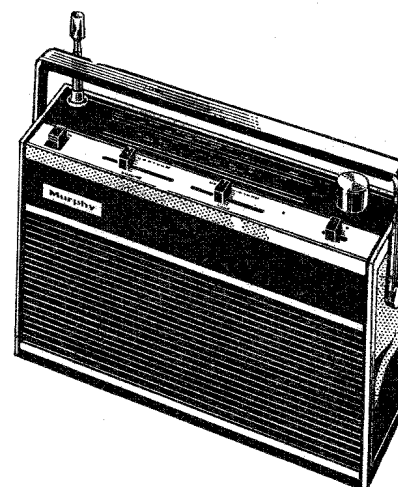


BUSH | MURPHY

SERVICE INFORMATION

MODELS VTR227 & BA838 RADIO RECEIVER



BA838

SPECIFICATION

GENERAL

Models VTR227 and BA838 are fully transistorised mains or battery operated portable AM-FM radio receivers designed to cover Long, Medium and VHF bands. The receivers are provided with an internal ferrite rod aerial for the LW and MW bands and a telescopic rod aerial for the VHF band. They incorporate an Automatic Frequency control circuit which is operative on VHF band only.

DIMENSIONS AND WEIGHT

	BA838	VTR227	Handle Position
Height :	168mm (6.6 in.) or 147mm (5.8 in.)	173mm (6.8 in.) or 150mm (5.9 in.)	erect down
Width :	236mm (9.3 in.)	238mm (9.38 in.)	
Depth :	67mm (2.64 in.) or 84mm (3.3 in.)	67mm (2.64 in.) or 85mm (3.34 in.)	erect down
Weight:	1.1 kg (2.42 lb.)	1.1 kg (2.42 lb.)	excluding battery

The above are overall dimensions including projections.

CONTROLS

Top left to right: Off-On, Volume, Tone and Wavechange switch.

MAINS SUPPLY AND CONSUMPTION

240 volts A.C., 50 Hz 1 Watt.

Note: Insertion of the Mains Plug into the socket automatically disconnects the internal battery.

BATTERY SUPPLY AND CONSUMPTION

Three 1½ volt cells, SP11 or equivalent. The battery consumption is 16mA quiescent and 21mA average listening level.

WAVEBANDS

LW Band : 1000 to 2000 metres (300 to 150 kHz).
MW Band : 186 to 582 metres (1615 to 515 kHz).
VHF Band : 87.5 to 104 MHz.

AUTOMATIC GAIN CONTROL

One controlled stage on AM bands only.

AUTOMATIC FREQUENCY CONTROL

Automatic Frequency Control is provided for the VHF band only.

INTERMEDIATE FREQUENCY

AM Bands : 470 kHz ±3kHz. Oscillator high with respect to signal.

FM Band : 10.7 MHz ±0.1 MHz. Oscillator low with respect to signal.

SENSITIVITY

LW Band : Not greater than 400µV/m.

MW Band : Not greater than 180µV/m.

VHF Band : Not greater than 4µV (actual signal voltage at the base of telescopic rod aerial).

POWER OUTPUT

Not less than 400mW at 1000Hz for 10% T.H.D.

LOUDSPEAKER

70 × 102mm (2.75 × 4 in.) elliptical cone. Impedance 8 ohms.

TAPE SOCKET

A 5 pin DIN type socket is fitted to connect a tape recorder to the receiver for recording purposes only. The source impedance of the tape recording signal is 8k ohms approximately.

DISMANTLING

- 1 Remove the two cabinet back retaining screws, and then remove the cabinet back.
- 2 Pull off the On/Off, Volume, Tone, Band selector and the Tuning control knobs.
- 3 Pull out the telescopic rod aerial until its lower part is out to its fullest extent.
- 4 Remove the four chassis fixing screws one located on top extreme left hand corner one on top right hand corner (below telescopic rod aerial) and two at the bottom left and right hand corners of the printed circuit board.
- 5 Remove the two rubber cushions inserted between the speaker and the printed circuit board.
- 6 To remove the chassis, lift the bottom right hand corner then the left side of the chassis to clear the handle pivot fixing
- 7 For a complete removal of the chassis, note and disconnect the leads to the chassis.

