

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 ³/₁₆" × 4 ³/₄" 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 ³/₄" (H) × 8 ⁹/₁₆" (W) × 2 ³/₁₆" (D)

WEIGHT 3.1 lbs with batteries

CONTROLS AND JACKS

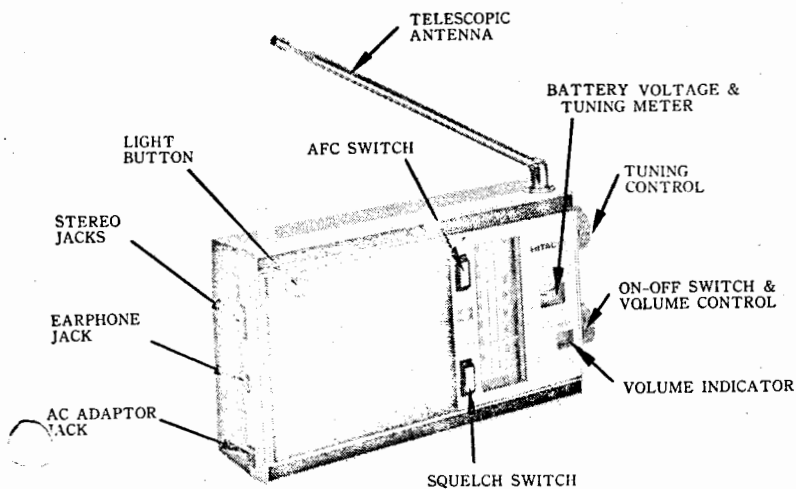


Fig. 1

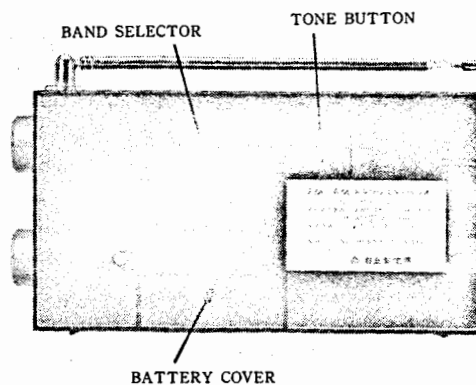


Fig. 2

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.

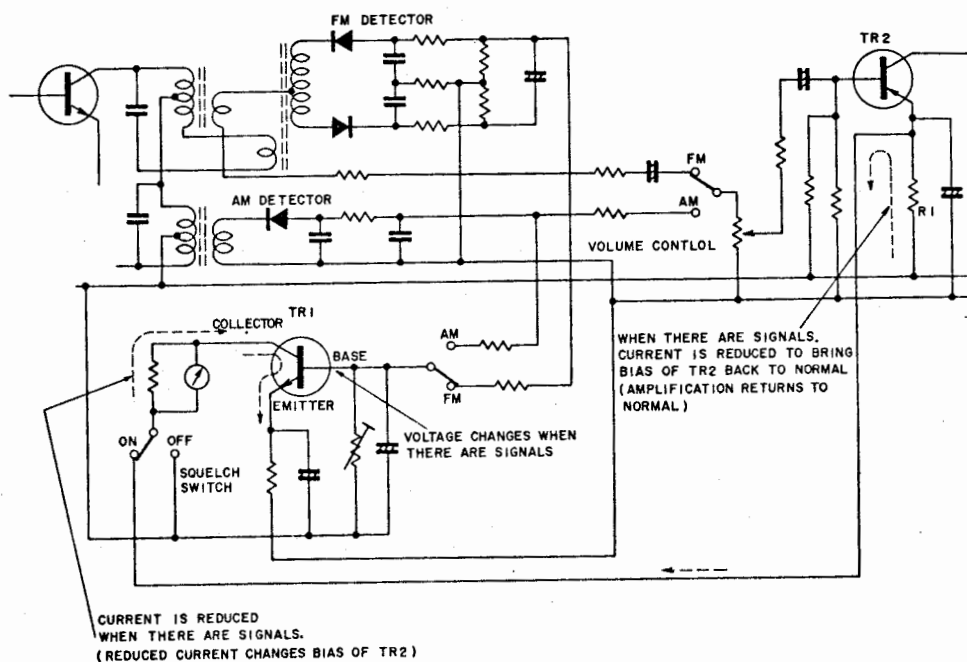


Fig. 3

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.

