

## TRANSISTOR PORTABLE RADIO

**MODEL KH-1230H**

# SERVICE MANUAL

NO. 154

1968

### SPECIFICATIONS

CIRCUIT SYSTEM ... 12 transistor FM/AM  
superheterodyne

TUNING RANGE ..... FM 86.5~108Mc  
MW 530~1,605Kc

#### TRANSISTORS

2SC 535 ..... FM RF Amp.  
2SC 535 ..... FM Frequency modulation  
2SC 460 ..... FM IF Amp.  
2SC 460 ..... FM IF Amp. & AM Frequency  
modulation  
2SC 460 ..... FM / AM IF Amp.  
2SC 460 ..... FM / AM IF Amp.  
2SC 461 ..... FM Oscillator  
2SC 281 ..... Squelch  
2SB 75 ..... Low Frequency Amp.  
2SB 77 ..... Power Amp.  
2SB 77 × 2 ..... Power Amp.

#### DIODES

1N60 ..... FM Limiter

1N 60 ..... FM Limiter  
1N 34A ..... AGC  
1N 60 ..... FM Limiter  
1N 34A ..... FM Detector & AGC  
1N 60×2 ..... FM Detector

#### THERMISTOR

D-2B ..... Temperature Compensator

SPEAKER ..... 3 <sup>3</sup>/<sub>16</sub>" × 4 <sup>3</sup>/<sub>4</sub>" oval PM

AUDIO OUTPUT ..... 500mW

POWER SUPPLY ..... DC:6V (JIS\*UM - 2" × 4, \*C" × 4  
or equivalent)  
AC adaptor available

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

EARPHONE ..... Hitachi magnetic earphone

DIMENSIONS ..... 4 <sup>3</sup>/<sub>4</sub>" (H) × 8 <sup>9</sup>/<sub>16</sub>" (W) × 2 <sup>3</sup>/<sub>16</sub>" (D)

WEIGHT ..... 3.1 lbs with batteries

CONTROLS AND JACKS

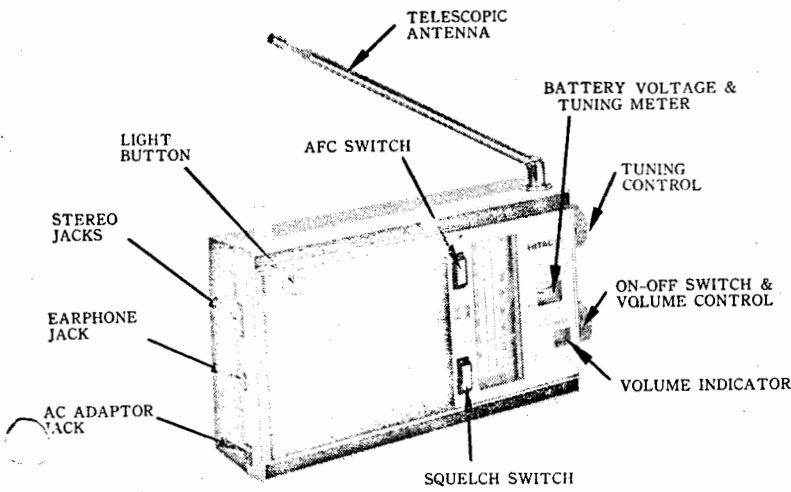


Fig. 1

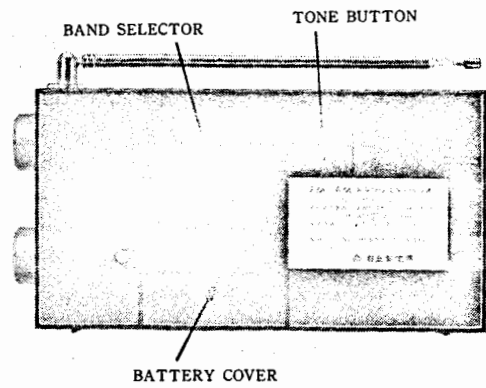


Fig. 2

Operating of Squelch Circuits

Fig. 3 shows the circuits pertaining to the squelch system. Normal bias is applied to the base of TR1 (transistor for squelch system) and the collector current is flowed through the transistor when no signals are coming from the tuning point. Since the collector current flows through the emitter resistor R1 of TR2 (transistor for low-frequency amplification), the base bias of TR2 changes to cut off its function (transistor does not activate and, therefore, does not amplify). Because of this principle, the noise is stopped at TR2 and no noises emitted from the speaker.

