The FISK
RADIOLA
MODEL 256

•

Six Valve, Three Band, A.C. Operated
Superheterodyne

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TECHNICAL INFORMATION
AND SERVICE DATA

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Amalgamated Wireless (Australasia) Ltd

THE FISK RADIOLA, MODEL 256

Six Valve, Three Band, A.C. Operated, Superheterodyne

TECHNICAL INFORMATION

Electrical Specifications

TUNING RANGE.

"Standard Medium Wave"	(a)	1500-550 K.C.
"Short Wave"	(b)	35-105 metres
"Short Wave"	(c)	13-39 metres

ALIGNMENT FREQUENCIES.

"Standard Medium Wave"	(a)	1400 K.C., 600 K.C.
"Short Wave"	(b)	38 metres
"Short Wave"	(c)	14 metres

Intermediate Frequency ..... 460 K.C.

Power Supply Rating ..... 200-260V., 50-60 C.

(Special instruments made for other voltage and frequency ratings).

Power Consumption ..... 75 Watts.

VALVE COMPLEMENT.

(1) 6D6	R.F. Amplifier	(4) 6B7	Det., A.V.C. and A.F. Amp.
(2) 6A7	Detector-Oscillator	(5) 42	Output Pentode
(3) 6D6	I.F. Amplifier	(6) 80	Rectifier

6G5 ..... Visual Tuning Indicator

Dial Lamps ..... 6.3 Volts, .25 Amp.

Loudspeaker—10 inch ..... Type A.N.2

Loudspeaker Transformer ..... T.A. 3200Y

Loudspeaker Field Coil Resistance ..... 2000 ohms

THE RADIOLA 256 is a six valve, three band, A.C. operated, superheterodyne. Fundamentally the circuit arrangement is similar to that used in the Radiola 255, the main difference being the use of an extra "Short Wave" band to make the Radiola tune continuously from 13-105 metres, and the adoption of a 6G5 Visual Tuning Indicator to facilitate tuning.

General Circuit Description

TUNED CIRCUITS.

In the R.F., Detector and Osc. stages the coils for bands "a" and "b" are wound on single forms which are mounted in coil shields on the top of the chassis. The coils for band "c" are wound on separate forms which are mounted on the range switch assembly. A multiple contact rotary switch is used to select the band it is desired to tune and to illuminate the proper tuning dial scale for the band in operation. Portions of the range switch are also used to short circuit the secondaries of the band "b" aerial, R.F. and oscillator coils, when operating the Radiola on band "c". This is done to prevent these coils resonating at frequencies within band "c" and thus causing dead-spots. The coils are tuned by a three section variable condenser. Plunger type air trimmers are used for alignment purposes and these are mounted in easily accessible locations beside the coil shields on the top of the chassis, see fig. 3. Fixed mica padding condensers are used in the oscillator stage for each band, the padding adjustment on the "Standard Medium Wave" band (band "a") being in the form of a magnetite core inserted within the oscillator coil and adjustable from the top of the coil shield — see fig. 3.

Sensitivity boosting on short waves is accomplished by short-circuiting bias resistor R9 to lower the cathode bias voltage on the 6A7 detector-oscillator and 6D6 I.F. amplifier. A variable control R10 is also in the circuit to allow the sensitivity of the Radiola to be controlled manually.

The intermediate frequency amplifier system comprises a 6D6 valve and two transformers. The stage operates at a basic frequency of 460 K.C. Adjustable magnetite cores are provided for adjusting the inductance of the I.F. transformer primary and secondary windings.

DETECTOR AND A.V.C.

The modulated signal, as obtained from the output of the I.F. stage, is detected by one diode in the 6B7 valve. The audio frequency component,

secured by this process, is transferred from the movable arm of the volume control R16 through the coupling condenser C42 to the control grid of the 6B7 for voltage amplification. A signal is also transferred via C44 to the other diode in the 6B7 and the D.C. potential produced across R17 (proportional to the incoming signal) is fed to the control grid circuits of the R.F. Amp., 1st Detector and I.F. amplifier valves to provide A.V.C.

