

## FM/AM 9-TRANSISTOR RADIO

### MODEL KH-980H

# SERVICE MANUAL

No. 128      1966. 10

## SPECIFICATIONS

CIRCUIT SYSTEM .....9-transistor superheterodyne  
 TUNING RANGE.....FM 86.5~108Mc  
                           AM 530~1,605kc

INTERMEDIATE  
 FREQUENCY .....FM 10.7Mc  
                           AM 455kc

TRANSISTOR COMPONENT

2SA435 .....FM R.F. Amp.  
 2SA235 .....FM Frequency Converter  
 2SA350 .....FM I.F. Amp. & AM Frequency  
                           Converter  
 2SA234 .....FM/AM I.F. Amp.  
 2SA234 .....FM/AM I.F. Amp.  
 2SB75 .....A.F. Amp.  
 2SB77 .....A.F. Amp.  
 2SB77 × 2 .....Class-B Push-pull Power Amp.

GERMANIUM DIODE

1N60 .....FM Limiter  
 1N34A .....AM A.G.C.  
 1N34A .....AM Detector & A.G.C.

1N60 × 2 .....FM Discriminator  
 1S85 .....FM A.F.C.

THERMISTOR  
 D-2B .....Temperature Compensator

POWER OUTPUT .....350mW (Maximum)  
                           220mW (Undistorted)

LOUDSPEAKER .....3" P.M. Speaker

EARPHONE JACK .....One. Hitachi magnetic earphone  
                           EL-216 is provided.

ANTENNA .....FM Telescopic antenna  
                           AM Ferrite-core antenna

POWER SOURCE.....DC 6V (JIS "UM-3" × 4, standard  
                           "AA" × 4 or equivalent)  
                           AC Adaptor (6V) available

CURRENT  
 CONSUMPTION .....FM 13mA (With no signal)  
                           AM 10mA (With no signal)

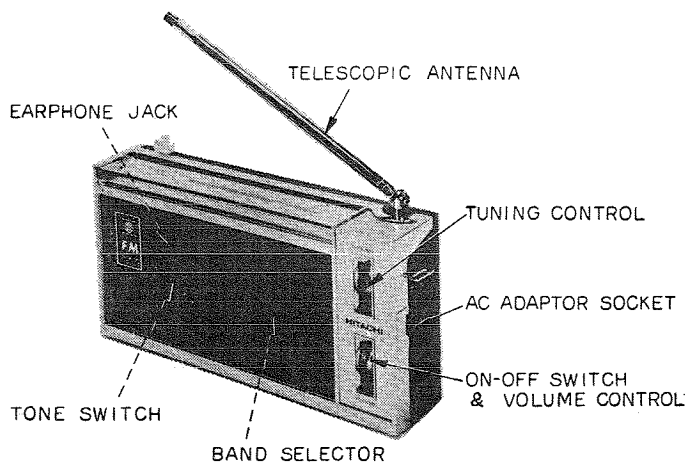
DIMENSIONS.....3 $\frac{3}{8}$ " (H) × 7 $\frac{1}{2}$ " (W) × 1 $\frac{3}{4}$ " (D)  
                           (97 × 189 × 43mm)