When signals come in on the tuning point, detected DC signals add to the base of TR1 to increase the bias in the opposite direction, and consequently, to reduce the collector current. Because of this principle, the bias for TR2 returns to normal, the low-frequency amplification circuit activates, and sound is emitted from the speaker. In order for the noise squelch to operate, the input signals level must be more than 45dB for AM and 15dB for FM. When receiving weaker signals than those specified above, squelch changeover must be turned off.

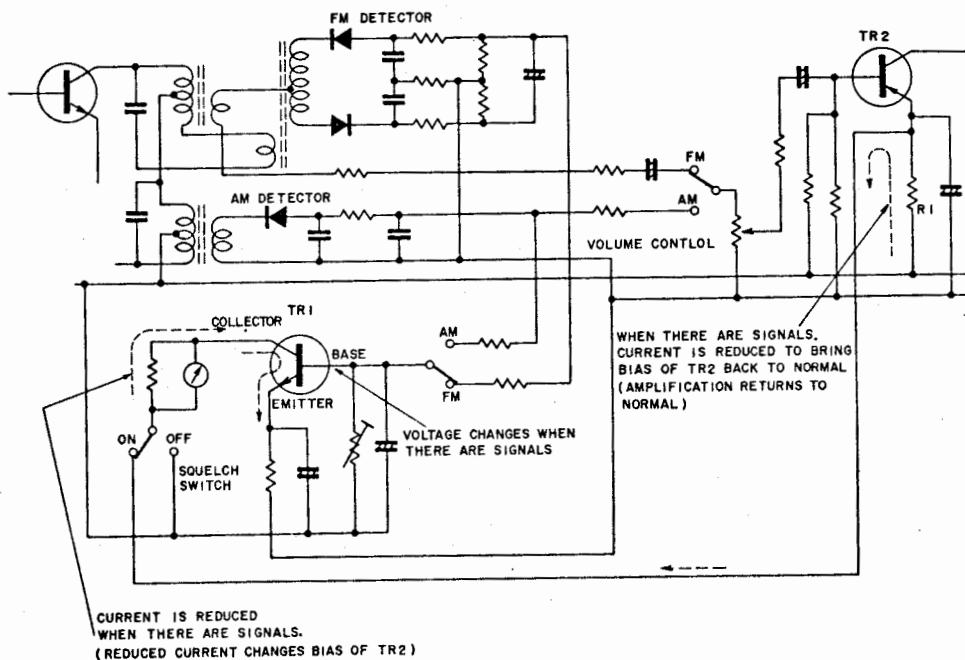


Fig. 3

## DISASSEMBLY

### 1. Removal of Rear Cover

Remove two screws shown in Fig. 4, open the rear cover, and take out the positive plate of the polarity and spring (negative plate) from the battery compartment. Then, disconnect the soldered part of the lead wire (coaxial cable) of the rod antenna.

### 2. Removal of Circuit Board

Disconnect the lead wires (lead wires connected to tuning meter) on both sides of the resistor (see Fig. 5) at the soldered sections, and remove five screws to disconnect the circuit board.

### 3. Removal of Tuning Scale Plate

Remove three screws shown in Fig. 6 and pull the scale plate upward or to the left.

