Det.-Osc. Grid Cap	—	460 K.C.	Approx. 550 K.C. No Signal	1st I.F. Trans.	Secondary	Max (peak)
4	1C6 Det.-Osc. Grid Cap	—	460 K.C.	Approx. 550 K.C. No Signal	1st I.F. Trans.	Primary	Max (peak)
		Repeat the above adjustments before proceeding.					
5	Aerial Term.	—	600 K.C.	600 K.C.	Oscillator	Padding Adjustment	Max. (peak)
6	Aerial Term.	—	1400 K.C.	1400 K.C.	Oscillator	C22	Max. (peak)
7	Aerial Term.	—	1400 K.C.	1400 K.C.	Detector	C8	Max. (peak)
8	Aerial Term.	—	1400 K.C.	1400 K.C.	R.F.	C2	Max. (peak)
9	Aerial Term.	—	600 K.C.	600 K.C.†	Oscillator	Padding Adjustment	Max. (peak)
		Repeat instructions 6, 7 and 8 before proceeding.					
10	Aerial Term	400 ohms	18 metres	18 metres	Oscillator	C23	Max. (peak)*
11	Aerial Term.	400 ohms	18 metres	18 metres†	Detector	C10	Max. (peak)**
12	Aerial Term.	400 ohms	18 metres	18 metres†	R.F.	C3	Max. (peak)††

* Use minimum capacity peak if two peaks can be obtained.
** Use maximum capacity peak if two peaks can be obtained.
†† After this adjustment, check for image signal by tuning the Radiola to approx. 19M.
† Rock the station selector back and forth through the signal.

