ORDER NO. GAD85065548C2

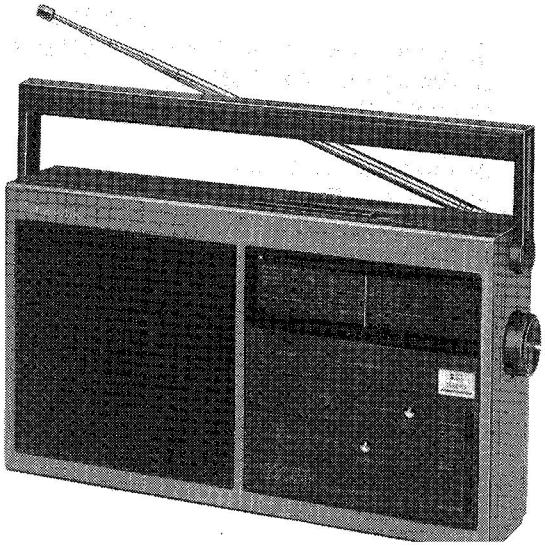
Service Manual

Radio

RF-1650L

(Black)

FM-LW-MW 3 Band Portable Receiver



This is the Service Manual for the following areas.

[Z] ···For all European areas except United Kingdom and France.

[E] ···For United Kingdom.

[F] ···For France.

■ SPECIFICATIONS

General:

Power Requirement:	AC; [Z][F]..220V, 50Hz [E].....240V, 50Hz Battery; 6V (four UM-2, "C" size batteries)
Power Consumption:	[Z][F]..4W [E].....3.5W
Power Output:	1.2W...RMS (Max.) 1.0W...MPO
Speaker:	10cm PM Dynamic Speaker (3Ω)
Output:	Earphone/External Speaker; 3~8Ω/ϕ3.5
Dimensions:	266mm(W)×143mm(H)×81mm(D)
Weight:	1.2kg without batteries

Radio Section:

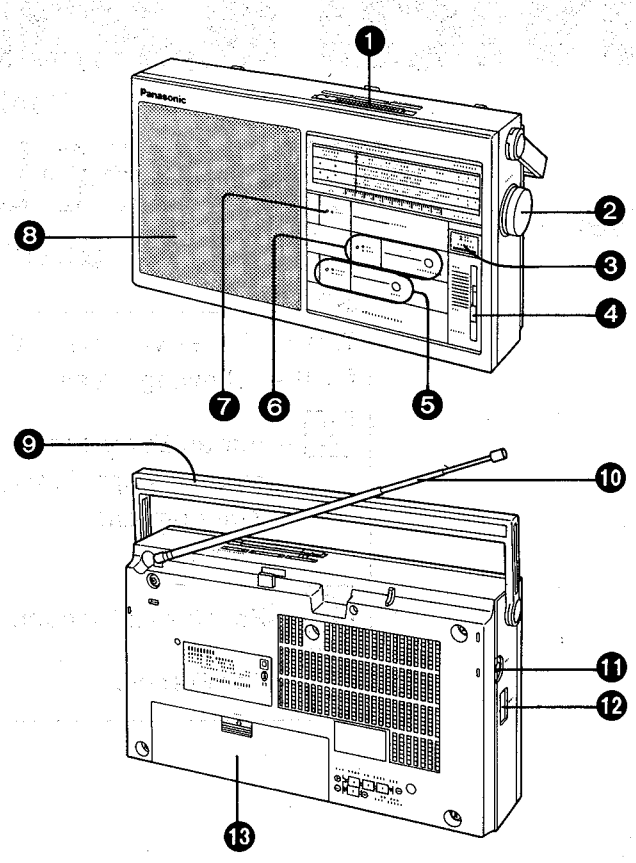
Radio Frequency Range:	FM; 87.5~108MHz LW; 150~285kHz (200~1060m) MW; 520~1610MHz (577~186m)
Intermediate Frequency:	FM; 10.7MHz [Z][F]..AM (LW/MW); 455kHz [E].....AM (LW/MW); 470kHz
Sensitivity:	FM; 3μV/50mW output (−3dB Limit sens) LW; 178μV/m/50mW output MW; 89μV/m/50mW output

Design and specifications are subject to change without notice.

Panasonic

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

LOCATION OF CONTROLS AND COMPONENTS



1. Band Selector (BAND SELECTOR)
2. Tuning Control (TUNING)
3. Radio Switch (RADIO)
4. Volume Control (VOLUME)
5. Tone Select Button/Indicator (TONE)
6. Loudness Button/Indicator (LOUDNESS)
7. Tuning Indicator (TUNING)
8. Built-in Speaker [10cm/3Ω]
9. Handle
10. Telescopic Antenna
11. Earphone/External Speaker Jack (IMP 3–8Ω ⌀3.5)
12. AC Socket (AC IN~)
13. Battery Compartment