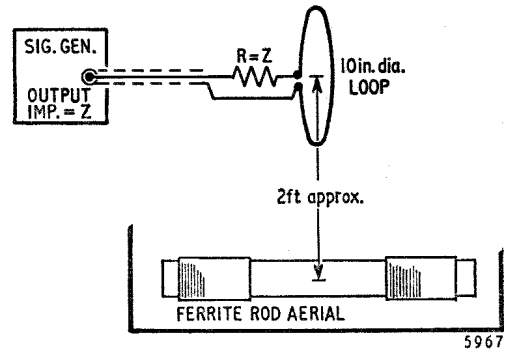


Fig. 1. Signal generator coupling

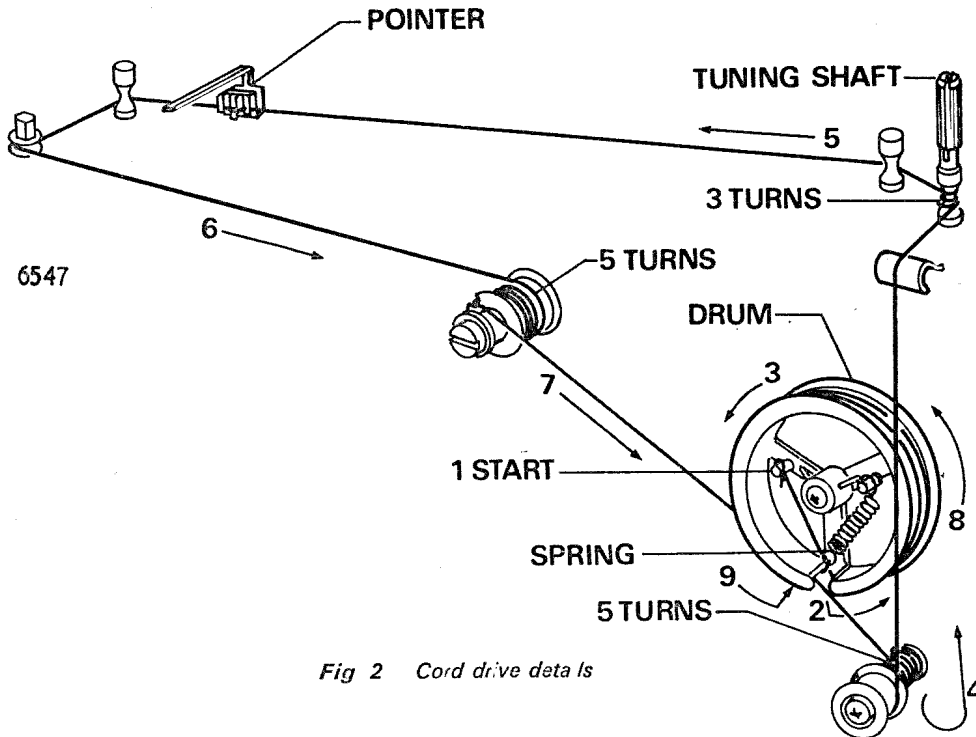


Fig 2 Cord drive details

TRANSISTOR VOLTAGES

Note: Voltage readings were measured across the emitter resistors with the receiver switched to MW under no signal conditions, using a 20,000 ohms/volt meter.

Transistor	Voltage across emitter R	Transistor	Voltage across emitter R
Q1	0.85V	Q7	0.001V
Q2	1.6V	Q8	0.1V
Q3	0.06V	Q9, Q10	6mA measured in lead from centre tap on T11 and negative line.
Q4	0.6V		
Q5	0.6V		
Q6	1.7V		