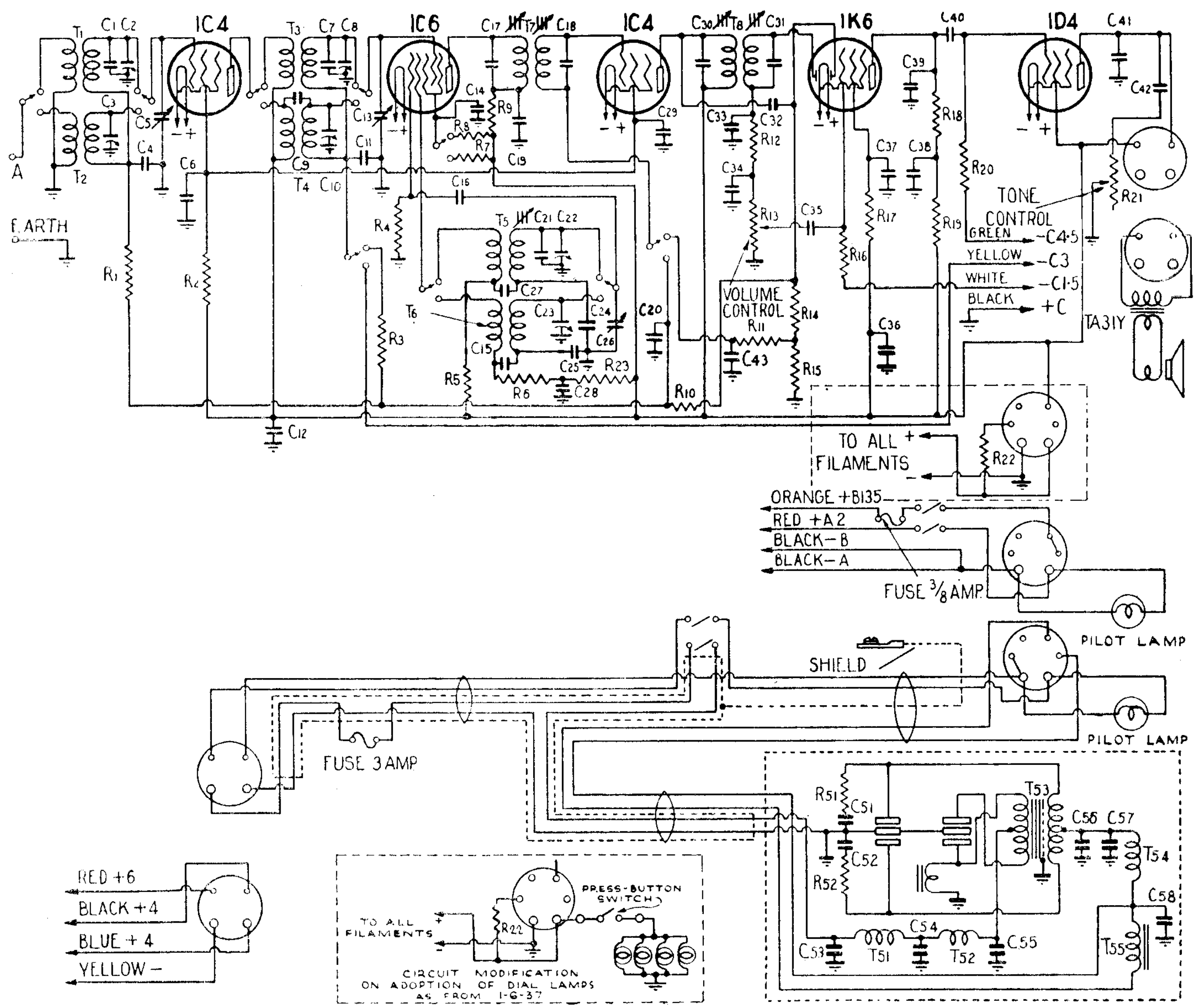

Fig. 1.—Circuit Diagram.

Code	Part No.	COILS — RECEIVER UNIT
T1	3402	Aerial Coil, 1500-550 K.C.
T2	3402	Aerial Coil, 16-50 Metres
T3	3404	R. F. Coil, 1500-550 K.C.
T4	3404	R.F. Coil, 16-50 Metres
T5	3407	Osc. Coil, 1500-550 K.C.
T6	3407	Osc. Coil, 16-50 Metres
T7	3243	First I.F. Transformer
T8	3244	Second I.F. Transformer
		COILS — POWER UNIT
T51	3149	R.F. Choke
T52	3294	R.F. Choke
T53	3290	Vibrator Transformer, 4V
T54	3303	R.F. Choke
T55	3292	Smoothing Choke
		RESISTORS — RECEIVER UNIT
R1		100,000 ohms, 1/3 watt
R2		75,000 ohms, 1/3 watt
R3		100,000 ohms, 1/3 watt
R4		60,000 ohms, 1/3 watt
R5		50,000 ohms, 1/3 watt
R6		5,000 ohms, 1/3 watt
R7		40,000 ohms, 1/3 watt
R8		60,000 ohms, 1/3 watt
R9		300 ohms, 1/3 watt
R10		1¾ Megohms, 1/3 watt
R11		1¾ Megohms, 1/3 watt
R12		100,000 ohms, 1/3 watt
R13	1507	500,000 ohms, Vol. Control
R14		1 Megohm, 1/3 watt
R15		500,000 ohms, 1/3 watt
R16		1¾ Megohms, 1/3 watt
R17		1 Megohm, 1/3 watt

Code	Part No.	RESISTORS — RECEIVER UNIT
R18		200,000 ohms, 1/3 watt
R19		50,000 ohms, 1/3 watt
R20		500,000 ohms, 1/3 watt
R21	2762	100,000 ohms, Tone Control
R22	3270	5.4 ohms, wire wound
R23		5,000 ohms, 1/3 watt
		RESISTORS — POWER UNIT
R51		50 ohms, 1/3 watt
R52		50 ohms, 1/3 watt
		CONDENSERS — RECEIVER UNIT
C1		6 mmfd. Mica (F)
C2		2-20 mmfd. Air Trimmer
C3		2-20 mmfd. Air Trimmer
C4		.05 mfd. Paper
C5	3450	Variable Condenser
C6		.1 mfd. Paper
C7		6 mmfd. Mica (F)
C8		2-20 mmfd. Air Trimmer
C9		10 mmfd. Mica (B)
C10		2-20 mmfd. Air Trimmer
C11		.05 mfd. Paper
C12		.5 mfd. Paper
C13	3450	Variable Condenser
C14		.1 mfd. Paper
C15		.05 mfd. Paper
C16		50 mmfd. Mica (D)
C17		115 mmfd. Mica (A)
C18		115 mmfd. Mica (A)
C19		.05 mfd. Paper
C20		.05 mfd. Paper