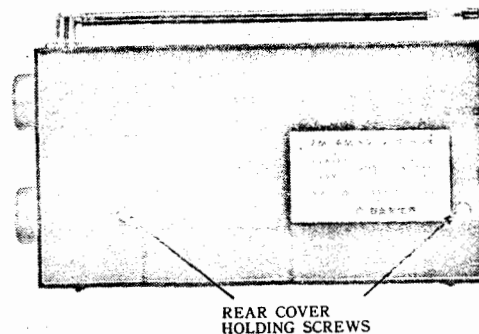


Fig. 4

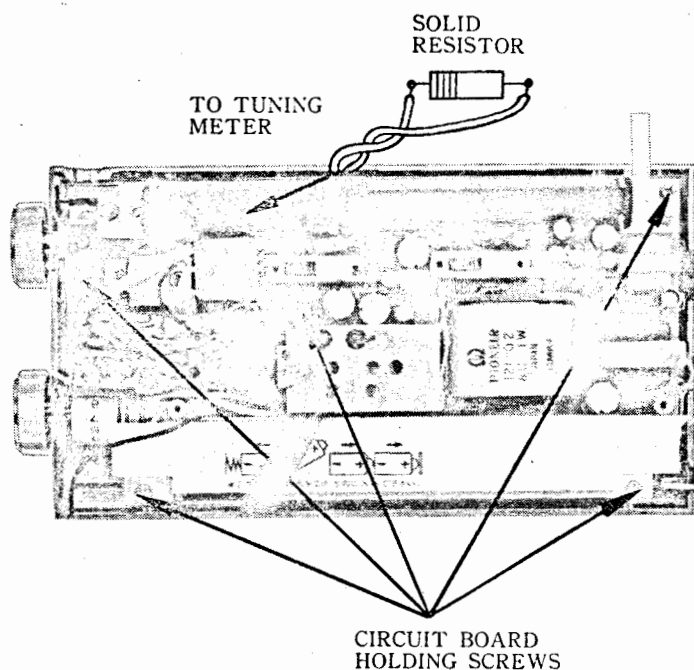


Fig. 5

### 4. Removal of Volume Indicator

Knobs must be removed before the indicator can be taken out.

To replace the indicator, insert the indicator with its OFF marking upward (correct position for peepwindow) and with the volume control knob turned OFF. If the OFF marking of the indicator do not match after insertion, try changing the position of the indicator with the volume control knob removed.

### 5. Removal of Block Section and Shield for IF Initial Amplification Circuit

To ensure high sensitivity of this radio, four stages are provided for IF amplification to increase the amplification

gain. Furthermore, a shield is provided to prevent the internal generation of signals. When it becomes necessary to detach the shield, disconnect two soldered sections of the main circuit board and disconnect the grounding wire at the soldered section, freeing the block section. As for the IF initial amplification circuit (next to the variable capacitor), remove one screw and disconnect the grounding wire at the soldered section.

### 6. Inspection of Squelch Circuit

The squelch circuit is judged to be defective when a noise still comes in strong with the squelch change-over turned ON. Since the tuning meter is connected to the squelch circuit, check the squelch circuit when malfunction

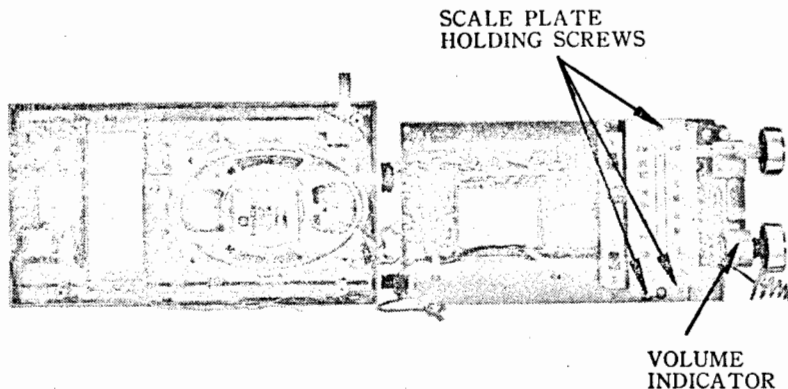


Fig. 6

of the tuning meter is noticed. Approximately  $400 \mu\text{A}$  maximum flows through this tuning meter.

