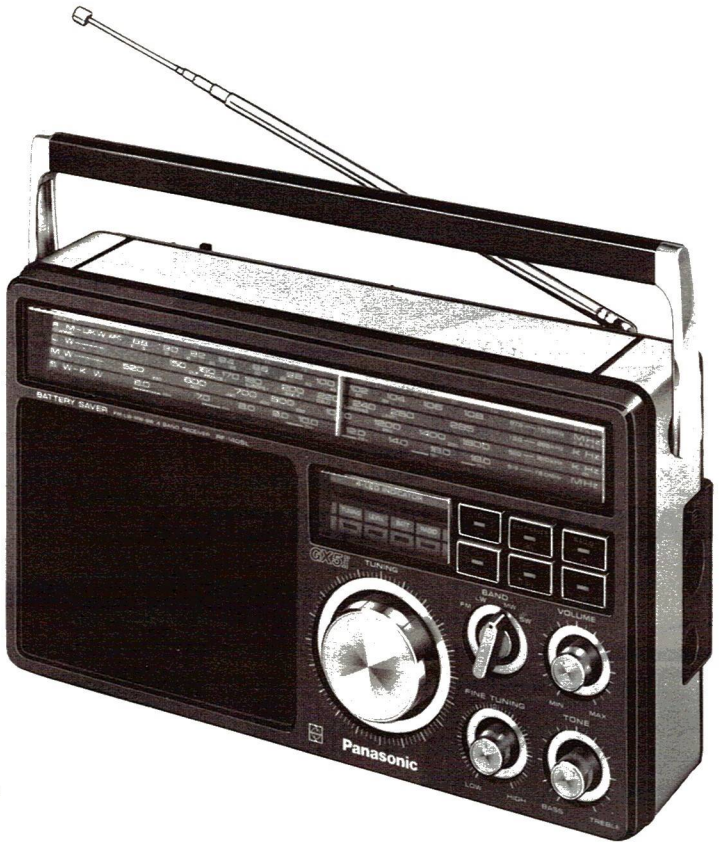
ORDER NO. RD8007-1803C

Service Manual

Radio

FM/LW/MW/SW 4-BAND
PORTABLE RADIO

RF-1405LBS



■ SPECIFICATIONS

Frequency Range:	FM 87.5~108 MHz LW 150~285 kHz (2000~1060m) MW 520~1610 kHz (577~186m) SW 5.9~18 MHz (50.8~16.7m)
Intermediate Frequency:	FM 10.7 MHz AM (LW, MW & SW) 455 kHz
Sensitivity:	FM 1.8μV (−10 dB Limit Sens) LW 100μV/m for 50 mW Output MW 40μV/m for 50 mW Output SW 3.5μV for 50 mW Output
Power Source:	AC 110~125/220~240 V 50/60 Hz or DC 6 V (Four "C" Size Flashlight Batteries) (National UM-2 or equivalent)
Power Consumption:	9 W (AC Only)
Power Output:	2 W (DC Max) 2 W (MPO)
Speaker:	10 cm (4") PM Dynamic Speaker
Dimensions:	$10\frac{1}{2}$"(Wide)×$6\frac{1}{4}$"(High)×$3\frac{3}{16}$"(Deep) (266×158×80)mm
Weight:	3 lb. 8.4 oz. (1.6 kg) without batteries
Impedance:	Speaker.....8Ω Earphone Jack.....8Ω

Specifications are subject to change without notice.

National Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka, Japan

LOCATION OF CONTROLS AND COMPONENTS

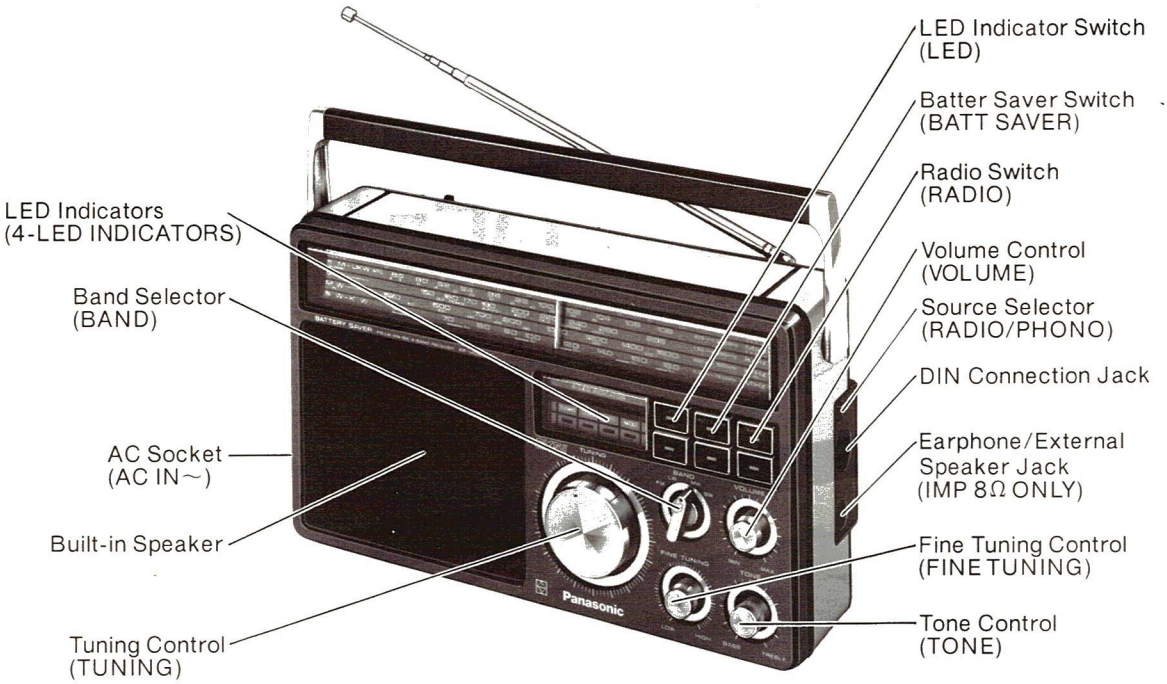


Fig. 1

DISASSEMBLY INSTRUCTION

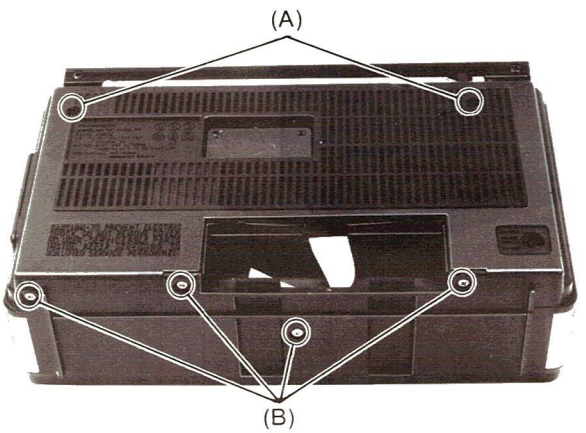


Fig. 2

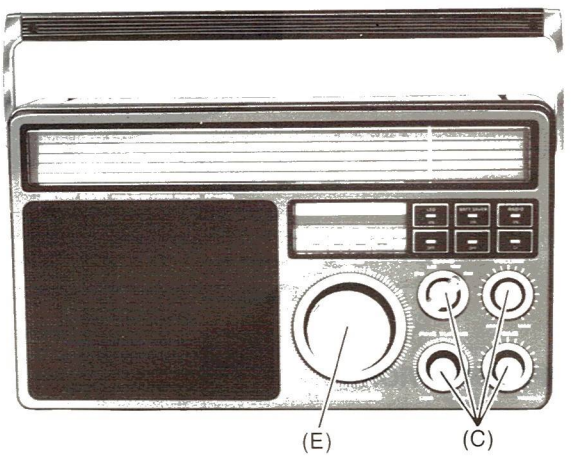


Fig. 3

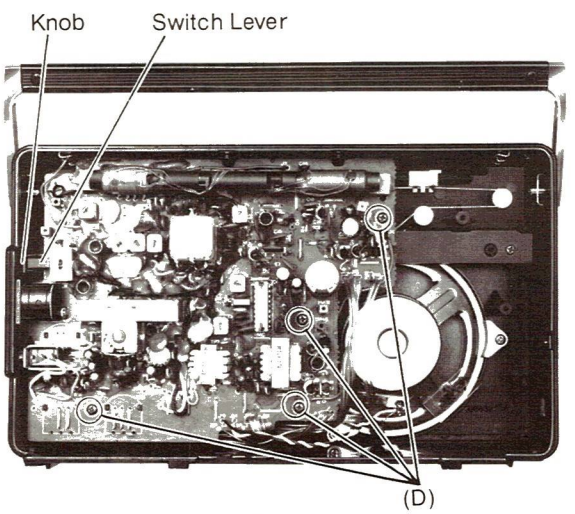


Fig. 4

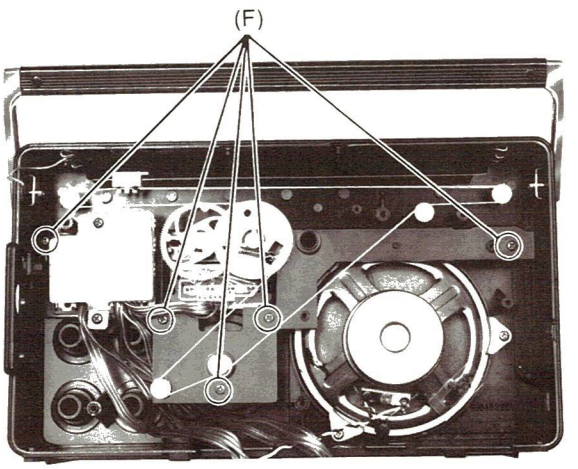


Fig. 5

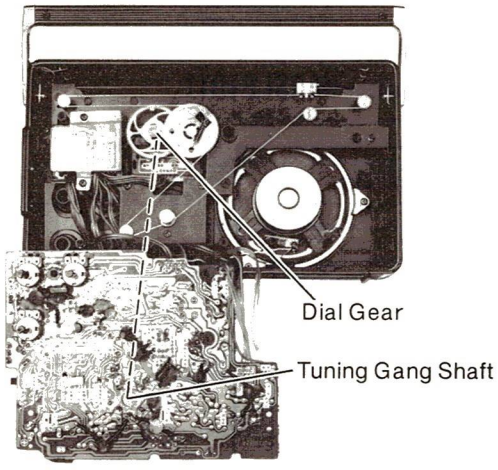


Fig. 6

DIAL THREADING

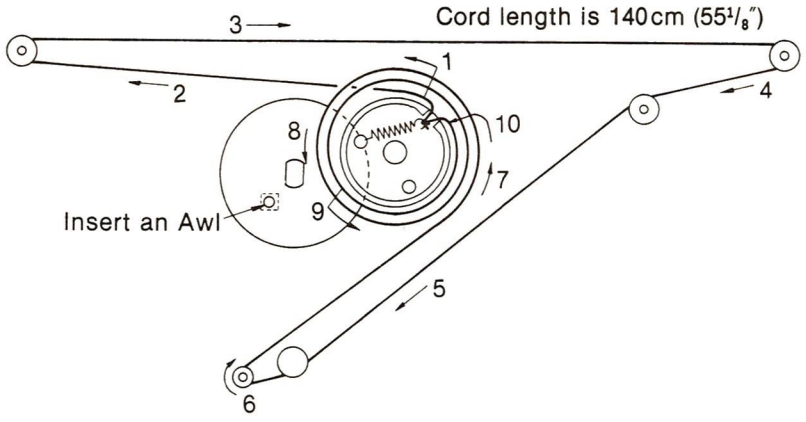


Fig. 7

Procedure	To remove—.	Remove—.	Shown in Fig.—.
1	Printed Circuit Board ※1, 2, 3	Screws (3×45) .....(A)×2	2
2		Screws (3×10) .....(B)×4	2
3		Knobs .....(C)×3	3
4		Red screws (3×12) .....(D)×4	4
5	Dial Chassis	Knob .....(E)×1	3
6		Screws (3×12) .....(F)×5	5

Notes:

※1. Turn tuning gang shaft to fully counter-clockwise.

※2. Insert the tuning gang shaft in the hole of dial gear as shown in fig. 6.

※3. Insert the switch lever in the knob as shown in fig. 4.

