ISO

ORDER NO. RD-671

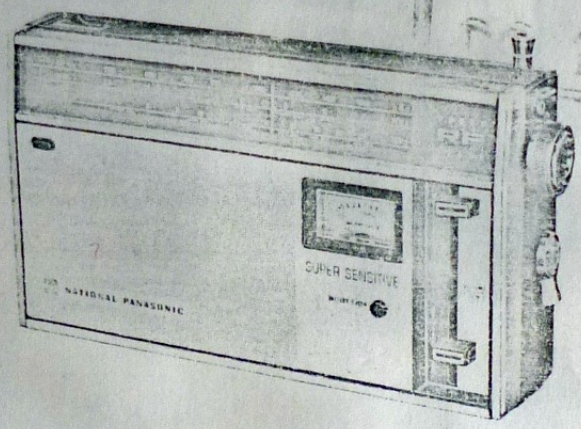
NATIONAL PANASONIC

Service Manual

3-BAND PORTABLE RADIO

MODEL R-399

ORIGINAL COPY
DO NOT REMOVE



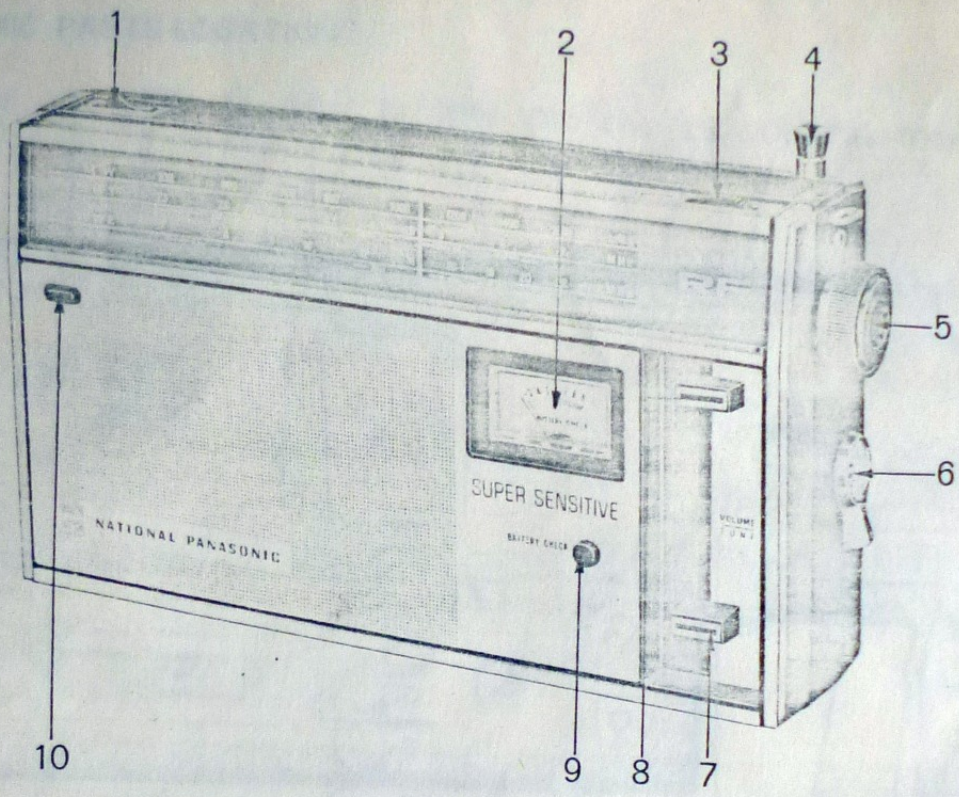
SPECIFICATIONS

Frequency Range:	MW 525~1605 kHz (571~187m) SW1 2.3~7 MHz (130~42.9m) SW2 7~22 MHz (42.9~13.6m)
Intermediate Frequency:	455 kHz
Transistors:	2SC920 RF Amplifier 2SC920 Converter 2SC829 1st IF Amplifier 2SC829 2nd IF Amplifier 2SB175 DC Amplifier 2SB173 1st AF Amplifier 2SB171 2nd AF Amplifier 2SB175 3rd AF Amplifier 2SB176, 2SB176, 2SB176, 2SB176 } Power Amplifier (parallel push-pull)
Diodes:	1S1211, 1S1211 } Operation Compensator OA90 Detector & AGC OA90 Operation Compensator
