

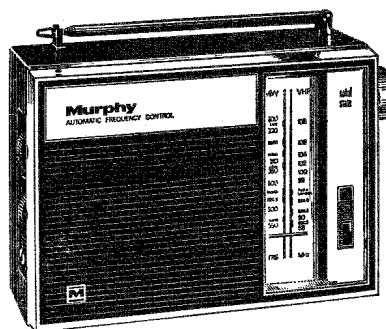
# SERVICE INSTRUCTIONS

# Murphy

## MODEL B868

## PORTABLE AM/FM

## TRANSISTOR RADIO



### SPECIFICATION

#### GENERAL

Model B868 is a battery operated AM/FM radio receiver designed to cover the MW and the VHF bands, and uses eleven transistors and six diodes. The receiver is provided with an internal ferrite rod aerial for the M.W. band and a telescopic rod aerial for the VHF band. It incorporates an Automatic Frequency control circuit which operates only on VHF band.

#### DIMENSIONS

Height: 143 mm (5 $\frac{5}{8}$  in.)  
 Width: 204 mm (8 in.)  
 Depth: 50 mm (2 in.)  
 Weight: 0.75 kg. (1 lb. 10 oz.) excluding battery.

The above are overall dimensions, including projections, with the telescopic rod aerial in 'folded down' position.

#### CONTROLS

Left hand side: Combined off/on switch and Volume control. Tone control.  
 Right hand side: Tuning control.  
 Front right hand side: Waveband selector slider switch.

#### WAVEBAND

M.W.: 187 to 570 metres (1605 to 525 kHz)  
 VHF: 87.5 to 108 MHz.

#### AERIALS

An internal ferrite rod aerial serves the M.W. band and a telescopic rod aerial serves the VHF band.

#### AUTOMATIC FREQUENCY CONTROL

Automatic Frequency Control is provided for the VHF band only.

#### AUTOMATIC GAIN CONTROL

One controlled stage on the M.W. band only.

#### INTERMEDIATE FREQUENCY

M.W. Band: 470kHz oscillator high with respect to signal.  
 VHF Band: 10.7 MHz oscillator low with respect to signal.

#### BATTERY AND CONSUMPTION

Three 1 $\frac{1}{2}$  volt cells, SP11 type or equivalent.  
 Average battery consumption on M.W. is 10mA quiescent. (15mA normal listening level) and on VHF is 12mA quiescent (17mA normal listening level.)

#### POWER OUTPUT

250mW at 1000 Hz.

#### LOUDSPEAKER

92mm (3 $\frac{5}{8}$  in.) circular. Impedance 8 ohms.

#### PHONE SOCKET

A socket is provided at the left hand side of the receiver into which may be plugged an earpiece with an impedance of 20 to 1000 ohms. Alternatively, this socket may be used for an external loudspeaker of 8 ohms impedance or for tape recording. The internal loudspeaker is muted when the plug is inserted in this socket.

### DISMANTLING

- 1 Remove the two cabinet back retaining screws and then remove the cabinet back and the battery.
- 2 Unscrew the earphone socket from the cabinet back. Unplug the telescopic rod aerial lead which is plugged to the terminal P1 Fig. 4, location A2.
- 3 Remove the six chassis fixing screws. See Fig. 4.  
 (NOTE: The screw at the bottom left hand side is located under

- the battery sleeve.)
- 4 For complete removal disconnect the negative battery lead and the earphone leads from the terminals P7 and P8 Fig. 4 location E3.
- 5 For reassembly reverse the above procedure and ensure that the battery ribbon is correctly positioned when replacing the battery.

## ALIGNMENT PROCEDURE

### 1. A.M. - IF ALIGNMENT

- Equipment Required:** (a) A.M. - IF (470kHz) Sweep Generator.  
(b) Oscilloscope.
- Receiver setting:** (a) Switch to MW position.  
(b) Tuning pointer to H.F. end of scale.  
(c) Volume control to minimum.  
(d) Tone control to maximum.
- Instrument connection:** (a) Sweep Generator output across tuning capacitor CV3 and terminal P2, in Fig. 4, location B2/A2.  
(b) Oscilloscope input across Volume control terminals.
- Adjustment:** (a) Adjust T10, T9, T8 and T7 in that order. Adjust T7 and T8 for symmetry bandwidth and gain and adjust T9 and T10 for centre frequency and gain.