ALIGNMENT POINTS

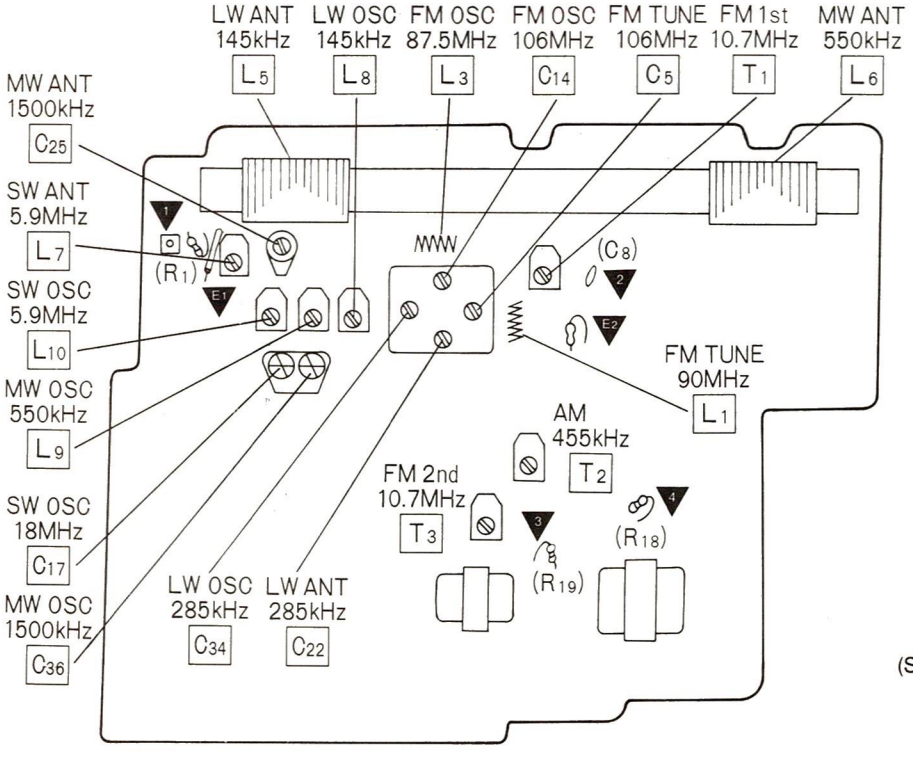


Fig. 8

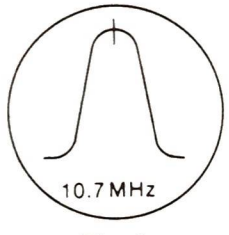


Fig. 9

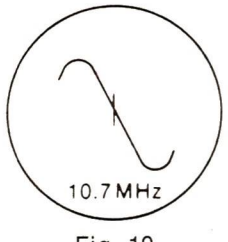


Fig. 10

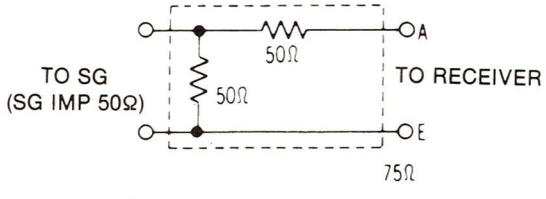


Fig. 11 FM Dummy Antenna

ALIGNMENTS

■ ALIGNMENT INSTRUCTION

READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

1. Set radio switch to ON.
2. Set volume control to maximum.
3. Set tone control to treble.
4. Set band switch to LW, MW, SW or FM.
5. Set LED indicator switch to OFF.
6. Set source selector to radio.
7. Set power source voltage to 6 V DC.
8. Output of signal generator should be no higher than necessary to obtain an output reading.

■ LW, MW, AND SW ALIGNMENT

	BAND	SIGNAL GENERATOR or SWEEP GENERATOR		RADIO DIAL SETTING	INDICATOR (ELECTRONICS VOLTMETER or SCOPE)	ADJUSTMENT	REMARKS
		CONNECTIONS	FREQUENCY				
		AM IF ALIGNMENT					
(1)	MW	Fashion loop of several turns of wire and radiate signal into loop of receiver.	455 kHz 30% Mod. at 400 Hz	Point of non-interference.	Output meter across voice coil.	T_2 (AM IFT)	Adjust for maximum output.
		LW-RF ALIGNMENT					
(2)	LW	〃	145 kHz	145 kHz [24.11mm ($\frac{31}{32}$'')]	Output meter across voice coil.	L_8 (LW OSC Coil) (＊1) L_5 (LW ANT Coil)	Adjust for maximum output. Adjust L_5 by moving coil bobbin along ferrite core.
(3)	LW	〃	285 kHz	285 kHz [142.5mm($5\frac{5}{8}$'')]	〃	C_{34} (LW OSC Trimmer) C_{22} (LW ANT Trimmer)	Adjust for maximum output. Repeat steps (2) and (3).
	(＊1) Cement antenna bobbin with wax after completing alignment.						
		MW-RF ALIGNMENT					
(4)	MW	〃	550 kHz	550 kHz [17.5mm($\frac{11}{16}$'')]	Output meter across voice coil.	L_9 (MW OSC Coil) (＊2) L_6 (MW ANT Coil)	Adjust for maximum output. Adjust L_6 by moving coil bobbin along ferrite core.
(5)	MW	〃	1,500 kHz	1,500 kHz [141mm($5\frac{9}{16}$'')]	〃	C_{36} (MW OSC Trimmer) C_{25} (MW ANT Trimmer)	Adjust for maximum output. Repeat steps (4) and (5).
	(＊2) Cement antenna bobbin with wax after completing alignment.						
		SW-RF ALIGNMENT					
(6)	SW	Connect to test point ▼1 through ceramic capacitor (10PF).	5.9 MHz	5.9 MHz [6mm ($\frac{1}{4}$'')]	Output meter across voice coil.	L_{10} (SW OSC Coil) L_7 (SW ANT Coil)	Adjust for maximum output.
(7)	SW	Negative side to test point ▼E1.	18 MHz	18 MHz [151mm ($5\frac{15}{16}$'')]	〃	C_{17} (SW OSC Trimmer)	Adjust for maximum output. Repeat steps (6) and (7).

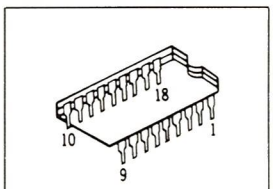
■ FM IF ALIGNMENT

	BAND	SIGNAL GENERATOR or SWEEP GENERATOR		RADIO DIAL SETTING	INDICATOR (VTVM or SCOPE)	ADJUSTMENT	REMARKS
		CONNECTIONS	FREQUENCY				
(1)	FM	Connect to test point ▼2 through 0.001μF. Negative side to point ▼E2.	10.7 MHz	Point of non-interference.	Connect vert. amp of scope to test point ▼3. Negative side to test point ▼E2.	T_1 (FM 1st)	Adjust for maximum amplitude. (Refer to Fig. 9.)
(2)	FM	〃	〃	〃	〃	T_3 (FM 2nd)	Adjust for maximum amplitude. (Refer to Fig. 10.)