DISASSEMBLY INSTRUCTIONS

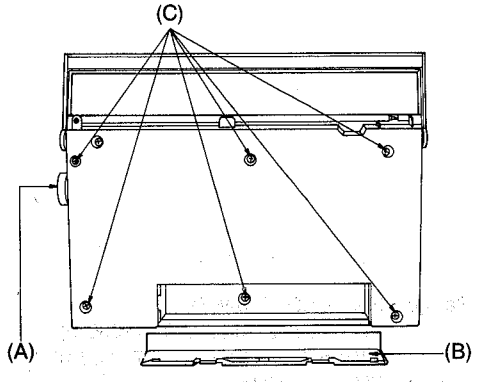


Fig. 1

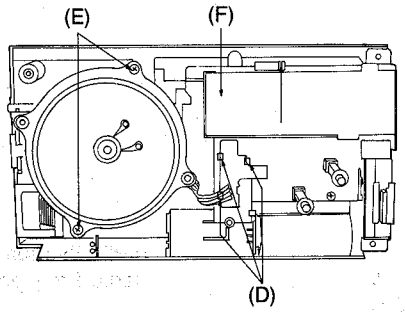


Fig. 2

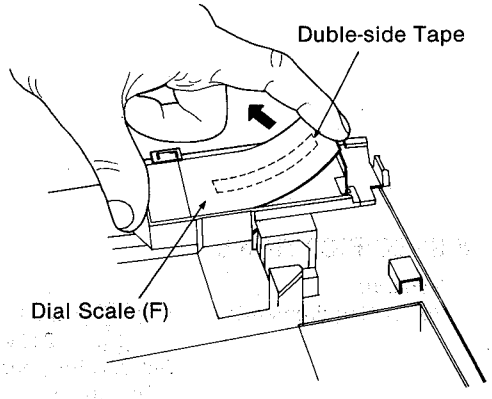


Fig. 3

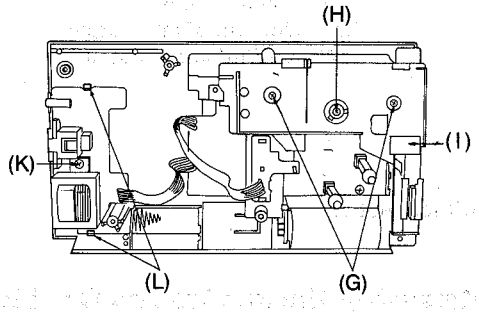


Fig. 4

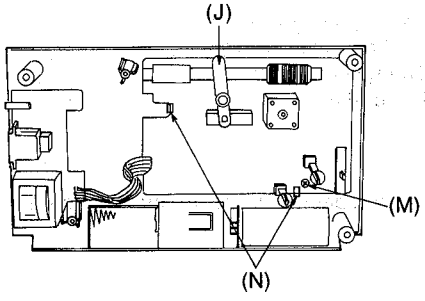


Fig. 5

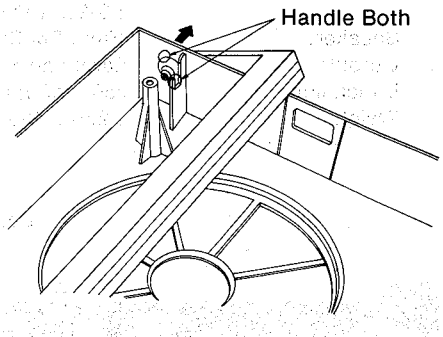


Fig. 6

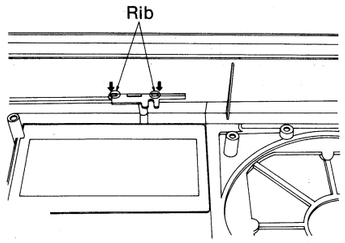


Fig. 7

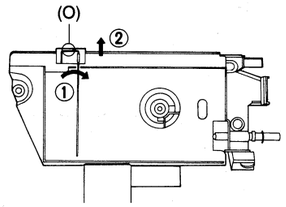


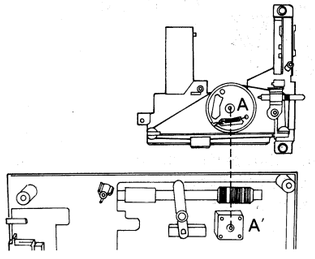
Fig. 8

Ref. No.	Shown in Fig. —.	To remove —.	Remove —.
1	1	Front Cabinet	Knob .....(A)×1
2	1		Battery cover .....(B)×1
3	1		Screw (3×16)mm .....(C)×6
3	2	LED Circuit Board	Rib .....(D)×3
4	2	Speaker	Screw (3×12)mm .....(E)×2
5	2	Dial Shassis (*1)	Turn the tuning shaft until the pointer reaches the left end.
6	2, 3		Remove the dial scale in the direction of the arrow ...(F)×1
7	4		Screw (3×30)mm .....(G)×2
8	4		Screw (2.6×6)mm .....(H)×1
9	4		Pull out the radio button. .....(I)×1
10	5	Band Switch Lever (*2)	Lever .....(J)×1
11	4	Power Supply Circuit Board	Screw (3×12)mm .....(K)×1
12	4		Rib .....(L)×2
13	5	Main Circuit Board	Screw (3×12)mm .....(M)×1
14	5		Rib .....(N)×2
15	6	Handle	Remove the handle both in the direction of arrow.
16	7	Band Knob	Remove the ribs in the direction of arrows.
17	8	Pointer	Remove the dial pointer in the direction of arrow ①, ② .....(O)×1

*1. If the double-sided tape on the back of the Dial Scale its not adhesive qualities, replace it.
*2. Note that they may be tightly engaged.

