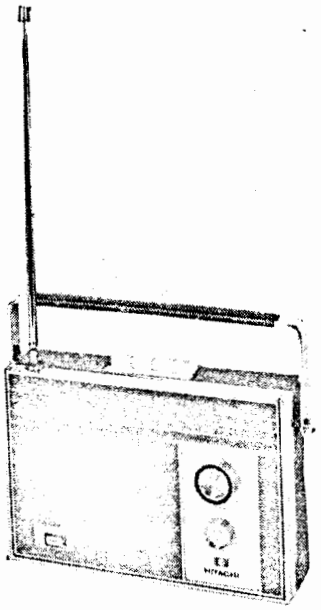


HITACHI
Hitachi, Ltd. Tokyo Japan

FM-AM 10-TRANSISTOR PORTABLE RADIO

MODEL KH-1006L

SERVICE MANUAL

No. 161 1968

SPECIFICATIONS

CIRCUIT SYSTEM·····10-Transistor Superheterodyne

TUNING RANGE·····FM:86.5～108MHz
MW:530～1,605KHz
LW:150～300KHz

INTERMEDIATE FREQUENCY·····FM 10.7MHz
AM 455KHz

TRANSISTOR COMPONENT

2SC535·····FM R.F. Amp.
2SC535·····FM Converter
2SC460·····FM I.F. Amp. & AM Converter
2SC460·····FM I F. Amp. & AM I.F. Amp.
2SC460·····FM I.F. Amp. & AM I.F. Amp.
2SB 77·····Line Filter
2SC458·····1st A.F. Amp.
2SB 77·····2nd A.F. Amp.
2SB156x2·····Push-Pull Power Amp.

GERMANIUM DIODE

IN60·····FM Stability
1S85·····FM Automatic Frequency Control
1N60·····AM A.G.C.
1N60·····FM Limiter
1N60x2·····FM Descriminator
1N 34A·····AM Det. & A. G. C.

VARISTOR

HV 23x2·····Voltage Compensator

THERMISTOR

D 1E·····Temperature Compensator

POWER OUTPUT·····800mW (Maximum)
600mW (Undistorted)

LOUDSPEAKER·····4" P. M.

POWER SUPPLY·····DC:6Volts
(JIS"UM 2"x4,"C"x4 or equivalent)

EARPHONE JACK·····One. Hitachi dynamic earphone EL-216 is provided.

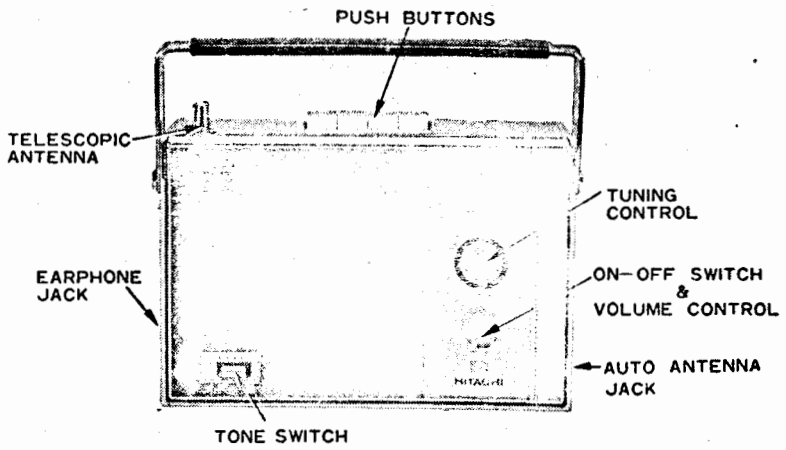
ANTENNA·····AM ferrite core antenna, FM swivel telescopic antenna built-in.

AUTO ANTENNA JACK···One. (Usable this radio as a car radio.)

DIMENSIONS·····6⅝"(16cm)High,9½"(24.2cm) Wide,2⅝"(6.6cm) Deep.

