The FISK
RADIOLA
MODEL 160

•

Five Valve, Medium Wave, A.C. Operated
Superheterodyne

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TECHNICAL INFORMATION
AND SERVICE DATA

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Amalgamated Wireless (Australasia) Ltd
World Wide Wireless

THE FISK RADIOLA, MODEL 160

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TECHNICAL INFORMATION

Electrical Specifications

TUNING RANGE

"Standard Medium Wave" .... 1500-550 K.C.

ALIGNMENT FREQUENCIES

"Standard Medium Wave" .... 1400 K.C.

Intermediate Frequency .... 460 K.C.

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

(Special instruments made for other voltage and frequency ratings)

Power Consumption .... 50 watts

VALVE COMPLEMENT

(1) 6D6 .... R.F. Amplifier

(2) 6A7 .... Detector-Oscillator

(3) 6B7 .. I.F. Amp. 2nd Det. A.V.C. and A.F. Amp.

(4) 42 .... output pentode

(5) 80 .... Rectifier

Dial Lamps .... 6.3 volts, .25 amps.

Loudspeaker .... 10 inch, Type AN2

Loudspeaker Transformer TA3200Y

Loudspeaker Field Coil Resistance .... 2000 ohms

General Circuit Description

The Radiola 160 is a five valve medium wave A.C. operated superheterodyne. A feature of this model is the use of magnetite cores in the I.F. transformers, providing greater selectivity, sensitivity, and insuring practically permanent alignment under extreme conditions.

This model employs an R.F. amplifier stage for high signal-to-noise ratio and high sensitivity. A 6D6 R.F. amplifier is used, the control grid of which is coupled to the aerial by the aerial coil T1, which is tuned by the rear section of the variable condenser C2. The amplified signal is coupled to the control grid of the 6A7 Detector — Oscillator by the tuned R.F. coil T2.

DETECTOR-OSCILLATOR.

The functions of detector and oscillator are combined within the same valve — the 6A7. In this valve the incoming signal is combined with a local oscillator signal, 460 K.C. different in frequency, and as a result of the beating of the two signals, the I.F. or beat frequency is present in the plate circuit of the valve. The frequency difference of 460 K.C. remains constant throughout the tuning range of the Radiola due to the design of the oscillator coil in conjunction with the variable and padding condensers. No padding adjustment is provided since the padding condenser C10 is of the correct capacity, predetermined at the factory. The alignment adjustments for the R.F., Detector and Oscillator circuits are located on the variable condenser — see fig. 3.

I.F. AMPLIFIER.

One stage of I.F. amplification is used with the pentode section of the 6B7 employed as an I.F. amplifier. Two I.F. transformers are used, both tuned by magnetic cores within the primary and secondary windings. The adjustments are shown in figs. 2 and 3, the primary adjustments being beneath and the secondary adjustments above the chassis. The output from the I.F. amplifier is fed to a diode of the 6B7 for rectification, which takes place across resistors R13 & R14.

A signal is also fed from the primary of the second I.F. transformer to the other diode of the 6B7 via C20 and a D.C. potential is produced across R11 proportional to the incoming signal. This is fed to the control grid circuits of the 6A7 and 6D6 valves to provide automatic volume control.

AUDIO AMPLIFIER.

The desired magnitude of the audio component in the diode circuit of the 6B7 is selected by the volume control, R13, and is fed to the control grid circuit of the 6B7, via C18, for amplification. The amplified signal is resistance capacity coupled to the 42 output pentode to be amplified to a suitable level for reproduction by the loudspeaker. Transformer TA3200Y provides the necessary matching between the 42 and the loudspeaker.

POWER UNIT SUPPLY.

The power unit circuit comprises a transformer T6, an 80 full-wave rectifier and an efficient filter circuit comprising two high capacity condensers C30 and C31 with the 2000 ohms loudspeaker field employed as a filter reactor.

Sensitivity of the Radiola is controlled by the 3000 ohms variable rotary resistance, R3, connected in the cathode circuits of the 6D6 and 6A7 valves to raise or lower the cathode bias voltage on these valves as desired.

The tone control circuit consists of a 100,000 ohm variable resistance connected in series with a .035 mfd. paper dielectric condenser between the plate of the 42 output pentode and earth.

Alignment Procedure

Unless it is felt 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.

When aligning, set the volume control and sensitivity 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.

"Approx. 550 K.C. No Signal" means that the Radiola should be tuned to a point at or near 550 kilocycles, where no signal or interference is received from a station or local (heterodyne) oscillator.

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 3, 4 and 5 of the chart.