VTR227 & BA838

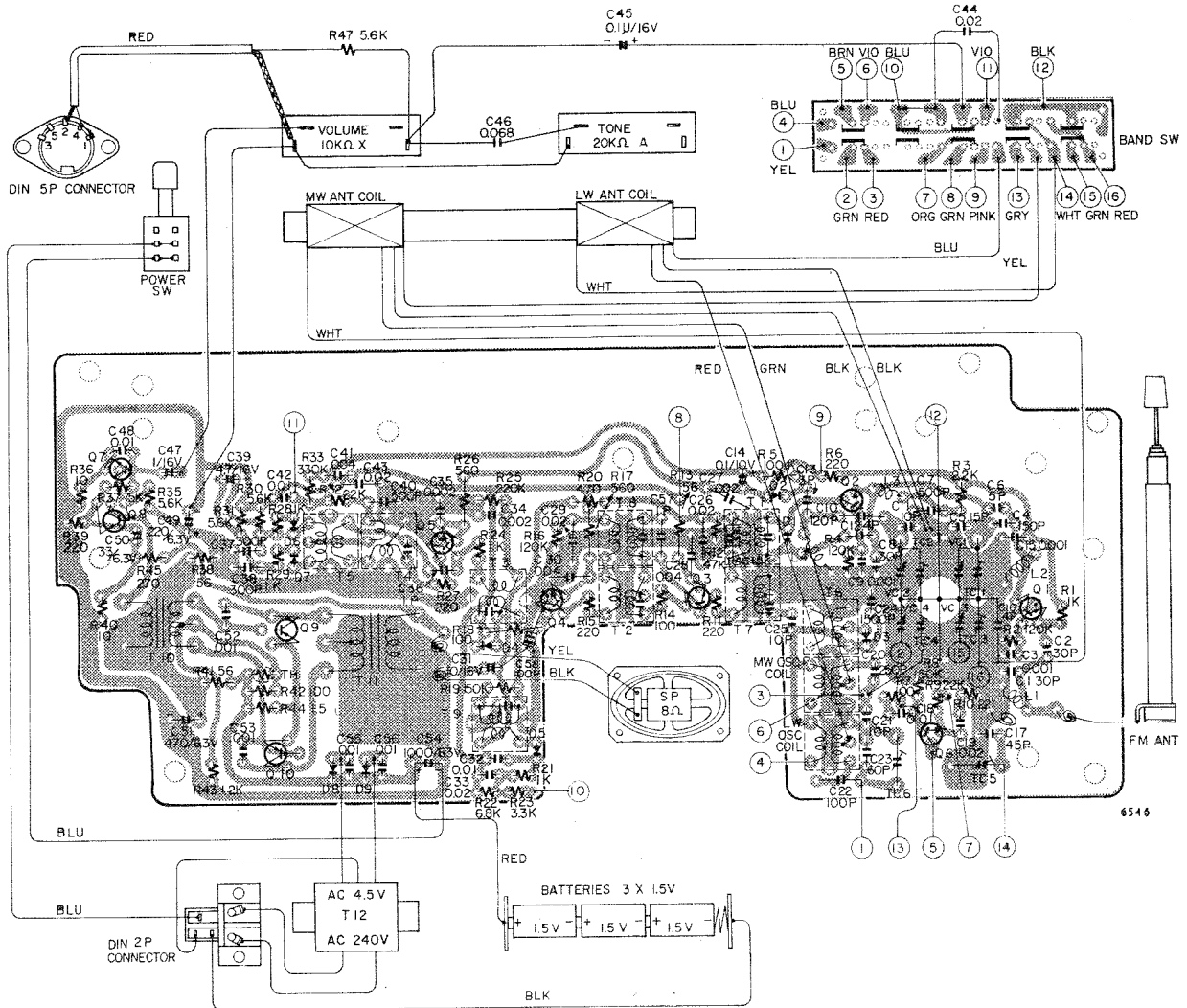


Fig. 4. Print side of component panel

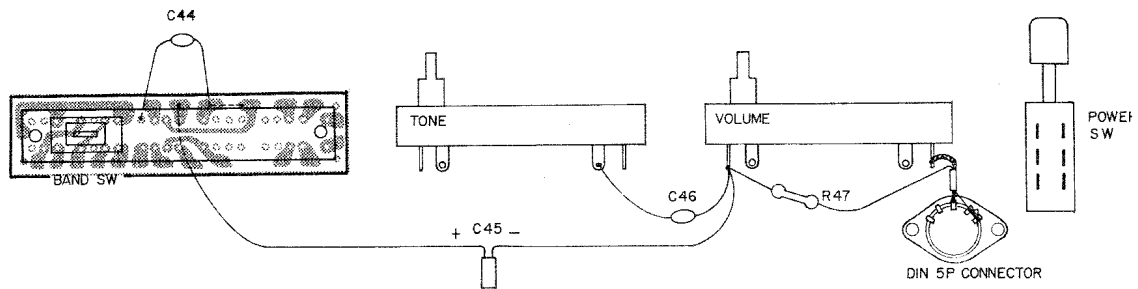


Fig. 5. Component layout

ALIGNMENT PROCEDURE

1 PRELIMINARY NOTES

(AM and FM Circuits).