Code	No.	CONDENSERS — RECEIVER UNIT
C21		15 mmfd. Mica (C)
C22		2-20 mmfd. Air Trimmer
C23		2-20 mmfd. Air Trimmer
C24		440 mmfd. Mica Padding
C25		2800 mmfd. Padding
C26	3450	Variable Condenser
C27		.05 mfd. Paper
C28		8 mfd. 500 Volt Electrolytic
C29		.1 mfd. Paper
C30		115 mmfd. Mica (A)
C31		115 mmfd. Mica (A)
C32		700 mmfd. Mica
C33		100 mmfd. Mica (G)
C34		100 mmfd. Mica (G)
C35		.05 mfd. Paper
C36		8 mfd. 500V Electrolytic
C37		.1 mfd. Paper
C38		.5 mfd. Paper
C39		200 mmfd. Mica (J)
C40		.05 mfd. Paper
C41		2300 mmfd. Mica
C42		.035 mfd. Paper
C43		.05 mfd. Paper
		CONDENSERS — POWER UNIT
C51		.02 mfd. Paper
C52		.02 mfd. Paper
C53		.1 mfd. Paper
C54		.25 mfd. Paper
C55		.25 mfd. Paper
C56		8 mfd. 500 V Electrolytic
C57		.02 mfd. Paper
C58		.5 mfd. Paper

Circuit Code.