It is important that a non-metallic screwdriver be used to make all adjustments.

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.

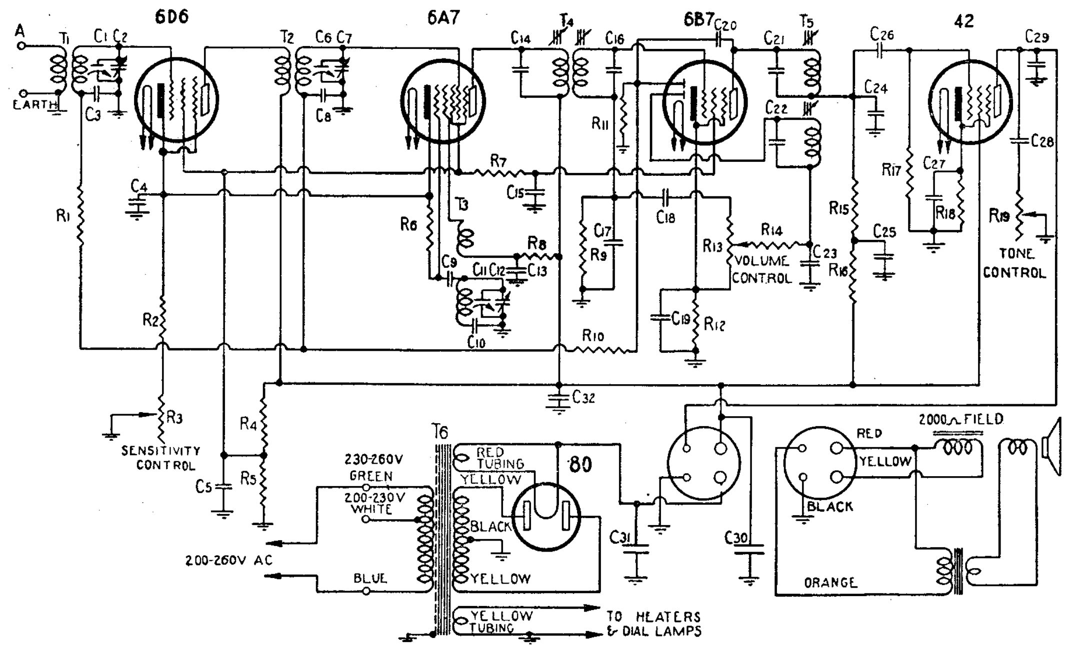
TUNING COILS.

Each coil is secured in its shield by a circular retaining spring which can be seen seated in a recess between the shield and the coil base. To remove a coil, disconnect the leads from the lugs and insert a small screwdriver between the spring and the shield, then ease the spring from the recess.

OSCILLATOR COIL (T3).

When removing the Oscillator Coil, do not detach the padding condenser C10, as each coil is adjusted during production for use with the particular condenser supplied.

Alignment Order	Oscillator Connection to Radiola	Oscillator Setting	Radiola Dial Setting	Circuit to Adjust	Adjustment Symbols	Adjust to Obtain
1–2	6A7 Det.-Osc. Grid Cap	460 K.C.	Approx. 550 K.C. No signal	2nd I.F. Trans. (T5)	Secondary and Primary (T5)	Max. (peak)
3–4	6A7 Det.-Osc. Grid Cap	460 K.C.	Approx. 550 K.C. No signal	1st I.F. Trans. (T4)	Secondary and Primary (T4)	Max. (peak)
5	Aerial Term.	1400 K.C.	1400 K.C.	Oscillator	C12	Max. (peak)
6	Aerial Term.	1400 K.C.	1400 K.C.	Detector	C7	Max. (peak)
7	Aerial Term.	1400 K.C.	1400 K.C.	R.F.	C2	Max. (peak)



Code	Part No.	COILS
T1	3245	Aerial Coil
T2	3247	R.F. Coil
T3	3246	Osc. Coil
T4	3243	First I.F. Transformer
T5	3244	Second I.F. Transformer
T6	1520A	Power Transformer, 50~
T6	1521A	Power Transformer, 40~
T6	1522A	Power Transformer, 110 Volts
		RESISTORS
R1		100,000 ohms, 1/3 watt
R2		400 ohms, 1/3 watt
R3	3266	3,000 ohms, Sensitivity Cont.
R4		40,000 ohms, 1 watt
R5		20,000 ohms, 1 watt
R6		60,000 ohms, 1/3 watt
R7		50,000 ohms, 1/3 watt
R8		20,000 ohms, 1/3 watt
R9		500,000 ohms, 1/3 watt
R10		1¾ Megohms, 1/3 watt
R11		1¾ Megohms, 1/3 watt
R12		2,000 ohms, 1/3 watt
R13	1668	300,000 ohms, Volume Control
R14		300,000 ohms, 1/3 watt