AUDIO SYSTEM.

The audio frequency component, mentioned under "Detector and A.V.C.", transferred to the control grid of the 6B7, is amplified in the valve and resistance-capacity coupled to the 42 output pentode. The output of the 42 is transformer coupled to the electro-dynamic loudspeaker by the transformer T.A. 3200Y.

POWER CIRCUIT.

The plate, grid and cathode voltages required for the operation of these receivers are supplied by a circuit comprising a transformer T12 and an 80 rectifier, with the loudspeaker field utilised as a filter reactor in conjunction with two high capacity electrolytic condensers C53 and C54.

VISUAL TUNING INDICATOR.

The voltage produced by the rectification of the I.F. signal in the diode circuit of the 6B7 is applied to the control grid of the 6G5 "Visual Tuning Indicator," and variations in this voltage are visible on a fluorescent screen within the device. The control voltage applied to the 6G5 is independent of the audio signal, hence the Radiola may be tuned visually, with the volume control in the minimum (anti-clockwise) position.

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 6A7 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 and sensitivity controls 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 — see fig. 3. 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 4, 5 and 6 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	6A7 Det.-Osc. Grid Cap	—	460 K.C.	Approx. 550 K.C. No Signal	2nd I.F. Trans.	Secondary and Primary	Max. (peak)
2	6A7 Det.-Osc. Grid Cap	—	460 K.C.	Approx. 550 K.C. No Signal	1st I.F. Trans.	Secondary and Primary	Max. (peak)

Repeat the above adjustments before proceeding.

