

Service Manual

FM-LW-MW-SW Portable Receiver

Radio
RF-3500

Colour

(K) : Black



Areas

Suffix for Model No.	Area	Colour
(E)	Europe	(K)
(EB)	Britain	
(EI)	Italy	

■ Specifications

Frequency Range:

FM	87.5 – 108.0 MHz
LW	148.5 – 285 kHz
MW	520 – 1610 kHz
SW	5.9 – 18.0 MHz

Intermediate Frequency:

FM	10.7 MHz
AM (LW/MW/SW)	459 kHz

Sensitivity:

FM	3.1 μ V/ 50 mW H.P. output (-3 dB Limit Sens.)
LW	79 μ V/m/ 50 mW H.P. output (Max.)
MW	50 μ V/m/ 50 mW H.P. output (Max.)
SW	6.3 μ V/ 50 mW H.P. output (Max.)

Power Requirement:

AC	(EB)...240 V, 50 Hz (E)(EI)...230 V, 50 Hz
Battery	6 V (Four R14/LR14, UM-2 batteries)

Power Consumption:

5 W (AC only)

Speaker:

10 cm PM dynamic speaker, 2.7 Ω

Output Power:

1.0 W (RMS...max.)

Output Jack:

EARPHONE: \varnothing 3.5, 3 – 8 Ω

Dimensions:

244 (W) \times 142 (H) \times 92(D) mm

Weight:

935 g (without batteries)

Notes:

1. Weight and dimensions shown are approximate.
2. Design and specifications are subject to change without notice.

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

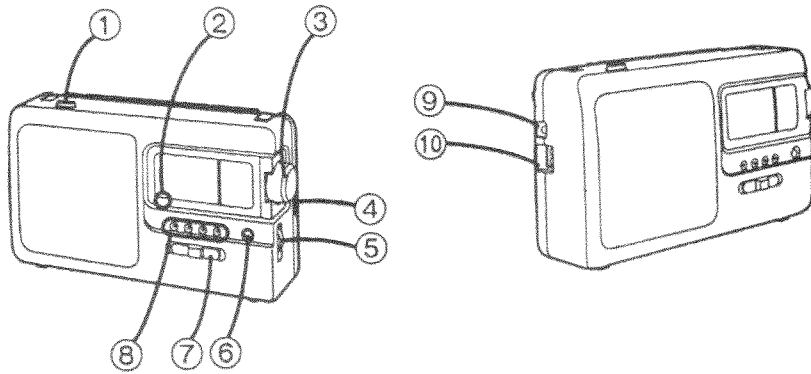
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■ Location of Controls



- ① Operation switch (OPERATION)
- ② Tuning indicator (TUNING)
- ③ Tuning control (TUNING)
- ④ Tone selector (TONE)
- ⑤ Volume control (VOLUME)
- ⑥ Volume indicator (VOLUME)
- ⑦ Band selector (BAND)
- ⑧ Band indicators (FM, LW, MW, SW)
- ⑨ Earphone jack (EARPHONE) (Ø 3.5, 3 - 8 Ω)
- ⑩ AC socket (AC IN)

■ How to use the earphone (not included)
Reduce the volume level. Connect the earphone to the earphone jack (⑨).

- Avoid listening for prolonged periods of time to prevent hearing damage.
- Speaker is automatically cut off when the earphone is connected.

Listening to the Radio

Follow steps 1 - 4.

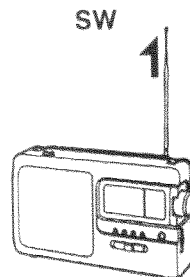
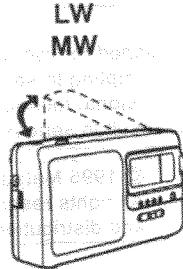
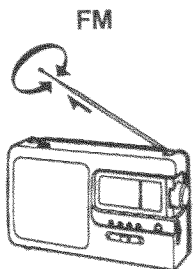
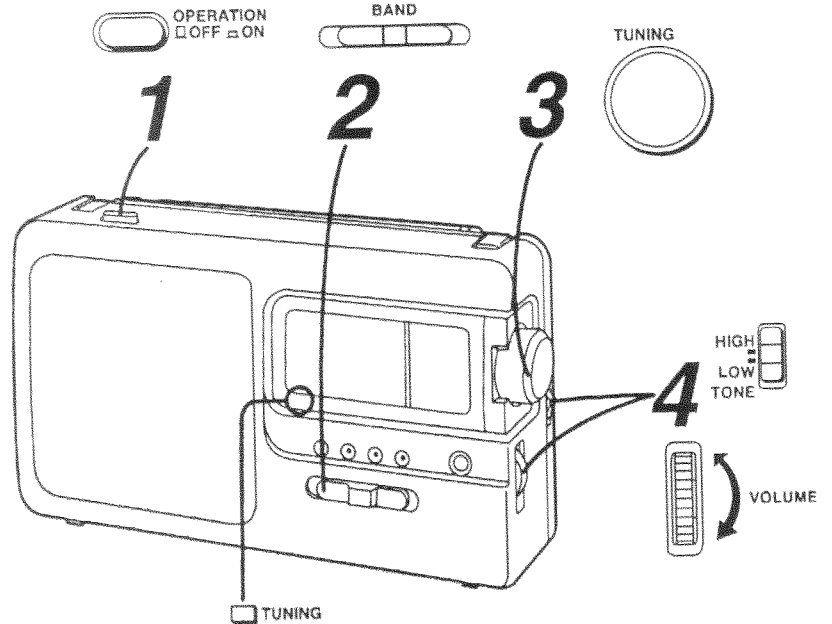
When tuning into a station, the tuning indicator will illuminate.
To turn off the unit, press OPERATION.

■ Antennas

FM:
Pull out the telescopic antenna and adjust its length and angle for optimum reception.

LW/MW:
The built-in ferrite core antenna will provide excellent LW/MW reception in most areas. Turn the unit in the direction which gives the best results since the ferrite core antenna is directional.

SW:
Extend the telescopic antenna fully, keep it vertical.