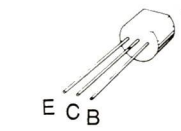
■ FM RF ALIGNMENT

	BAND	SIGNAL GENERATOR or SWEEP GENERATOR		RADIO DIAL SETTING	INDICATOR (VTVM or SCOPE)	ADJUSTMENT	REMARKS
		CONNECTIONS	FREQUENCY				
(1)	FM	Connect to test point ▼1 through FM dummy antenna. (Refer to Fig. 11.)	87.5 MHz	Variable capacitor fully closed.	Output meter across voice coil.	L_3 (FM OSC Coil)	(＊3) Adjust for maximum output.
(2)	FM		90 MHz	90 MHz [21mm($\frac{27}{32}$'')]	〃	L_1 (FM TUNE Coil)	(＊3) Adjust for maximum output.
(3)	FM		106 MHz	106 MHz [130mm($5\frac{1}{8}$'')]	〃	C_{14} (FM OSC Trimmer) C_5 (FM TUNE Trimmer)	(＊3) Adjust for maximum output. Repeat steps. (1)～(3).
	(＊3) Three output responses will be present; proper tuning is the center frequency.						

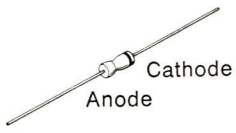
SCHEMATIC DIAGRAM MOD



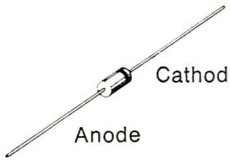
IC1



Q1～15



D1, 6, 16



D2, 3, 8～11, 18

D4, 5, 7, 17

Q1 2SC1674 FM RF AMP
D2 RVDSD113 FM AFC
Q2 2SC1674 FM CONV
D1 0A90 FM D. AGC
D4 RVDVD1272LE AOC
Q3 2SC16 FM IF A

TELESCOPIC ANTENNA

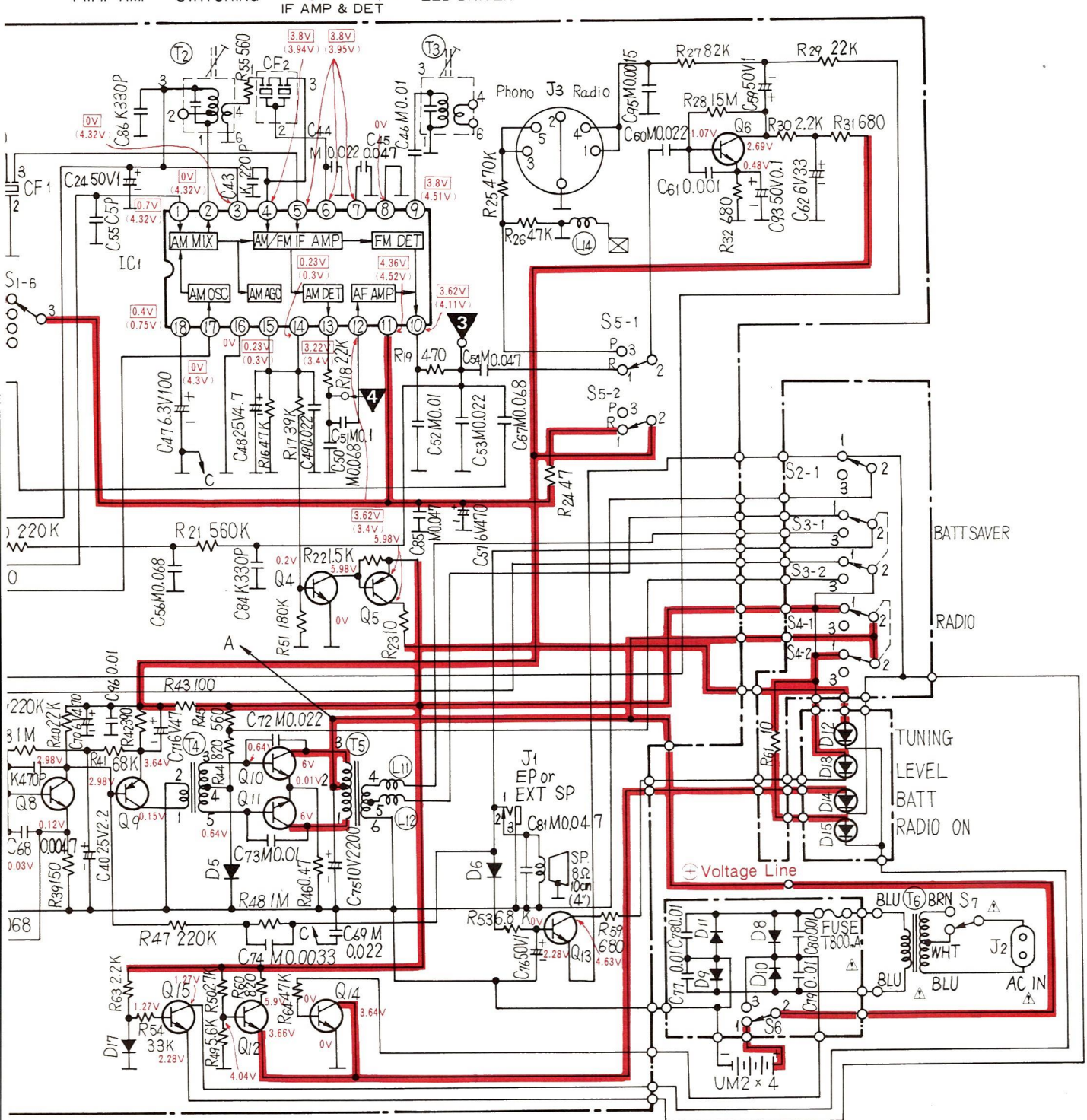
D3,18 RVDSD113 FINE TUNING
D7 RVDVD1272LE AOC
Q7 2SC828 SWITCHING
Q8 2SC828 AF AMP
Q9 2SA564 AF DRIVER
D17 RVDVD127 AOC

Notes:

1. S_{1-1}～S_{1-6}: Band switch in "FM" position. (1...FM, 2...LW, 4...MW, 5...SW)
2. S_{2-1}, S_{2-2}: LED switch in "ON" position. (1...ON, 3...OFF)
3. S_{3-1},S_{3-2}: Battery saver switch in "ON" position. (1...ON, 3...OFF)
4. S_{4-1}, S_{4-2}: Power switch in "ON" position. (1...ON, 3..⏻)
5. S_{5-1}, S_{5-2}: Radio/Phono switch in "RADIO" position. (1...RADIO, 3...PHONO)
6. S_6: AC/DC select switch in "DC" position.
7. S_7: Voltage selector.
8. DC voltage measurements are taken with electron voltmeter from negative terminal of battery. □...FM position, ( )...AM position.
9. Battery current: No signal .....38 Maximum output 700
10. ⚠ indicates that only parts specified by the manufact be used for safety.
11. The mark (▼) shows test point. e.g. ▼=test point 1