WEIGHT·····2.9 lbs (1.3kg) with batteries

NAME OF THE PARTS



DISASSEMBLY

HOW TO REMOVE THE PRINTED CIRCUIT BOARD

After taking out the battery case, pull out the two knobs (TUNING CONTROL, ON-OFF SWITCH & VOLUME CONTROL).

Remove two studs and five screws shown in Fig. 1.

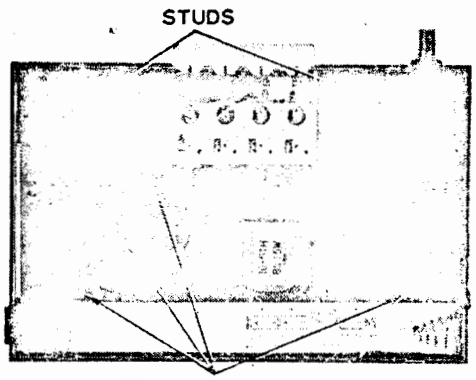


Fig. 1

HOW TO LOOP THE DIAL CORD

After taking out the chassis, move the dial pointer to the low frequency by tuning knob. Refer to Fig. 2.

1) Cut the dial cord to 25⅝".
2) Turn the tuning shaft fully counterclockwise and set the knotched section of dial pulley shown in Fig. 2.
3) Loop the dial cord according to each arrow's direction as shown in Fig. 2.
4) After the dial pointer to punched position on the rail and fix it to the dial cord.

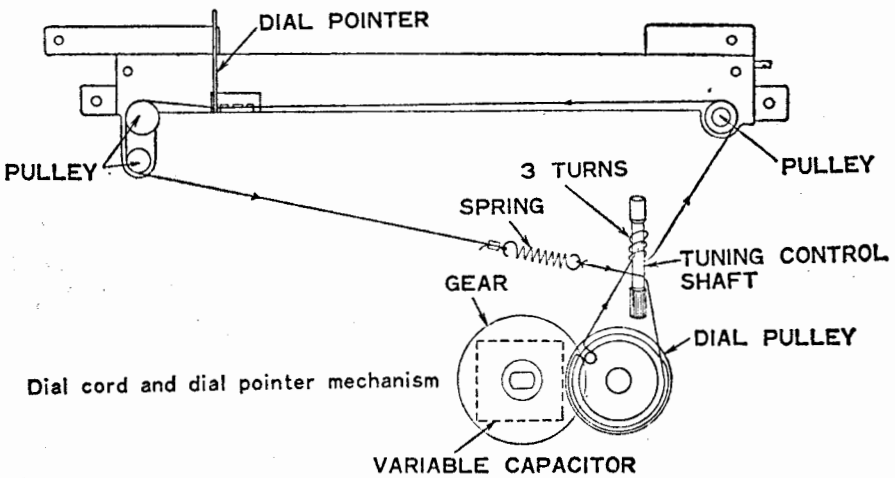
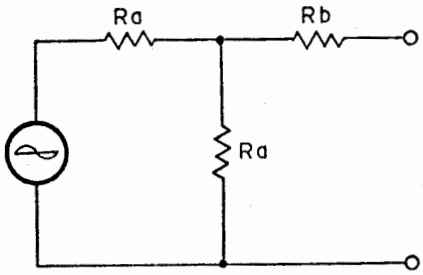


Fig. 2

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 volts.
2. After turning the volume control to maximum, connect the output of the signal generator (modulated to 400HZ or 1000HZ) to aloop antenna (4" in diameter, looped 2 or 3 rounds), connect the loop antenna to the ferrite core antenna and the earth terminal of the signal generator to the receiver chassis.

   And connect the voltmeter (AC 3V or less range) with the speaker terminals. In case of FM RF alignment, connect the output of signal generator to telescopic antenna using to such a dummy antenna Fig. 3.
3. Adjust with insulated screw driver to prevent bodyeffect.
4. The order of adjustment is shown as below. In proportion to adjustment the reading of voltmeter rises. Therefore, adjust so that the oscillator's output may not exceed 3V at maximum.