■ HOW TO REPLACE

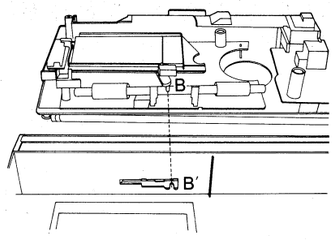
(Dial shassis)



During installation, simultaneously fit in A and A′.

Fig. 9

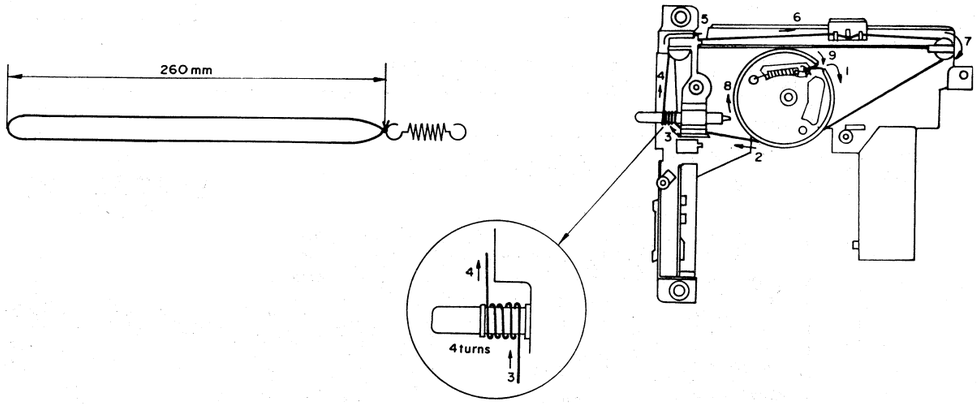
(Cabinet)



During installation, simultaneously fit in B and B′.

Fig. 10

DIAL THREADING



MEASUREMENTS AND ADJUSTMENTS

Notes:
[Z] .....Far all European areas except United Kingdom and France.
[E] .....For United Kingdom.
[F] .....For France.