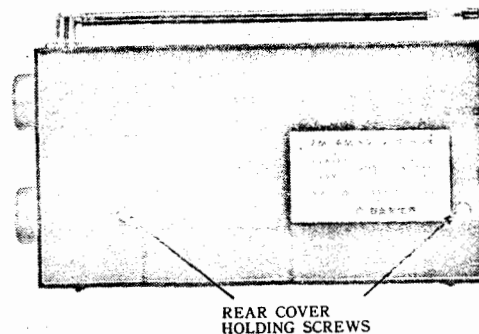


Fig. 4

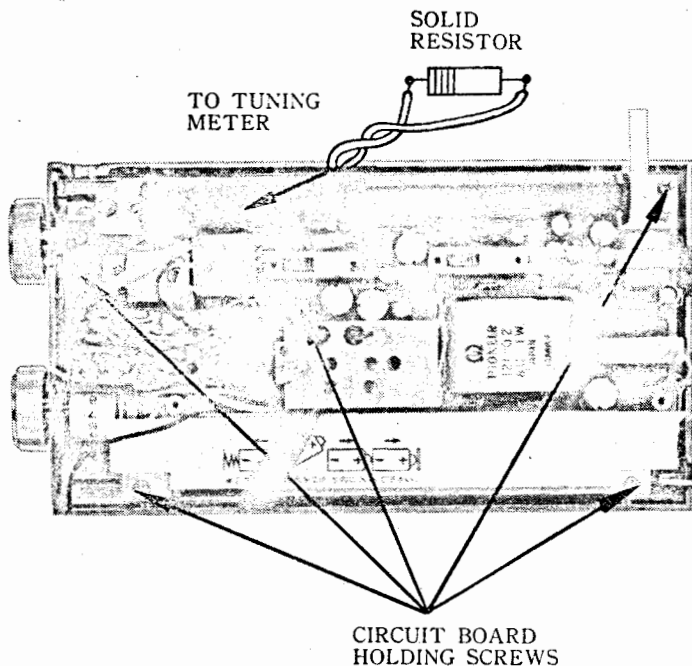


Fig. 5

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

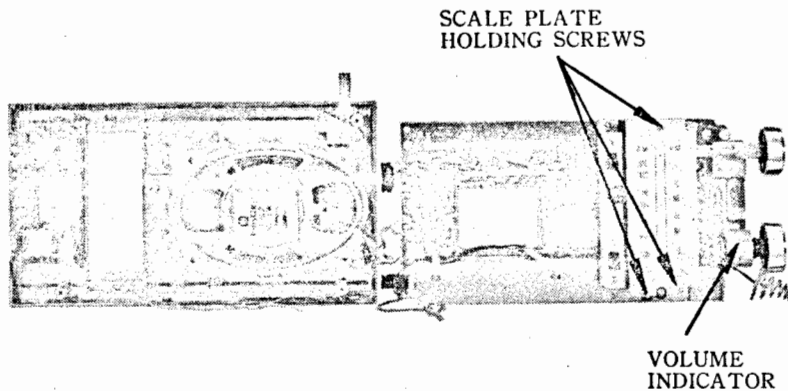


Fig. 6

of the tuning meter is noticed. Approximately 400 μ A maximum flows through this tuning meter.

Adjustment of Squelch Circuit

Follow the procedures given below to adjust the current (adjustable resistor RV₀₀₁) 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 RV₀₀₁ (100K Ω) to bring the indicator needle to the "F" position.