Sensitivity:	MW 50μV/m for 50mW Output SW1 30μV/m for 50mW Output SW2 5μV for 50mW Output
Power Output:	700mW Maximum
Batteries:	4.5V (Three "D" Size Flashlight Batteries) (NATIONAL UM-1 or equivalent)
Speaker:	10 cm (4") PM Dynamic Speaker, Imp. 8Ω
Cabinet Dimension:	250(Wide)×149(High)×62(Deep) mm (9 7/32"×5 7/8"×2 7/8")
Weight:	1.2kg. (2 lb. 10 oz.) without batteries
Impedance:	Earphone Jack 8Ω

<EXPORT DIVISION>
MATSUSHITA ELECTRIC TRADING CO., LTD.
P. O. Box 288 Central, Osaka, Japan

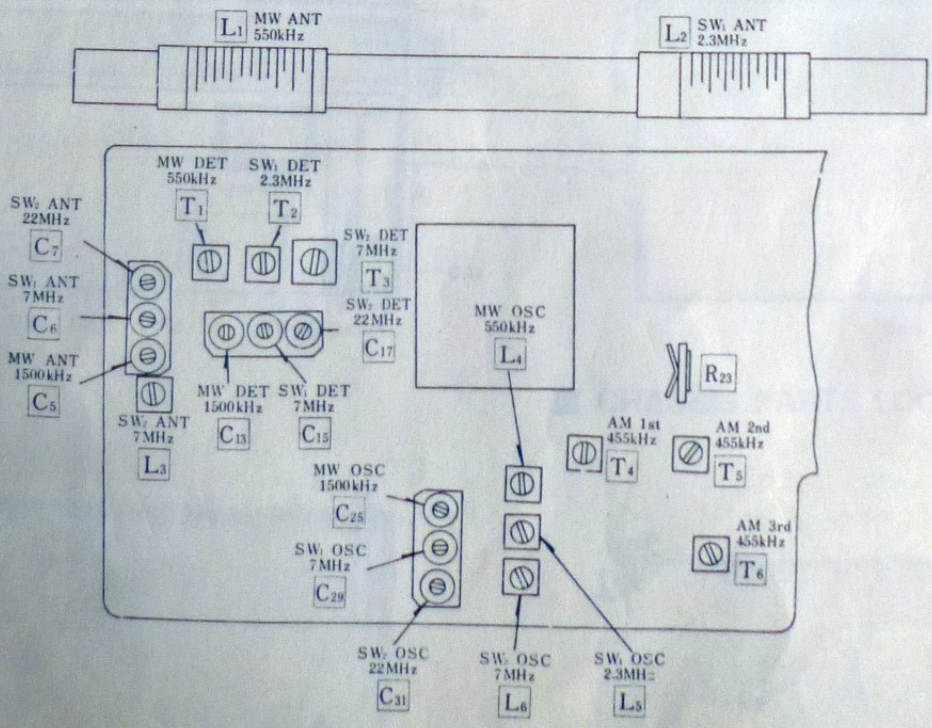
MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
RADIO and STEREO DIVISION