Ra···Signal Generator Output Impedance

Rb···$(75-\frac{Ra}{2})$ohms

Fig. 3

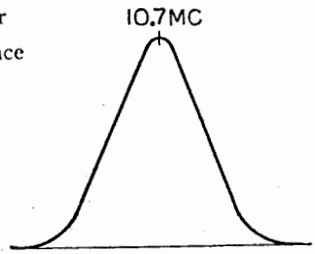


Fig. 4

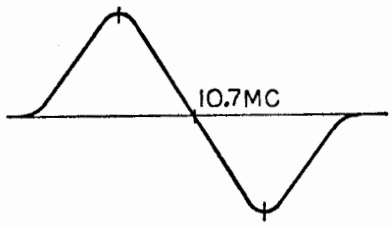
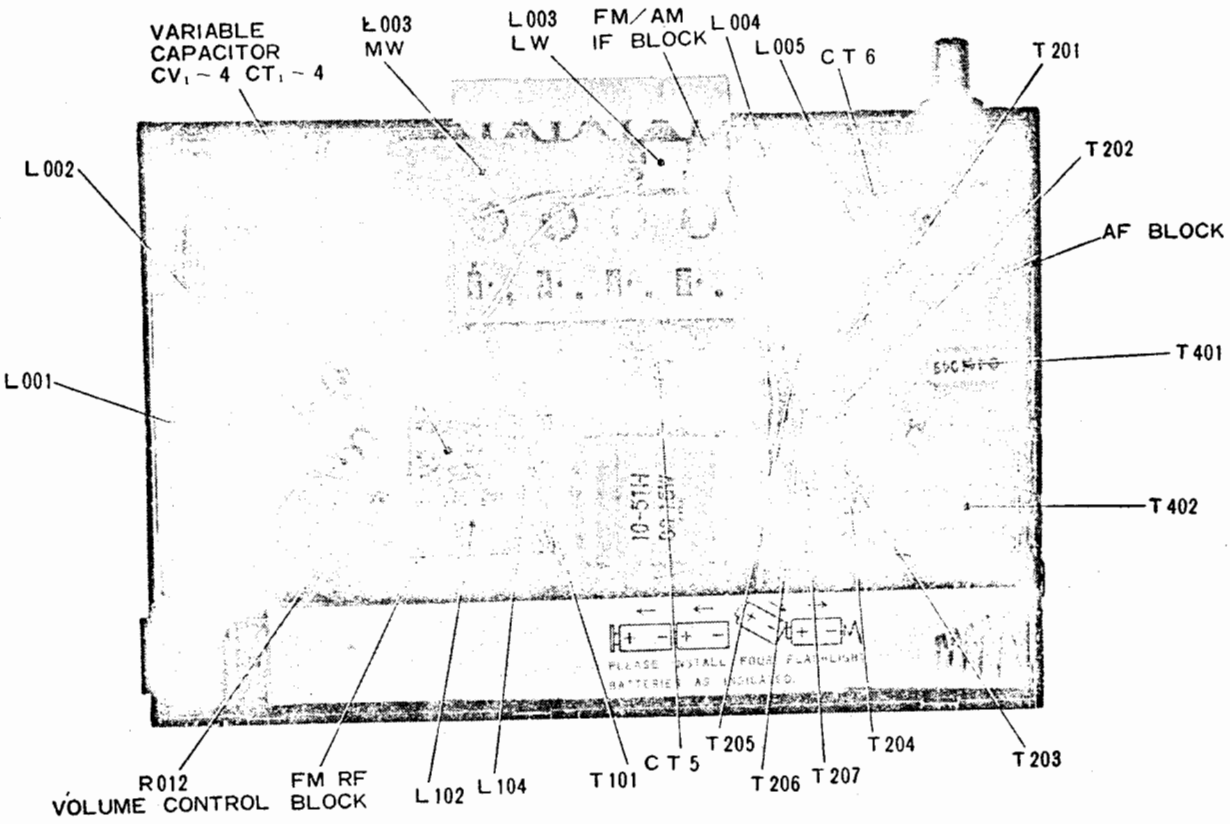