8. Threading Tuning Dial

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

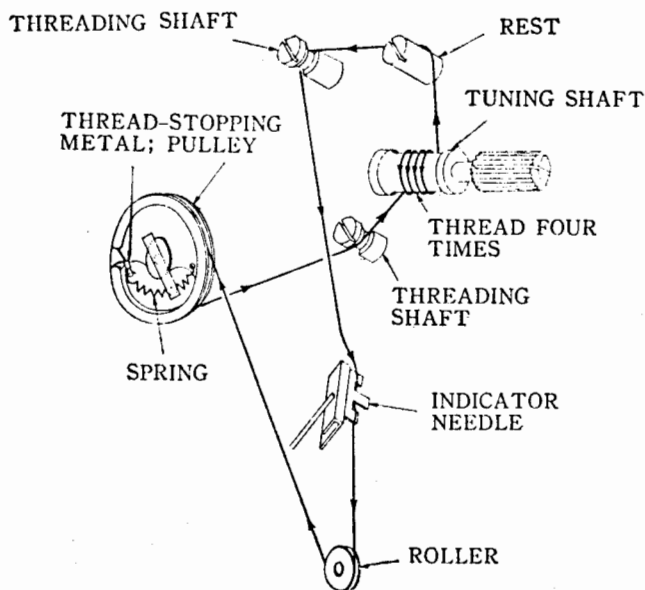


Fig. 7

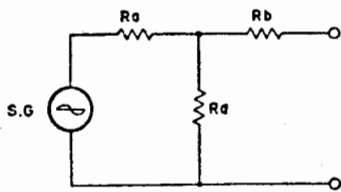
ALIGNMENT PROCEDURE

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

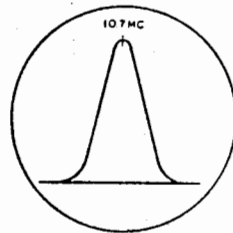


Fig. 9

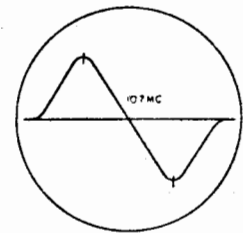
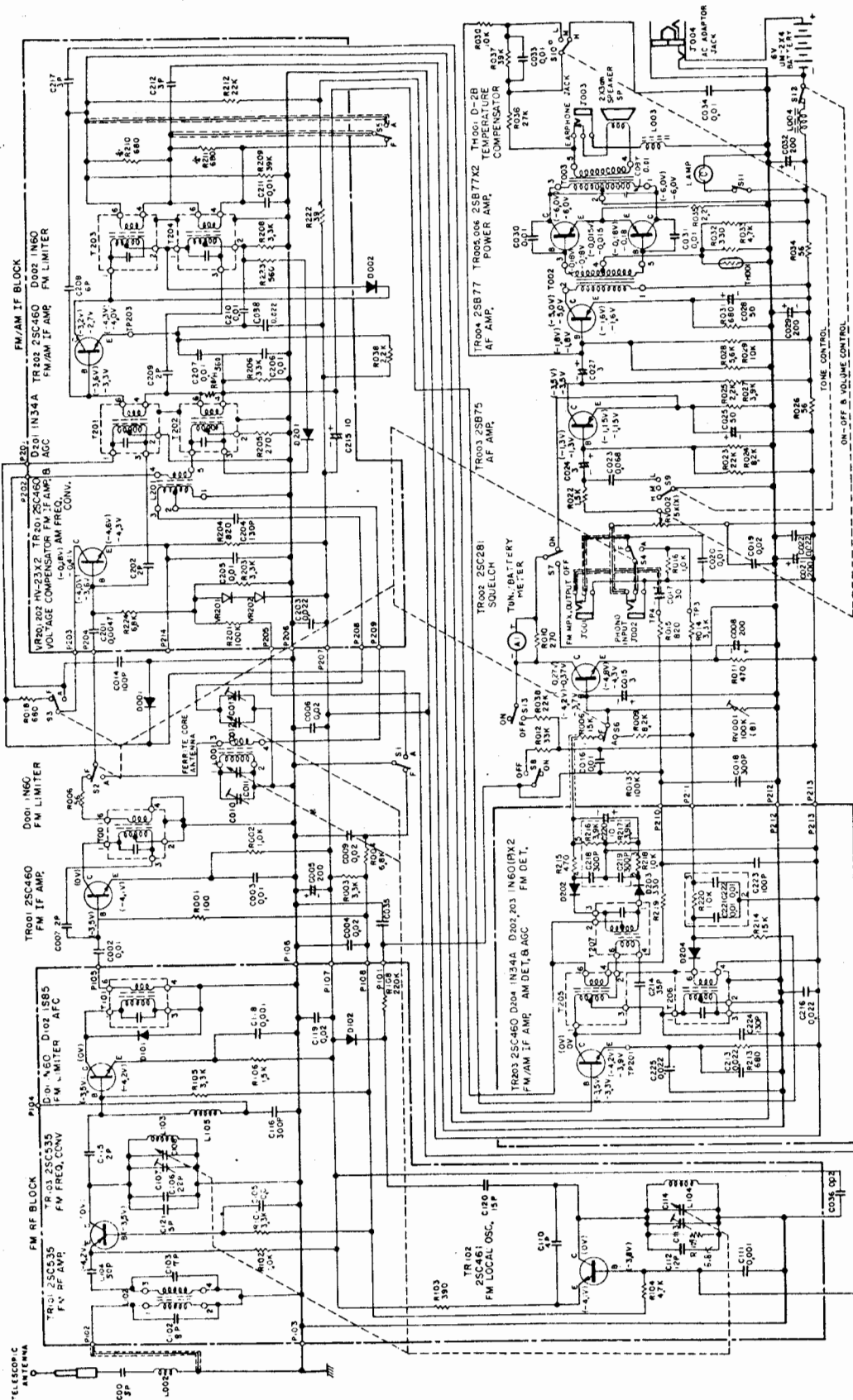