LOCATION OF CONTROLS



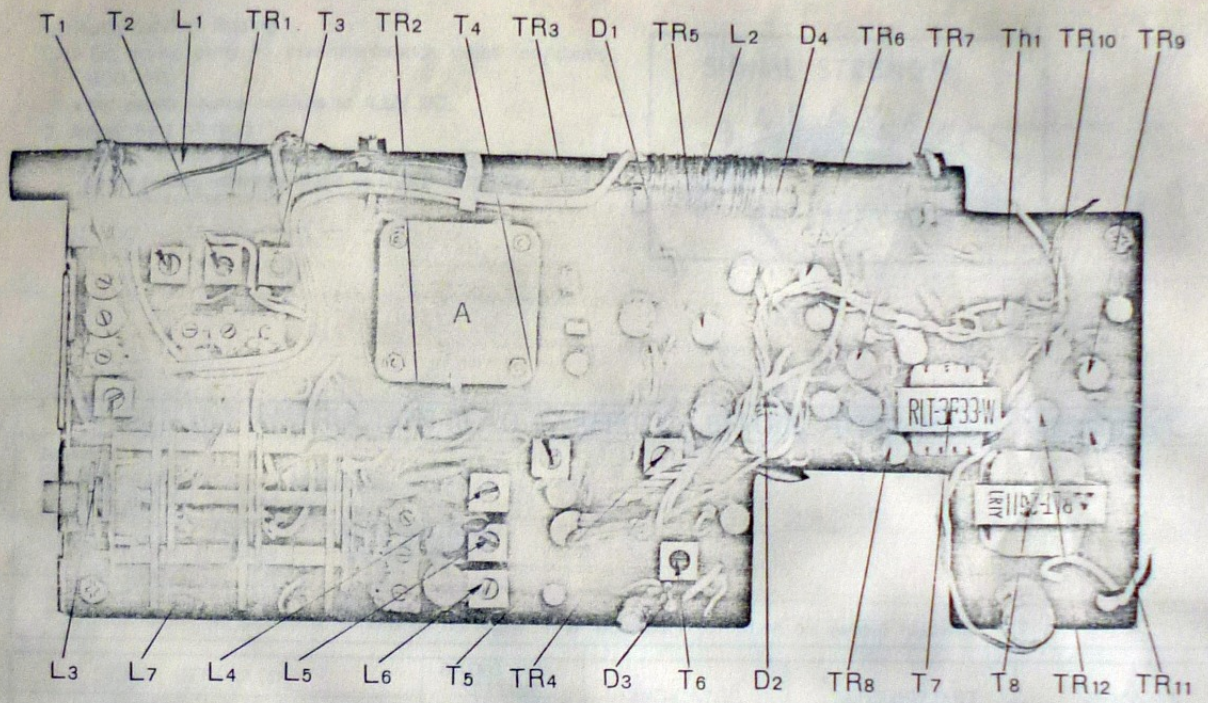
1 – POWER SWITCH
2 – TUNING/BATTERY CHECK METER
3 – FINE TUNING CONTROL
4 – TELESCOPIC WHIP ANTENNA
5 – TUNING CONTROL
6 – BAND SELECTOR SWITCH
7 – TONE CONTROL
8 – VOLUME CONTROL
9 – BATTERY CHECK BUTTON
10 – DIAL LIGHT BUTTON