WEIGHT .....1.5 lbs. (600g) including batteries

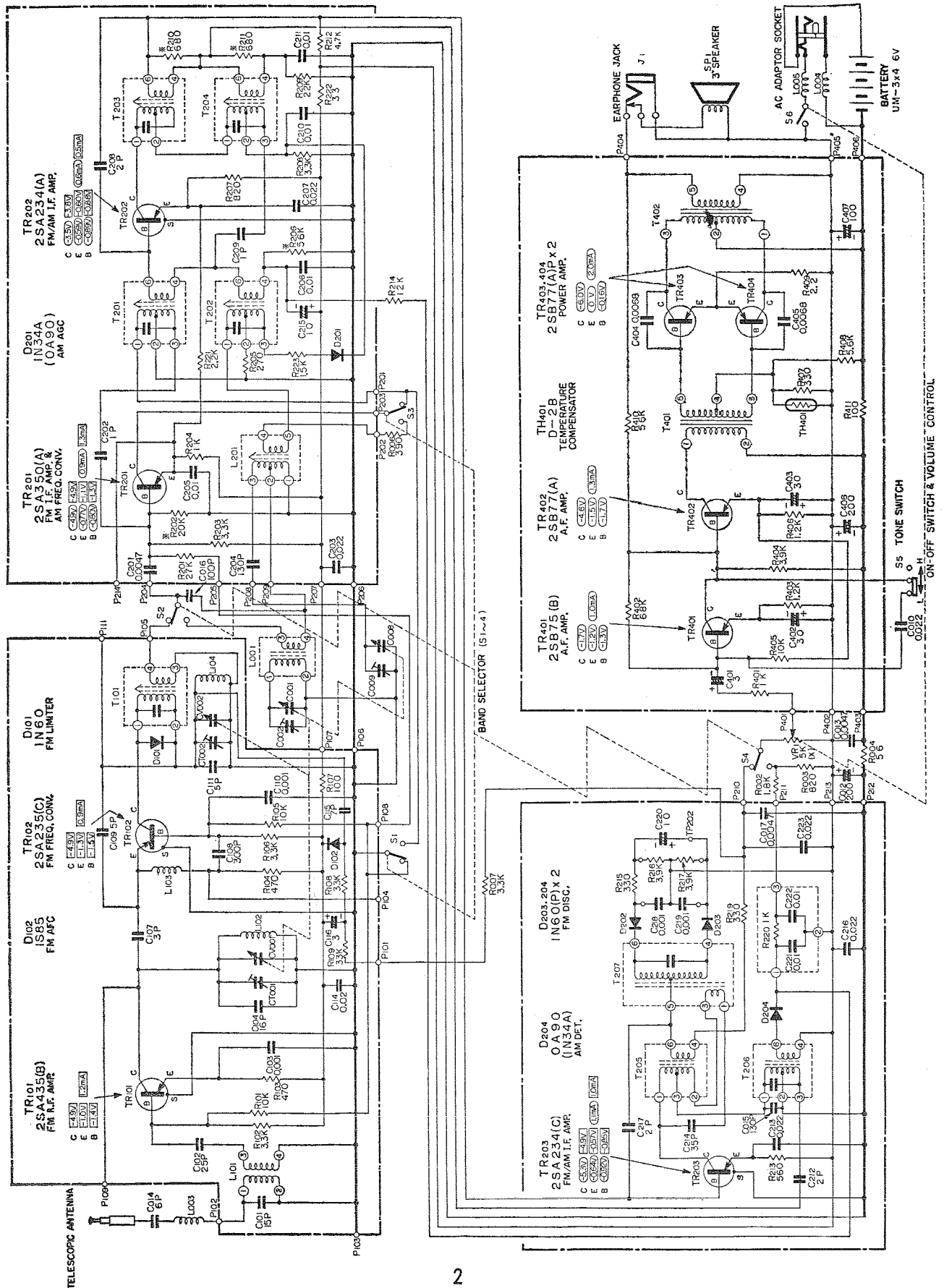
## DESCRIPTION

- 1) KH-980H operates both on battery and AC power.
- 2) Block circuit board employed in FM R.F. circuit, I.F. circuit and A.F. circuit gives the set compact styling and stable reception.
- 3) Four mesa type transistors and a drift type transistor provide high sensitivity.
- 4) Large sized 3" speaker and the audio output of 350mW produce rich, clear tone.
- 5) The set permits you easy handling and easy battery replacement.
- 6) Desired tone can be obtained with the tone control.