AM MODEL RF-1405LBS

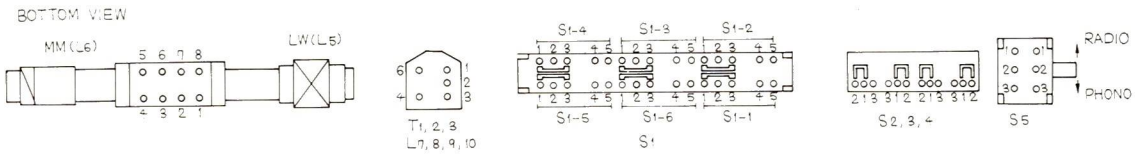
	Q3	D16	IC1	Q4	Q5	Q6	D12~15
72LE	2SC1675	0A90	AN7220A	2SC828	2SA564	2SC828	RADSLP1011
	FM IF AMP	SWITCHING	AM CONV. AM/FM IF AMP & DET	LED DRIVER	LED DRIVER	PRE AMP	LED INDICATOR



	D17	Q15	Q12	Q14	D5	Q10,11	D6	Q13	D8~11
64	RVDVD1272LE	2SC828	2SC828	2SC828	RVDVD1170LE	2SC1383	0A90	2SC828	RVDW06B
ER	AOC	REGULATOR	LED DRIVER	SWITCHING	AOC	POWER AMP	RECT	LED DRIVER	RECT

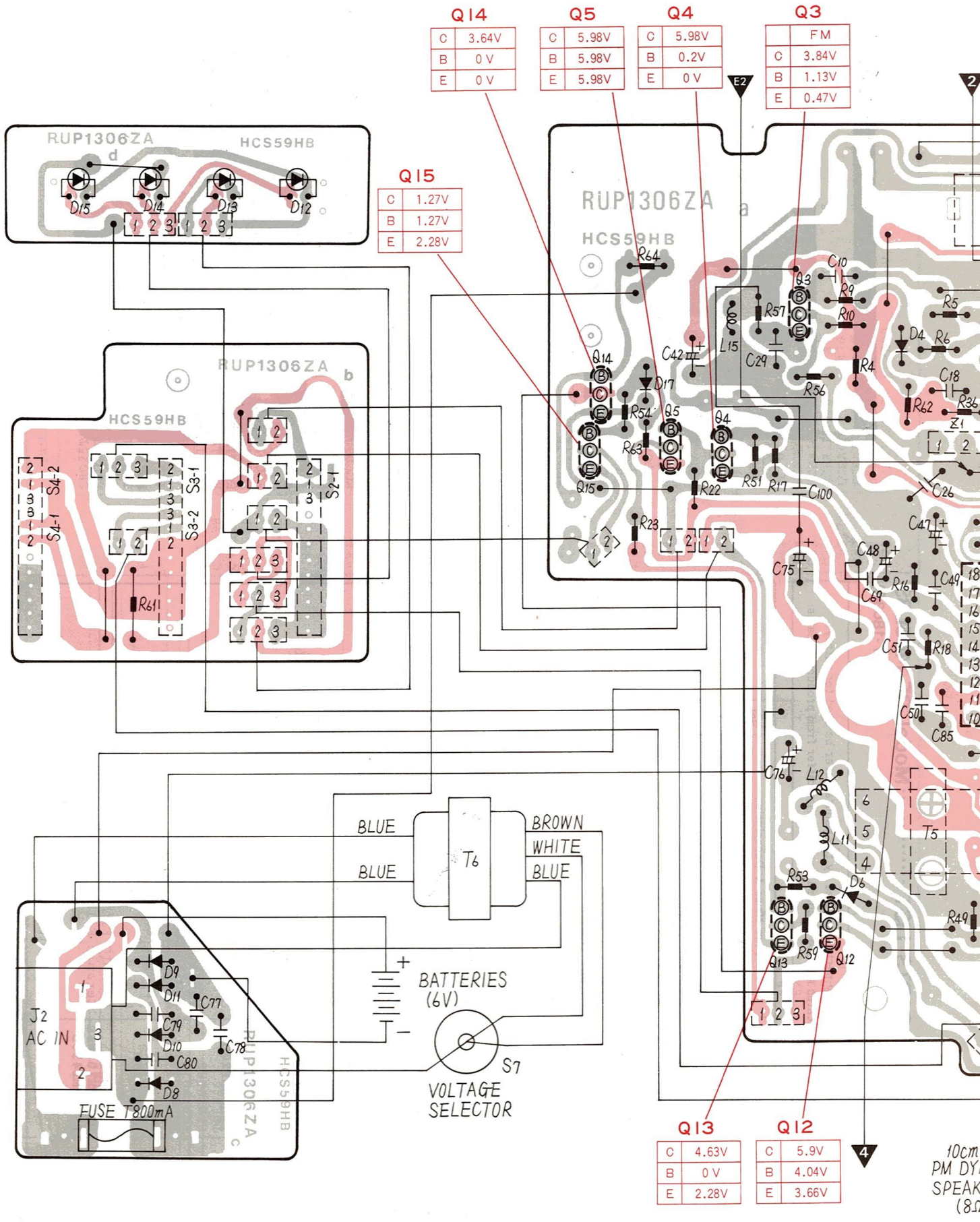
osition.

en with electronics
battery.
n.
.....38mA
.....700mA
by the manufacture



▼= test point 1.

CIRCUIT BOARD WIRING V



G VIEW MODEL RF-1405LBS

IC1

	FM	AM		FM	AM		FM	AM
1	0.7V	4.32V	7	3.8V	3.95V	13	3.22V	3.4V
2	0 V	4.32V	8	0 V	0 V	14	0.23V	0.3V
3	0 V	4.32V	9	3.8V	4.51V	15	0.23V	0.3V
4	3.8V	3.94V	10	3.62V	4.11V	16	0 V	0 V
5	3.8V	3.95V	11	4.36V	4.52V	17	0 V	4.3V
6	3.8V	3.95V	12	3.62V	3.4V	18	0.4V	0.75V

Q1

	FM
C	3.98V
B	4.19V
E	3.42V

Q2

	FM
C	4.04V
B	1.13V
E	0.44V

Q7

C	0.03V
B	0 V
E	0 V

Q6

C	2.69V
B	1.07V
E	0.48V

Q10, 11

C	6 V
B	0.64V
E	0.01V

Q9

C	0.15V
B	2.98V
E	3.64V

Q8

C	2.98V
B	0.76V
E	0.12V

TELESCOPIC ANTENNA

J3 DIN

J1 EARPHONE JACK

10cm (4") DM DYNAMIC SPEAKER (8Ω)