ALIGNMENT INSTRUCTIONS



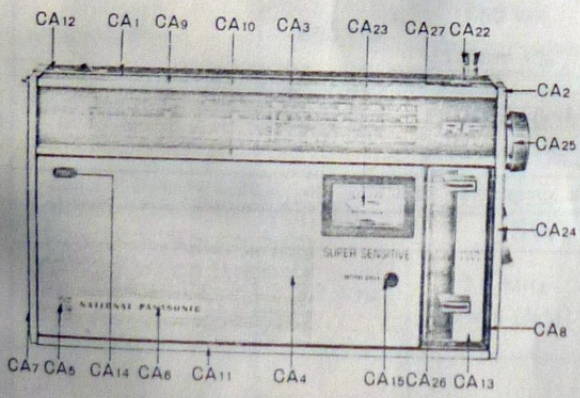
Alignment Point

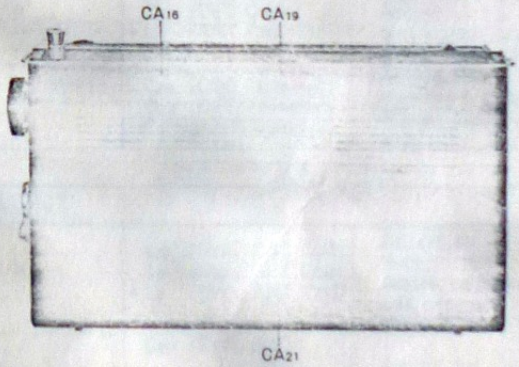
ELECTRIC PARTS LOCATION



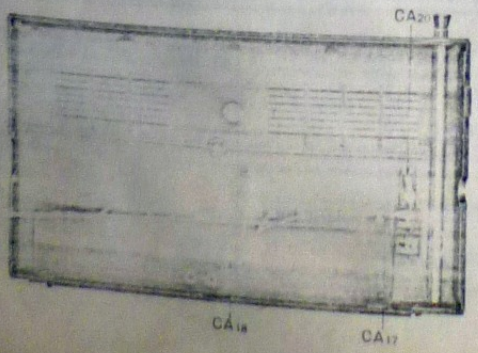
CABINET PARTS LOCATION

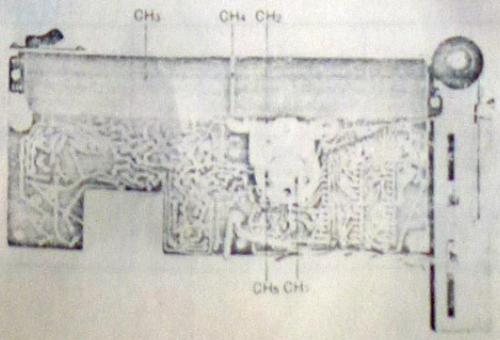
Cabinet (Complete)
RYAR 399X





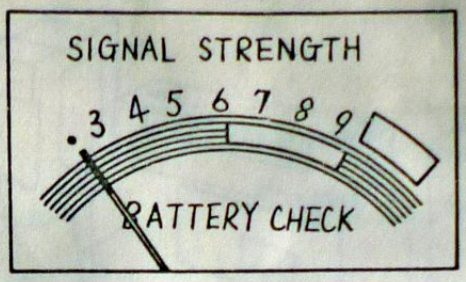
CHASSIS PARTS LOCATION





TUNING METER ALIGNMENT

1. Radio Receiver Setting
   - Set tuning gang to non-interference point (on/about 600 kHz)
   - Set power source voltage to 4.5V DC.
2. Adjustment Method
   - Adjust 100KΩ potentiometer (R_{23}) so that the pointer of the tuning indicator stays as shown in figure.



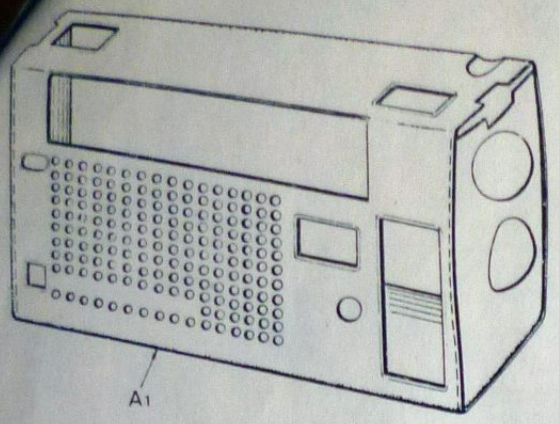
ALIGNMENT INSTRUCTION-READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

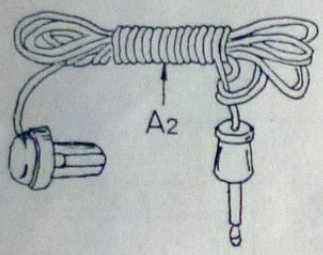
Notes :

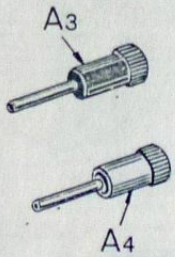
1. Volume control ····· Maximum.
2. Tone control ····· Music.
3. Band selector switch ····· MW, SW_1, SW_2.
4. Power source voltage ····· DC 4.5 volts.
5. Fine tuning ····· Center.
6. Power source switch ····· ON.
7. Output of signal generator should be no higher than necessary to obtain an output reading.