■ ALIGNMENT INSTRUCTION

READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

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

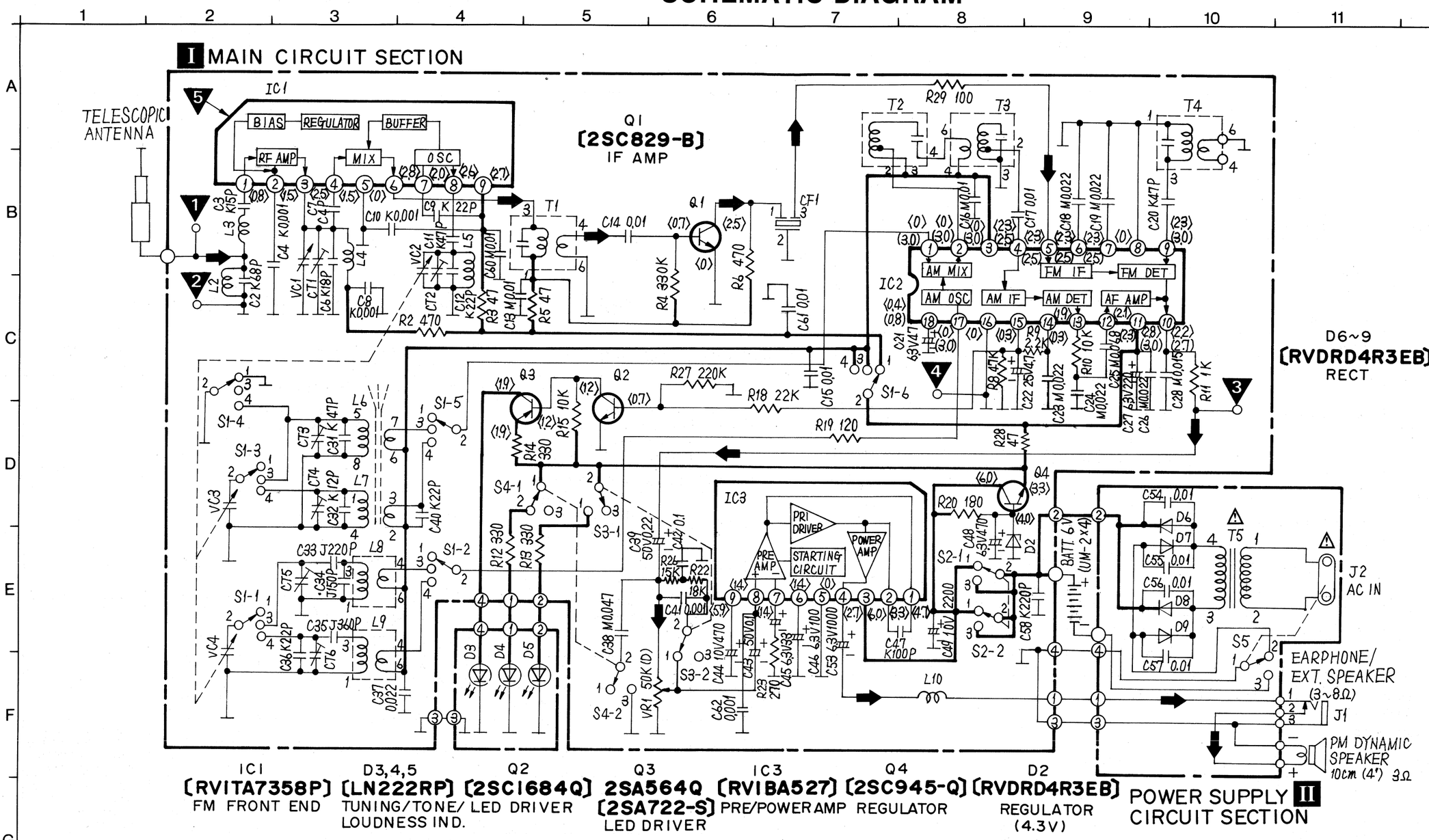
■ LW, MW and SW ALIGNMENT

	BAND	SIGNAL GENERATOR or SWEEP GENERATOR CONNECTIONS	SIGNAL GENERATOR or SWEEP GENERATOR FREQUENCY	RADIO DIAL SETTING	INDICATOR (ELECTRONICS VOLTMETER or SCOPE)	ADJUSTMENT	REMARKS
		AM-IF ALIGNMENT					
(1)	MW	Fashion loop of several turns of wire and radiate signal into loop of receiver.	[Z][F] 455kHz [E] 470kHz 30% Mod. at 400Hz	Point of non-interference. (on/about 600 kHz)	Output meter across voice coil.	T2 (AM 1st IFT) T3 (AM 2nd IFT)	Adjust for maximum output.
		LW-RF ALIGNMENT					
(2)	LW	〃	136kHz	Tuning capacitor fully closed.	〃	L8 (LW OSC Coil)	〃
(3)	LW	〃	297 kHz	Tuning capacitor fully open.	〃	CT5 (LW OSC Trimmer)	〃
(4)	LW	〃	150 kHz	Tune to signal.	〃	(*1) L6 (LW ANT Coil)	Adjust for maximum output. Adjust L6 by moving coil bobbin along ferrite core.
(5)	LW	〃	285 kHz	〃	〃	CT3 (LW ANT Trimmer)	Adjust for maximum output. Repeat steps (2)~(5).
		MW-RF ALIGNMENT					
(6)	MW	〃	511 kHz	Tuning capacitor fully closed.	〃	L9 (MW OSC Coil)	Adjust for maximum output.
(7)	MW	〃	1,650 kHz	Tuning capacitor fully open.	〃	CT6 (MW OSC Trimmer)	〃
(8)	MW	〃	550 kHz	Tune to signal.	〃	(*1) L7 (MW ANT Coil)	Adjust for maximum output. Adjust L7 by moving coil bobbin along ferrite core.
(9)	MW	〃	1,500 kHz	〃	〃	CT4 (MW ANT Trimmer)	Adjust for maximum output. Repeat steps (6)~(9).

(*1) Cement antenna bobbin with wax after completing alignment.

▼ Be sure to fold at the (▼) mark so that mark is on the outside.

SCHEMATIC DIAGRAM



IC1 (RVITA7358P) FM FRONT END

D3,4,5 (LN222RP) TUNING/TONE/ LED DRIVER LOUDNESS IND.

Q2 (2SC1684Q) Q3 2SA564Q (2SA722-S) LED DRIVER

IC3 (RVIBA527) PRE/POWER AMP REGULATOR

Q4 (2SC945-Q) REGULATOR (4.3V)

D2 (RVDRD4R3EB) REGULATOR (4.3V)

POWER SUPPLY CIRCUIT SECTION II

Notes:

1. S1-1~S1-6: Band switch in "FM" position. (1...FM, 3...LW, 4...MW)
2. S2-1, S2-2: Radio ON/OFF switch in "ON" position.
3. S3-1, S3-2: LOUDNESS ON/OFF switch in "OFF" position.
4. S4-1, S4-2: TONE HIGH/LOW switch in "HIGH" position.
5. S5: AC/DC IN select switch in "DC IN" position.
6. VR1: Volume control.
7. The mark (▼) shows test point e.g. ▼1 = test point 1.
8. DC voltage measurement are taken with electronics voltmeter from negative terminal of battery.
   < >...FM position, ( )...AM position
9. Battery current: No signal 32mA
   Maximum output (radio) 290mA
10. Important safety notice
    Components identified by ⚠ mark have special characteristics important for safety.
    When replacing any of these components, use only manufacturer's specified parts.
11. Described in schematic diagram are two types of numbers; the supply parts number and production parts number for transistors and dioes.
    One type number is uded for supply parts number and production parts number which they are identicial.