CABINET PARTS

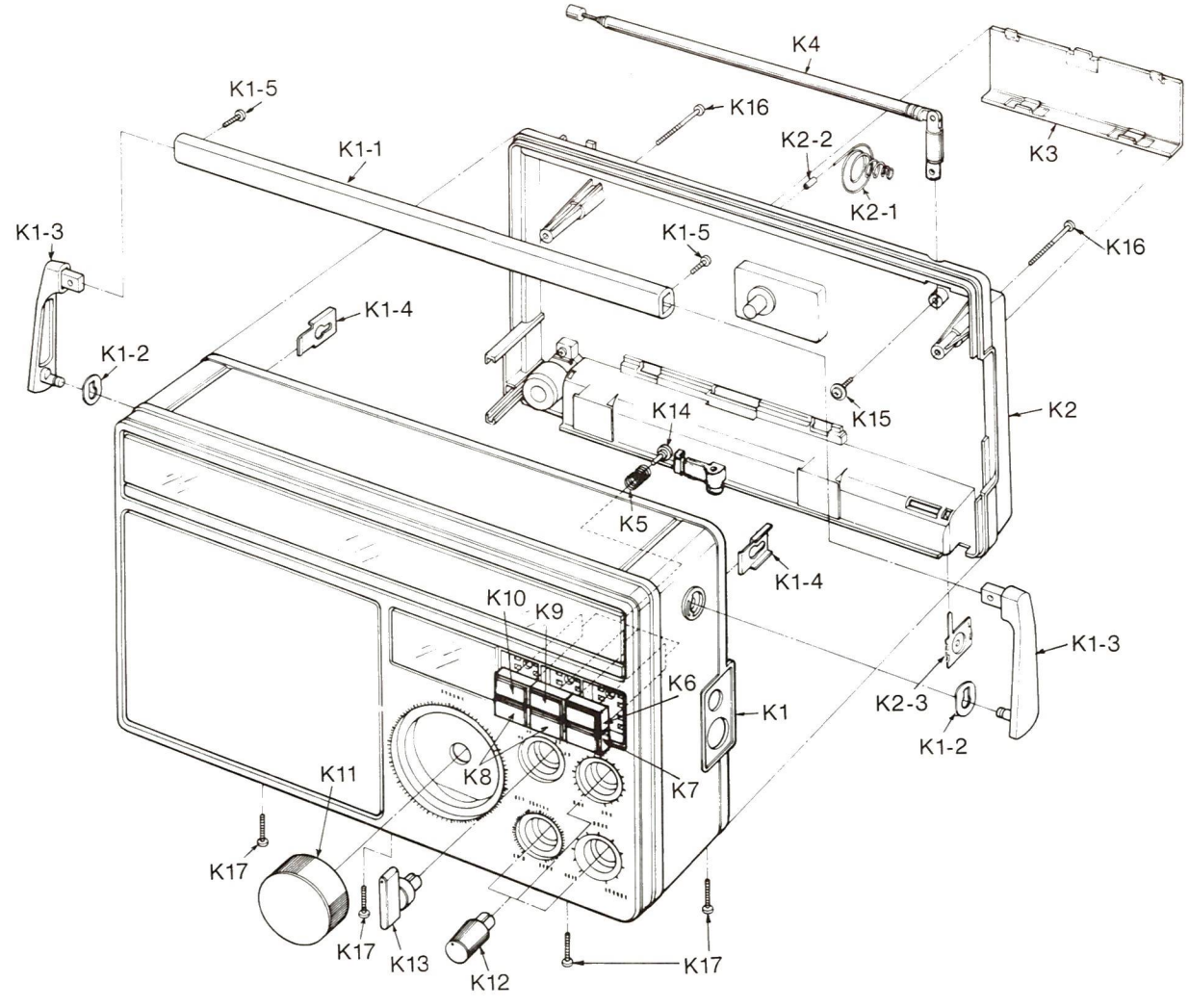


Fig. 12

ELECTRICAL PARTS

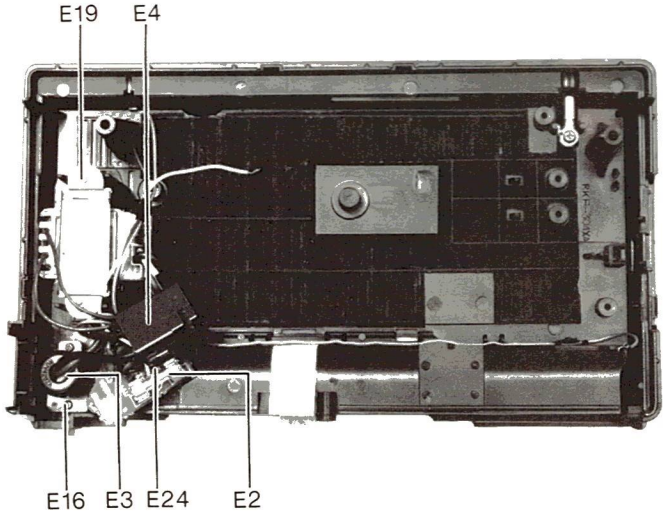


Fig. 13

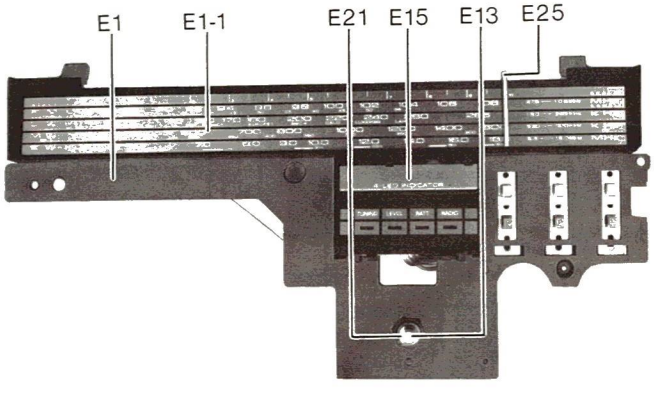


Fig. 14

■REPLACEMENT PARTS LIST ····· Model RF-1405LBS

(RD8007-1803C)

NOTES: 1. ⚠ indicates that only parts specified by the manufacturer be used for safety.
2. The S mark indicates service standard parts and may differ from production parts.