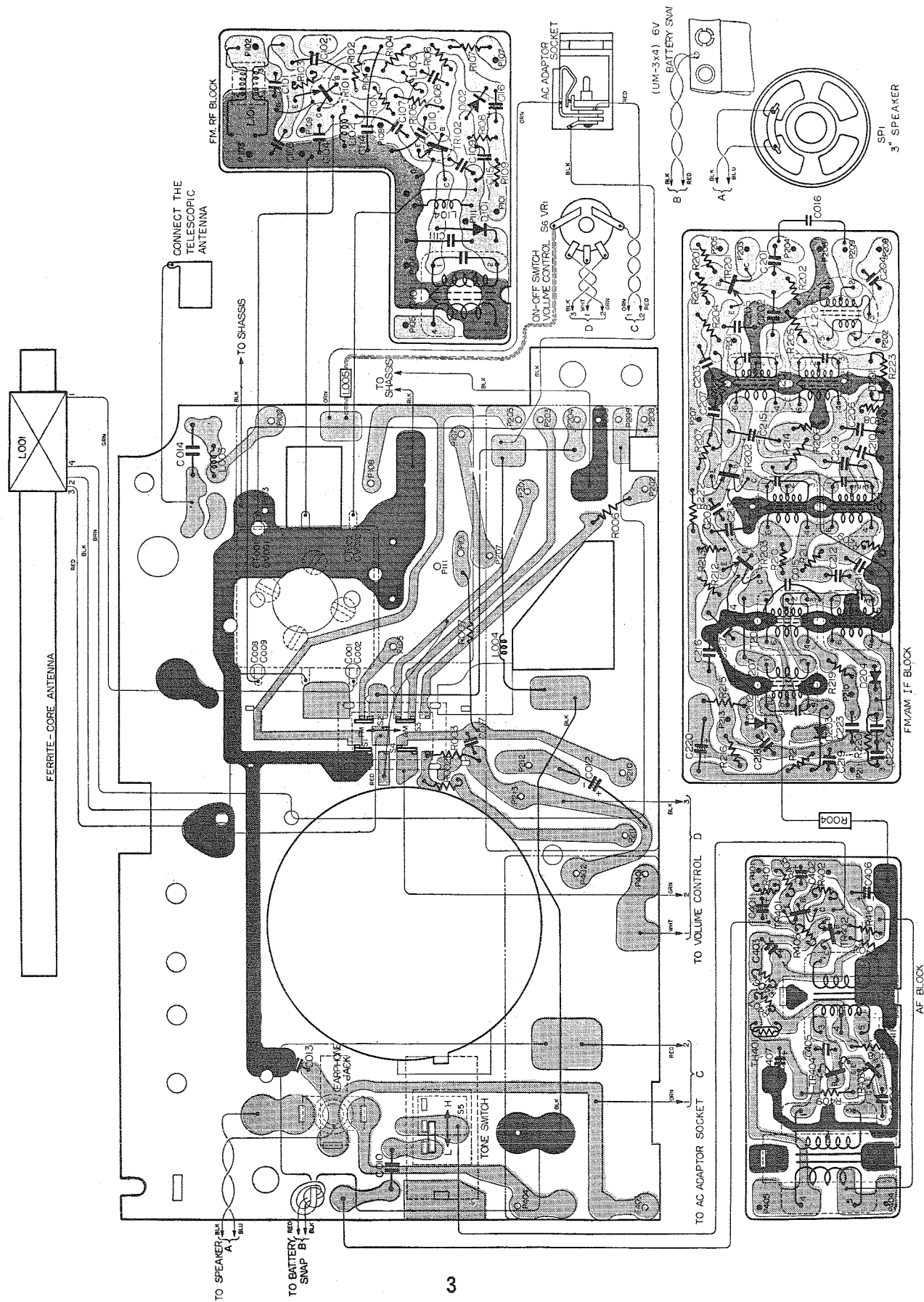
## NAMES OF THE PARTS



CIRCUIT DIAGRAM



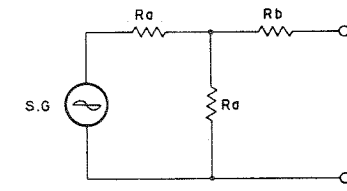
CIRCUIT BOARD DIAGRAM



ALIGNMENT PROCEDURE

1. Use batteries having the specified voltage. Voltage, when the switch is turned on (with no signal), must not be less than 5.5 V.
2. Turn the volume control knob to maximum (in case of FM-IF and FM-DISC, turn the knob to minimum), and set the tone switch at "L".
3. In case of AM alignment, connect the output of signal generator (modulated by 400% or 1000% 30%) to a loop antenna (4" in diameter, looped 2 or 3 turns), couple the loop antenna to the ferrite-core antenna. And connect the

4. Adjust with an insulated screw driver to prevent body-effect.
5. During alignment, be sure to adjust the output of the signal generator so that the reading on voltmeter may drop to minimum adjustable, as it rises according to adjustment.