### 3. M.W. - RF ALIGNMENT

- Equipment Required:** (a) An A.M. Signal Generator covering 525kHz to 1605kHz modulated at 30% 400Hz.  
(b) A power output meter (0-250mw). Impedance 8 ohms.  
(c) Loop aerial (a loop of insulated wire see Fig. 1).  
(d) Oscilloscope.
- Receiver setting:** (a) Switch to MW position.  
(b) Set Volume and Tone controls to maximum.
- Instrument connection:** (a) The output from the signal generator should be coupled by a 10 in. diameter loop of wire in series with a resistor of a value to match the output impedance of the generator. The loop should be placed about two feet from the receiver with its plane at right angles to the ferrite rod aerial. See Fig. 1.  
(b) Connect the output meter and the Oscilloscope in parallel across the terminals P7 (chassis) and P8 Fig. 1, location E3.
- Adjustment:** (a) Tune receiver to 500 metres and inject a signal of 600kHz. Adjust L9 for correct calibration and L8 for maximum gain.  
(b) Tune receiver to 200 metres and inject a signal of 1500kHz. Adjust oscillator trimmer CT4 for correct calibration and aerial trimmer CT3 for maximum gain.  
(c) Repeat operations (a) and (b) until the calibration and tracking is correct.

### 2. F.M. - IF ALIGNMENT

- Equipment Required:** (a) F.M. - IF (10.7MHz) Sweep Generator.  
(b) Oscilloscope.
- Receiver setting:** (a) Switch to VHF position.  
(b) Tuning pointer to H.F. end of scale.  
(c) Volume control to minimum.  
(d) Tone control to maximum.
- Instrument connection:** (a) Sweep Generator output across the emitter of TR1 and chassis (P2) via 0.1µF isolating capacitor.  
(b) Oscilloscope input across terminals P6 and P2 (chassis) in Fig. 4, location A2/3.
- Adjustment:** (a) Detune T6.  
(b) Adjust T5, T4, T3, T2 and T1 in that order. Adjust T1 for gain, T2, T3, T4 for symmetry, bandwidth and gain and T5 for centre frequency.  
(c) Adjust T6 for correct centre frequency of 10.7MHz.

### 4. F.M. - RF ALIGNMENT

- Equipment Required:** (a) An F.M. Signal Generator covering 87.5 to 108MHz, modulated at 30% 400Hz.  
(b) A power output meter (0-250mW). Impedance 8 ohms.  
(c) Oscilloscope.
- Receiver setting:** (a) Switch to FM position.  
(b) Set Volume and Tone controls to maximum.
- Instrument connection:** (a) Connect the output from Signal Generator across the terminals P1 and P2 Fig. 4, location A2.  
(b) Connect the output meter and the Oscilloscope in parallel across the terminals P7 and P8 Fig. 4, location E3.
- Adjustment:** (a) Tune receiver to 90MHz and inject a signal of 90MHz. Adjust oscillator coil L4 for correct calibration and R.F. coil L2 for maximum gain.  
(b) Tune receiver to 106MHz and inject a signal of 106MHz. Adjust oscillator trimmer CT2 for correct calibration and R.F. trimmer CT1 for maximum gain.  
(c) Repeat operations (a) and (b) until the calibration and tracking is correct.

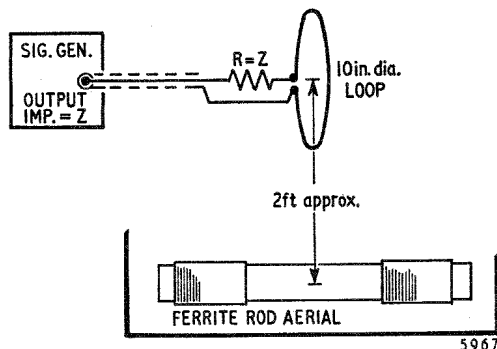


Fig. 1 Signal Generator coupling.