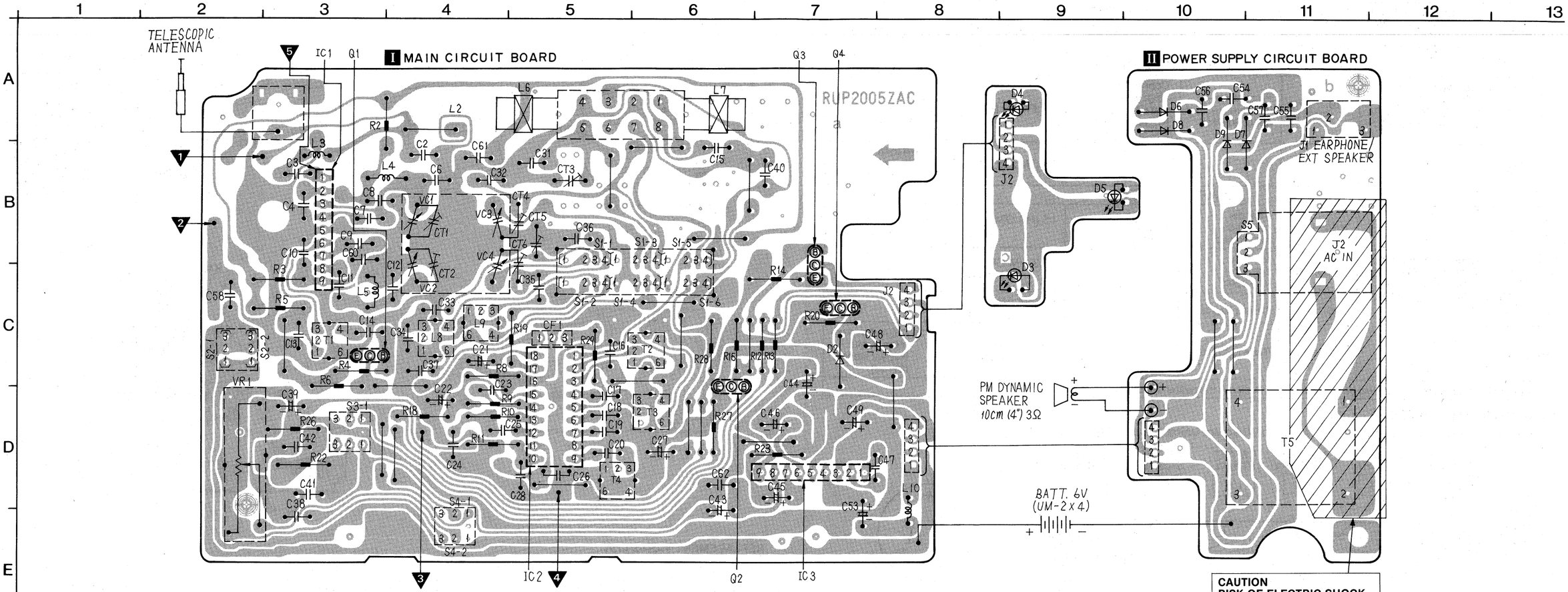
e.g. Q1
2SC2412NRTB, LNSTB——Production parts number
[2SC2412]——————Supply parts number

* **The supply parts number is described alone in the replacement parts list.**

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

+B Voltage Line
Radio (FM) Signal Line

CIRCUIT BOARS AND WIRING CONNECTION DIAGRAM



ELECTRICAL PARTS LIST

Numbering System of Resistor

Example					
ERD	25	F	J	101	
Type	Wattage	Shape	Tolerance	Value (100Ω)	
ERX	2	AN	J	2R2	
Type	Wattage	Shape	Tolerance	Value (2.2Ω)	

Resistor Type	Wattage Tolerance
ERD: Carbon	10 : 1/8 W J : ±5%
ERG: Metal Film	12 : 1/2 W
ERX: Metal Film	25 : 1/4 W
ERQ: Fuse Type Metal	1 : 1 W
RRD: Carbon (Chip Type)	18 : 1/8 W

Numbering System of Capacitor

Example				
ECKD	1H	102	Z	F
Type	Voltage	Value (1000 pF)	Tolerance	Peculiarity
ECEA	50	M	R47	
Type	Voltage	Peculiarity	Value (0.47 μF)	

Capacitor Type	Voltage		Tolerance
	ECEA Type	Other	
ECEA: Electrolytic	0J : 6.3 V	2H : 500 V DC	C : ±0.25 pF
ECCD: Ceramic	1A : 10 V	1 : 100 V	J : ±5%
ECKD: Ceramic	1C : 16 V	DKC : 400 V AC	K : ±10%
ECQM: Polyyester	1E : 25 V		Z : +80%, −20%
	1H : 50 V		
ECQP: Polyproylene	1V : 35 V		P : +100%, −0%
	50 : 50 V		
ECET: Electrolytic			
ECEA□□□N: Non Polar Electrolytic	25 : 25 V		
	16 : 16 V		
QCU □: Ceramic (Chip Type)			
ECUX: Ceramic (Chip Type)			

REPLACEMENT PARTS LIST

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

• mark stands for that the parts are supplied in MESA.
[Z] .....Far all European areas except United Kingdom and France.
[E] .....For United Kingdom.
[F] .....For France.