Ra...Signal Generator Output Impedance  
 Rb... $(75 - \frac{R_a}{2})$  Ohms

Fig. 1

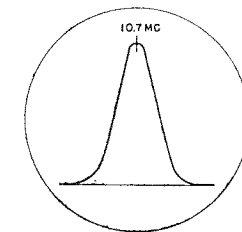


Fig. 2

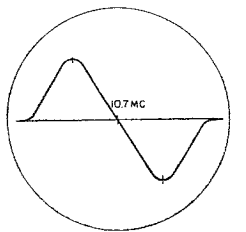


Fig. 3

Adjusted circuit	Using meter and connecting points	step	Dial Pointer setting	S.G. Freq.	Adjust for Max. Output
FM-IF	OSCILLOSCOPE.....Connect VERT. terminal of oscilloscope to P210 through proper amplifier of about 40 dB amplification. SWEEP GENERATOR.....Connect to P104. Connect 1kΩ resistor with 0.02μF capacitor in series and connect them between sweep generator and P104. MARKER GENERATOR.....Connect to P104. Then adjust as follows until the waveform shown in Fig. 2 is obtained.	①	High freq. end	10.7 ± 1Mc sweep	Remove T207 core and adjust T101, T201, T203, and T205
FM-DISC	OSCILLOSCOPE.....Same as FM-IF SWEEP GENERATOR.....Same as FM-IF MARKER GENERATOR.....Same as FM-IF Then adjust as follows until the waveform shown in Fig. 3 is obtained.	②	High freq. end	10.7 ± 1Mc sweep	Adjust T207 core for waveform centered at 10.7Mc marker Adjust T207 core until waveform maximum and minimum points are at the same distance from horizontal line as figured in Fig. 3, and until maximum and minimum points and 10.7Mc point on waveform are on a straight line.
AM-IF	SIGNAL GENERATOR.....Connect output terminal of AM signal generator to loop antenna. VACUUM TUBE VOLTMETER.....Connect AC probe of vacuum tube voltmeter to speaker terminals. Adjust as follows to gain maximum on voltmeter.	③ ④ ⑤	High freq. end	455kc	T202 T204 T206  Repeat steps ③, ④ and ⑤
FM-RF	SIGNAL GENERATOR.....Connect output terminal of FM signal generator to rod antenna. VACUUM TUBE VOLTMETER.....Same as in AM-IF Adjust as follows to gain maximum on voltmeter.	⑦ ⑧ ⑨ ⑩ ⑪ ⑫	Low freq. end High freq. end	85Mc 110.5Mc 90Mc signal 98Mc signal	L104 CT002 Repeat steps ⑦ and ⑧ L102 CT001 Repeat steps ⑩ and ⑪
AM-RF	Same as in AM-IF circuit alignment Adjust as follows to gain maximum on voltmeter	⑬ ⑭ ⑮ ⑯ ⑰ ⑱	Low freq. end High freq. end	515kc 1,670kc 600kc signal 1,400kc signal	L201 C009 Repeat steps ⑬ and ⑭ L001 C002 Repeat steps ⑯ and ⑰

SERVICE HINTS

- How to remove the printed circuit board**  
Loosen two boss and a tapping screw holding printed circuit board shown in Fig. 4.
- How to loop the dial cord**  
Follow the procedure below, referring to Fig. 5.
  - Cut out about 23" of dial cord.
  - Turn the variable capacitor fully counter-clockwise (to the maximum capacity position)
  - Loop the dial cord according to each arrow's direction as shown in Fig. 5 by using the spring and cord stopper.
  - Adjust the dial pointer to the punched mark in the back plate and fix it.