	SIGNAL GENERATOR		RADIO DIAL SETTING	INDICATOR	ADJUSTMENT	REMARKS
	CONNECT	FREQUENCY	[DISTANCE]			
	MW ALIGNMENT					
1	Fashion loop of several turns of wire and radiate signal into loop of receiver.	455 kHz (30% Mod. with 400Hz)	Point of non-interference. (on/about 600 kHz)	Output meter across earphone jack. (Load 8Ω)	T_4 (1st IFT) T_5 (2nd IFT) T_6 (3rd IFT)	Adjust for maximum output.
2	〃	550 kHz	550 kHz [13 mm (17/32")]	〃	L_4 (OSC Coil) T_1 (DET Coil) *L_1 (ANT Coil)	Adjust for maximum output. Adjust L_1 by moving coil bobbin along ferrite core.
3	〃	1500 kHz	1500 kHz [123 mm (4 27/32")]	〃	C_{25} (OSC Trimmer) C_{13} (DET Trimmer) C_5 (ANT Trimmer)	Adjust for maximum output. Repeat steps (2) and (3).
	*Cement antenna bobbin with wax after completing alignment.					
	SW_1 ALIGNMENT					
4	〃	2.3 MHz	2.3 MHz [4.6 mm (3/16")]	〃	L_5 (SW_1 OSC Coil) T_2 (SW_1 DET Coil) *L_2 (SW_1 ANT Coil)	Adjust for maximum output. Adjust L_2 by moving coil bobbin along ferrite core.
5	〃	7 MHz	7 MHz [131.3mm (5 3/16")]	〃	C_{29} (SW_1 OSC Trimmer) C_{15} (SW_1 DET Trimmer) C_6 (SW_1 ANT Trimmer)	Adjust for maximum output. Repeat steps (4) and (5).
	*Cement antenna bobbin with wax after completing alignment.					
	SW_2 ALIGNMENT					
6	Connect to EXT antenna jack through ceramic capacitor (10mmf). Common to EXT ground jack.	7 MHz	7 MHz [4.6 mm (3/16")]	〃	L_6 (SW_2 OSC Coil) T_3 (SW_2 DET Coil) L_3 (SW_2 ANT Coil)	Adjust for maximum output.
7	〃	22 MHz	22 MHz [131.3mm (5 3/16")]	〃	C_{31} (SW_2 OSC Trimmer) C_{17} (SW_2 DET Trimmer) C_7 (SW_2 ANT Trimmer)	Adjust for maximum output. Repeat steps (6) and (7).

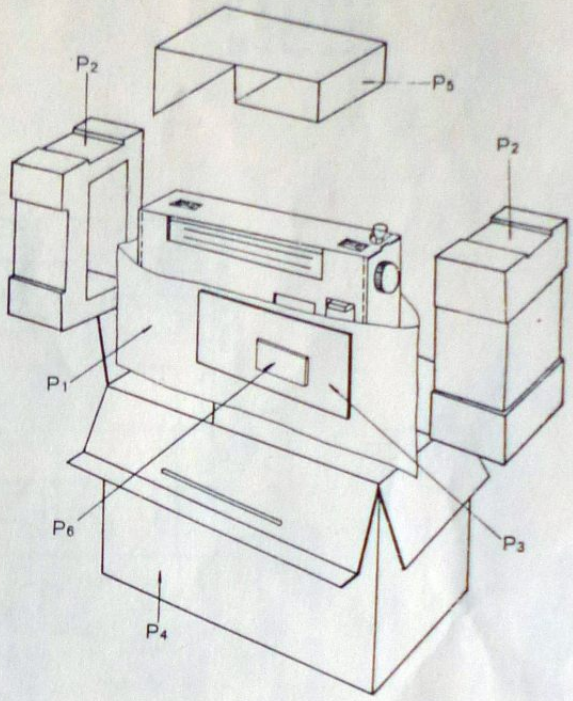
SSORY PARTS LOCATION







PACKING PARTS LOCATION

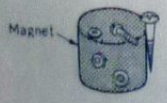


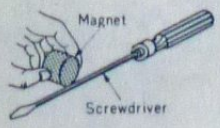
SERVICE AIDS

MAKING USE OF AN OLD SPEAKER MAGNET

1. When repairing or disassembling any appliance, attach all small parts such as screws and washers which will not be harmed by magnetization to an old speaker magnet, as shown in the illustration, to avoid losing them.
2. Magnetize a screwdriver, as shown in the illustration, for easier screw installation. It will also be convenient for picking up any screws etc. which have fallen into hard-to-reach places.

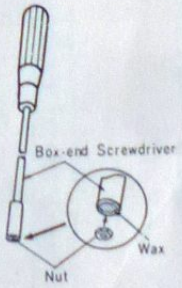
Caution: Don't place the magnet near a clock, recording tape and similar objects which might be affected by it.