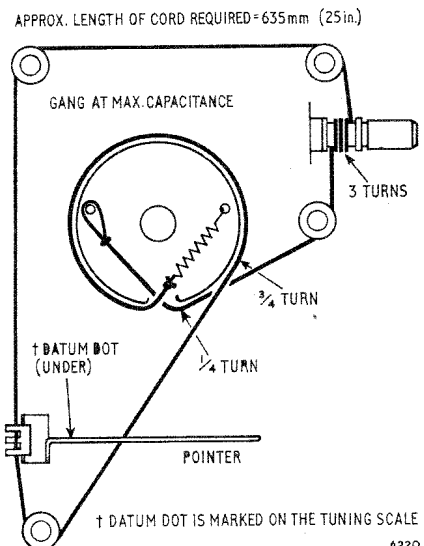


Fig. 2 Cord drive details

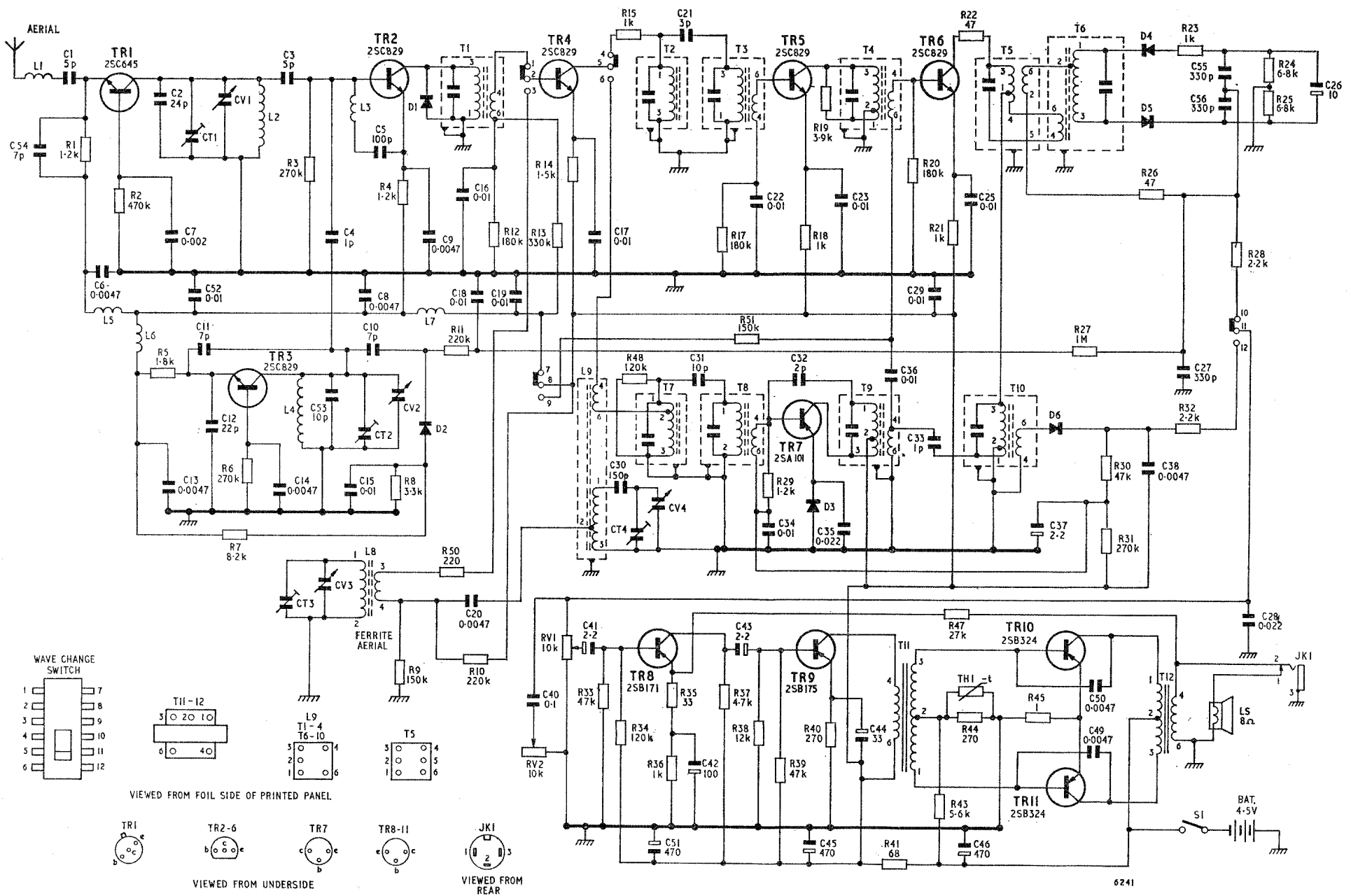


Fig. 3 Circuit diagram.