Code	Part No.	RESISTORS
R15		100,000 ohms, 1/3 watt
R16		25,000 ohms, 1 watt
R17		300,000 ohms, 1/3 watt
R18		400 ohms, 1 watt
R19	2762	100,000 ohms, Tone Control
		CONDENSERS
C1		10-50 mmfd. Mica Trimmer
C2	3241	Variable Condenser
C3		.05 mfd. Paper
C4		.1 mfd. Paper
C5		.1 mfd. Paper
C6		10-50 mmfd. Mica Trimmer
C7	3241	Variable Condenser
C8		.05 mfd. Paper
C9		50 mmfd. Mica (D)
C10		380 mmfd. Mica Padding
C11		10-50 mmfd. Mica Trimmer
C12	3241	Variable Condenser
C13		.05 mfd. Paper
C14		115 mmfd. Mica (A)
C15		.1 mfd. Paper
C16		115 mmfd. Mica (A)
C17		200 mmfd. Mica (J)

Code	Part No.	CONDENSERS
C18		.05 mfd. Paper
C19		25 mfd. 25 Volt Electrolytic
C20		200 mmfd. Mica (J)
C21		115 mmfd. Mica (A)
C22		115 mmfd. Mica (A)
C23		200 mmfd. Mica (J)
C24		700 mmfd. Mica
C25		.5 mfd. Paper
C26		.05 mfd. Paper
C27		25 mfd. 25 Volt Electrolytic
C28		.035 mfd. Paper
C29		.005 mfd. Paper
C30		8 mfd. '500 Volt Electrolytic
C31		8 mfd. '500 Volt Electrolytic
C32		.5 mfd. Paper

Fig. 1.—Circuit Diagram and Code.