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
		INTEGRATED CIRCUIT, TRANSISTORS AND DIODES		
IC1	AN7220A	IC	1	
Q1,2	2SC1674	Transistor (Si)	2	
Q3	2SC1675	Transistor (Si)	1	
Q4,6,7,8,12∿15	2SC828	Transistor (Si)	8	
Q5,9	2SA564	Transistor (Ge)	2	
Q10,11	2SC1383	Transistor (Si)	2	
D1,6,16	OA90	Diode (Ge)	3	S
D2,3,18	RVDSD113	Diode (Si)	3	S
D4,7,17	RVDVD1272LE	Diode (Si)	3	
D5	RVDVD1170LE	Diode (Si)	1	
D8∿11	RVDW06B	Diode (Si)	4	
D12∿15	RADSLP1011	Diode (Ga)	1	
		COILS AND TRANSFORMERS		
L1	RLD4Y44	Tuning Coil, FM	1	
L3	RLO4Y43	Oscillator Coil, FM	1	
L5,6	RLF6E10	Antenna Coil, LW, MW	1	
L7	RLA3M10	" SW	1	
L8	RLO1M4	Oscillator Coil, LW	1	
L9	RLO2M6	" MW	1	
L10	RLO3M31	" SW	1	
T1,3	RLI4M101	IFT, FM	2	S
T2	RLI2M213	IFT, AM	1	
T4	RLT3F33	Input Transformer	1	
T5	RLT2G28	Output Transformer	1	
T6	RLT5J269	Power Transformer	1	⚠
		VARIABLE RESISTORS		
VR1	EVHOXAF20B54	Variable Resistor, 50kΩ (B)	1	
VR2	EVHOXAF20B14	" 10kΩ (B)	1	
VR3	EVHOXAF20D54	" 50kΩ (D)	1	
		VARIABLE CAPACITORS		
C3,4, 21,32	RCV4RC2V1L	Tuning Capacitor, w/Trimmer Capacitor (C5,14,22,34)	1	
C25	RCV1T-16M	Trimmer Capacitor	1	
C17,36	RCV2T-16M	"	1	
		CERAMIC FILTERS		
CF1	RVFSFE107MSR	Ceramic Filter	1	
CF2	RVFCFM2455D	"	1	

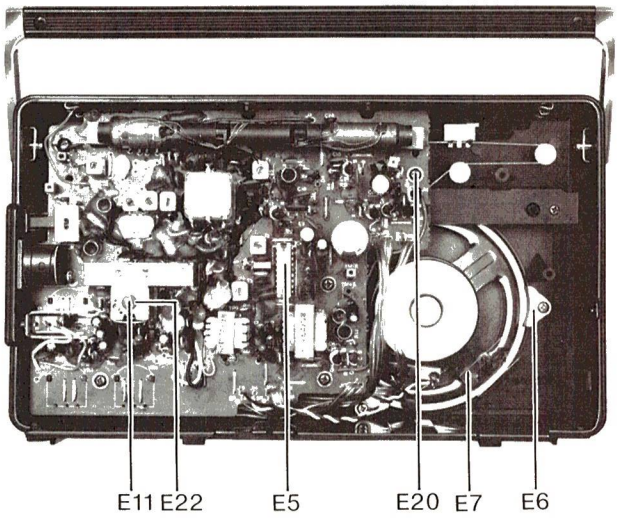


Fig. 15

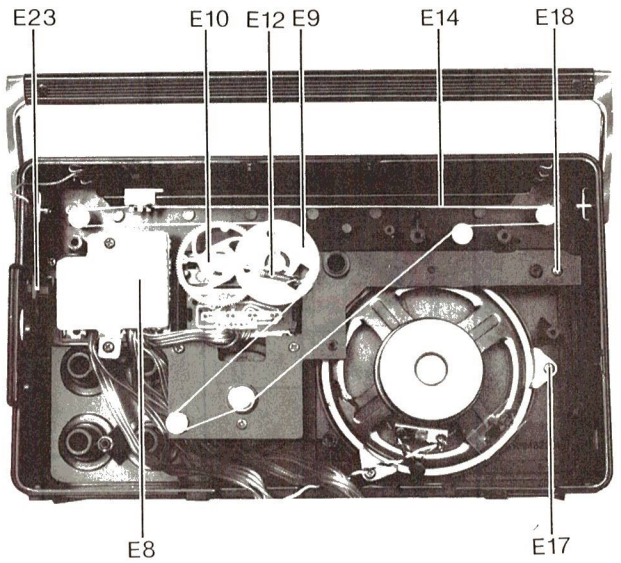


Fig. 16

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
		COMPONENT COMBINATION		
Z1	RXABPWB5	Component Combination	1	
		SPEAKER		
	EAS10P182S	Speaker, 10cm (4"), 8Ω	1	
		SWITCHES		
S1	RSR4F02Z	Switch, Band	1	
S2∿S4	RSHX028Z	" LED, BATT SAVE, RADIO	3	
S5	TSE346	" Radio/Phono	1	
S7	RSR2A01Y	" Voltage Selector	1	⚠
		JACKS		
J1	RJJ32E	Jack, Earphone	1	S
J2	RJJ115Z	" AC IN	1	⚠
J3	RJS15A	" Din	1	
		RESISTORS (Value is in OHMS)		
R2,49	ERD25TJ562	5.6 k 1/4W Carbon	2	S
R1	ERD25TJ563	56 k " "	1	S
R18	ERD25TJ222	2.2 k " "	1	S
R4,15,24	ERD25TJ470	47 " "	3	S
R53	ERD25TJ682	6.8 k " "	1	S
R23,61	ERD25TJ100	10 " "	2	S
R52	ERD25TJ6R8	6.8 " "	1	S
R43,58	ERD25TJ101	100 " "	2	S
R36,39	ERD25TJ151	150 " "	2	S
R8	ERD25TJ271	270 " "	1	S
R3	ERD25TJ331	330 " "	1	S
R42	ERD25TJ391	390 " "	1	S
R19	ERD25TJ471	470 " "	1	S
R5,45,55	ERD25TJ561	560 " "	3	S
R31,32,59	ERD25TJ681	680 " "	3	S
R44,60	ERD25TJ821	820 " "	2	S
R56	ERD25TJ221	220 " "	1	S
R57	ERD25TJ122	1.2 k " "	1	S
R10,65	ERD25TJ102	1 k " "	2	S
R30,40,63	ERD25TJ222	2.2 k " "	3	S
R35,50	ERD25TJ272	2.7 k " "	2	S
R62,66	ERD25TJ332	3.3 k " "	2	S
R6	ERD25TJ103	10 k " "	1	S
R22,69	ERD25TJ153	15 k " "	2	S
R12,17	ERD25TJ393	39 k " "	2	S
R16,26,64,68	ERD25TJ473	47 k " "	4	S
R41	ERD25TJ683	68 k " "	1	S
R27	ERD25TJ823	82 k " "	1	S
R9,29	ERD25TJ223	22 k " "	2	S
R54	ERD25TJ333	33 k " "	1	S
R7,67	ERD25TJ104	100 k " "	2	S
R51	ERD25TJ184	180 k " "	1	S
R11,20,37,47	ERD25TJ224	220 k " "	4	S