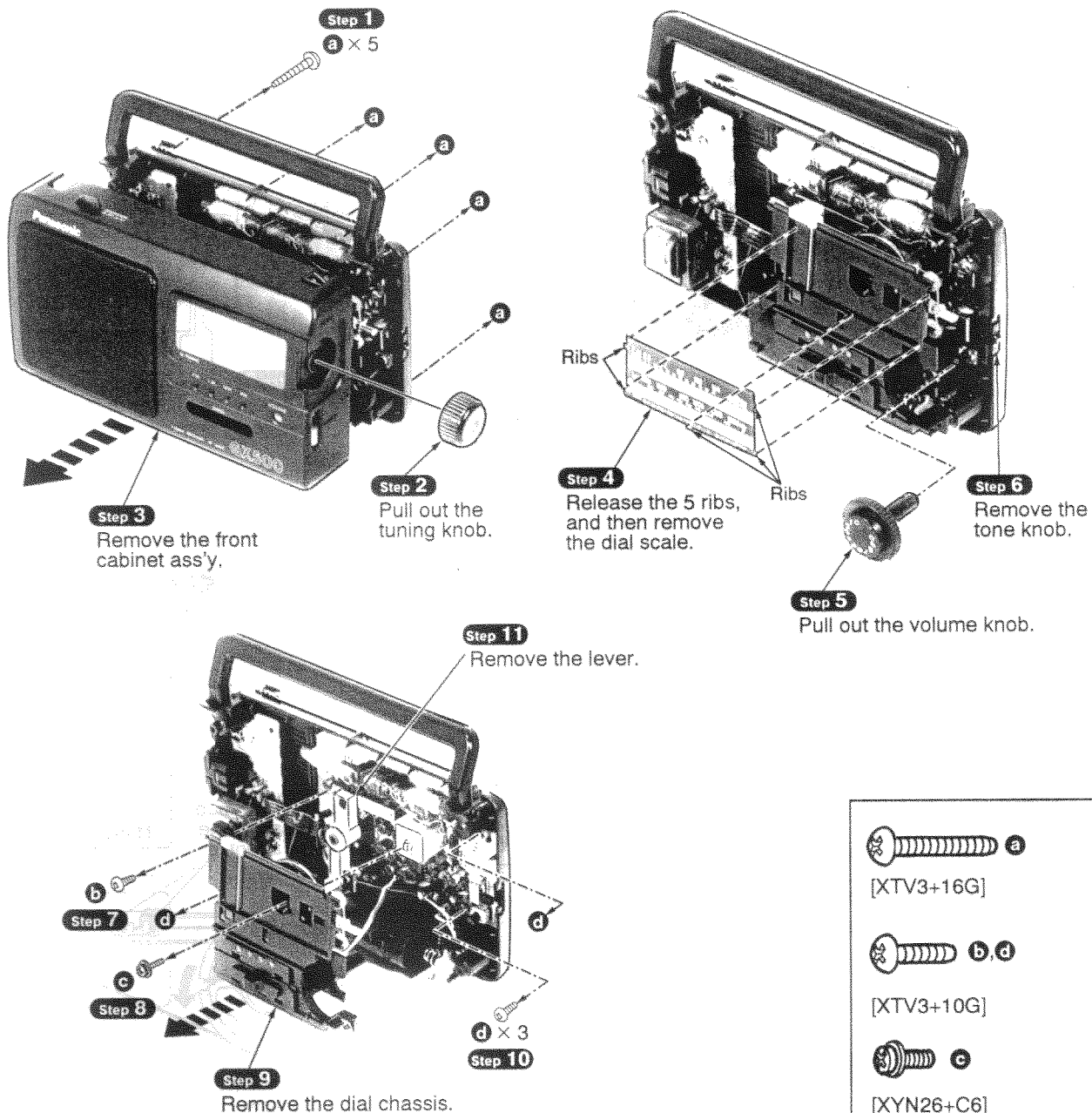


■ Operation Check and Main Component Replacement Procedures

NOTE

1. This section describes procedures for checking the operation of the major printed circuit boards and replacing the main components.
2. For reassembly after operation checks or replacement, reverse the respective procedures. Special reassembly procedures are described only when required.
3. Illustrated screws are equivalent to actual size.
4. Refer the parts No. on the page of "Main Component Replacement Procedures", if necessary.

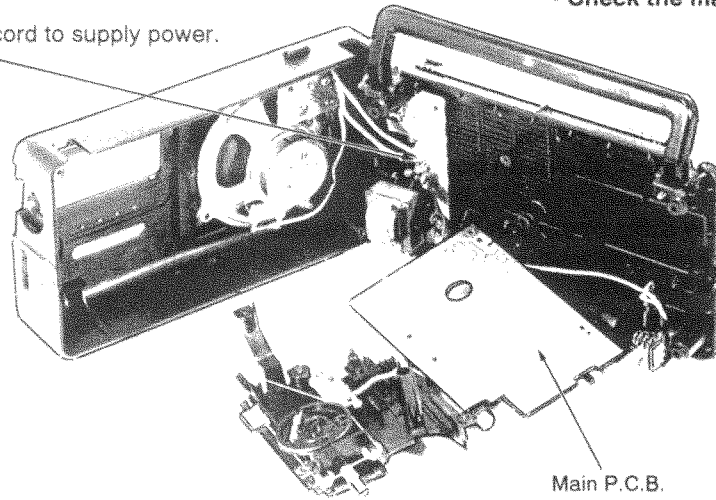
1. Checking for the main P.C.B.



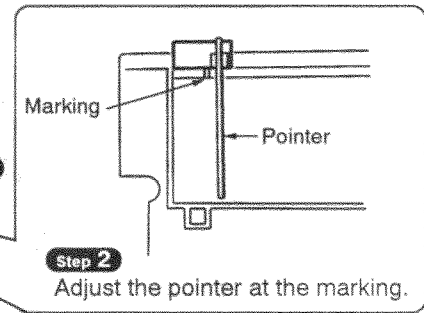
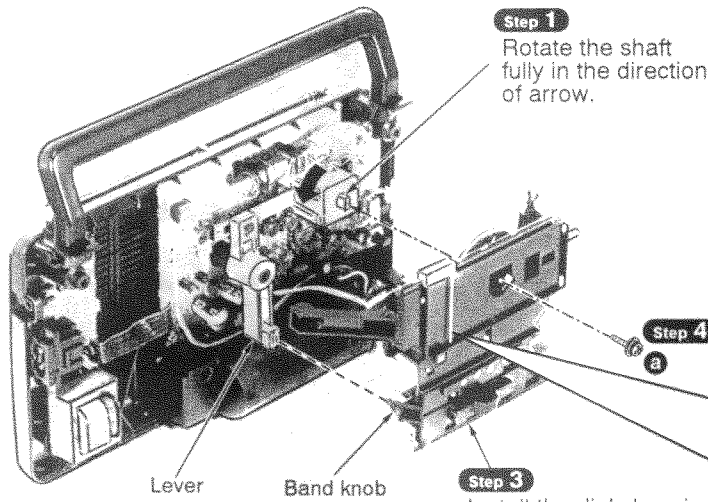
Step 12

Connect AC power cord to supply power.