Adjustment of Squelch Circuit

Follow the procedures given below to adjust the current (adjustable resistor  $RV_{001}$ ) for the squelch transistor. Set the band selector to AM, the squelch switch to OFF, the tuning dial to the highest frequency, the volume

control to the minimum, and the power source voltage to 6V, and adjust the adjustable resistor  $RV_{001}$  ( $100\text{K}\Omega$ ) to bring the indicator needle to the "F" position.

8. Threading Tuning Dial

Thread the tuning dial in a manner shown in Fig. 7.

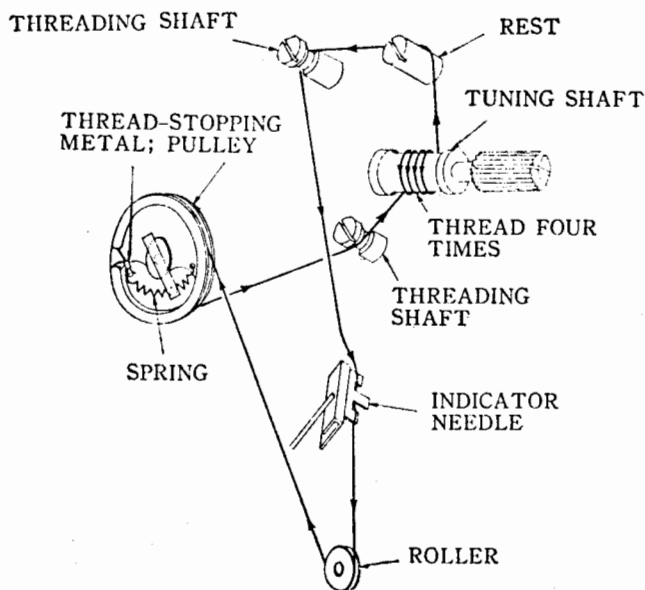


Fig. 7

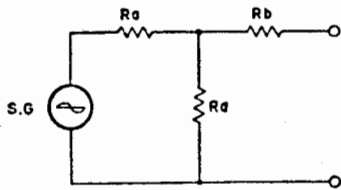
ALIGNMENT PROCEDURE

1. Use batteries having the specified voltage. Voltage, when the switch is turned on (with no signal), must not be less than 5.5V.
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 button 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

voltmeter (AC 3V or less scale) with the speaker terminals.

In case of FM alignment, connect the output of signal generator to rod antenna using a dummy antenna as shown in Fig. 8.

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

$$R_b \dots \left(75 \frac{R_a}{2}\right) \text{ Ohms}$$

Fig. 8

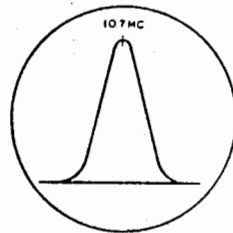


Fig. 9

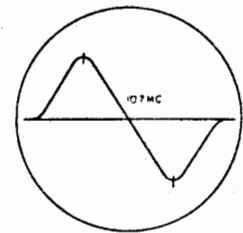


Fig. 10

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. 9 is obtained.	①	High freq. end	10.7 ± 1Mc sweep	Remove T207 core and adjust T101, T001, 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. 10 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. 10, 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 ⑥	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 C113 Repeat steps ⑦ and ⑧ L103 C107 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 C013 Repeat steps ⑬ and ⑭ L001 C010 Repeat steps ⑯ and ⑰