Ref. No.	Part No.	Ref. No.	Part No.
CAPACITORS			
C 1	ECCD1H150KC	C 44	ECEA1AU471
C 2	ECCD1H680K	C 45	ECEA1JU330
C 4, 8, 10	ECKD1H102KB	C 46	ECEA1JU101
C 6	ECCD1H180KC	C 47	ECCD1H101K
C 7	ECCD1H040CC	C 48	ECEA1JU471
C 9, 12, 36, 40	ECCD1H220KC	C 49	ECEA1AU222
C 11, 20, 31	ECCD1H470KC	C 53	ECEA0JU102
C 13, 15, 16, 61	ECKD1H103MD	C 58	ECCD1H221K
C 14, 17, 54, 55, 56, 57	ECKD1H103ZF	C 60	ECKD1H103MD
C 18, 19, 23, 24, 26	ECFT1E223MD	**RESISTORS**	
C 21	ECEA1JU470	R 2, 6	ERD25FJ471
C 22	ECEA1EU4R7	R 3, 5, 28	ERD25FJ470
C 25	ECFT1C683MD	R 4	ERD25TJ334
C 27	ECEA1JU221	R 8	ERD25TJ473
C 28	ECFT1C153MD	R 9	ERD25FJ222
C 32	ECCD1H120KC	R 10, 15	ERD25FJ103
C 33	ECQP2A221JZ	R 11	ERD25FJ102
C 34	ECQP2A151JZ	R 12, 13, 14	ERD25FJ331
C 35	ECQP2A361JZ	R 18	ERD25TJ223
C 37	ECKD1H223ZF	R 19	ERD25FJ121
C 38	ECFT1C473MD	R 20	ERD25FJ181
C 39	ECEA1HUR22	R 22	ERD25TJ183
C 41, 62	ECKD1H102MD	R 23	ERD25FJ271
C 42	ECFT1C104MD	R 26	ERD25TJ153
C 43	ECEA1HU0R1	R 27	ERD25TJ224
		R 29	ERD25FJ101

Ref. No.	Part No.	Part Name & Description
INTEGRATED CIRCUITS		
IC 1	RViTA7358P	IC (FM FRONT END)
IC 2	AN7220A	IC (AM MIX/OSC, FM/AM IF/DET, AMP)
IC 3	RViBA527	IC (PRE/Power AMP)
TRANSISTORS		
Q 1	2SC829-B	Transistor, Si
Q 2	2SC1684Q	Transistor, Si
Q 3	2SA722-S	Transistor, Ge
Q 4	2SC945-Q	Transistor, Si
DIODES & RECTIFIERS		
•D 2	RVDRD4R3EB	Zenner Diode (Si)
D 3, 4, 5	LN222RP	LED (Tuning, Tone, Loudness Ind.)
D 6, 7, 8, 9	RVD1SR35	Diode (Si)
COILS		
L 3	RLQY18S3	Choke Coil
L 4	RLD4Y44	Antenna Coil, FM
L 5	RLD4Y43	OSC Coil, FM
L 6, 7	RLF6D154	Antenna Coil, LW/MW
L 8	RL01B12	OSC Coil, LW
L 9	RL02B108	OSC Coil, MW
L 10	RLQZD101K	Choke Coil
TRANSFORMERS		
T 1, 4	RLi4B153	IFT, FM 1st/2nd

Ref. No.	Part No.	Part Name & Description
T 2	RLi2B216	IFT, AM 1st
T 3	RLi2B217	IFT, AM 2nd
•T 5 [E]	RLT5i2E1A	Power Transformer ⚠
•T 5 [Z][F]	RLT5i2G3A	Power Transformer ⚠
VARIABLE CAPACITORS		
VC 1, 2, 3, 4	RCV4RC2RA	Variable Capacitor/with Trimmer Capacitor (CT 1, 2, 4, 6)
TRIMMER CONDENSERS		
CT 3, 5	RCVTZ30F	Trimmer Capacitor
VARIABLE RESISTOR		
•VR 1	EWALF0C10D54	Volume Control, 50kΩ (D)
CERAMIC FILTER		
CF 1	RVFSFE107MSZ	Ceramic Filter (10.7MHz)
SWITCHES		
•S 1	RSS3F14Z	Slide Switch (Band Selector)
S 2	ESB6484	Push Switch (Radio)
S 3, 4	ESB64513	Push Switch (Loudness/Tone)
JACKS		
J 1	RJJ1D20Y	Jack, Eeaphone/Ext. Speaker
J 2 (S5) [E]	RJJ1A5Z	Jack, AC IN ⚠
J 2 (S5) [Z][F]	RJJ1A4Z	Jack, AC IN ⚠