(i) Equipment required:

- (a) A suitable AM Signal Generator to cover 140 kHz to 1700 kHz with 400 Hz modulation.
- (b) An FM Sweep Generator with marker at 10.7 MHz.
- (c) An FM Signal Generator to cover 87 MHz to 110 MHz.
- (d) An Oscilloscope.
- (e) A Power Output meter 500mW, 8 ohms impedance.
- (f) A Loop aerial (Fig. 1).

(ii) Set the Volume control to maximum unless otherwise stated.

(iii) Disconnect the loudspeaker and connect the Output meter in its place.

2 A.M. CIRCUITS

Notes:—

- (a) See preliminary notes (i)a, (i)e, (i)f, (ii) and (iii).
- (b) The signal generator should be coupled to the receiver by a 10 inch 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.

(i) I.F. ALIGNMENT

- 1 Switch the receiver to Medium waveband and set the tuning scale to approximately 300 metres.
- 2 Inject a signal of 470 kHz, modulated 30% at 400 Hz and align I.F. transformers T9, T8, T7 and T6 in that order for maximum audio output.

(ii) R.F. ALIGNMENT

Operation	Wave-band	Sig. Gen. Freq. (mod. 30% 400 Hz)	Tuning Pointer Setting	Adjust for Max. Output
1	MW	505 kHz	L.F. end of scale (Gang closed)	MW Osc. coil
2	MW	1650 kHz	H.F. end of scale (Gang opened)	TC4
3	MW	600 kHz	500 metres	MW Aerial Coil
4	MW	1500 kHz	200 metres	TC3

Repeat operations 1 and 2 for correct calibration and 3 and 4 for correct tracking.

5	LW	145 kHz	L.F. end of scale (Gang closed)	LW Osc. coil
6	LW	310 kHz	H.F. end of scale (Gang opened)	TC6
7	LW	167 kHz	1800 metres	LW Aerial coil
8	LW	250 kHz	1200 metres	TV5

Repeat operations 5 and 6 for correct calibration and 7 and 8 for correct tracking.

3 F.M. CIRCUITS

Note:—

(a) See preliminary notes (i)b, (i)c, (i)d, (i)e, (ii) and (iii).

(i) I.F. ALIGNMENT

Note:—

(a) Before commencing alignment detune T5.

- 1 Connect Sweep Generator to the VHF aerial and chassis, and Oscilloscope to the junction of R32/R33.
- 2 Switch the receiver to VHF and set the tuning pointer to approximately 94 MHz.
- 3 Inject a signal with a marker at 10.7 MHz (unmodulated) and adjust I.F. transformers T4, T3, T2 and T1 for a maximum symmetrical response centred at 10.7 MHz marker.
- 4 Adjust T5 for a linear and symmetrical 'S' shaped curve centred at 10.7 MHz marker.
- 5 Disconnect the Sweep Generator and the Oscilloscope.

(ii) R.F. ALIGNMENT

Note:—

(a) Connect FM Signal Generator to the VHF aerial and chassis and follow the procedure below:

Operation	Wave-band	Sig. Gen. Freq. (modulated)	Tuning Pointer Setting	Adjust for Max. Output
1	VHF	87.2 MHz	L.F. end of scale (Gang closed)	L4
2	VHF	106 MHz	H.F. end of scale (Gang opened)	TC2

Repeat operations 1 and 2 for correct calibration.

3	VHF	90 MHz	90 MHz	L2
4	VHF	102 MHz	102 MHz	TC1

Repeat operations 3 and 4 until tracking is correct.