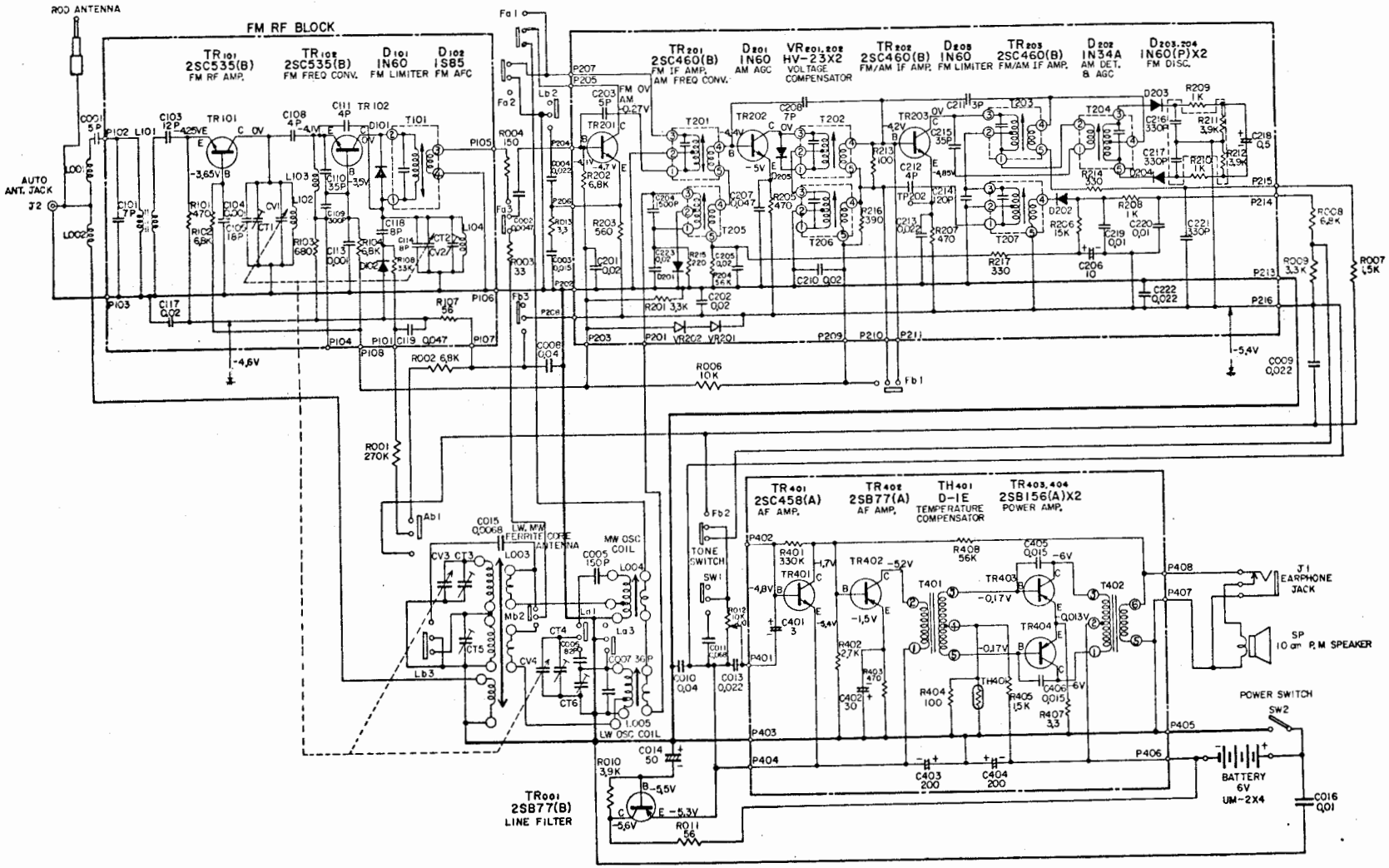
Fig. 5

Adjusted circuit	Using meter and connecting points	step	Dial Pointer setting	Signal Generator Frequency	Adjust for Max. Output
FM-IF	OSCILLOSCOPE·····Connect VERT. Terminal of oscilloscope to P215. SWEEP GENERATOR·····Connect to P104. Be sure to cut off direct current by putting suitable capacitor between sweep generator and P104. Then, adjust as follows until the wavform shown in Fig.4 is obtained.	(1)	High frequency end	10.7MHz±1MHz sweep	Remove T204 core and adjust T203 T202 T201 T101
FM-DISC	OSCILLOSCOPE ····· Connect to P215. SWEEP GENERATOR·····same as FM-IF MARKER GENERATOR ····· same as FM-IF Then, adjust as follows until the waveform shown in Fig. 5 is obtained.	(2)	High frequency end	10.7MHz±1MHz sweep	T204 core for waveform centered at 10.7MHz maker T204 core until waveform maximum and minimum points are at the same distance from horizontal line as figured in Fig.5, and maximum and minimum points and 10.7MHz 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 volt meter to speaker terminals. Adjust as follows to gain maximum on voltmeter.	(3) (4) (5) (6)	High frequency end	455KHz	T207 T206 T205 Repeat steps (3), (4) and (5)
FM-RF	SIGNAL GENERATOR ····· Connect output terminal of FM signal gemerator to rod antenna. VACUUM TUBE VOLTMETER Same as in AM-IF circuit alignment. Adjust as follows to gain maximum on voltmeter.	(7) (8) (9) (10) (11) (12)	Low frequency end High frequency end ····· 90MHz signal 105MHz signal ·····	85.0MHz 110.5MHz ····· 90MHz 105MHz ·····	L104 CT2 Repeat steps (7) and (8) L102 CT1 Repeat steps (10) and (11)
MW-RF	Same as in AM-IF circuit alignment. Adjust as follows to gain maximum on voltmeter.	(13) (14) (15) (16) (17) (18)	Low frequency end High frequency end ····· 600KHz signal 1,400KHz signal ·····	515KHz 1,670KHz ····· 600KHz 1,400KHz ·····	L004 CT4 Repeat steps (13) and (14) L003 MW Ant. Coil CT3 Repeat steps (16) and (17)
LW-RF	Same as in AM-IF circuit alignment. Adjust as follows to gain maximum on voltmeter.	(19) (20) (21) (22) (23) (24)	Low frequency end High frequency end ····· 160KHz signal 280KHz signal ·····	145KHz 310KHz ····· 160KHz 280KHz ·····	L005 CT6 Repeat steps (19) and (20) L003 LW Ant. Coil CT5 Repeat steps (22) and (23)