• Check the main P.C.B. as shown below.



Installation of dial chassis (Point "0" Adjustment)

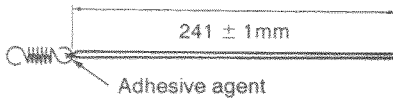


NOTE Align the lever with the band knob.

Installation of dial rope

Step 1

Tight the dial rope with spring, and then fix it with adhesive agent.

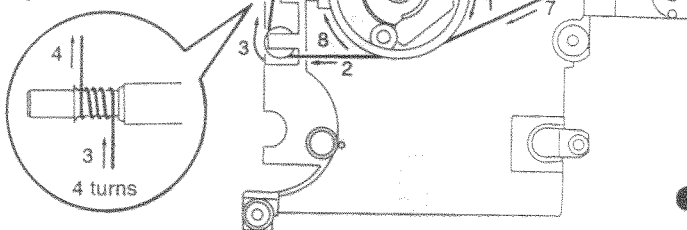


Step 2

Attach the spring to the hole of dial drum.

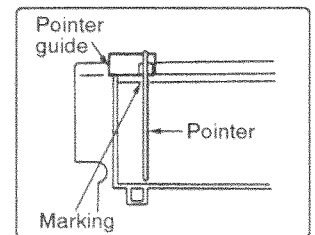
Step 3

Attach the dial rope in order as shown right.



Step 5

Align the pointer with the marking, and then install the pointer guide.



Step 6

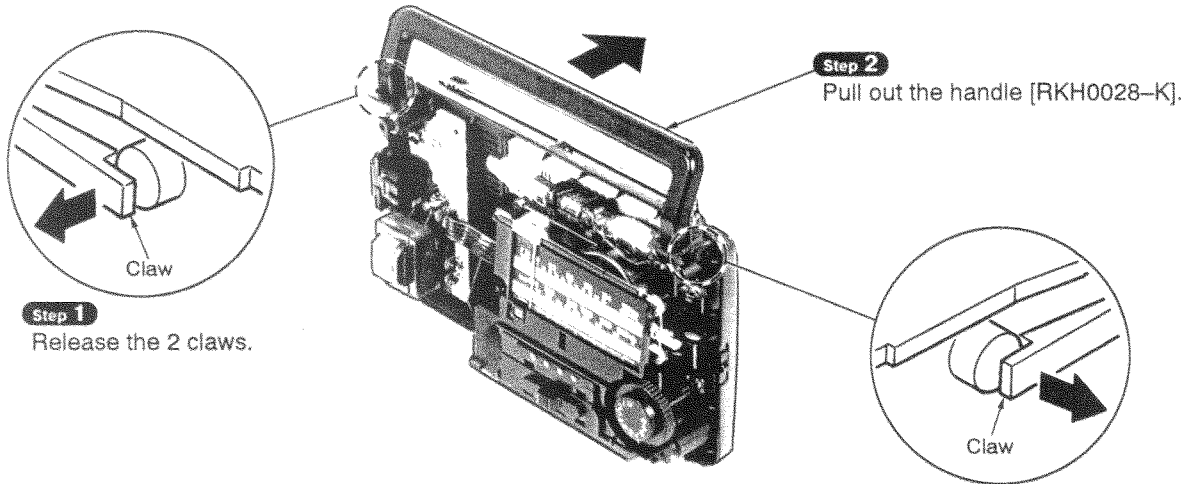
Install the dial rope, and then apply the adhesive agent.

Step 4

Rotate the dial drum fully in the direction of arrow.

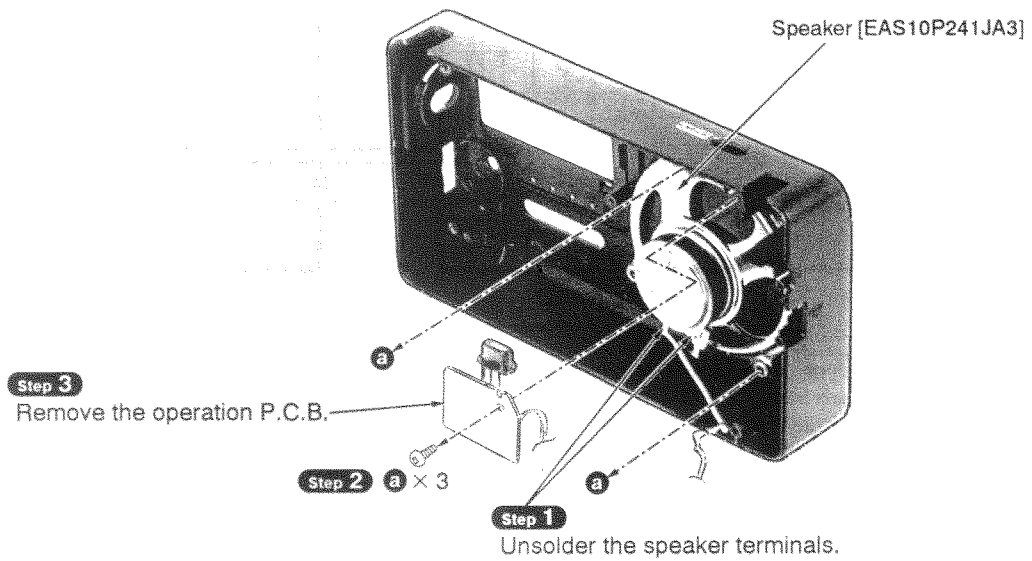
2. Replacement for the handle

• Follow the item 1 (**Step 1** ~ **Step 3**) on page 3.