PARTS LIST

ABBREVIATIONS:

C—CARBON E—ELECTROLYTIC S—SILVER

CAPACITORS

Ref.	Value	Type	Tol. (±%)	Rating	Part Number
C1	30 pF	C	10		AP90239
C2	30 pF	C	10		AP90239
C3	0.001 μF	C	+80-20		AP92080
C4	150 pF	C	10		AP92948
C5	15 pF	C	10		AP58531
C6	5 pF	C	0.5 pF		AP92076
C7	500 pF	C	10		AP90243
C8	30 pF	C	10		AP90239
C9	0.001 μF	C	+80-20		AP92080
C10	120 pF	C	5	10V	AP92945
C11	10pF	C	5		AP92943
C12	4 pF	C	5		AP90227
C13	3 pF	C	5		AP92074
C14	0.1 μF	E	—		AP93643
C15	0.001 μF	C	+80-20		AP92080
C16	4 pF	C	5		AP90227
C17	45 pF	C	10		AP92947
C18	0.01 μF	C	+80-20		AP90246
C19	0.02 μF	C	20		AP92082
C20	250 pF	S	5		AP90888
C21	10 pF	C	5		AP92943
C22	100 pF	C	5		AP92944
C23	60 pF	C	5		AP90234
C24	1500 pF	S	5		AP92941
C25	10 pF	C	5		AP92943
C26	0.02 μF	C	20		AP92082
C27	0.02 μF	C	20		AP92082
C28	0.02 μF	C	+80-20		AP94104
C29	0.02 μF	C	20		AP92082
C30	0.04 μF	C	+80-20		AP90248
C31	10 μF	E	—	16V	AP92939
C32	0.01 μF	C	+80-20		AP90246
C33	0.02 μF	C	20		AP92082
C34	0.002 μF	C	20		AP92801
C35	0.002 μF	C	20		AP92081
C36	1 pF	C	±5 pF		AP90237
C37	300 pF	C	10		AP90242
C38	300 pF	C	10		AP90242
C39	4.7 μF	E	—	16V	AP92070
C40	500 pF	C	10		AP90243
C41	0.04 μF	C	+80-20		AP90248
C42	0.01 μF	C	+80-20		AP94104
C43	0.02 μF	C	20		AP93609
C44	0.02 μF	C	20		AP93609
C45	0.1 μF	E	—	16V	AP93600
C46	0.068 μF	—	—		AP93644
C47	1 μF	E	—	16V	AP93645
C48	0.01 μF	C	+80-20		AP90246
C49	220 μF	E	—	6.3V	AP90256
C50	33 μF	E	—	6.3V	AP94256
C51	470 μF	E	—	6.3V	AP90257
C52	0.01 μF	C	+80-20		AP90246
C53	0.01 μF	C	+80-20		AP90246
C54	1000 μF	E	—	6.3V	AP92938
C55	0.01 μF	C	+80-20		AP90246
C56	0.01 μF	C	+80-20		AP90246
C57	1 pF	C	±5 pF		AP90237
C58	100 pF	C	5		AP92944

RESISTORS

Ref.	Value (ohms)	Type	Rating (watts)	Part Number
R1	1k	C	1/4	AP93370
R2	120k	C	1/4	AP93622
R3	2.2k	C	1/4	AP90211
R4	120k	C	1/4	AP93622
R5	100k	C	1/4	AP90220

RESISTORS—Continued

Ref.	Value (ohms)	Type	Rating (watts)	Part Number
R6	220	C	1/4	AP93364
R7	100	C	1/4	AP93616
R8	150k	C	1/4	AP93623
R9	2.2k	C	1/4	AP90211
R10	22	C	1/4	AP94111
R11	220	C	1/4	AP93364
R12	47k	C	1/4	AP93620
R13	56	C	1/4	AP93615
R14	100	C	1/4	AP93616
R15	220	C	1/4	AP93364
R16	120k	C	1/4	AP93622
R17	560	C	1/4	AP93619
R18	100	C	1/4	AP93616
R19	150k	C	1/4	AP93623
R20	470	C	1/4	AP93618
R21	1k	C	1/4	AP93370
R22	6.8k	C	1/4	AP58559
R23	3.3k	C	1/4	AP90213
R24	1k	C	1/4	AP93370
R25	220k	C	1/4	AP93624
R26	560	C	1/4	AP93619
R27	220	C	1/4	AP93364
R28	1k	C	1/4	AP93370
R29	1k	C	1/4	AP93370
R30	5.6k	C	1/4	AP90214
R31	5.6k	C	1/4	AP90214
R32	2.2k	C	1/4	AP90211
R33	330k	C	1/4	AP90223
R34	—	—	—	—
R35	5.6k	C	1/4	AP94730
R36	10	C	1/4	AP90220
R37	91k	C	1/4	AP94780
R38	56	C	1/4	AP93619
R39	220	C	1/4	AP93364
R40	10	C	1/4	AP90200
R41	56	C	1/4	AP93619
R42	100	C	1/4	AP93616
R43	1.5k	C	1/4	AP93178
R44	1.5	C	1/4	AP93614
R45	270	C	1/4	AP93617
R46	—	—	—	—
R47	5.6k	C	1/4	AP90214