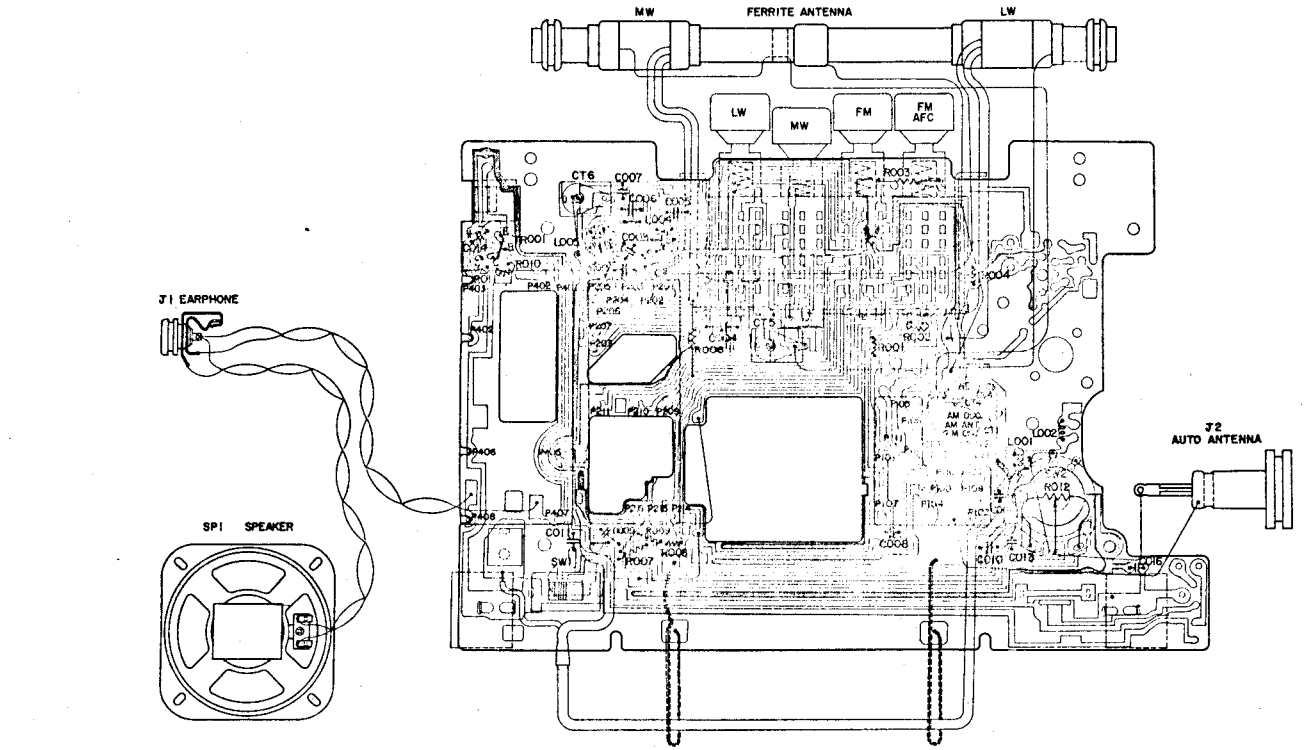
INTERNAL VIEW



CIRCUIT DIAGRAM



CIRCUIT BOARD DIAGRAM



REPLACEMENT PARTS

Symbol No.	Stock No.	Description		
CAPACITORS:				
C001	0248645	Ceramic, discal	5pF±0.5pF	
C002	0274115	Mylar	0.0047μF±20%	
C003	0275112	Mylar	0.015μF±20%	
C004	0275113	Mylar	0.022μF±20%	
C005	0233021	Ceramic, cylindric	150pF±5%	
C006	0248682	Ceramic, discal	82pF±5%	
C007	0248673	Ceramic, discal	36pF±5%	
C008	0245019	Ceramic, discal	0.04μF +80% −20%	
C009	0275113	Same as C004		
C010	0245019	Same as C008		
C011	0275116	Mylar	0.068μF±20%	
C013	0275113	Same as C004		
C014	0252225	Electrolytic	50μF	6WV
C015	0274116	Mylar	0.0068μF±20%	
C016	0245017	Ceramic, discal	0.01μF +80% −20%	
C208	0248644	Ceramic, discal	4pF±0.5pF	
C101	0248647	Ceramic, discal	7pF±0.5pF	
C103	0248702	Ceramic, discal	12pF±10%	
C104	0244016	Ceramic, discal	0.001μF +80% −20%	
C105	0242834	Ceramic, discal	18pF±5%	
C108	0248644	Ceramic, discal	4pF±0.5pF	
C109	0233006	Ceramic, cylindric	300pF±10%	
C110	0242004	Ceramic, discal	35pF±5%	
C111	0241868	Ceramic, discal	4pF±0.5pF	
C113	0244016	Same as C104		
C114	0248648	Ceramic, discal	8pF±0.5pF	
C117	0245018	Ceramic, discal	0.02μF +80% −20%	
C118	0248648	Same as C114		
C119	0275115	Mylar	0.047μF±20%	
C201	0245018	Ceramic	0.02μF +80% −20%	
C202	0245018	Same as C201		
C203	0248645	Ceramic	5pF±0.5pF	
C204	0221128	Styrol	1500pF±5%	
C205	0245018	Same as C201		
C206	0252221	Electrolytic	10μF	6WV
C207	0275115	Mylar	0.047μF±20%	
C208	0248647	Ceramic	7pF±0.5pF	
C210	0245018	Same as C201		
C211	0248643	Ceramic	3pF±0.5pF	
C212	0248644	Ceramic	4pF±0.5pF	
C213	0275113	Mylar	0.022μF±20%	
C214	0248726	Ceramic	120pF±10%	
C215	0242004	Ceramic	35pF±5%	
C216	——	C−R pack	330pF±20%×2	
C217	——			
C218	0257040	Electrolytic	0.5μF±20%	
C219	——	C−R pack	0.01μF +80% −20% ×2	
C220	——			
C221	0243004	Ceramic	330pF±10%	
C222	0275113	Same as C213		
C223	0245018	Same as C201		
C401	0252313	Electrolytic	3μF	10WV