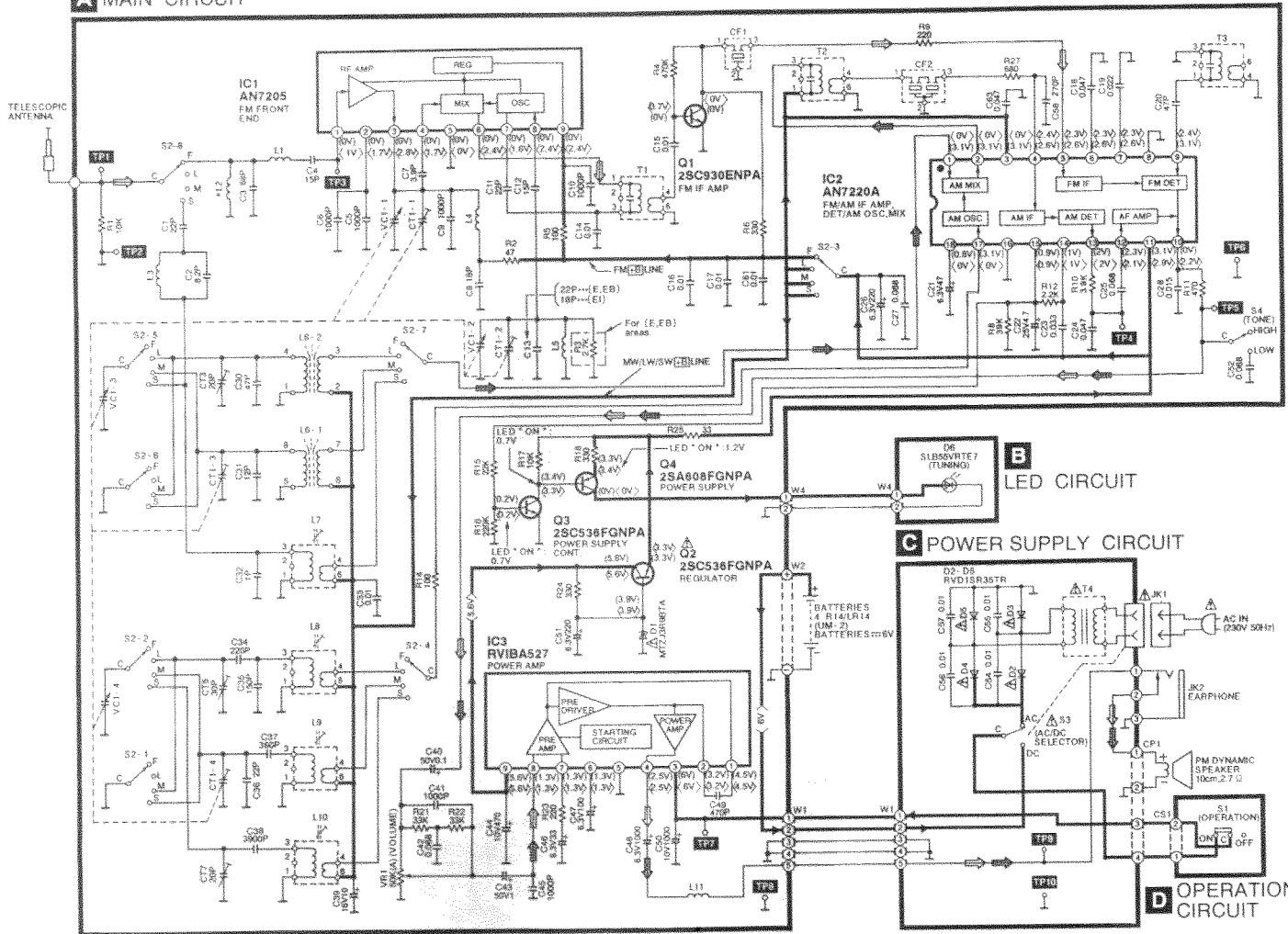
3. Replacement for the speaker

• Follow the item 1 (**Step 1** ~ **Step 3**) on page 3.



Schematic Diagram

A MAIN CIRCUIT



Notes:

- S1 : Operation on/off switch to "ON" position.
- S2-1~S2-8 : Band select switch to "FM" position.
(F...FM, L...LW, M...MW, S...SW)
- S3 : AC/DC select switch to "DC" position.
- S4 : Tone select switch to "HIGH" position.
- VR1 : Volume control VR.

Battery current:

Vol. min...36 mA (FM) Vol. max...246 mA (FM)
 31 mA (AM) 270mA (AM)

Measurement instruction

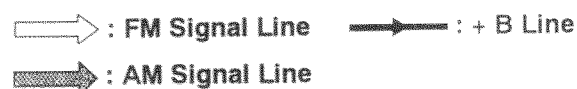
() AM (MW/LW/SW) 74 dB/m, 30% Mod.
 FM: 60 dB, 30% Mod.

- DC voltage measurements are taken with electronics voltmeter.
The negative terminal of the battery provides negative meter connection point.
() AM (MW/LW/SW) < > FM