■ FM ALIGNMENT

	BAND	SIGNAL GENERATOR or SWEEP GENERATOR		RADIO DIAL SETTING	INDICATOR (ELECTRONICS VOLTMETER or SCOPE)	ADJUSTMENT	REMARKS
		CONNECTIONS	FREQUENCY				
		FM-IF ALIGNMENT					
(1)	FM	High side thru. 0.001 µF to test point ⑤, Negative side to test point ②.	10.7 MHz (SWP.)	Point of non-interference. (on/ about 90 MHz)	Connect vert. amp. of scope to test point ③. Negative side to test point ④.	T1 (FM 1st IFT)	Adjust for maximum amplitude. (Refer to fig. 2).
(2)	FM	〃	〃	〃	〃	T4 (FM 2nd IFT)	Adjust for maximum amplitude. (Refer to fig. 3).
		FM-RF ALIGNMENT					
(3)	FM	Connect to test point ① through FM dummy antenna. Negative side to test point ②.	86.2 MHz	Variable capacitor fully closed.	Output meter across voice coil.	L5 (FM OSC Coil)	(＊2) Adjust for maximum output.
(4)	FM		109.2 MHz	Variable capacitor fully open.	〃	CT2 (FM OSC Trimmer)	〃
(5)	FM		90 MHz	Tune to signal.	〃	L4 (FM ANT Coil)	〃
(6)	FM		106 MHz	Tune to signal.	〃	CT1 (FM ANT Trimmer)	(＊2) Adjust for maximum output. Repeat steps (3)~(6).
	(＊2) Three output responses will be present; proper tuning is the center frequency.						

■ ALIGNMENT POINTS

(Please refer to Circuit Board and Wiring Connection Diagram which is located test points)

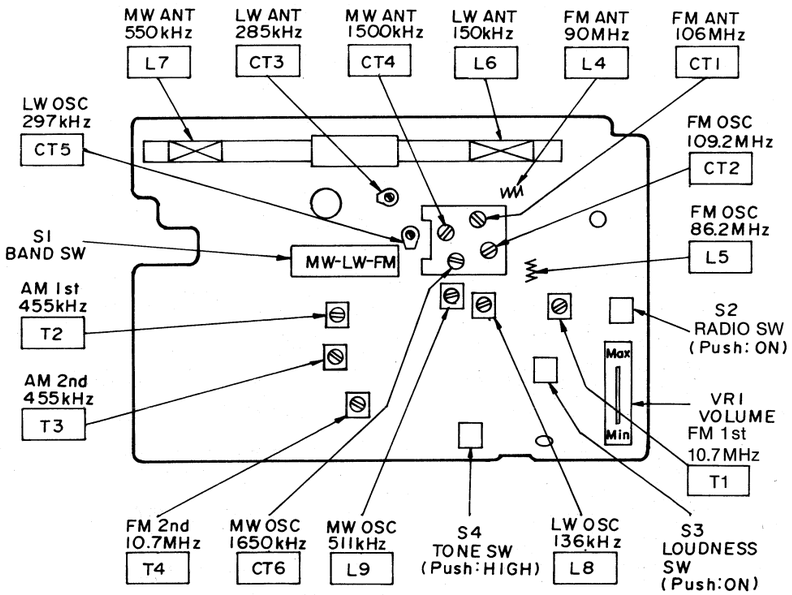


Fig. 1

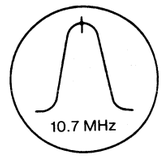


Fig. 2

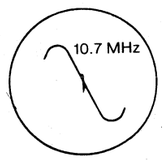


Fig. 3

■ DIAL POINTS (0 Point adjustment)

1. Turn the Variable Capacitor to fully counter-clockwise.
2. Position the pointer over the slow.

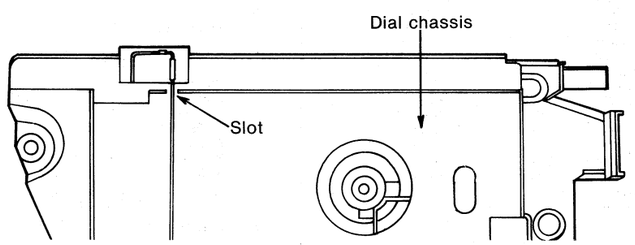
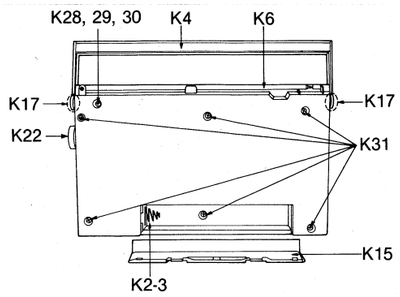
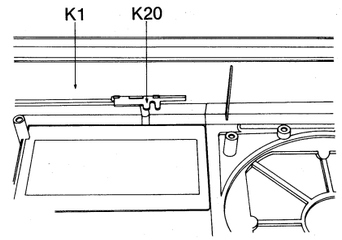
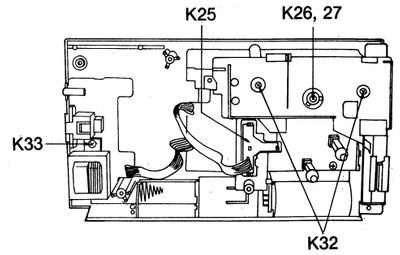