C402	0252223	Electrolytic	30μF	6WV
C403	0252232	Electrolytic	200μF	6WV
C404	0252232	Same as C403		
C405	0275112	Mylar	0.015μF±20%	
C406	0275112	Same as C405		
RESISTORS:				
R001	0137956	Carbon film	270kΩ±10%	SRD¼SD
R002	0137861	Carbon film	6.8kΩ±10%	SRD¼SD
R003	0131622	Composition	33Ω±20%	RC¼GF
R004	0137803	Carbon film	150Ω±10%	SRD¼SD
R006	0131745	Composition	10kΩ±20%	RC¼GF
R007	0139193	Composition	1.5kΩ±10%	RC¼GF
R008	0137861	Same as R002		
R009	0137857	Carbon film	3.3kΩ±10%	SRD¼SD
R010	0137858	Carbon film	3.9kΩ±10%	SRD¼SD
R011	0137768	Carbon film	56Ω±10%	SRD¼SD
R012	0153618	Variable	10kΩ(X)	RV−24
R013	0137753	Carbon film	33Ω±10%	SRD¼SD
R015	0137811	Carbon film	680Ω±10%	SRD¼SD
R101	0117309	Carbon film	470Ω±10%	SRD⅛PL
R102	0117361	Carbon film	6.8kΩ±10%	SRD⅛PL
R103	0117311	Carbon film	680Ω±10%	SRD⅛PL
R104	0117361	Same as R102		
R107	0117268	Carbon film	56Ω±10%	SRD⅛PL
R108	0117407	Carbon film	33kΩ±10%	SRD⅛PL
R201	0137857	Carbon film	3.3kΩ±10%	SRD¼SD
R202	0137861	Carbon film	6.8kΩ±10%	SRD¼SD
R203	0137569	Carbon film	560Ω±5%	SRD¼SD
R204	0137910	Carbon film	56kΩ±10%	SRD¼SD
R205	0114147	Carbon film	470Ω±5%	SRD¼P
R206	0137903	Carbon film	15kΩ±10%	SRD¼SD
R207	0114147	Same as R205		
R208	——	C−R pack	1kΩ±20%	
R209	0137851	Carbon film	1kΩ±10%	SRD¼SD
R210	0137851	Same as R209		
R211	——	C−R pack	3.9kΩ±10%×2	
R212	——			
R213	0137801	Carbon film	100Ω±10%	SRD¼SD
R214	0114447	Carbon film	330Ω±10%	SRD¼P
R215	0137805	Carbon film	220Ω±10%	SRD¼SD
R216	0117101	Carbon film	1kΩ±5%	SRD⅛PL
R217	0137807	Carbon film	330Ω±10%	SRD¼SD
R401	0137957	Carbon film	330kΩ±10%	SRD¼SD
R402	0137856	Carbon film	2.7kΩ±10%	SRD¼SD
R403	0137809	Carbon film	470Ω±10%	SRD¼SD
R404	0137801	Carbon film	100Ω±10%	SRD¼SD
R405	0137853	Carbon film	1.5kΩ±10%	SRD¼SD
R406	0137768	Carbon film	56Ω±10%	SRD¼SD
R407	0131597	Composition	3.3Ω±10%	RC¼GF
R408	0137910	Carbon film	56kΩ±10%	SRD¼SD
	0599723	C−R pack	includes:R208, C219,220	