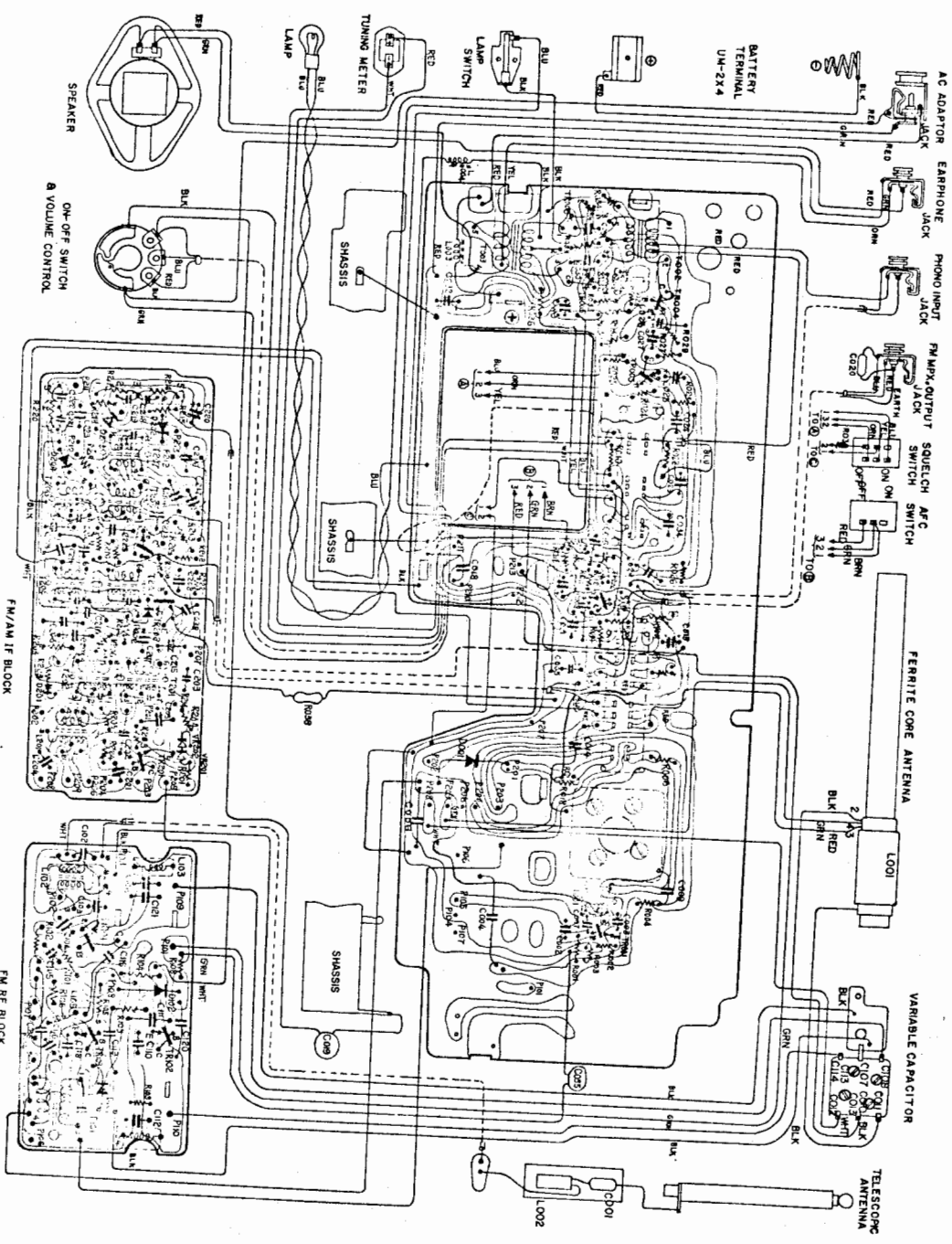




HITACHI

MODEL KH-1230H SERVICE MANUAL

CIRCUIT BOARD DIAGRAM







# MODEL KH-1230H SERVICE MANUAL

Symbol No.	Stock No.	Description	Symbol No.	Stock No.	Description
D 101	0575005	Diode		0612935	Cover—battery cover
D 102	0575024	Diode			for Chassis assembly
D 201	0575005	Diode		0924794	Bracket (T) assembly
D 202	575019	Diode			Screw—2.6mm $\phi$ $\times$ 6mm pan head screw for cord shaft mounting
D 203		Diode			Washer—"E" type retaining washer
D 204	0575001	Diode		0924080	Shaft—cord shaft (S)
H001	0576062	Thermistor		0924081	Column (M)
R201	0576054	Varistor			Screw—2.6mm $\phi$ $\times$ 6mm pan head screw for cord shaft mounting
R202	0576054	Same as VR201			Nut—3mm $\phi$ nut for column (M)
<b>TRANSFORMERS:</b>					
T001	0322323	FM IF		0282078	Capacitor—variable capacitor
T002	0441085	Driver	15k $\Omega$ :1k $\Omega$		Screw—2.6mm $\phi$ $\times$ 4mm pan head screw (2 req'd) for variable capacitor mounting
T003	0452020	Output	2.5k $\Omega$ :3k $\Omega$ 150 $\Omega$ :8 $\Omega$	0639826	Plate—plate for variable capacitor
T101	0322327	FM IF		0661082	Pulley
T201	0322323	FM IF			Screw—2.6mm $\phi$ $\times$ 4mm pan head screw for pulley mounting
T202	0322144	AM IF		0666028	Holder—spring holder
T203	0322334	FM IF		0667241	Pointer
T204	0322127	AM IF		0662701	Spring
T205	0326023	FM discriminator		0666058	Bracket—dial bracket
T206	0322130	AM IF			Screw—2.6mm $\phi$ $\times$ 6mm pan head screw (2 req'd) for antenna bracket mounting
T207	0326024	FM discriminator			Nut—2.6mm $\phi$ nut (2 req'd) for antenna bracket
<b>COILS:</b>					
L001	0332143	Ferrite antenna		5112143	Antenna—ferrite antenna
L002	0324003	FM trap		0638351	Wedge for ferrite antenna
L003	0333125	Choke	1.4#H	0532127	Switch—slide switch
L004	0333125	Same as L003		0532161	Switch—slide switch