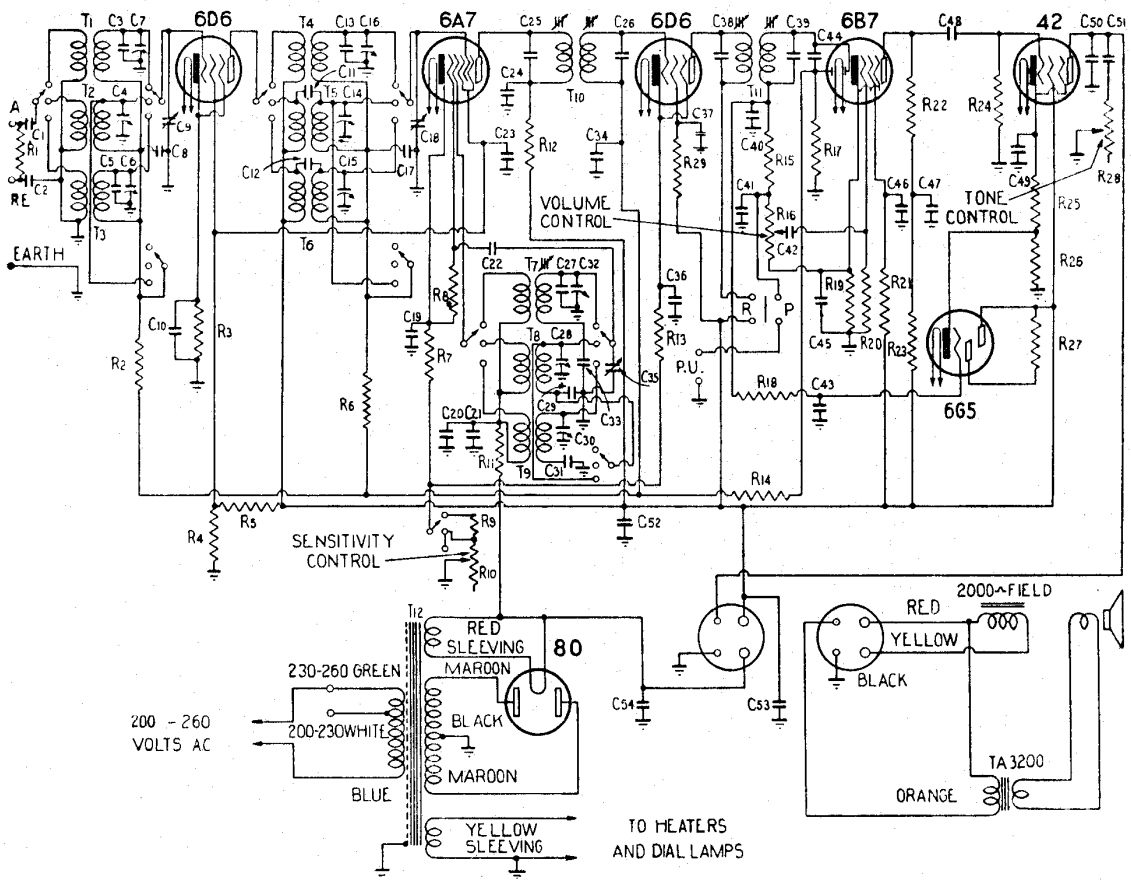

Fig. 1.—Circuit Diagram.

Code	Part No.	COILS
T1	3563	Aerial Coil, 1500-550 K.C.
T2	3563	Aerial Coil, 35-105 Metres
T3	3568	Aerial Coil, 13-39 Metres
T4	3565	R.F. Coil, 1500-550 K.C.
T5	3565	R.F. Coil, 35-105 Metres
T6	3569	R.F. Coil, 13-39 Metres
T7	3567	Osc. Coil, 1500-550 K.C.
T8	3567	Osc. Coil, 35-105 Metres
T9	3570	Osc. Coil, 13-39 Metres
T10	3243	1st I.F. Transformer
T11	3244	2nd I.F. Transformer
T12	1805A	Power Transformer, 50-60 C.
T12	1806A	Power Transformer, 40 C.
T12	1807A	Power Transformer, 110 V.

Code	Part No.	RESISTORS
R1		100,000 ohms, 1/3 watt
R2		100,000 ohms, 1/8 watt
R3		300 ohms, 1/3 watt
R4		11,000 ohms, 3 watt
R5		11,000 ohms, 3 watt
R6		100,000 ohms, 1/8 watt
R7		300 ohms, 1/8 watt
R8		60,000 ohms, 1/8 watt
R9		300 ohms, 1/8 watt
R10	3410	3,000 ohms, Sens. Control
R11		50,000 ohms, 1 watt
R12		300 ohms, 1/8 watt
R13		600 ohms, 1/8 watt
R14		1 3/4 megohms, 1/8 watt
R15		100,000 ohms, 1/8 watt
R16	1668	300,000 ohms, Vol. Control
R17		1 1/4 megohms, 1/8 watt
R18		1 1/4 megohms, 1/8 watt
R19		3,000 ohms, 1/8 watt
R20		500,000 ohms, 1/3 watt
R21		1 megohm, 1 watt
R22		200,000 ohms, 1/3 watt
R23		50,000 ohms, 1/8 watt
R24		300,000 ohms, 1/3 watt
R25		400 ohms, 1 watt
R26		50 ohms, 1/3 watt
R27		1 megohm, 1/3 watt
R28	2762	100,000 ohms, Tone Control
R29		100,000 ohms, 1 watt