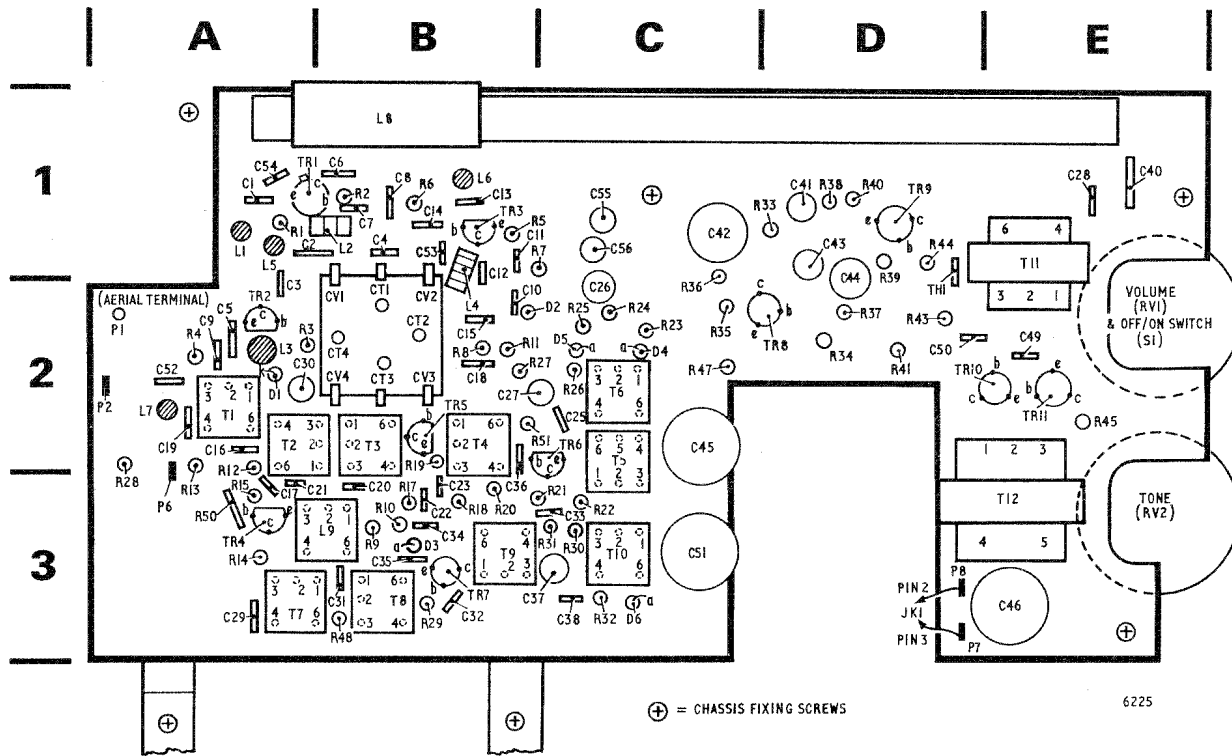


Fig. 4 Component layout

Note: For component locations, see location column in Parts lists on pages 5 and 6.