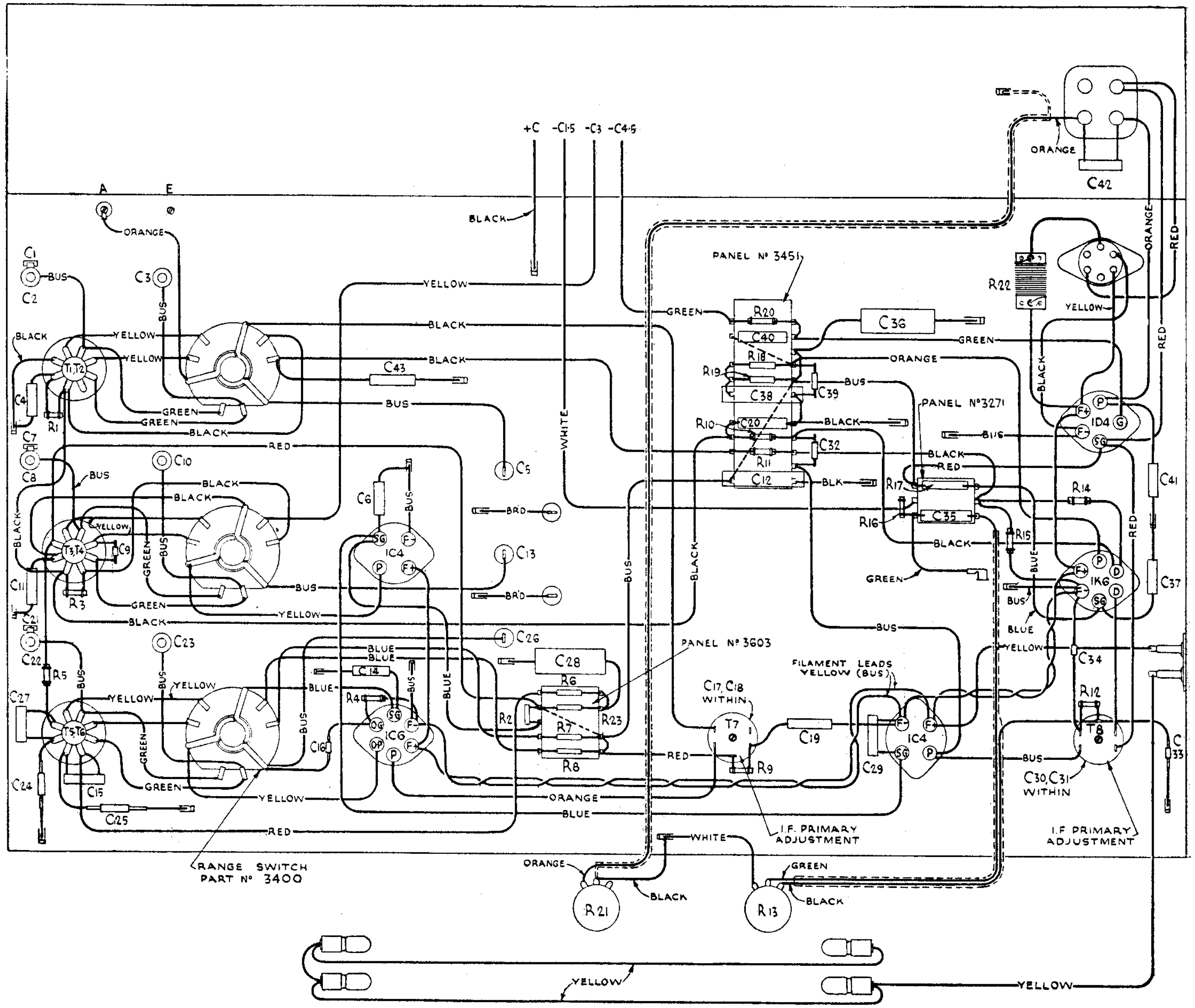

Fig. 2.—Lay-out Diagram (underneath view).