Code	Part No.	CONDENSERS
C1		500 mmfd. Mica
C2		500 mmfd. Mica
C3		6 mmfd. Mica (F)
C4		2-20 mmfd. Air Trimmer
C5		6 mmfd. Mica (F)
C6		2-20 mmfd. Air Trimmer
C7		2-20 mmfd. Air Trimmer
C8		.05 mfd. Paper
C9	3399	Variable Condenser
C10		.1 mfd. Paper
C11		6 mmfd. Mica (F)
C12		10 mmfd. Mica (B)
C13		6 mmfd. Mica (F)
C14		2-20 mmfd. Air Trimmer
C15		2-20 mmfd. Air Trimmer
C16		2-20 mmfd. Air Trimmer
C17		.05 mfd. Paper
C18	3399	Variable Condenser
C19		.1 mfd. Paper
C20		.05 mfd. Paper
C21		8 mfd. 500V. Electrolytic
C22		50 mmfd. Mica (D)
C23		.1 mfd. Paper
C24		.05 mfd. Paper
C25		115 mmfd. Mica (A)
C26		115 mmfd. Mica (A)
C27		15 mmfd. Mica (C)
C28		2-20 mmfd. Air Trimmer
C29		2025 mmfd. Mica
C30		2-10 mmfd. Air Trimmer
C31		3400 mmfd. Mica
C32		2-20 mmfd. Air Trimmer
C33		440 mmfd. Mica
C34		.05 mfd. Paper
C35	3399	Variable Condenser
C36		.1 mfd. Paper
C37		.1 mfd. Paper
C38		115 mmfd. Mica (A)
C39		115 mmfd. Mica (A)
C40		100 mmfd. Mica (G)
C41		100 mmfd. Mica (G)
C42		.05 mfd. Paper
C43		.05 mfd. Paper
C44		700 mmfd. Mica
C45		5 mfd. 25V. Electrolytic
C46		.1 mfd. Paper
C47		.5 mfd. Paper
C48		.05 mfd. Paper
C49		25 mfd. 25V. Electrolytic
C50		.005 mfd. Paper
C51		.035 mfd. Paper
C52		.5 mfd. Paper
C53		8 mfd. 500V. Electrolytic
C54		8 mfd. 500V. Electrolytic

Circuit Code.