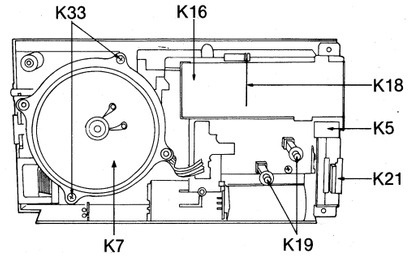
Fig. 4

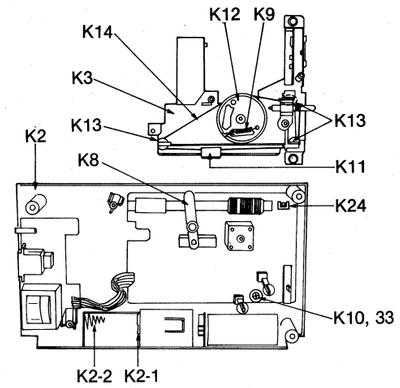
CABINET PARTS LOCATION











REPLACEMENT PARTS LIST

＊Important safety notice
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
＊• mark stands for that the parts are supplied in MESA.
＊The color name in parentheses ( ) in the parts list is the color of that part.

Notes: Part numbers may difer according to shipping destination. Be sure to refer to the below destination codes before ordering replacement parts.
[Z] .....For all European areas except United Kingdom and France.
[E] .....For United Kingdom.
[F] .....For France.

Ref. No.	Part No.	Part Name & Description
		CABINET PARTS
•K 1 [E]	**RYMF1650LZE8**	Front Cabinet Ass'y (Black) ⚠
•K 1 [Z][F]	**RYMF1650LZK8**	Front Cabinet Ass'y (Black)
•K 2 [E]	**RYFF1650LZEK**	Rear Cabinet Ass'y (Black) ⚠
•K 2 [Z][F]	**RYFF1650LZKS**	Rear Cabinet Ass'y (Black)
•K 2-1	**RJC20003Z**	Battery Spring (+)
•K 2-2	**RJC60005Z**	Battery Spring (−)
•K 2-3	**RJC92001Z**	Battery Spring (+, −)
•K 3	**RZAF1650LZKS**	Dial Chassis Ass'y (Black)
•K 4	**RYHF1650LZKS**	Hanldle Ass'y (Black)
•K 5	**RYTF1650LZKS**	Radio Button Ass'y (Black)
•K 6	**XEARK162EJY**	Telescopic Antenna
•K 7	**RAS10P23Z**	Speaker
•K 8	**RUB386Z**	Lever, Band Switch
K 9	**RDS4060A**	Spring, Dial Drum
K 10	**RUD16Z**	Spring, Boss
•K 11	**RDA104Z**	Bracket, Dial Pointer
•K 12	**RDD414Y**	Dial Drum
•K 13	**RDR54Z**	Roller, Dial
K 14	**RDZ05A1**	Cord, Dial
•K 15	**RKK288Z**	Battery Cover (Black)
•K 16 [E]	**RKD684Y**	Scale, Dial (Black)
•K 16 [Z][F]	**RKD684Z**	Scale, Dial (Black)
K 17	**RKX165Z**	Spacer, Handle
•K 18	**RDP289Z**	Dial Pointer
•K 19	**RBC743Z**	Push Knob, Loudness/Tone (Black)
•K 20	**RBD281Z**	Knob, Band Selector (Black)
•K 21	**RBD328Z**	Knob, Volume (Black)
•K 22	**RBN704Z**	Knob, Tunning (Black)
K 24	**RJT865Z**	Terminal, Earth
•K 25	**RMP239Z**	LED Holder
K 26	**XSN26+6**	Screw ⊕2.6×6 (Dial Drum M'tg)
K 27	**XWA26B**	Washer ϕ2.6 (Dial Drum M'tg)
K 28	**XSN3+25BNS**	Screw ⊕3×25 (Antenna M'tg)
K 29	**XWA3BFN**	Washer ϕ3 (Antenna M'tg)
K 30	**XWG3FN**	Washer ϕ3 (Antenna M'tg)
K 31	**XTB3+16CFZ**	Tapping Screw ⊕3×16 (Black) (Rear Cabinet M'tg)
K 32	**XTB3+30BFN**	Tapping Screw ⊕3×16 (Dial Chassis M'tg)
K 33	**XTV3+12G**	Tapping Screw ⊕3×12 (P.C.B. Speaker M'tg)
		ACCESSORIES
A 1 [E]	**RJA43Z**	Power Cord ⚠
A 1 [Z][F]	**RJA20Z**	Power Cord ⚠
•A 2	**RQX4645Z**	Operating Instructions
		PACKINGS
•P 1	**RPK2087Z**	Gift Box
•P 2	**RPN9508Z**	Pad Completion (L, R)
P 3	**XZB36X30A04**	Protection Cover

MESA H.M ZEF Printed in Japan Ⓗ