Fig. 10

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

CIRCUIT DIAGRAM

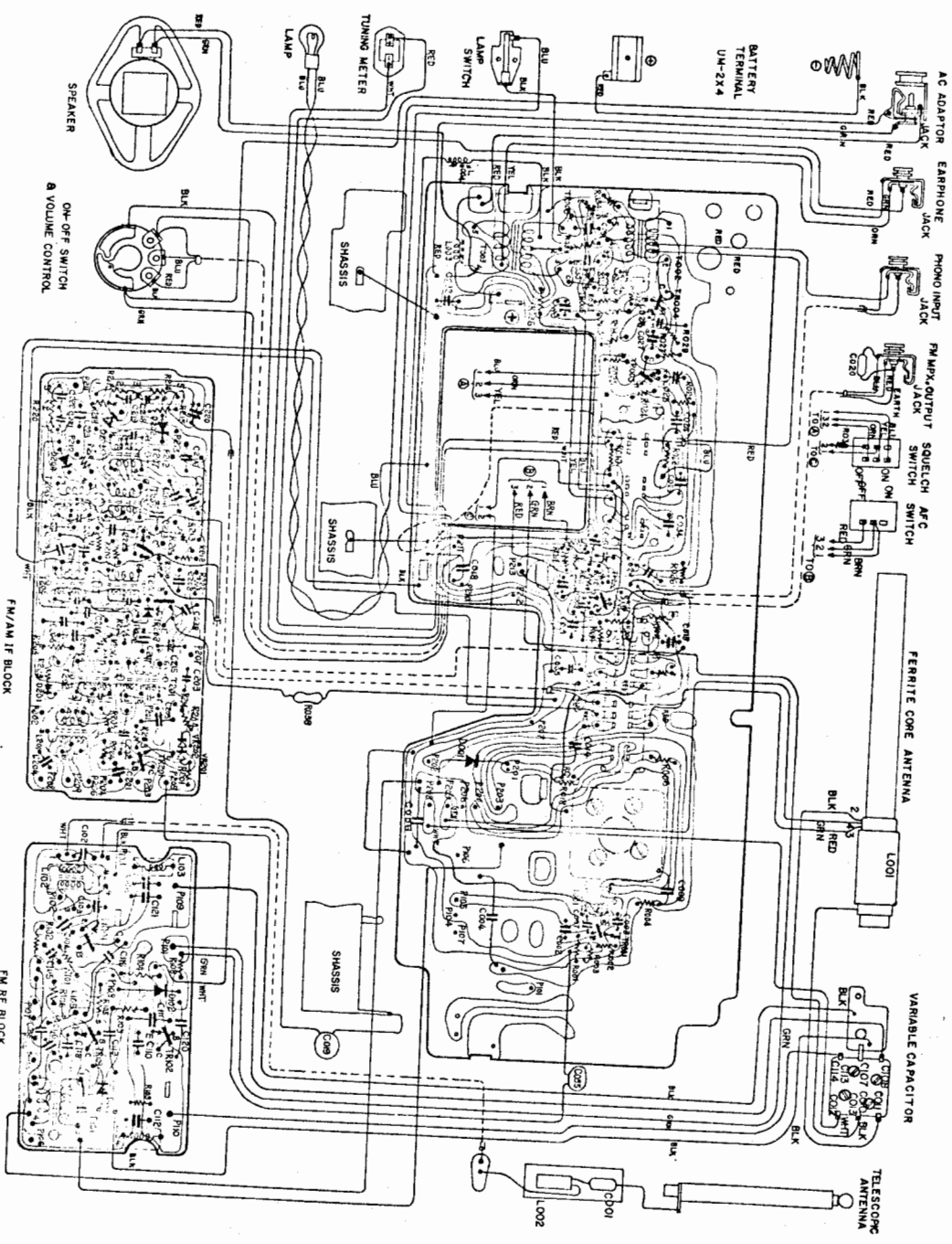




HITACHI

MODEL KH-1230H SERVICE MANUAL

CIRCUIT BOARD DIAGRAM



MODEL KH-1230H SERVICE MANUAL

REPLACEMENT PARTS

Symbol No.	Stock No.	Descrip	Symbol No.	Stock No.	Descrip		
CAPACITORS:			R004	0137861	Carbon film	6.8kΩ±10%	SRD¼SD
C001	0241822	Ceramic, discal	R006	0137768	Carbon film	56Ω±10%	SRD¼SD
C002	0275111	Mylar	R008	0137655	Carbon film	15kΩ±5%	SRD¼SD
C003	0275111	Same as C002	R009	0137862	Carbon film	8.2kΩ±10%	SRD¼SD
C004	0245018	Ceramic, discal	R010	0131654	Composition	270Ω±10%	RC¼GF
C005	0252232	Electrolytic	R011	0137800	Carbon film	470Ω±10%	SRD¼SD
C006	0245018	Same as C004	R012	0137859	Carbon film	4.7kΩ±10%	SRD¼SD
C007	0241810	Ceramic, discal	R013	0137951	Carbon film	100kΩ±10%	SRD¼SD
C008	0252232	Same as C005	R014	0131691	Composition	1kΩ±10%	RC¼GF
C009	0245018	Same as C004	R015	0131660	Composition	820kΩ±10%	RC¼GF
C010	---	Variable	R016	0137851	Carbon film	1kΩ±10%	SRD¼SD
C011	---	Capacitor with trimmer	R018	0137811	Carbon film	680Ω±10%	SRD¼SD
C012	---	Capacitor with trimmer	R022	0137853	Carbon film	1.5kΩ±10%	SRD¼SD
C013	---	Capacitor with trimmer	R023	1037905	Carbon film	22kΩ±10%	SRD¼SD
C014	0243813	Ceramic, discal	R024	0137862	Same as R009		
C015	0252213	Electrolytic	R025	0137855	Carbon film	2.2kΩ±10%	SRD¼SD
C016	0275111	Same as C002	R026	0137768	Same as R006		
C017	0252123	Electrolytic	R027	0137858	Carbon film	3.9kΩ±10%	SRD¼SD
C019	0245018	Same as C004	R028	0137860	Carbon film	5.6kΩ±10%	SRD¼SD
C020	0275111	Same as C002	R029	0137901	Carbon film	10kΩ±10%	SRD¼SD
C021	0252232	Same as C005	R030	0137901	Same as R029		
C022	0275113	Mylar	R031	0137811	Same as R018		
C023	0275116	Mylar	R032	0137807	Carbon film	330Ω±10%	SRD¼SD
C024	0252213	Same as C015	R033	0137859	Same as R12		
C025	0252225	Electrolytic	R034	0137768	Same as R006		