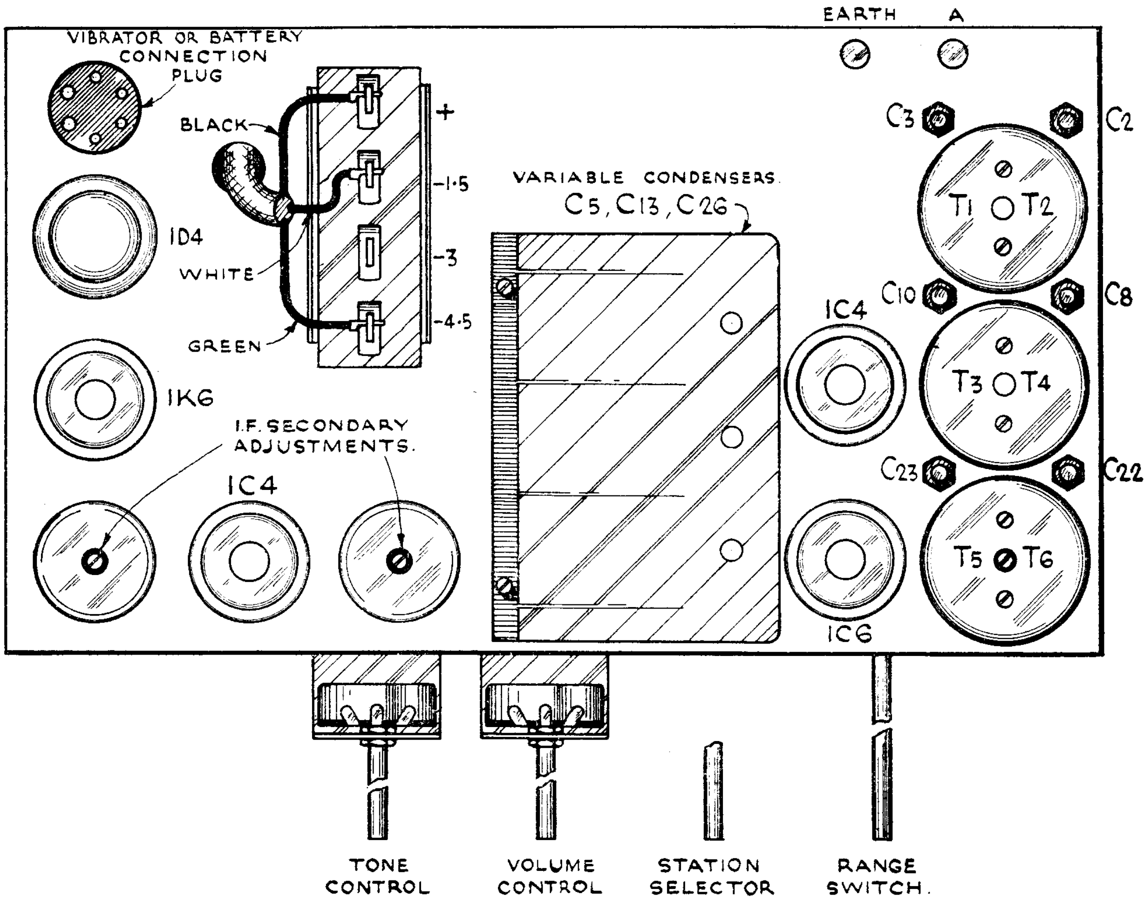

Fig. 3.—Lay-out Diagram (top view).

Vibrator Power Unit

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

Rectification of the high voltage is accomplished by means of the synchronous vibrator. The complete unit is acoustically housed in a soundproof case to prevent mechanical noise and 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 is lined with soundproofing material and, in addition, the vibrator power unit is suspended on sponge-rubber pads within the case. When fitting the unit in the case, first make certain that the vibrator is firmly seated in its socket and is making good contact. Also, when fitting, see that the vibrator is not moved out of place by side contact with the sponge-rubber pad. The pad is placed in the correct position to provide a gentle downward pressure on the vibrator.

The instrument is protected by a fuse, which is located in the vibrator 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 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. 6 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.