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
R13,25	ERD25TJ474	470 k 1/4W Carbon	2	S
R21	ERD25TJ564	560 k " "	1	S
R38,48	ERD25TJ105	1 M " "	2	S
R28	ERD25TJ155	1.5 M " "	1	
R46	ERX1ANJR47	0.47 1W Metal	1	S
		CAPACITORS (Value is in MICRO FARADS except P.P=PICO FARADS)		
C19	ECCD1H040C	4 P 50V Ceramic	1	
C55,98	ECCD1H050CC	5 P " "	2	
C7,12,82	ECCD1H100KC	10 P " "	3	
C20,89	ECCD1H270KC	27 P " "	2	
C43	ECCD1H221K	220 P " "	1	
C8,11,30,84,86	ECCD1H331K	330 P " "	5	
C99	ECCD1H070DC	7 P " "	1	
C9	ECCD1H560KC	56 P " "	2	
C2	ECCD1H3R5C	3.5 P " "	1	
C23	ECCD1H470KC	47 P " "	1	
C92	ECCD1H471KB	470 P " "	1	
C6,31	ECCD1H180KC	18 P " "	2	
C87	ECCD1H030C	3 P " "	1	
C88,97,100,101	ECCD1H101K	100 P " "	4	
C92	ECKD1H471KB	470 P " "	1	
C1,58,61	ECKD1H102ZF	0.001 " "	3	
C10,15,16,18,26,29,46,52,83,90	ECKD1H103MD	0.01 " "	10	
C74	ECKD1H332MD	0.0033 " "	1	
C49	ECKD1H223ZF	0.022 " "	1	
C68	ECKD1H472MD	0.0047 " "	1	
C27,41,77∿80,96	ECKD1H103ZF	0.01 " "	7	
C95	ECKD1H152MD	0.0015 " "	1	
C38	ECQS05371JZ	370 P " Styrol	1	
C39	ECQS05392KZ	3900 P " "	1	
C33	ECQS05221JZ	220 P " "	1	
C35	ECQS05141JZ	140 P " "	1	
C73	ECFVD103MD	0.01 25V Semi-Conductor	1	
C3,53,60,69,72,91	ECFVD223MD	0.022 " "	6	
C45,54,63,81,85	ECFVD473MD	0.047 " "	5	
C28,50,56,67,94	ECFVD683MD	0.068 " "	5	
C51	ECFVD104MD	0.1 " "	1	
C44	ECFVD153MD	0.015 " "	1	
C64	ECFVD333MD	0.033 " "	1	
C62	ECEA1CS330	33 16V Electrolytic	1	S
C71	ECEA1AS470	47 10V "	1	S
C57,70	ECEA0JS471	470 6.3V "	2	S
C47	ECEA1AS101	100 10V "	1	S
C42	ECEA0JS102	1000 6.3V "	1	S
C75	ECEA1CS222	2200 16V "	1	S

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
C37,48	ECEA25Z4R7	4.7 25V Electrolytic	2	S
C24,59,65,66,76	ECEA50Z1	1 50V "	5	S
C40	ECEA50Z2R2	2.2 " "	1	S
C93	ECEA50ZR1	0.1 " "	1	S
		CABINET PARTS		
K1	RYMF1405LBSX	Front Cabinet Ass'y	1	
K1-1	RKX199Z	Handle	1	
K1-2	RKX184Z	Spacer, Arm	2	
K1-3	RKX204Z	Arm, Handle	2	
K1-4	QBP1817	Stopper, Arm	2	
K1-5	XSB3+6FZ	Screw, Handle M'tg	2	
K2	RYFF1405LBSX	Rear Cabinet Ass'y	1	
K2	RYFF1405LBSF	Rear Cabinet Ass'y, for Itary, France & Finland	1	
K2-1	RJC603Z	Spring, Battery - Side	1	
K2-2	RJT398A	Connecting Pipe	1	
K2-3	RJC205B	Terminal, Battery + Side	1	
K3	RYNF1405LBSX	Battery Cover Ass'y	1	
K4	XEARR170FKY	Telescopic Antenna	1	
K5	RDS5104Z	Spring, Button	6	
K6	RBC279P	Button, Radio On	1	
K7	RBC279Q	Button, Radio Off	1	
K8	RBC279R	" Off	2	
K9	RBC279S	" Batt Saver	1	
K10	RBC279T	" LED On	1	
K11	RBN533Z	Knob Tuning	1	
K12	RBN534Z	" Volume	3	
K13	RBS168Z	" Band	1	
K14	RHR1127Z	Stopper, Button	6	
K15	XTW3+10F	Screw, Telescopic Antenna M'tg	1	
K16	XTB3+45CFN	" , Cabinet M'tg	2	
K17	XTN3+10B	" , "	4	S
		ELECTRICAL PARTS		
E1	RZAF1405LBSX	Dial Chassis Ass'y	1	
E1-1	RKD563Z	Dial Scale	1	
E2	QTF1054	Holder, Fuse	2	⚠
E3	RUV426Z	Cover, Voltage Selector	1	⚠
E4	RUV482Z	Cover, AC IN Jack	1	⚠
E5	RMC607Z	Shield Cover, IC	1	
E6	RMS12B	Bracket, Speaker	3	
E7	RMX198Z	Insulator	1	
E8	RMX183Z	Insulator	1	
E9	RDD3383Z	Drum, Dial	1	
E10	RDG5694Z	Gear, Dial	1	
E11	RDF864Z	Shaft, Band Switch	1	
E12	RDS4090A	Spring, Dial	1	
E13	RDT2252Z	Shaft, Tuning	1	
E14	RDZ05Z	Cord, Dial	1 ROLL	
E15	RGK957Z	Indicating Plate, LED	1	
E16	XTN23+8B	Screw, Voltage Selector M'tg	2	S

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
E17	XTN3+10B	Screw, Speaker M'tg	3	S
E18	XTN3+12B	" Chassis M'tg	5	S
E19	XTW3+16F	" Transformer M'tg	2	
E20	XTW3+12FR	Red Screw, PC Board M'tg	6	
E21	XNS9	Nut, Tuning Shaft M'tg	1	S
E22	XUC25FT	Circlip	1	S
E23	RBD122Z	Knob, Radio/Phono	1	
E24	XBA2C05TRO	Fuse, T500mA	1	⚠
E25	RDP813Z	Pointer, Dial	1	
		ACCESSORIES		
	XEH1A1-P	Magnetic Earphone	1	S
	RJA20Z	Power Cord, AC	1	S ⚠
	RQE13Z	Caution Tag	1	
		PACKING MATERIALS		
	XZB40X30A04	Polyethylene Cover	1	S
	XZB10X25A04	"	1	S
	RPN9347Z	Pad Complete	1	
	RPK984Z	Gift Box	1	
		PRINTED MATERIALS		
	RQX6597Z	Instruction Book	1	
	RQX6619Z	Instruction Book, for Itary	1	