C027	0252213	Same as C015	R035	0131595	Composition	2.2Ω±10%	RC¼GF
C028	0252225	Same as C025	R036	0137906	Carbon film	27kΩ±10%	SRD¼SD
C029	0252232	Same as C005	R037	0137908	Carbon film	39kΩ±10%	SRD¼SD
C030	0275111	Same as C002	R039	0137737	Composition	22kΩ±10%	RC¼GF
C031	0275111	Same as C002	R042	0137861	Carbon film	6.8kΩ±10%	SRD¼SD
C032	0252232	Same as C005	R043	0137768	Same as R006		
C033	0275111	Same as C002	R101	0137857	Carbon film	3.3kΩ±10%	SRD¼SD
C034	0275111	Same as C002	R102	0137851	Carbon film	1kΩ±10%	SRD¼SD
C035	0276111	Mylar	R103	0137808	Carbon film	390Ω±10%	SRD¼SD
C036	0245018	Same as C004	R104	0137859	Carbon film	4.7kΩ±10%	SRD¼SD
C037	0275111	Same as C002	R105	0137857	Same as C101		
C039	0275113	Same as C022	R106	0137853	Carbon film	1.5kΩ±10%	SRD¼SD
C040	0245018	Same as C004	R108	0137955	Carbon film	220kΩ±10%	SRD¼SD
C102	0241831	Ceramic, discal	R109	0137861	Carbon film	6.8kΩ±10%	SRD¼SD
C103	0241830	Ceramic, discal	R201	0137951	Carbon film	100kΩ±10%	SRD¼SD
C104	0242424	Ceramic, discal	R203	0137857	Carbon film	3.3kΩ±10%	SRD¼SD
C105	0245017	Ceramic, discal	R204	0137573	Carbon film	820Ω±5%	SRD¼SD
C106	0242807	Ceramic, discal	R206	0137900	Carbon film	56kΩ±10%	SRD¼SD
C107	---	Variable	R207	0131645	Composition	680Ω±5%	RC¼GF
C108	---	Capacitor with trimmer	R209	0137665	Carbon film	39kΩ±5%	SRD¼SD
C110	0241868	Ceramic, discal	R210	0117071	Carbon film	680Ω±5%	SRD¼PL
C111	0244016	Ceramic, discal	R211	0117071	Same as R210		
C112	0248702	Ceramic, discal	R212	0137659	Carbon film	22kΩ±5%	SRD¼SD
C113	---	Variable	R213	0131645	Same as R207		
C114	---	Capacitor with trimmer	R214	0137655	Carbon film	15kΩ±5%	SRD¼SD
C115	0241810	Ceramic, discal	R215	0137809	Carbon film	470Ω±10%	SRD¼SD
C116	0233006	Ceramic, cylindric	R216	---	C-R pack		
C118	0244016	Same as C111	R217	---	C-R pack		
C119	0245018	Ceramic, discal	R218	0137851	Carbon film	1kΩ±10%	SRD¼SD