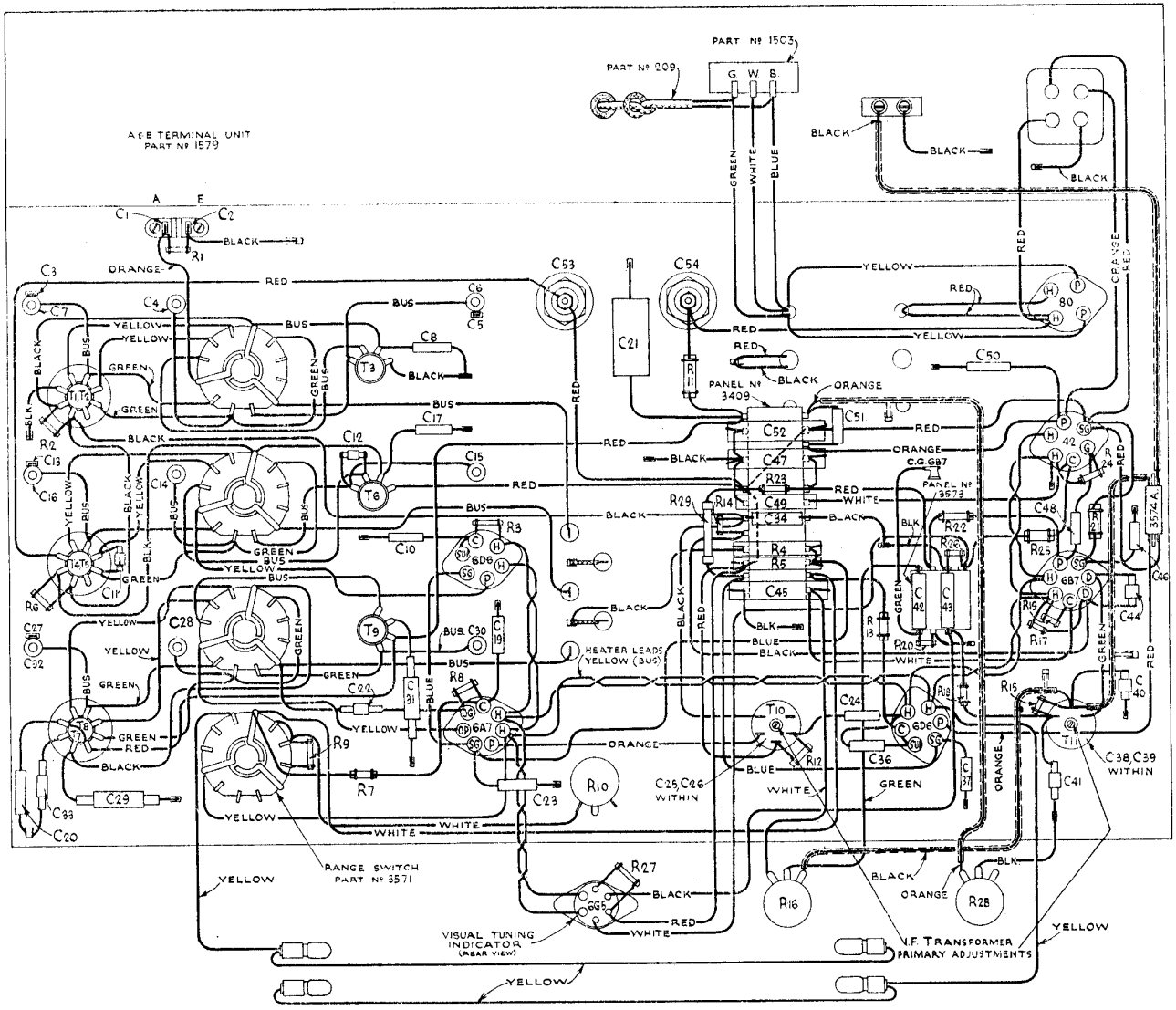

Fig. 2.—Lay-out Diagram (underneath view).

Alignment Order	Oscillator Connection to Radiola	Dummy Aerial	Oscillator Setting	Radiola Dial Setting	Circuit to Adjust	Adjustment Symbol	Adjust to obtain
3	Aerial Term.	—	600 K.C.	600 K.C.	Oscillator	Padding Adjustment	Max. (peak)
4	Aerial Term.	—	1400 K.C.	1400 K.C.	Oscillator	C32	Max. (peak)
5	Aerial Term.	—	1400 K.C.	1400 K.C.	Detector	C16	Max. (peak)
6	Aerial Term.	—	1400 K.C.	1400 K.C.	R.F.	C7	Max. (peak)
7	Aerial Term.	—	600 K.C.	600 K.C.‡	Oscillator	Padding Adjustment	Max. (peak)
			Repeat adjustments 4, 5 and 6 before proceeding.				
8	Aerial Term.	400 ohms	38 metres	38 metres	Oscillator	C28	Max. (peak)*
9	Aerial Term.	400 ohms	38 metres	38 metres‡	Detector	C14	Max. (peak)**
10	Aerial Term.	400 ohms	38 metres	38 metres‡	R.F.	C4	Max. (peak)†
11	Aerial Term.	400 ohms	42 metres	14 metres	Oscillator	C30	Max. (peak)*
12	Aerial Term.	400 ohms	42 metres	14 metres‡	Detector	C15	Max. (peak)**
13	Aerial Term.	400 ohms	42 metres	14 metres‡	R.F.	C6	Max. (peak)††

NOTE.—To align the Radiola at 14 metres with a Type C1070 modulated oscillator, set the oscillator to 42 metres and use the third harmonic.

* 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. 42.5M.

†† After this adjustment, check for image signal by tuning the Radiola to approx. 14.6M.

‡ Rock the station selector back and forth through the signal.