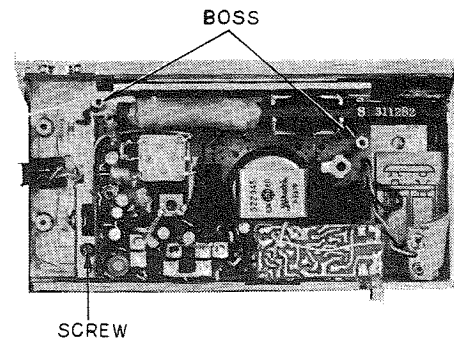


Fig. 4

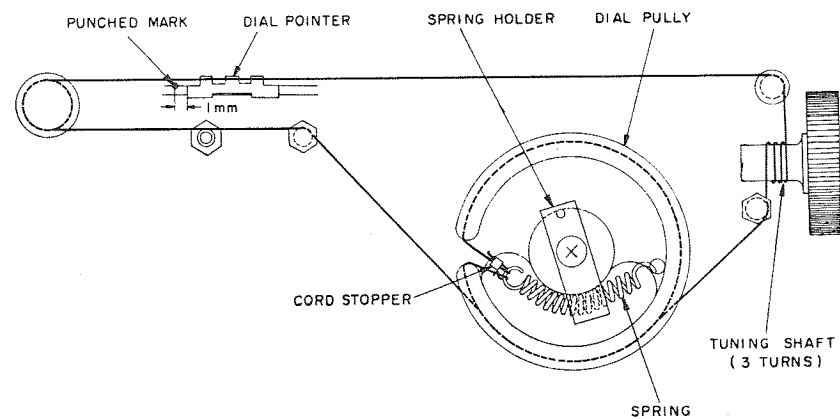


Fig. 5

REPLACEMENT PARTS

Symbol No.	Stock No.	Description	Symbol No.	Stock No.	Description
<b>TRANSISTORS :</b>					
TR101	573471	2 S A 435(B)	T 205	326025	FM I.F.
TR102	573366	2 S A 235(C)	T 206	322130	AM I.F.
TR201	573398	2 S A 350(A)	T 207	326024	discriminator
TR202	573427	2 S A 234(A)	T 401	441113	driver
TR203	573428	2 S A 234(C)	T 402	451101	output
TR401	573117	2 S B 75(B)	<b>COILS :</b>		
TR402	573103	2 S B 77(A)	L 001	311282	ferrite-core antenna
TR403	573003	2 S B 77(A)P	L 003	324003	FM choke
TR404			L 004	333048	choke
D 101	575005	Diode-Germanium 1N60	L 005	333116	choke
D 102	575024	Diode-Silicon 1S 85	L 101	318519	FM antenna
D 201	575001	Diode-Germanium 1N34A	L 102	318526	FM R.F.
D 202	575019	Diode-Germanium 1N60(P)	L 103	324003	FM trap
D 203			L 104	318531	FM oscillator
D 204	575001	Diode-Germanium 1N34A	L 201	316200	MW oscillator
TH401	576038	Thermistor D-2B	<b>CAPACITORS :</b>		
<b>TRANSFORMERS :</b>					
T 101	322327	FM I.F.	CV 001	282079	plastic variable
T 201	322333	FM I.F.	CV 002		
T 202	322128	AM I.F.	CT 001		
T 203	322334	FM I.F.	CT 002		
T 204	322127	AM I.F.	C 001		
			C 002		
			C 003		
			C 009		