NOTE: Voltages indicated are approximate and negative with respect to chassis. Measured with 20,000 ohms per volt meter under no signal conditions. Volume control set to minimum.

Transistor Ref.	Waveband	Collector volts	Base volts	Emitter volts
TR1	MW	—	—	—
	VHF	—	2	3.5
TR2	MW	—	—	—
	VHF	—	1.8	3.2
TR3	MW	—	—	—
	VHF	—	2.3	3
TR4	MW	—	1.8	3
	VHF	0.6	1.8	3
TR5	MW	—	1.9	3.2
	VHF	—	1.9	3.2
TR6	MW	—	2.5	3.7
	VHF	—	2	3.2
TR7	MW	4.2	0.5	0.3
	VHF	4	0.5	0.3
TR8	MW	1	0.7	0.6
	VHF	1	0.7	0.6
TR9	MW	3.9	0.7	0.6
	VHF	3.7	0.7	0.6
TR10	MW	4.5	0.1	—
	VHF	4.5	0.1	—
TR11	MW	4.5	0.1	—
	VHF	4.5	0.1	—

## PARTS LIST

### CAPACITORS

Ref.	*Location	Value (pF) (μF)	Type	Rating V	Part Number
C1	A1	5	Ceramic		AP57891
C2	A1	27	"		AP57892
C3	A2	5	"		AP57891
C4	B1	1	"		AP57893
C5	A2	100	"		AP57894
C6	B1	4700	"		AP57895
C7	B1	2200	"		AP57896
C8	B1	4700	"		AP57895
C9	A2	4700	"		AP57895
C10	B2	7	"		AP57897
C11	C1	7	"		AP57897
C12	B1	22	"		AP57898
C13	B1	4700	"		AP57895
C14	B1	4700	"		AP57895
C15	B2		"		AP57899
C16	A2	0-01	"		AP57899
C17	A3	0-01	"		AP57899
C18	B2	0-01	"		AP57899
C19	A2	0-01	"		AP57899
C20	B3	4700	Mylar		AP57900
C21	A3	3	Ceramic		AP57901
C22	B3	0-01	"		AP57899
C23	B3	0-01	"		AP57899
C24	—	—	—		—
C25	C2	0-01	"		AP57899
C26	C2	10	Elect	6-3	AP57902
C27	B2	330	"		—
C28	E1	0-022	Mylar		AP57903
C29	A3	0-01	Ceramic		AP57899
C30	A2	150	Polyethylene		AP57904
C31	B3	10	Ceramic		AP57905
C32	B3	2	"		AP57906
C33	C3	1	"		AP57893
C34	B3	0-01	"		AP57899
C35	B3	0-022	"		AP57907
C36	B3	0-01	"		AP57899
C37	B3	2-2	Elect.	16	AP57908
C38	C3	4700	Mylar		AP57900
C39	—	—	—		—
C40	E1	0-1	Mylar		AP57909
C41	D1	2-2	Elect.	16	AP57908
C42	C1	100	"	10	AP57910
C43	D1	2-2	"	16	AP57908
C44	D1	33	Elect.	6-3	AP57911
C45	C2	470	"	6-3	AP57912
C46	E3	470	"	6-3	AP57912
C47	—	—	—		—
C48	—	—	—		—
C49	E2	4700	Mylar		AP57900
C50	D2	4700	"		AP57900
C51	C3	470	Elect.	16	AP57912
C52	A2	0-01	Ceramic		AP57899
C53	B1	7	"		AP57897
C54	A1	1	"		AP57893
C55	C1	330	Polyethylene		AP57913
C56	C1	330	"		AP57913

### VARIABLE CAPACITORS

Ref.	*Location	Value (pF)	Function	Part Number
CT1	B2		V.H.F. r.f. trimmer	AP57720 (complete)
CT2	B2		V.H.F. osc. trimmer	
CT3	B2		M.W. aerial trimmer	
CT4	B2		M.W. osc. trimmer	
CV1	B2		Tuning gang	AP57720 (complete)
CV2	B2			
CV3	B2			
CV4	B2			