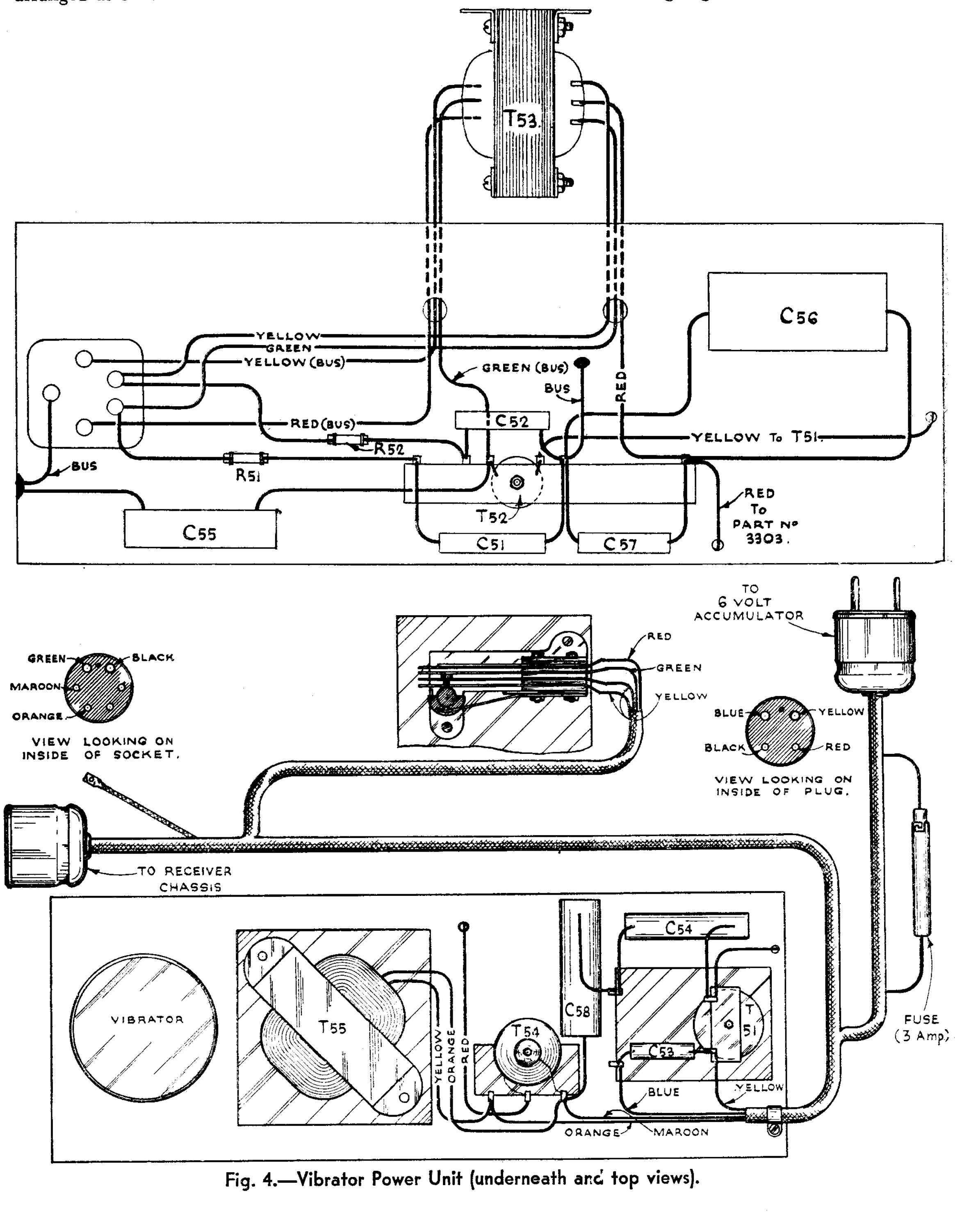

Fig. 4.—Vibrator Power Unit (underneath and top views).

Conversion from "B" Battery to Vibrator Power Unit Operation

The "A" and "B" batteries and the battery cable should be removed. To remove the cable it is first necessary to remove the chassis from the cabinet to allow access to the battery switch, which is bolted to the cabinet shelf.

Two holes are provided in the base of the cabinet to receive the protruding bolts attached to the Vibrator Power Unit case. Mount the Vibrator power unit and fit the switch attached to the cable in the same position as that removed in the previous paragraph. The chassis may then be replaced in the cabinet and connected; that is, to the loudspeaker and vibrator power unit.

A short cable is provided for connecting the 6 volt accumulator. Connect as shown in fig. 6 and refer to the section headed Vibrator Power Unit. The accumulator should then be placed in the base of the cabinet and connected to the vibrator power unit.

Conversion from Vibrator Power Unit to "B" Battery Operation

Disconnect and remove the accumulator, disconnect the power unit cable from the chassis and remove the chassis from the cabinet. Detach the battery switch from the cabinet shelf and remove the vibrator power unit.

Mount the switch attached to the replacement battery cable in the same position as the switch removed previously and replace the chassis in the cabinet, connecting the loudspeaker and the vibrator power unit.

Instal the 2 volt accumulator and the three 45 volt "B" batteries and connect them according to the circuit diagram.