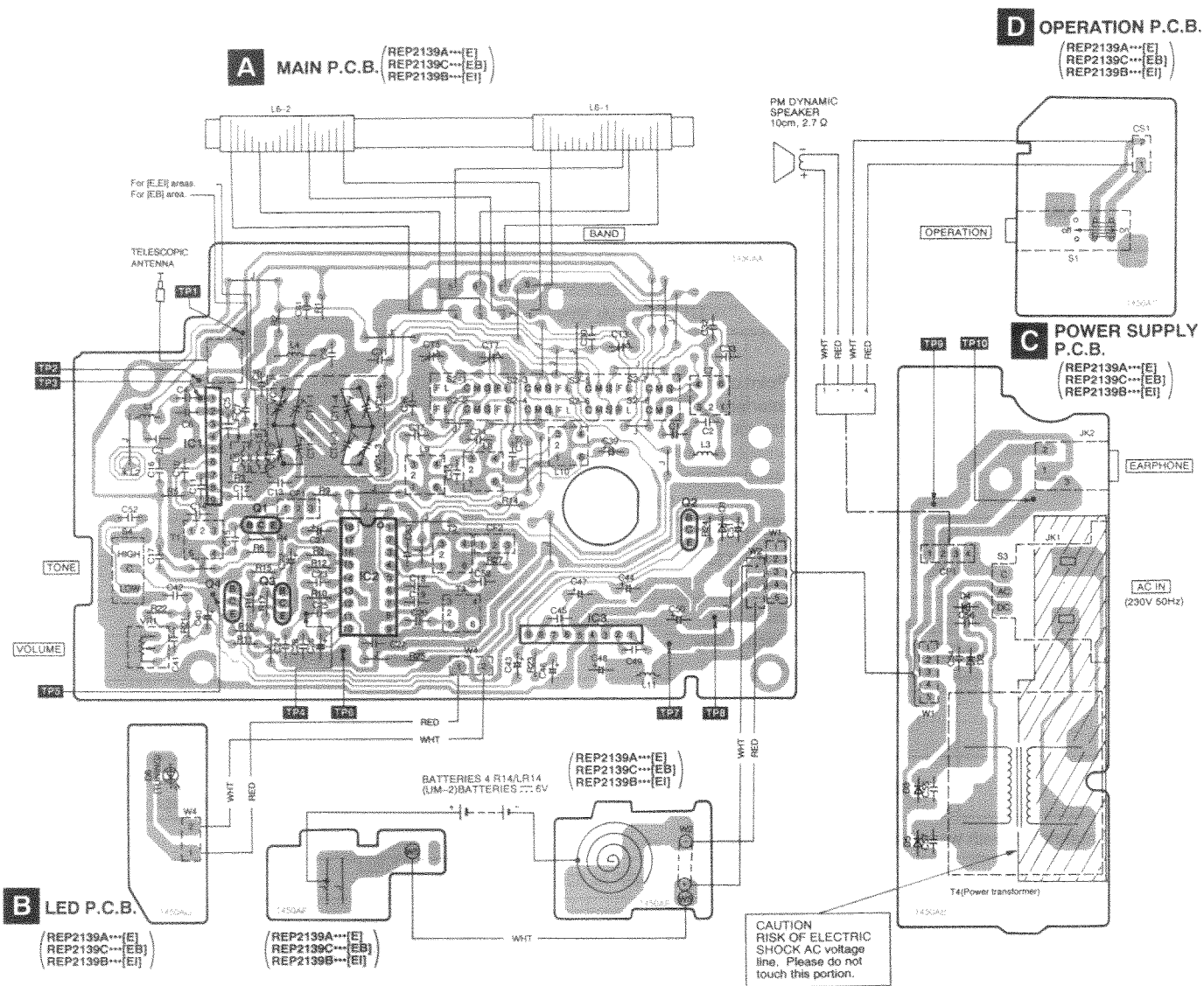
Important safety notice

Components identified by Δ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

- This schematic diagram may be modified at any time with the development of new technology.



Printed Circuit Board and Wiring Connection Diagram



• This circuit board diagram may be modified at any time with the development of new technology.

<p>AN7220A</p>	<p>AN7205</p>	<p>BA527</p>	<p>2SA608FGNPA 2SC536FGNPA 2SC930ENPA</p>
<p>MTZJ3R9BTA</p>	<p>RVD1SR35TR</p>	<p>SLB55VRTE7</p>	

■ Measurements and Adjustments

● ALIGNMENT INSTRUCTION

READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

- Set power source voltage to 6 V DC.
- Set operation switch to ON.
- Set band select switch to FM, LW, MW or SW.
- Set volume control to maximum.
- Output of signal generator should be no higher than necessary to obtain an output reading.

● AM ALIGNMENT

(The parts other than the ones listed below are aligned at the factory before they are supplied. Therefore, alignment of those parts is unnecessary when used for replacement.)

SIGNAL GENERATOR or SWEEP GENERATOR		RADIO DIAL SETTING	INDICATOR (ELECTRONIC VOLTMETER or OSCILLOSCOPE)	ADJUSTMENT (Refer to Fig. 1)	REMARKS
CONNECTIONS	FREQUENCY				
AM-IF ALIGNMENT					
(1)	Fashion a loop of several turns of wire and radiate a signal into the loop ant. of receiver.	459 kHz	Point of non-interference. (on/about 600kHz)	Earphone Jack (8Ω) (Fabricate the plug as shown in Fig.2 and then connect the lead wires of the plug to the measuring instrument.)	T2 (AM IFT) Adjust for maximum output.
LW-RF ALIGNMENT					
(2)	"	(E)(EB):136 kHz (EI):137 ± 5 kHz	Tuning capacitor fully closed.	"	L8 (LW OSC Coil) "
(3)	"	(E)(EB):297 kHz (EI):297 ± 5 kHz	Tuning capacitor fully open.	"	CT5 (LW OSC Trimmer) "
(4)	"	145 kHz	Tune to signal	"	(*1) L6-2 (LW ANT Coil) Adjust for maximum output. Adjust L6-2 by moving coil along the ferrite core.
(5)	"	285 kHz	Tune to signal	"	CT3 (LW ANT Trimmer) Adjust for maximum output. Repeat steps (2)-(5).
(*1) Fix antenna coil with wax after completing alignment.					
MW-RF ALIGNMENT					
(6)	"	(E)(EB): 511 kHz (EI): 514±3 kHz	Tuning capacitor fully closed.	"	L9 (MW OSC Coil) Adjust for maximum output.
(7)	"	(E)(EB) : 1650 kHz (EI) : 1639 ± 5 kHz	Tuning capacitor fully open.	"	CT1-4 (MW OSC Trimmer) Adjust for maximum output.
(8)	"	550 kHz	Tune to signal	"	(*2) L6-1 (MW ANT Coil) Adjust for maximum output. Adjust L6-1 by moving coil along the ferrite core.
(9)	"	1500 kHz	"	"	CT1-3 (MW ANT Trimmer) Adjust for maximum output. Repeat steps (6)-(9).
(*2) Fix antenna coil with wax after completing alignment.					
SW-RF ALIGNMENT					
(10)	"	5.75 MHz	Tuning capacitor fully closed.	"	L10 (SW OSC Coil) Adjust for maximum output.
(11)	"	18.8 Hz	Tuning capacitor fully open.	"	CT7 (SW OSC Trimmer) Adjust for maximum output.
(12)	"	5.9 MHz	Tune to signal	"	L7 (SW ANT Coil) Adjust for maximum output. Repeat steps (10)-(12).

● FM ALIGNMENT

SIGNAL GENERATOR or SWEEP GENERATOR		RADIO DIAL SETTING	INDICATOR (ELECTRONIC VOLTMETER or OSCILLOSCOPE)	ADJUSTMENT (Refer to Fig. 1)	REMARKS
CONNECTIONS	FREQUENCY				
AM-IF ALIGNMENT					
(13)	Connect to test point TP3 through ceramic capacitor (0.001 μ F). Negative side to test point TP2 .	10.7 MHz	Point of non-interference. (on/about 90 MHz)	Connect vert. amp. scope to test point TP5 . Negative side to test point TP6 .	T1 (FM 1st IFT) Waveform is shown in Fig.3.
(14)	"	"	"	"	T3 (FM 2nd IFT) Waveform is shown in Fig.4.
FM-RF ALIGNMENT					
(15)	Connect to test point TP1 through FM dummy antenna. Negative side to test point TP2 .	(E)(EB): 86.2 MHz (EI): 87.35 MHz \pm 50 kHz	Tuning capacitor fully closed.	Earphone Jack (8 Ω) (Fabricate the plug as shown in Fig.2 and then connect the lead wires of the plug to the measuring instrument.)	L5 (FM OSC Coil) Adjust for maximum output.
(16)	"	(E)(EB): 109.2 MHz (EI): 108.3 MHz \pm 75 kHz	Tuning capacitor fully open.	"	CT1-2 (FM OSC Trimmer) "
(17)	"	90.0 MHz	Tune to signal	"	L4 (FM ANT Coil) "
(18)	"	106.0 MHz	Tune to signal	"	CT1-1 (FM ANT Trimmer) Adjust for maximum output. Repeat steps (15)~(18).