### RESISTORS

Ref.	*Location	Value	Type	Tol. %	Rating (Watts)	Part Number
R1	A1	1-2k	C			AP57766
R2	B1	470k	C			AP57767
R3	A2	270k	C			AP57768
R4	A2	1-2k	C			AP57766
R5	C1	1-8k	C			AP57769
R6	B1	68k	C			AP57770
R7	C1	8-2k	C			AP57771
R8	B2	4-7k	C			AP57772
R9	B3	150k	C			AP57773
R10	B3	220k	C			AP57774
R11	B2	220k	C			AP57774
R12	A2	180k	C			AP57775
R13	A3	330k	C			AP57872

Ref.	*Location	Value	Type	Tol. %	Rating (Watts)	Part Number
R14	A3	1-5k	C			AP57873
R15	A3	1k	C			AP57874
R16	—	—	—			—
R17	B3	180k	C			AP57775
R18	B3	1k	C			AP57874
R19	B2	10k	C			AP57875
R20	B3	180k	C			AP57775
R21	C3	1k	C			AP57874
R22	C3	47	C			AP57876
R23	C2	1k	C			AP57874
R24	C2	6-8k	C			AP57877
R25	C2	6-8k	C			AP57877
R26	C2	47	C			AP57876
R27	C2	1M	C			AP57878
R28	A3	2-2k	C			AP57879
R29	B3	1-2k	C			AP57766
R30	C3	47k	C			AP57880
R31	C3	270k	C			AP57768
R32	C3	2-2k	C			AP57879
R33	D1	47k	C			AP57880
R34	D2	120k	C			AP57881
R35	C2	33	C			AP57882
R36	C2	1k	C			AP57874
R37	D2	4-7k	C			AP57883
R38	D1	12k	C			AP57784
R39	D1	47k	C			AP57880
R40	D1	270	C			AP57885
R41	D2	68	C			AP57886
R42	—	—	—			—
R43	D2	5-6k	C			AP57887
R44	D1	270	C			AP57885
R45	E2	1	C			AP57888
R46	—	—	—			—
R47	C2	27k	C			AP57889
R48	B3	120k	C			AP57881
R49	—	—	—			—
R50	A3	220	C			AP57890
R51	C2	150k	C			AP57773

### VARIABLE RESISTORS

Ref.	*Location	Value (ohms)	Function	Part Number
RV1	E2	10k	Volume control with switch	AP57730
RV2	E3	10k	Tone control	AP57731

### THERMISTORS

Ref.	*Location	Type	Part Number
TH1	D1	D32S	AP57788

### INDUCTORS AND TRANSFORMERS

Ref.	*Location	Function	D.C. Resistance (ohms)	Part Number
L1	A1	F.M. coupling coil	less than 0-5	AP57750
L2	B1	F.M. r.f. coil	less than 0-5	AP57751
L3	A2	Choke coil	less than 0-5	AP57752
L4	B2	F.M. Osc. coil	less than 0-5	AP57753
L5	A1	Choke coil	less than 0-5	AP57754
L6	B1	Choke coil	less than 0-5	AP57754
L7	A2	Choke coil	less than 0-5	AP57754
L8	B1	M.W. aerial coil	Pins 1 & 2 6 Pins 3 & 4 less than 0-5	AP57755
L9	B3	A.M. Osc. coil	Pins 1 & 3 4	
T1	A2	1st IFT (F.M.)	Pins 4 & 6 less than 0-5 Pins 1 & 3 less than 0-5	AP57756
T2	A2	2nd IFT (F.M.)	Pins 1 & 3 less than 0-5	AP57757
T3	B2	3rd IFT (F.M.)	Pins 1 & 3 less than 0-5 Pins 4 & 6 less than 0-5	AP57758
T4	B2	4th IFT (F.M.)	Pins 1 & 3 less than 0-5 Pins 4 & 6 less than 0-5	AP57758
T5	C2	Ratio transformer (F.M.)	Pins 3 & 4 less than 1 Pins 2 & 6 less than 0-5	AP57759
T6	C2	Ratio transformer (F.M.)	Pins 1 & 3 less than 0-5 Pins 4 & 6 less than 0-5	AP57760
T7	A3	1st IFT (A.M.)	Pins 1 & 3 7	AP57761
T8	B3	2nd IFT (A.M.)	Pins 1 & 2 3-5 Pins 4 & 6 less than 0-5	AP57762
T9	B3	3rd IFT (A.M.)	Pins 1 & 3 7 Pins 4 & 6 less than 0-5	AP57762
T10	C3	4th IFT (A.M.)	Pins 1 & 3 6 Pins 4 & 6 less than 0-5	AP57762
T11	E1	Driver transformer	Pins 1 & 3 100 Pins 4 & 6 120	AP57764
T12	E3	Output transformer	Pins 1 & 3 3 Pins 4 & 6 less than 0-5	AP57763