L102	0318519	FM antenna			Screw—2.6mm $\phi$ $\times$ 3mm pan head screw (4 req'd) for slide switch mounting
L103	0318523	FM RF			Screw—2.6mm $\phi$ $\times$ 3mm pan head screw (3 req'd) for scale plate mounting
L104	0318531	FM oscillator		0924087	Column (2 req'd)
L105	0324003	FM trap			Washer—2.6mm $\phi$ washer (2 req'd) for bracket mounting
L201	0316200	MW oscillator		0924616	Indicator—battery indicator
<b>MISCELLANEOUS:</b>					
for Final assembly					
0651177		Case—leather case		0924379	Switch—lever switch
0652079		Case—earphone case			Eyelet—2mm $\phi$ $\times$ 4mm eyelet (2 req'd) for lever switch mounting
0592052		Earphone—magnetic earphone		0532155	Switch—slide switch for band selector
		Screw—3mm $\phi$ $\times$ 6mm binding screw (2 req'd) rear case mounting		0532169	Switch—slide switch for tone
		Screw—3mm $\phi$ $\times$ 8mm tapping screw (5 req'd) printed circuit board mounting		0015267	Knob—30mm $\phi$ knob
for Case assembly					
0021234		Case assembly		0015269	Dram assembly
0526167		Speaker		0543212	Jack—AC jack
		Screw—3mm $\phi$ $\times$ 6mm tapping screw (4 req'd) for speaker mounting		0543140	Jack—jack II
179		Jack—earphone jack		0151625	Resistor—variable resistor (RV—16)
0015265		Knob—Switch knob for AFC, squelch		0637518	Terminal
0020768		Spring—lock spring			
0015436		Holder—antenna holder			
		Screw—3mm $\phi$ $\times$ 8mm tapping screw for antenna holder mounting			
		Washer—3mm $\phi$ washer for antenna holder			
0015266		Button—push button for lamp switch			
0020503		Spring—6mm $\phi$ spring for push button			
		Screw—3mm $\phi$ $\times$ 6mm tapping screw (2 req'd) for bracket mounting			
0515012		Indicator			
		Screw—3mm $\phi$ $\times$ 6mm tapping screw for terminal mounting			
0644113		Antenna—rod antenna			
		Washer—5mm $\phi$ spring washer for rod antenna			
		Nut—5mm $\phi$ nut for rod antenna			



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