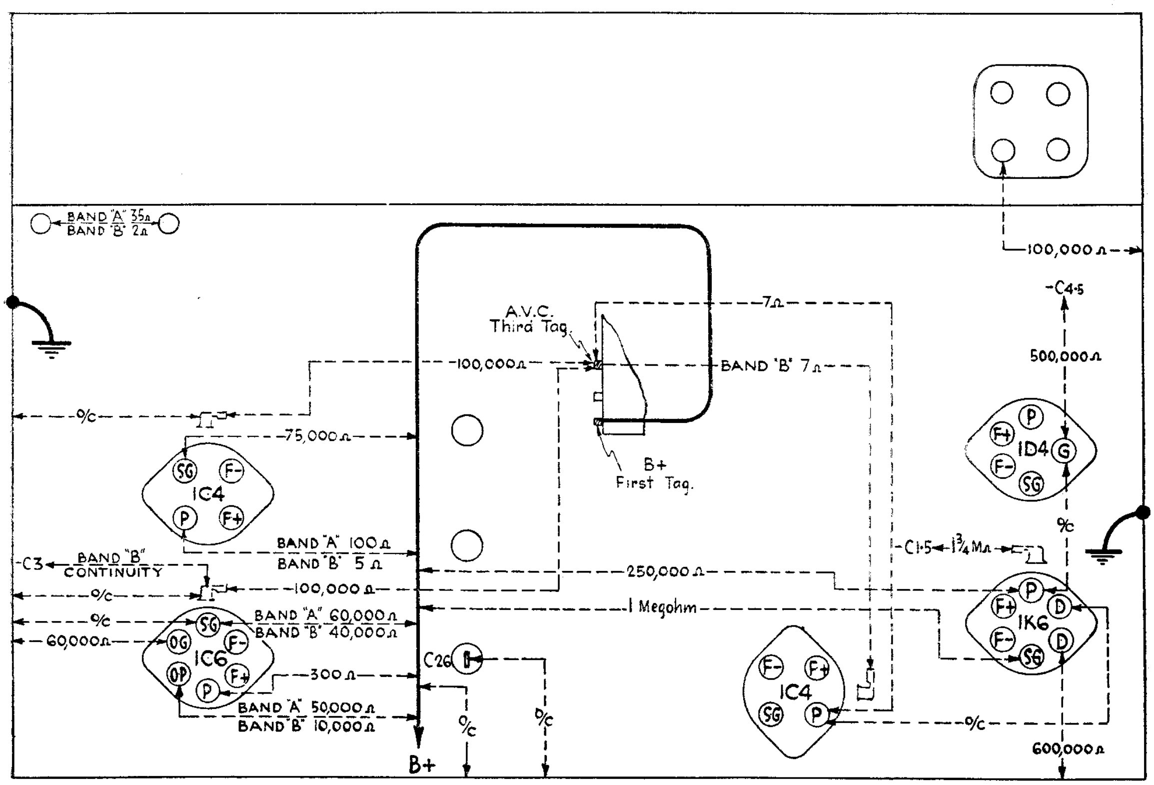

Fig. 5.—Resistance Diagram.

RESISTANCE MEASUREMENTS.

The resistance values shown in fig. 5 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 diagrams 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.

DIAL LAMPS.

Dial lamps were adopted as from the 1/6/37. Four dial lamps are used and are illuminated by pressing a pushbutton switch on the front of the cabinet. When the Radiola is correctly tuned, the pressure on the button is released and the dial lamps become inoperative in order to conserve battery current. Prior to the above date a ruby pilot glowed from the front of the cabinet to indicate when the Radiola was in operation.

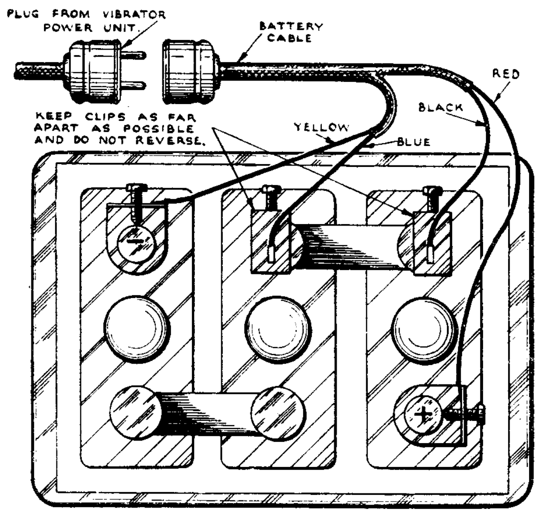

Fig. 6.—Accumulator Connections.

SOCKET VOLTAGES.

VALVE	Chassis to Control Grid Volts	Chassis to Screen Grid Volts	Chassis to Plate Volts	Plate Current M.A.	Filament Volts
1C4 R.F. Amplifier ...	0	*50	135	2.0	2.0
1C6 Detector M.W....	0	*45	135	2.0	2.0
S.W. ...	−3	*60	135	2.0	–
Oscillator M.W.	–	–	50	1.5	–
S.W.	–	–	90	3.0	–
1C4 I.F. Amplifier	0	*50	135	2.0	2.0
1K6 Detector	*−1.5	*35	*50	0.25	2.0
1D4 Output Pentode	*−4.5	135	130	6.0	2.0

Measured with no signal input.

* Cannot be measured with ordinary voltmeter.