Symbol No.	Stock No.	Description	Symbol No.	Stock No.	Description
C 010	275113	mylar 0.022μF ± 20%	R 103	137809	carbon film 470Ω ± 10% SRD¼SD
C 012	252232	electrolytic 200μF	R 104	137809	same as R103
C 013	274115	mylar 0.0047μF ± 20%	R 105	137401	same as R101
C 014	241812	ceramic, discal 6pF ± 0.5pF	R 106	137857	same as R102
C 015	233023	ceramic, cylindric 130pF ± 5%	R 107	137801	carbon film 100Ω ± 10% SRD¼SD
C 016	233010	ceramic, cylindric 100pF ± 5%	R 108	137407	carbon film 33kΩ ± 10% SRD¼SD
C 017	274115	same as C013	R 109	137407	same as R108
C 101	241828	ceramic, discal 15pF ± 10%	R 201	137906	carbon film 27kΩ ± 10% SRD¼SD
C 102	242810	ceramic, discal 25pF ± 10%	R 202	117158	carbon film 20kΩ ± 5% SRD¼PL
C 103	244016	ceramic, discal 0.001μF ± 80%	R 203	117357	carbon film 3.3kΩ ± 10% SRD¼PL
C 104	242422	ceramic, discal 16pF ± 10%	R 204	137601	carbon film 1kΩ ± 5% SRD¼SD
C 107	241821	ceramic, discal 3pF ± 0.5pF	R 205	117306	carbon film 270Ω ± 10% SRD¼PL
C 108	233006	ceramic, cylindric 300pF ± 10%	R 206	117169	carbon film 56kΩ ± 5% SRD¼PL
C 109	241852	ceramic, discal 5pF ± 0.5pF	R 207	137573	carbon film 820Ω ± 5% SRD¼SD
C 110	244016	same as C103	R 208	117357	same as R203
C 111	241822	ceramic, discal 5pF ± 0.5pF	R 209	117405	carbon film 22kΩ ± 10% SRD¼PL
C 114	245018	ceramic, discal 0.02μF ± 80%	R 210	117071	carbon film 680Ω ± 5% SRD¼PL
C 115	241830	ceramic, discal 7pF ± 0.5pF	R 211	117071	same as R210
C 116	252213	electrolytic 3μF	R 212	117359	carbon film 4.7kΩ ± 10% SRD¼PL
C 201	274115	mylar 0.0047μF ± 20%	R 213	132285	composition 560Ω ± 10% RC¼BE
C 202	241827	ceramic, discal 1pF ± 0.5pF	R 214	137902	carbon film 12kΩ ± 10% SRD¼SD
C 203	275113	mylar 0.022μF ± 20%	R 215	137807	carbon film 330Ω ± 10% SRD¼SD
C 204	233023	ceramic, cylindric 130pF ± 5%	R 216	137858	carbon film 3.9kΩ ± 10% SRD¼SD
C 205	275111	mylar 0.01μF ± 20%	R 217	137858	same as R216
C 206	275111	same as C205	R 219	137807	carbon film 330Ω ± 10% SRD¼SD
C 207	275113	same as C203	R 220	—	part of C-R pack 1kΩ
C 208	241810	ceramic, discal 2pF ± 0.5pF	R 221	117109	carbon film 2.2kΩ ± 5% SRD¼PL
C 209	241827	same as C202	R 222	117265	carbon film 33Ω ± 10% SRD¼PL
C 210	275111	same as C205	R 223	132363	compositin 1.5kΩ ± 10% RC¼BE
C 211	275111	same as C205	R 401	117351	carbon film 1kΩ ± 10% SRD¼PL
C 212	241810	same as C208	R 402	117411	carbon film 68kΩ ± 10% SRD¼PL
C 213	275113	same as C203	R 403	117352	carbon film 1.2kΩ ± 10% SRD¼PL
C 214	232020	ceramic, cylindric 35pF ± 5%	R 404	137358	carbon film 3.9kΩ ± 10% SRD¼SD
C 215	252221	electrolytic 10μF	R 405	117401	carbon film 10kΩ ± 10% SRD¼PL
C 216	275113	same as C203	R 406	137352	carbon film 1.2kΩ ± 10% SRD¼SD
C 217	241810	ceramic, discal 2pF ± 0.5pF	R 407	137307	carbon film 330Ω ± 10% SRD¼SD
C 218	274111	mylar 0.001μF ± 20%	R 408	137360	carbon film 5.6kΩ ± 10% SRD¼SD
C 219	274111	same as C218	R 409	137751	carbon film 2.2kΩ ± 10% SRD¼SD
C 220	252221	same as C215	R 410	137410	carbon film 56kΩ ± 10% SRD¼SD
C 221	—	part of C-R pack	R 411	137301	carbon film 100Ω ± 10% SRD¼SD
C 222	—	part of C-R pack	<b>MISCELLANEOUS</b>		
C 223	275113	same as C203	644105	Antenna-Rod antenna	
C 401	252113	electrolytic 3μF	611684	Back-Case back assembly	
C 402	252123	electrolytic 30μF	915236	Box-Dressing box	
C 403	252123	same as C402	611682	Case-Case assembly	
C 404	274116	mylar 0.0068μF ± 20%	612859	Case-Battery case	
C 405	274116	same as C404	651169	Case-Leather case	
C 406	259041	electrolytic 200μF	622000	Cover-Battery case cover	
C 407	252231	electrolytic 100μF	995096	Cushion for packing	
<b>RESISTORS :</b>					
R 002	117354	carbon film 1.8kΩ ± 10%	592052	Earphone-Magnetic earphone (EL-216)	
R 003	117312	carbon film 820Ω ± 10%	543212	Jack-AC jack	
R 004	132223	composition 56Ω ± 10%	543213	Jack-Antenna Jack	
R 006	117308	carbon film 390Ω ± 10%	543217	Jack-Earphone jack	
R 007	132366	composition 3.3kΩ ± 10%	619380	Knob-Tuning knob	
VR 1	151603	variable, carbon 5kΩ (X)	619382	Knob-Volume knob	
R 101	137401	carbon film 10kΩ ± 10%	669472	Pointer-Dial pointer	
R 102	137857	carbon film 3.3kΩ ± 10%	522045	Speaker-3" P.M speaker 8 ohms	
<b>VOLUME</b>					
with S6					
<b>SP 1</b>					
532163 Switch-Band selector switch					
532162 Switch-Tone switch					