● ALIGNMENT POINTS

● Please refer to Printed Circuit Board Diagram for test point locations.

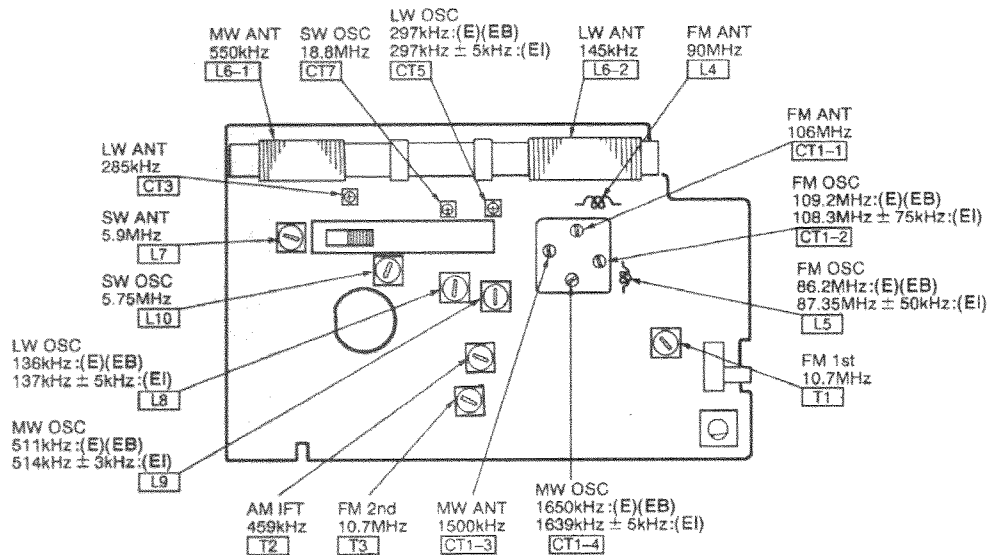


Fig.1

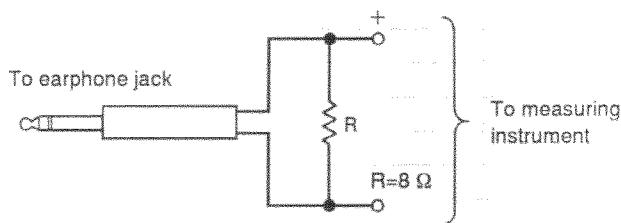


Fig.2

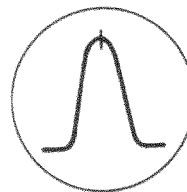


Fig.3

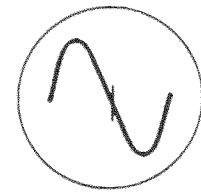


Fig.4

■ Replacement Parts List

Notes: *Important safety notice:

Components identified by Δ mark have special characteristics important for safety. Furthermore, special parts which have purposes of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used. When replacing any of components, be sure to use only manufacture's specified parts shown in the parts list.

*The parenthesized indications in the Remarks columns specify the areas. (Refer to the cover page for area.) Parts without these indications can be used for all areas.

* [M] Indicates in Remarks columns parts that are supplied by MESA.

* <VRD> indicates parts that are supplied by Video Recorder Division.

*The "[SF]" mark denotes the standard part.

Ref. No.	Part No.	Part Name & Description	Remarks	Ref. No.	Part No.	Part Name & Description	Remarks
		INTEGRATED CIRCUIT(S)		T3	RL14B153-T	TRANSFORMER	
				T4	RTP111E004-V	POWER TRANSFORMER	(E) (E1) Δ
				T4	RTP111B003-V	POWER TRANSFORMER	(EB) Δ
IC1	AN7205	IC, FM FRONT END				FILTER(S)	
IC2	AN7220A	IC, FM/AM IF AMP					
IC3	BA527	IC, POWER AMP		CF1	RLFFEHWNOZZT	CERAMIC FILTER	
		TRANSISTOR(S)		CF2	RLFCFM2459BL	CERAMIC FILTER	
Q1	2SC930ENPA	TRANSISTOR				CONNECTOR	
Q2	2SC536FGNPA	TRANSISTOR	Δ	CP1	RJP4G4YA	CONNECTOR(4P)	
Q3	2SC536FGNPA	TRANSISTOR				VARIABLE CAPACITOR(S)	
Q4	2SA608FGNPA	TRANSISTOR		CT3	ECRLA020E53R	VARIABLE CAPACITOR	
		DIODE(S)		CT5	ECRLA030E53R	VARIABLE CAPACITOR	
D1	MTZJ3R9BTA	DIODE	Δ	CT7	ECRLA020E53R	VARIABLE CAPACITOR	
D2-5	RVD1SR35TR	DIODE	Δ			SWITCH(ES)	
D6	SLB55VRTE7	LED	[M]	S1	RSP2B019-B	SW, OPERATION	
		VARIABLE RESISTOR(S)		S2	RSS4H001-B	SW, BAND	
VR1	RRV09A01D54A	V. R. VOLUME	[M]	S3	RJJ1SE01-1H	SW, AC/DC (JK1)	Δ
		VARIABLE CAPACITOR(S)		S4	RAA2B019-B	SW, TONE	
VC1	RCV4RC2R1A-M	V. C				JACK(S)	
		COIL(S)		JK1	RJJ1SE01-1H	JACK, AC IN(S3)	Δ
L1	RLQY18S3W-X	COIL		JK2	RJJD3M6ZB-C	JACK, EARPHONE	
L3	RLQY30S1W-X	COIL					
L4	RLD4Y44W-X	COIL					
L5	RLD4Y53W-X	COIL	(E) (EB)				
L5	RL04N187-0	COIL	(E1) [M]				
L6	RLF6D154-0	COIL					
L7	RLA3B41-T	COIL					
L8	RL01B12-T	COIL					
L9	RL02B017-T	COIL					
L10	RL03B87-T	COIL					
L11	RLQZD101K-Y	COIL					
		TRANSFORMER(S)					
T1	RL14B153-T	TRANSFORMER					
T2	RL12B153-T	TRANSFORMER					