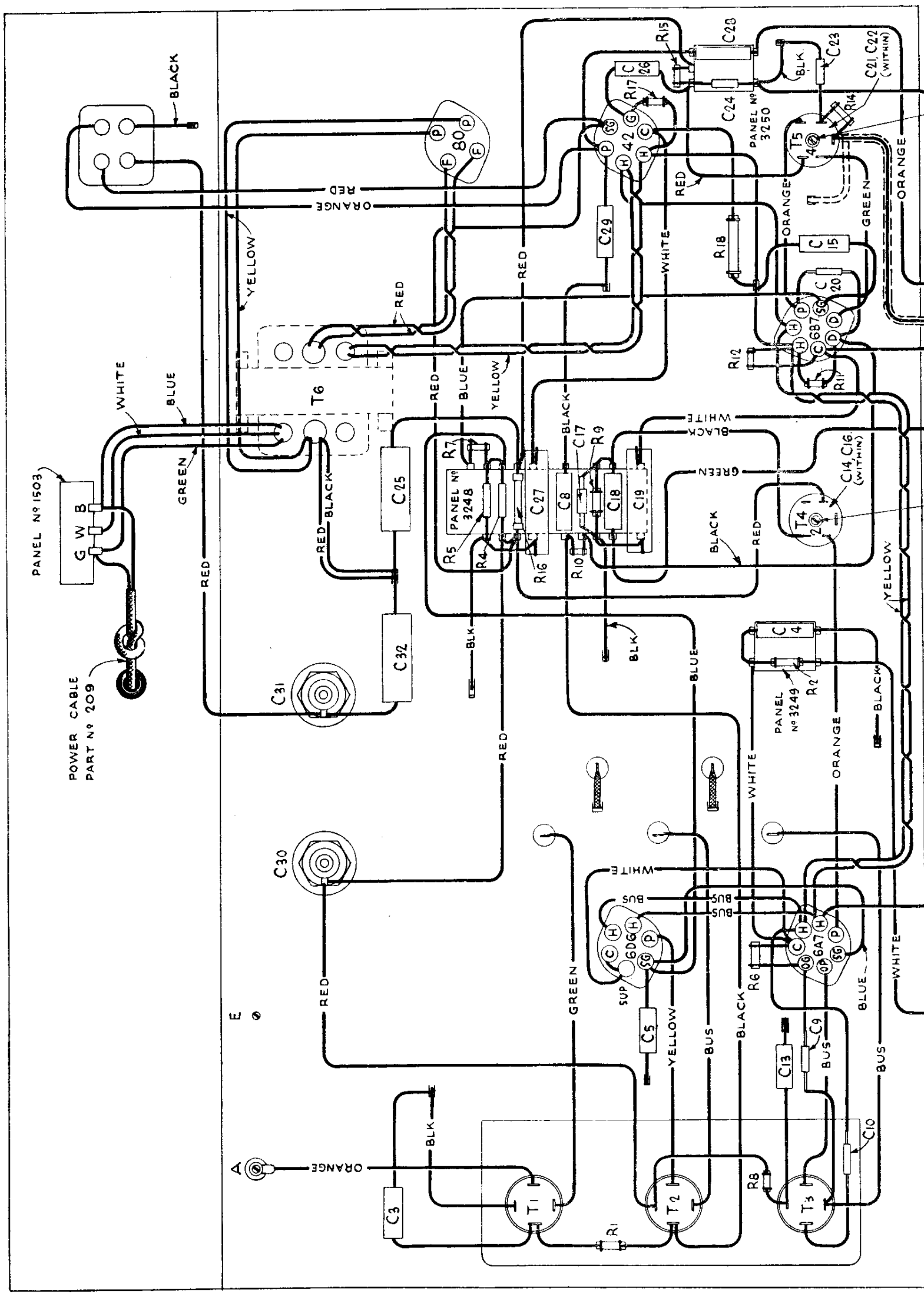


Fig. 2.—Lay-out Diagram (underneath view).

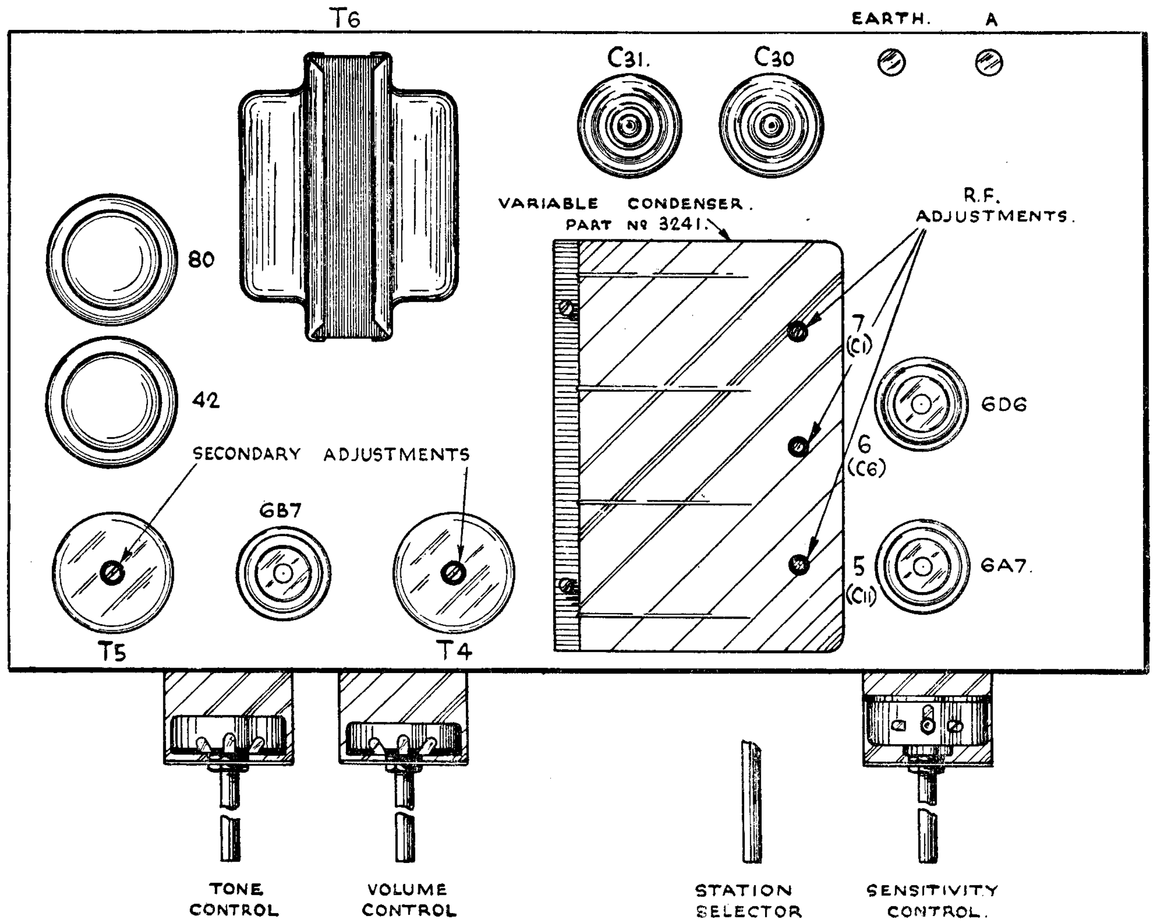


Fig. 3.—Lay-out Diagram (top view).