C120	0241831	Same as C102	R219	0137807	Carbon film	330Ω±10%	SRD¼SD
C121	0248646	Ceramic, discal	R220	---	C-R pack		
C201	0274115	Mylar	R222	0117266	Carbon film	39Ω±10%	SRD¼PL
C202	0241810	Ceramic, discal	R224	0137861	Carbon film	6.8kΩ±10%	SRD¼SD
C203	0275113	Mylar	RV 001	0151159	Adjustable	100kΩ±20% P	RV-12
C204	0233023	Ceramic, cylindric	RV 002	0151625	Variable	5kΩ(X)	RV-16
C205	0275111	Same as C002		0599723	C-R pack	0.01µF +80% -20% × 2	includes: C221, C222 R220
C206	0275111	Mylar		0186003	C-R pack	1kΩ±20%	C218, C219 R216, R217
C208	0241812	Ceramic, discal				330pF × 2	
C209	0241810	Same as C202				3.9kΩ × 2	
C211	0245017	Ceramic, discal					
C212	0241821	Ceramic, discal					
C213	0275113	Same as C203					
C214	0342004	Ceramic, discal					
C215	0252221	Electrolytic					
C216	0275113	Same as C203					
C217	0241821	Same as C212					
C218	---	C-R pack					
C219	---	C-R pack					
C220	0257040	Electrolytic					
C221	---	C-R pack					
C222	---	C-R pack					
C223	0233006	Ceramic, cylindric					
C224	0233023	Ceramic, cylindric					
C225	0275113	Same as C203					
C226	0221128	Styrol					
C227	0275113	Same as C203					
RESISTORS:							
R001	0137801	Carbon film				100Ω±10%	SRD¼SD
R002	0137851	Carbon film				1kΩ±10%	SRD¼SD
R003	0137857	Carbon film				3.3kΩ±10%	SRD¼SD
TRANSISTORS:							
TR001	0573485		TR001	0573485		2SC460(A)	
TR002	0573469		TR002	0573469		2SC281(C)	
TR003	0573117		TR003	0573117		2SB75(B)	
TR004	0573119		TR004	0573119		2SB77(C)	
TR005	0573004		TR005	0573004		2SB77(B)P	
TR006	0573004		TR006	0573004		2SB77(B)P	
TR101	0573510		TR101	0573510		2SC535(B)	
TR102	0573506		TR102	0573506		2SC461(A)	
TR103	0573509		TR103	0573509		2SC535(A)	
TR201	0573486		TR201	0573486		2SC460(B)	
TR202	0573486		TR202	0573486	Same as TR201		
TF 2/3	0573487		TF 2/3	0573487		2SC460(C)	
D 001	0575005	Germanium diode	D 001	0575005		1N60	
D 002	0575005	Same as D001	D 002	0575005			