Notes : * Capacity values are in microfarads (μF) unless specified otherwise, P=Pico-farads (pF) F=Farads (F)
 * Resistance values are in ohms, unless specified otherwise, 1K=1,000(OHM) , 1M=1,000k(OHM)

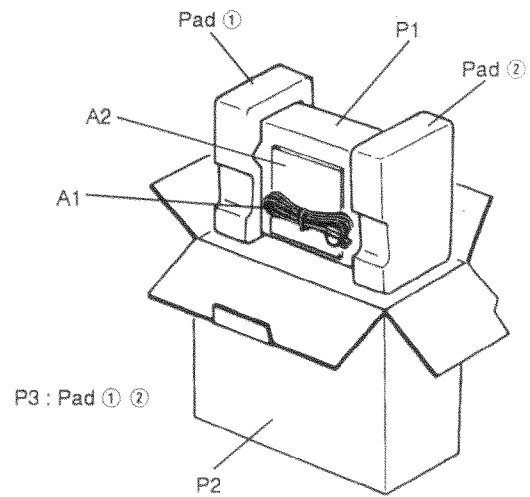
Ref. No.	Part No.	Values & Remarks	Ref. No.	Part No.	Values & Remarks			
		RESISTORS	C26	ECEAJU221	6.3V 220U			
			C27	ECFR1C683MR	16V 0.068U			
			C28	ECBTJ153MS5	6.3V 0.015U			
R1	ERDS2TJ103	1/4W 10K	C30	ECBT1H470J5	50V 47P			
R2	ERDS2TJ470	1/4W 47	C31	ECBT1H120JC5	50V 12P			
R3 (E, EB)	ERDS2TJ272T	1/4W 2.7K	C32	ECBT1H010MC5	50V 1P			
R4	ERDS2TJ474	1/4W 470K	C33	ECFR1C103MR	16V 0.01U			
R5	ERDS2TJ101	1/4W 100	C34	ECQP2A221JZT	100V 220P			
R6	ERDS2TJ331	1/4W 330	C35	ECQP2A151JZT	100V 150P			
R8	ERDS2TJ393	1/4W 39K	C36	ECBT1H220JC5	50V 22P			
R9	ERDS2TJ221	1/4W 220	C37	ECQP2A361JZT	100V 360P			
R10	ERDS2TJ392T	1/4W 3.9K	C38	ECQP2A392JZT	100V 3900P			
R11	ERDS2TJ471	1/4W 470	C39	ECEA1CU100	16V 10U			
R12	ERDS2TJ222	1/4W 2.2K	C40	ECEA1HJDR1	50V 0.1U			
R14	ERDS2TJ101	1/4W 100	C41	ECBT1H102KB5	50V 1000P			
R15	ERDS2TJ223	1/4W 22K	C42	ECFR1C683MR	16V 0.068U			
R16	ERDS2TJ224T	1/4W 220K	C43	ECEA1HJ010	50V 1U			
R17	ERDS2TJ103	1/4W 10K	C44	ECEA1AU471	10V 470U			
R18	ERDS2TJ331	1/4W 330	C45	ECBT1H102KB5	50V 1000P			
R21, 22	ERDS2TJ333	1/4W 33K	C46	ECEAJU330	6.3V 33U			
R23	ERDS2TJ221	1/4W 220	C47	ECEAJU101B	6.3V 100U			
R24	ERDS2TJ331	1/4W 330	C48	ECEAJU102	6.3V 1000U			
R25	ERDS2TJ330	1/4W 33	C49	ECBT1H471KB5	50V 470P			
R27	ERDS2TJ681	1/4W 680	C50	ECEA1AU102	10V 1000U			
		CAPACITORS	C51	ECEAJU221	6.3V 220U			
			C52	ECFR1C683MR	16V 0.068U			
			C54-57	ECKR1H103ZF5	50V 0.01U			
C1	ECBT1H220JC5	50V 22P	C58	ECBT1H271KB5	50V 270P			
C2	ECBT1H8R2KC5	50V 8.2P	C61	ECBT1C103MS5	16V 0.01U			
C3	ECBT1H680J5	50V 68P	C63	ECFR1C473MR	16V 0.047U			
C4	ECBT1H150JC5	50V 15P						
C5, 6	ECBT1H102KB5	50V 1000P						
C7	ECBT1H393KC5	50V 3.9P						
C8	ECBT1H180JC5	50V 18P						
C9	ECBT1H102KB5	50V 1000P						
C10	ECBT1H102KB5	50V 1000P						
C11	ECBT1H220JC5	50V 22P						
C12	ECBT1H150JC5	50V 15P						
C13 (E, EB)	ECBT1H220JC5	50V 22P						
C13 (E1)	ECBT1H180JC5	50V 18P						
C14-17	ECBT1C103MS5	16V 0.01U						
C18	ECFR1C473MR	16V 0.047U						
C19	ECFR1C223MR	16V 0.022U						
C20	ECBT1H470J5	50V 47P						
C21	ECEAJU470B	6.3V 47U						
C22	ECEA1ED4R7	25V 4.7U						
C23	ECFR1C333MR	16V 0.033U						
C24	ECFR1C473MR	16V 0.047U						
C25	ECFR1C683MR	16V 0.068U						

Ref. No.	Part No.	Part Name & Description	Remarks
		CABINET PARTS	
1	RFKGF3500E-K	FRONT CABINET ASS'Y	
2	RKSO205-K	REAR CABINET	(E)
2	RFKHF3500EBK	REAR CABINET ASS'Y	(EB)
2	RFKHF3500E1K	REAR CABINET ASS'Y	(E1)
3	REX0718	WIRE ASS'Y (CS1)	
4	RJC60001	TERMINAL, BATT -	
5	RJT865ZA	ANT. TERMINAL	
6	FWJ0105070KK	FLAT CABLE (W1)	
7	RGV0151-K	KNOB, BAND	
8	RGV0152-K	KNOB, TONE	
9	RGW0204-K	KNOB, TUNING	[M]
10	RGX0020-K	KNOB, VOLUME	
11	RHR822ZA	SPONGE MAT	
12	RJC92002	TERMINAL, BATT+/-	
13	RKDO006-K	DIAL SCALE	(E) (EB)
13	RKDO006A-K	DIAL SCALE	(E1)
14	RKH0028-K	HANDLE	
15	RKRD084-K	BATT. COVER	
16	RML0375	LEVER	
17	RDA104ZA	POINTER GUIDE	[M]
18	RDD414YC	DIAL DRUM	[M]
19	RDR64ZA	ROLLER	[M]
20	RDT9133ZB	SHAFT	
21	RGJ0018-S	POINTER	
22	RMKD285	DIAL CHAASIS	
23	RDS4060A	SPRING	
24	RDZ05A-V	DIAL (70cm)	
25	EAS10P241JA3	SPEAKER	[M]
26	RGU1234-K	BUTTON, OPERATION	
27	XEARR150EA-Y	TELESCOPIC ANTENNA	
28	XTV3+10G	SCREW	
29	XTV3+16G	SCREW	
30	XYN26+C6	SCREW	
31	XYN3+F25FN	SCREW	
32	RFKBF3500EKA	P. C. B. (BATT-)	
33	RFKBF3500EKB	P. C. B. (BATT+)	
		PACKING MATERIALS	
P1	RPFO161	PROTECTION COVER	
P2	RFKTF3500E1K	GIFT BOX ASS'Y	(E1)
P2	RPG2529	GIFT BOX	(E)
P2	RPG2530	GIFT BOX	(EB)
P3	RPNO886	PAD ASS'Y	
P4	RPQ0520	PAD	(EB)