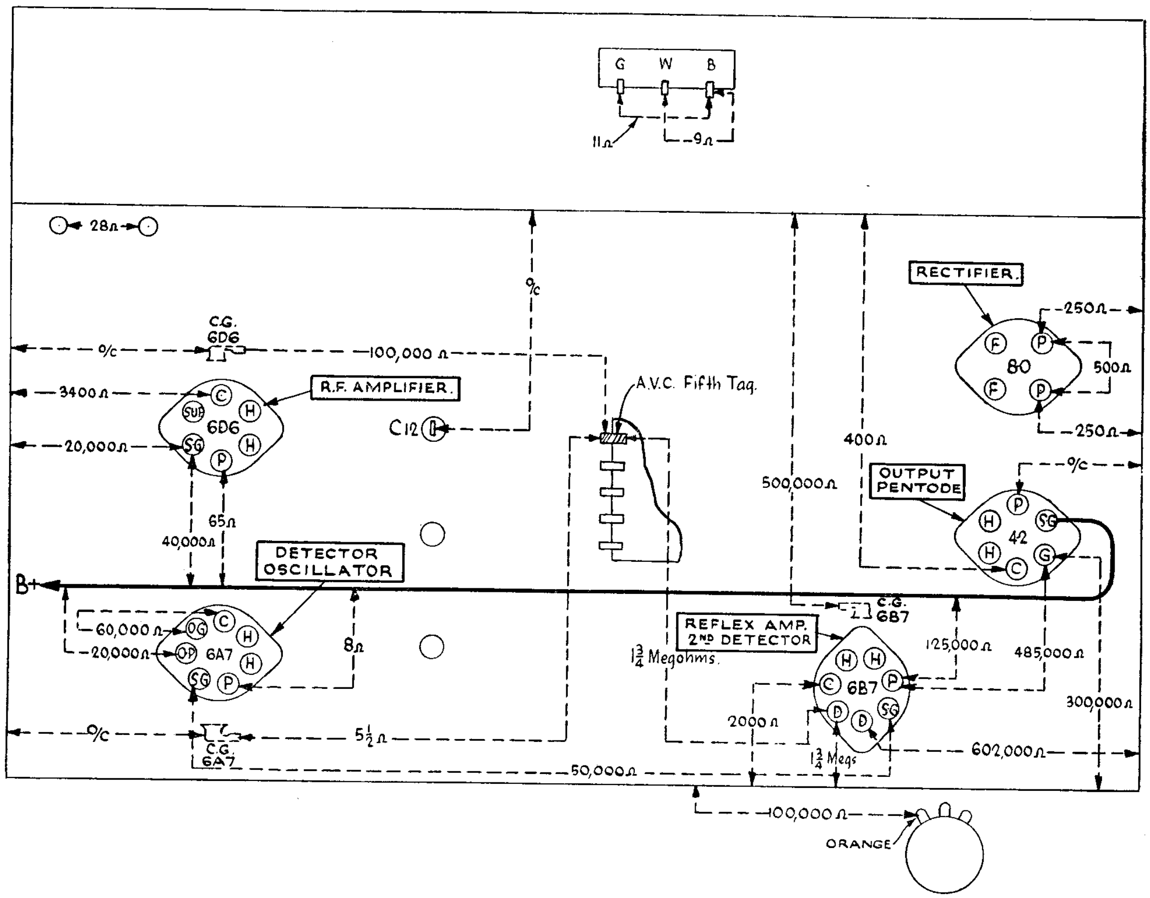


Fig. 4.—Resistance Diagram.

Resistance values were taken with the valves removed from sockets, power supply disconnected, variable condenser in full mesh, sensitivity control in anti-clockwise position and volume control 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 ...	6.0	50	250	2.0	6.3
6A7 Detector	6.0	50	250	.75	6.3
Oscillator	—	—	180	2.25	—
6B7 Reflex Amplifier	2.0	30	*100	1.0	6.3
42 Pentode	14.0	250	235	30.0	6.3
80 Rectifier ...... ——	630/315 volts		45 m/a. total current		5.0

Voltage across loudspeaker field—90 volts.

Measured at 240 volts A.C. supply. No signal input. Controls in maximum clockwise position.

* Cannot be measured with an ordinary volt meter.

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