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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 ϕ \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 ϕ \times 6mm pan head screw for cord shaft mounting		
R202	0576054	Same as VR201			Nut—3mm ϕ nut for column (M)		
TRANSFORMERS:					0282078	Capacitor—variable capacitor	
T001	0322323	FM IF			Screw—2.6mm ϕ \times 4mm pan head screw (2 req'd) for variable capacitor mounting		
T002	0441085	Driver	15k Ω :1k Ω		0639826	Plate—plate for variable capacitor	
T003	0452020	Output	2.5k Ω :3k Ω 150 Ω :8 Ω		0661082	Pulley	
T101	0322327	FM IF			Screw—2.6mm ϕ \times 4mm pan head screw for pulley mounting		
T201	0322323	FM IF			0666028	Holder—spring holder	
T202	0322144	AM IF			0667241	Pointer	
T203	0322334	FM IF			0662701	Spring	
T204	0322127	AM IF			0666058	Bracket—dial bracket	
T205	0326023	FM discriminator				Screw—2.6mm ϕ \times 6mm pan head screw (2 req'd) for antenna bracket mounting	
T206	0322130	AM IF				Nut—2.6mm ϕ nut (2 req'd) for antenna bracket	
T207	0326024	FM discriminator				5112143	Antenna—ferrite antenna
COILS:						0638351	Wedge for ferrite antenna
L001	0332143	Ferrite antenna				0532127	Switch—slide switch
L002	0324003	FM trap				0532161	Switch—slide switch
L003	0333125	Choke	1.4 μ H				Screw—2.6mm ϕ \times 3mm pan head screw (4 req'd) for slide switch mounting
L004	0333125	Same as L003					Screw—2.6mm ϕ \times 3mm pan head screw (3 req'd) for scale plate mounting
L102	0318519	FM antenna					Screw—2.6mm ϕ \times 6mm binding screw for supporter
L103	0318523	FM RF				0924087	Column (2 req'd)
L104	0318531	FM oscillator					Washer—2.6mm ϕ washer (2 req'd) for bracket mounting
L105	0324003	FM trap				0924616	Indicator—battery indicator
L201	0316200	MW oscillator				0594089	Lamp
MISCELLANEOUS:						0636390	Plate—8mm ϕ rubber plate
for Final assembly						0924379	Switch—lever switch
0651177		Case—leather case					Eyelet—2mm ϕ \times 4mm eyelet (2 req'd) for lever switch mounting
0652079		Case—earphone case				0532155	Switch—slide switch for band selector
0592052		Earphone—magnetic earphone				0532169	Switch—slide switch for tone
		Screw—3mm ϕ \times 6mm binding screw (2 req'd) rear case mounting				0015267	Knob—30mm ϕ knob
		Screw—3mm ϕ \times 8mm tapping screw (5 req'd) printed circuit board mounting				0015269	Dram assembly
for Case assembly						0543212	Jack—AC jack
0021234		Case assembly				0543140	Jack—jack II
0526167		Speaker				0151625	Resistor—variable resistor (RV—16)
		Screw—3mm ϕ \times 6mm tapping screw (4 req'd) for speaker mounting				0637518	Terminal
179		Jack—earphone jack					
0015265		Knob—Switch knob for AFC, squelch					
0020768		Spring—lock spring					
0015436		Holder—antenna holder					
		Screw—3mm ϕ \times 8mm tapping screw for antenna holder mounting					
		Washer—3mm ϕ washer for antenna holder					
0015266		Button—push button for lamp switch					
0020503		Spring—6mm ϕ spring for push button					
		Screw—3mm ϕ \times 6mm tapping screw (2 req'd) for bracket mounting					
0515012		Indicator					
		Screw—3mm ϕ \times 6mm tapping screw for terminal mounting					
0644113		Antenna—rod antenna					
		Washer—5mm ϕ spring washer for rod antenna					
		Nut—5mm ϕ nut for rod antenna					



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