TRANSISTORS AND DIODES

Ref.	Type	Part Number
Q1	2SC-928C	AP58981
Q2	2SC-930D	AP90139
Q3	2SC-930E	AP58988
Q4	2SC-928D	AP58983
Q5	2SC-928D	AP58983
Q6	2SC-929C	AP90141
Q7	2SC-537F1	AP58989
Q8	2SC-537F2	AP58990
Q9	2SB-22B	AP58984
Q10	2SB-22B	AP58984
D1	1S-188AM	AP90146
D2	1S-553	AP90149
D3	1S-188AM	AP90146
D4	CDG-22	AP90148
D5	CDG-22	AP90148
D6	1S-188FM	AP90147
D7	1S-188FM	AP90147
D8	SR-1K-1	AP92954
D9	SR-1K-1	AP92954

THERMISTOR

Ref.	Type	Part Number
TH1	100R	AP90150

TRANSFORMERS AND INDUCTORS

Ref.	Function	Part Number	Ref.	Function	Part Number
L1	VHF Coil	AP92929	T4	10-7 1FT. D. Blue	AP90160
L2	I.F. Trap Coil	AP92931	T5	10-7 1FT. E. Pink	AP90161
L3	VHF Coil	AP92930	T6	470 1FT. A. Yellow	AP92934
L4	VHF Coil	AP92932	T7	470 1FT. B. White	AP90163
MW Osc. Coil	Red	AP90156	T8	470 1FT. C. White	AP92935
LW Osc. Coil	White	AP90157	T9	470 1FT. D. Black	AP92936
Ferrite Aerial	—	AP92933	T10	Input Transformer	AP92955
T1	10-7 1FT. A. Yellow	AP90158	T11	Output Transformer	AP92956
T2	10-7 1FT. B. Green	AP90159	Power Transformer	(mains)	AP92141
T3	10-7 1FT. C. Green	AP90159			

CABINET

Title	Description	Part Number	Title	Description	Part Number
Aerial	rotating telescopic	AP92951	Loudspeaker		AP92409
Cabinet front assembly		BA838	Pointer	VTR227	AP93573
Cabinet front assembly		VTR227	Mains transformer	VTR227	AP93589
Cabinet front	moulded	BA838	Mains lead	VTR227	AP93594
Cabinet front		VTR227	Socket mains 2 pin		AP92148
Cabinet back assembly		BA838	Socket output 5 pin Din		AP92147
Cabinet back assembly		BA838	Socket Din. 2 pin	VTR227	AP93590
Cabinet back assembly		VTR227	Switch slide with knob	wavechange	VTR227
Battery cover assembly		VTR227	Switch slide with knob	wavechange	BA838
Battery cover assembly		BA838			
Battery holder	cover assembly	BA838			
Dial scale		VTR227			
Dial scale		BA838			
Dial back plate		VTR227			
Dial back plate		BA838			
Handle metal		AP92113			
Handle plastic cover		BA838			
Handle pivot		AP93626			
Handle plastic cover		VTR227			
Knob control Tone/Volume		BA838			
Knob push-button On/Off		AP92116			
Knob tuning		AP92950			
Knob tuning		AP92115			
Knob tuning		VTR227			
Knob slider Volume/Tone		VTR227			
		AP93568			

CHASSIS

Title	Description	Part Number
Cord	drive	AP93636
Drum	—	AP92150
Pointer	—	AP93642
Pulley (2)	double plastic	AP93637
Pulley	single plastic	AP92126
Pulley	single, metal each end of dial scale	AP92122
Scale	back plate	AP92949
Slide	volume control	AP92143
Slide	tone control	AP92144
Switch	On/Off	AP92146
Spring	dial cord	AP92151