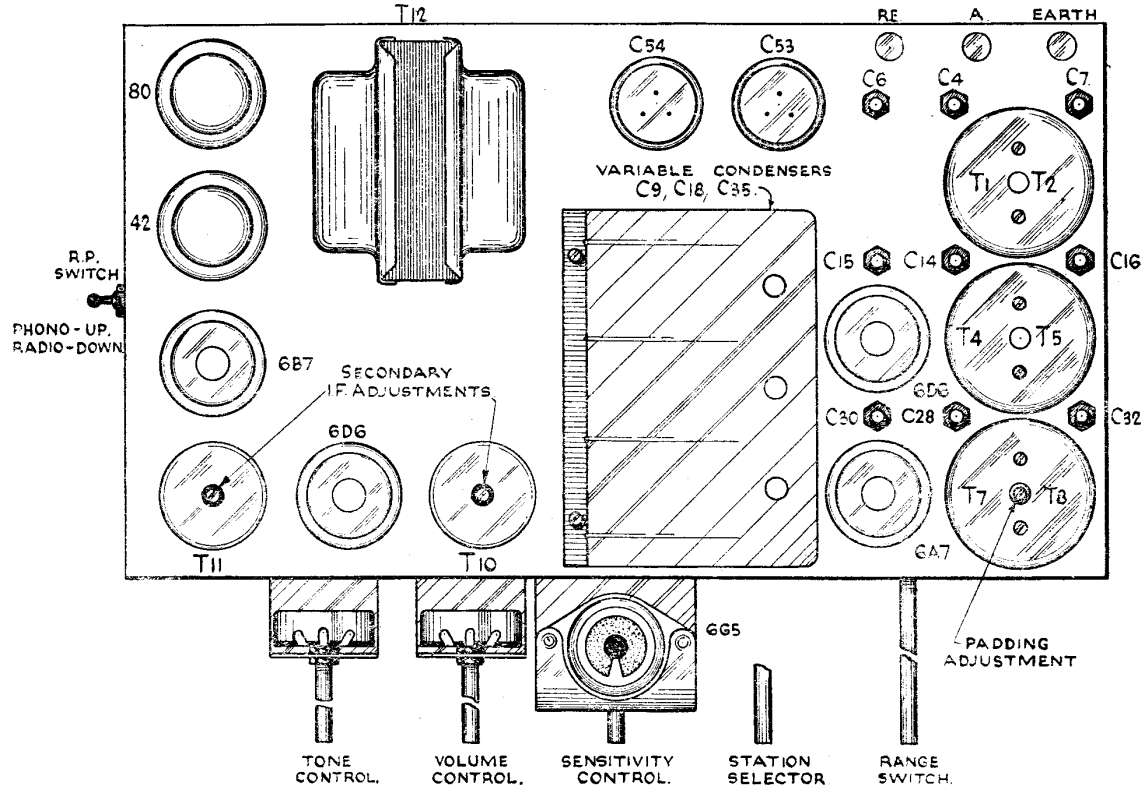

Fig. 3.—Lay-out Diagram (top view).

RESISTANCE MEASUREMENTS.

The resistance values shown in fig. 4 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.