\* Use this column in conjunction with Fig. 4 on page 4.

**TRANSISTORS AND DIODES**

Ref.	*Location	Type	Function	Part Number
TR1	A1	2SC645	R.F. amplifier (F.M.)	AP57776
TR2	A2	2SC829	Mixer (F.M.)	} AP57777
TR3	B1	2SC829	Oscillator (F.M.)	
TR4	A3	2SC829	2nd I.F. amplifier (F.M.)	
			Mixer oscillator (A.M.)	
TR5	B2	2SC829	3rd I.F. amplifier (F.M.)	} AP57778
TR6	C2	2SC829	4th I.F. amplifier (F.M.)	
			3rd I.F. amplifier (A.M.)	
TR7	B3	2SA101	2nd I.F. amplifier (A.M.)	AP57779
TR8	D2	2SB171	Audio amplifier	AP57781
TR9	D1	2SB175	Driver stage	AP57782
TR10	D2	2SB 324	} Push-Pull Output	} AP57785
TR11	E2	2SB 324		
D1	A2	SD46	Damping diode (F.M.)	} AP57787
D2	C2	MA 311	A.F.C. diode (Varicap) (F.M.)	
D3	B3	SD46	Current stabiliser (A.M.)	AP57786
D4	C2	SD46 (1)	} Detector (F.M.)	} AP57758
D5	C2	SD46 (1)		
D6	C3	SD46	Detector and A.G.C.	

**CABINET**

Title	Description	Part Number
Battery lid assembly	complete	AP57694
Cabinet front assembly	complete, less loudspeaker and chassis	AP57678
Cabinet rear assembly	complete, less telescopic aerial rod	AP57685
Cabinet unit assembly	complete	AP57655
Window	scale	AP57681

**CHASSIS**

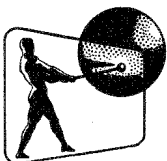
Title	Description	Part Number
Contact socket	for telescopic aerial	AP57673
Dial cord	(600 mm)	AP57724
Dial drum	on gang	AP57721
Dial scale		AP57714
Dial pointer assembly		AP57717
Ferrite rod	less coils	AP57719
Knob	Tone control	AP57732
Knob	Tuning	AP57657
Knob	Volume control	AP57733
Printed cct. board assembly	complete with components	AP57749
Spring for dial drum	cord drive fixing	AP57723
Switch, wavechange	VHF-MW	AP57725
Tuning shaft bearing	black plastic	AP57734

**MISCELLANEOUS**

Title	Description	Part Number
Band indicating cover		AP57727
Band indicating plate	less spring	AP57729
Band indicating spring		AP57728
Battery sleeve		AP57658
Earphone jack		AP57661
Speaker	8 ohms	AP57660
Telescopic aerial		AP57662
VHF/MW	indicating plate	AP57726

\* Use this column in conjunction with Fig. 4 on page 4.

**THE SERVICE DEPARTMENT**



**RANK BUSH MURPHY**

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