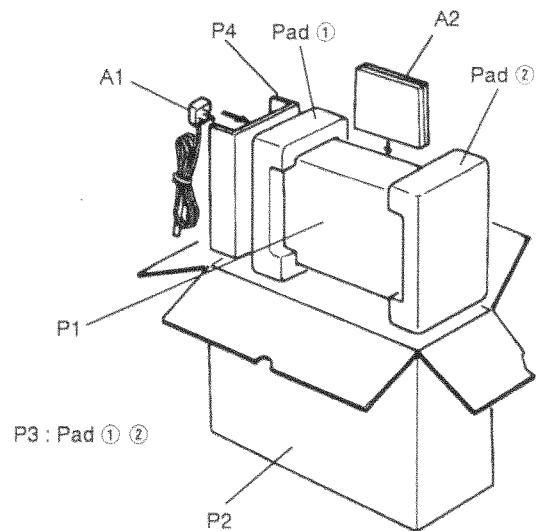
Ref. No.	Part No.	Part Name & Description	Remarks
		ACCESSORIES	
A1	VJA0733	AC POWER CORD	(EB) Δ [VRD]
A1	RJA0019-1U	AC POWER CORD	(E) (E1) Δ
A2	RQT3005-E	INST. MANUAL	(E1)
A2	RQT3004-B	INST. MANUAL	(E) (EB)

■ Packaging

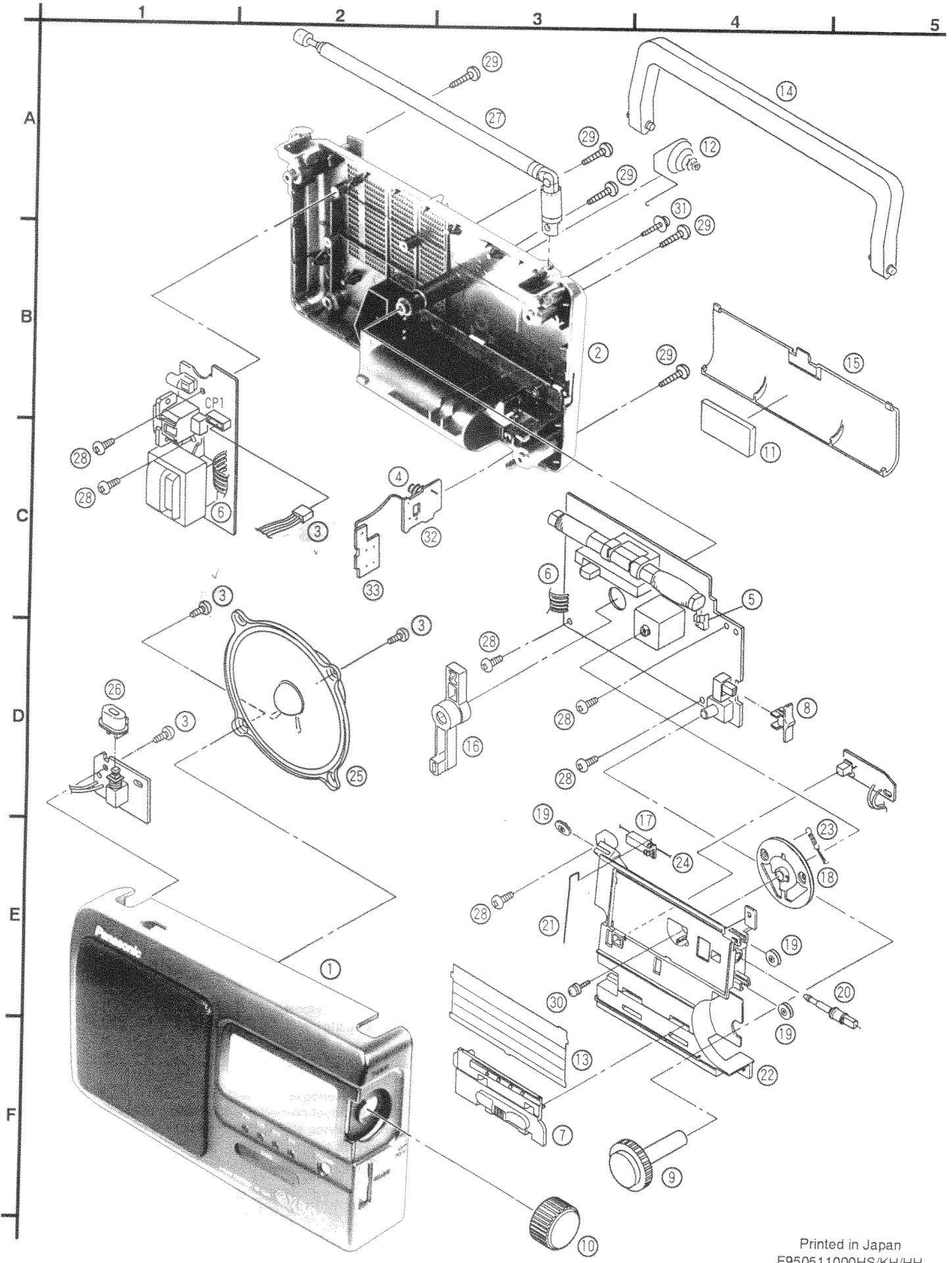
(E)(E1) areas



(EB) area



Cabinet Parts Location



Printed in Japan
F950511000HS/KH/HH