	0186003	C−R pack	includes:R211,212 C216,217	
TRANSISTORS:				
TR001	0573114		2SB77(B)	
TR101	0573510		2SC535(B)	
TR102	0573510	Same as TR101		
TR201	0573486		2SC460(B)	
TR202	0573486	Same as TR201		
TR203	0573486	Same as TR201		
TR401	0573479		2SC458(A)	
TR402	0573103		2SB77(A)	
TR403	0573011		2SB156(A)P	
TR404				
D 101	0575005	Diode	1N60	
D 102	0575024	Diode	1S85	
D 201	0575005	Diode	1N60	
D 202	0575001	Diode	1N34A	
D 203	0575019	Diode	1N60P	
D 204				
D 205	0575005	Same as D201		
VR201	0576054	Varistor	HV−23	
VR202	0576054	Same as VR201		
TH401	0576044	Thermistor	D−IE	
TRANSFORMERS:				
T 101	0322327	FM. IF		
T 201	0322339	FM. IF		
T 202	0322340	FM. IF		
T 203	0326029	Discriminator		
T 204	0326024	Discriminator		
T 205	0322144	AM. IF		
T 206	0322145	AM. IF		
T 207	0322130	AM. IF		
T 401	0441049	Driver	1.5kΩ: 0.8kΩ	
T 402	0452024	Output	90Ω: 8Ω	
COILS:				
L 001	0324003	Choke coil for FM		
L 002	0333100	Choke coil	220μH	
L 003	5112073	M.W.LW ferrite antenna		
L 004	0319651	Oscillator coil for MW		
L 005	0319652	Oscillator coil for LW		
L 101	0318519	FM antenna		
L 102	0318536	FM RF		
L 103	0324003	FM trap		
L 104	0318537	FM oscillator		
MISCELLANEOUS:				
		for Final assembly		
	0592052	Earphone−magnetic earphone		
		Stud (28) (2req'd)		
		Screw−3mmφ×8mm binding screw (2req'd) for rearcase mounting		
		Washer−3mmφ washer (2 reg'd) for printed circuit board		
		Screw−3mmφ×6mm tapping screw (4 req'd) for front case mounting		
	0015085	Knob−knob for tuning		
	0015084	Knob−knob for volume		
	7660041	Washer−washer for knob		
	7660042	Washer−washer for knob		
		for Case assembly		
	0681380	Case assembly		
	0619248	Knob−tone control knob		
	5410072	Speaker		
	0681115	Holder−speaker holder		
		Screw−3mmφ×6mm tapping screw (2 req'd)		
	0543179	Jack−earphone jack		
	0543228	jack−car antenna jack		
	6310193	Handle		
	0680346	Shaft−handle shaft (2 req'd)		
	0680347	Spring−handle spring		
	0680348	Washer−handle washer (2 req'd)		