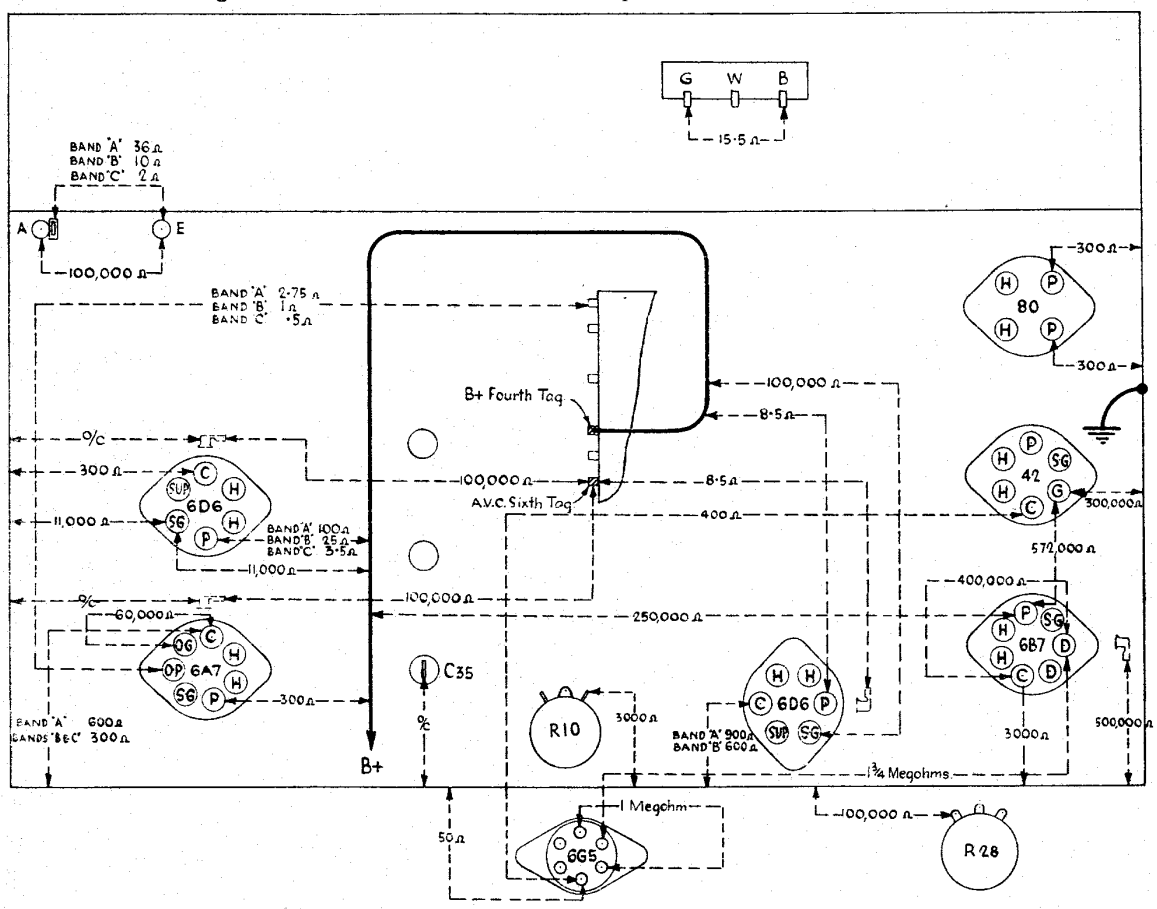

Fig. 4.—Resistance Diagram.

Resistance values were taken with the valves removed from sockets, power supply disconnected, variable condensers in full mesh and volume and sensitivity controls in maximum clockwise position.

SOCKET VOLTAGES

VALVE.	Chassis to Cathode Volts.	Chassis to Screen Grid Volts.	Chassis to Plate Volts.	Plate Current M.A.	Heater Volts.
6D6 R.F. Amplifier	3.0	100	250	6.0	6.3
6A7 Detector, M.W.	6.5	100	250	2.0	6.3
S.W., 35-105	3.0	100	250	4.0	—
S.W., 13-39	3.0	100	250	4.0	—
6A7 Oscillator	—	—	150	4.0	—
6D6 I.F. Amplifier—					
M.W.	6.5	105	250	2.5	6.3
S.W., 35-105	3.0	85	250	6.0	—
S.W., 13-39	3.0	85	250	6.0	—
6B7 Detector	2.0	*25	*60	0.75	6.3
42 Pentode	14.5	250	235	30.0	6.3
80 Rectifier	680/340 volts, 65 M.A. total current.			5.0	

Voltage across loudspeaker field — 130 volts.

Measured at 240 volts A.C. supply. No signal input. Controls in maximum clockwise position excepting range switch which is set as desired.

* Cannot be measured with ordinary voltmeter.