REPLACEMENT PARTS

Symbol No.	Stock No.	Description
	0015539	Cover—battery cover
		for Chassis assembly
	0924836	Pointer
	0662001	Spring (A)
	0666058	Blacket—dial blacket
		Screw—2.6mmφ×6mm pan head screw }
		Nut—2.6mmφ unt (2 req'd) for printed circuit board mounting
		Washer—3mmφ washer (2 req'd)
		Screw—3mmφ×4mm pan head screw
		Screw—2.6mmφ×4mm pan head screw
CV1~4	0282091	Plastic film variable capacitor {includes trimmer capacitor (CT1~4)
CT5.6	0283103	Trimmer capacitor
	0924628	Terminal assembly
	0924630	Terminal
	0924835	Holder—antenna holder
	0930042	Holder—antenna holder

Symbol No.	Stock No.	Description
		Screw—2.6mmφ×6mm pan head screw }
		Screw—2.6mmφ×8mm pan head screw } for antenna mounting
	5112073	Antenna—ferrite core antenna
	0638351	Wedge—for ferrite antenna
	0644102	Antenna—rod antenna
		Screw—3mmφ×6mm pan head screw (2 req'd)
		Washer—3mmφ locking washer (2 req'd)
	0533172	Switch—push button switch
	0532162	Switch—slide switch
		Screw—3mmφ×8mm pan head screw for antenna holder mounting
		Screw—3mmφ×5mmφ pan head screw for push button, antenna holder mounting
		Washer—3mmφ locking washer

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