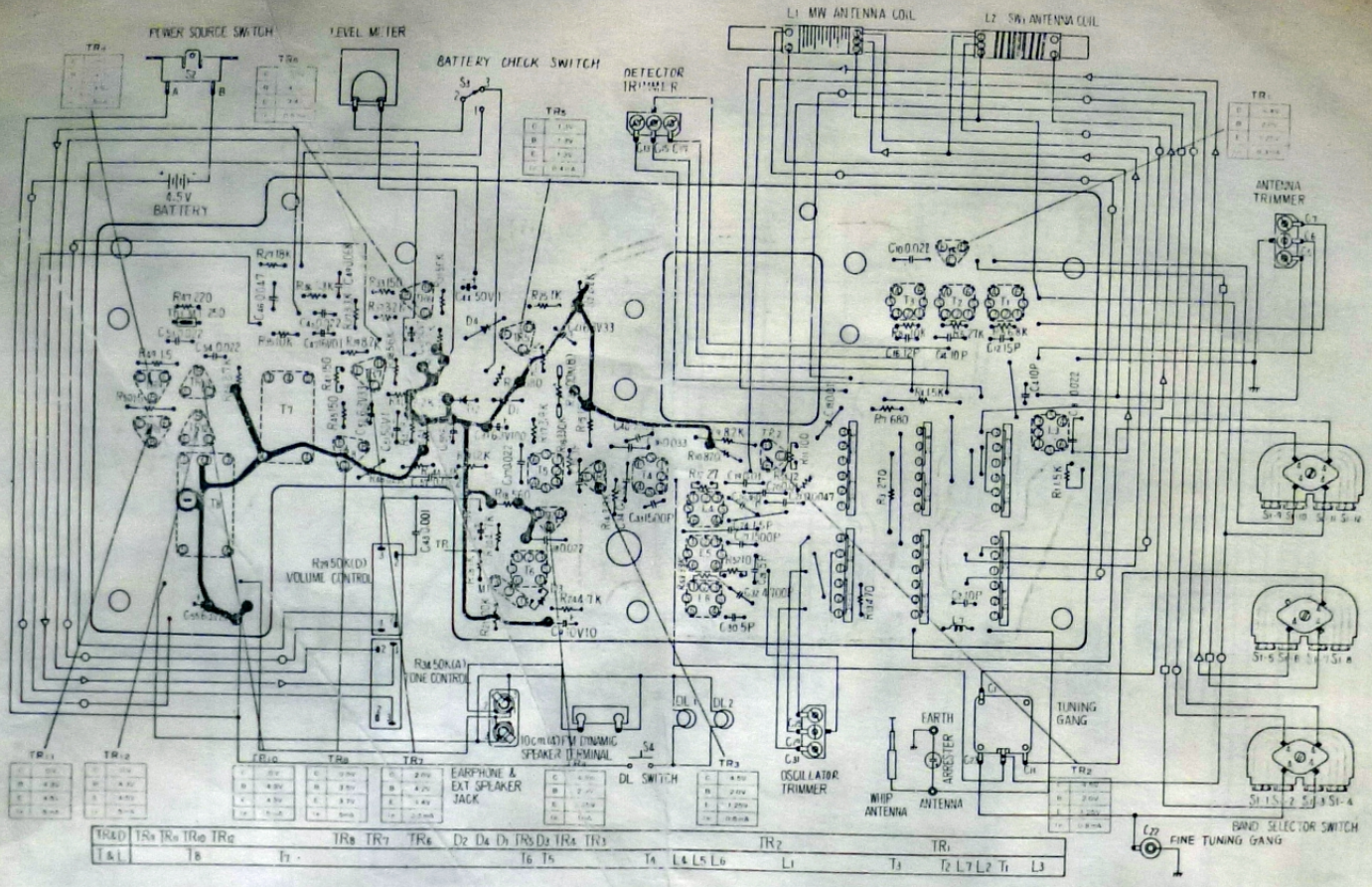
HOW TO INSTALL NUTS IN HARD-TO-REACH PLACES

It is very often difficult, if not impossible, to install nuts in some hard-to-reach locations because the fingers won't go in the narrow access. Even if a special tool is used, they often drop out of it. However, if wax, vaseline, silicone, grease or some similar substance is used, as shown in the figure, they can easily be installed with the tool.



(MEMO)

Circuit Board Wiring View-Model R-399

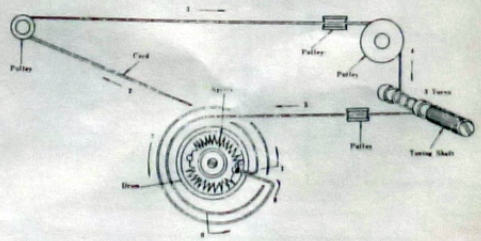


DIAL CORD STRINGING GUIDE

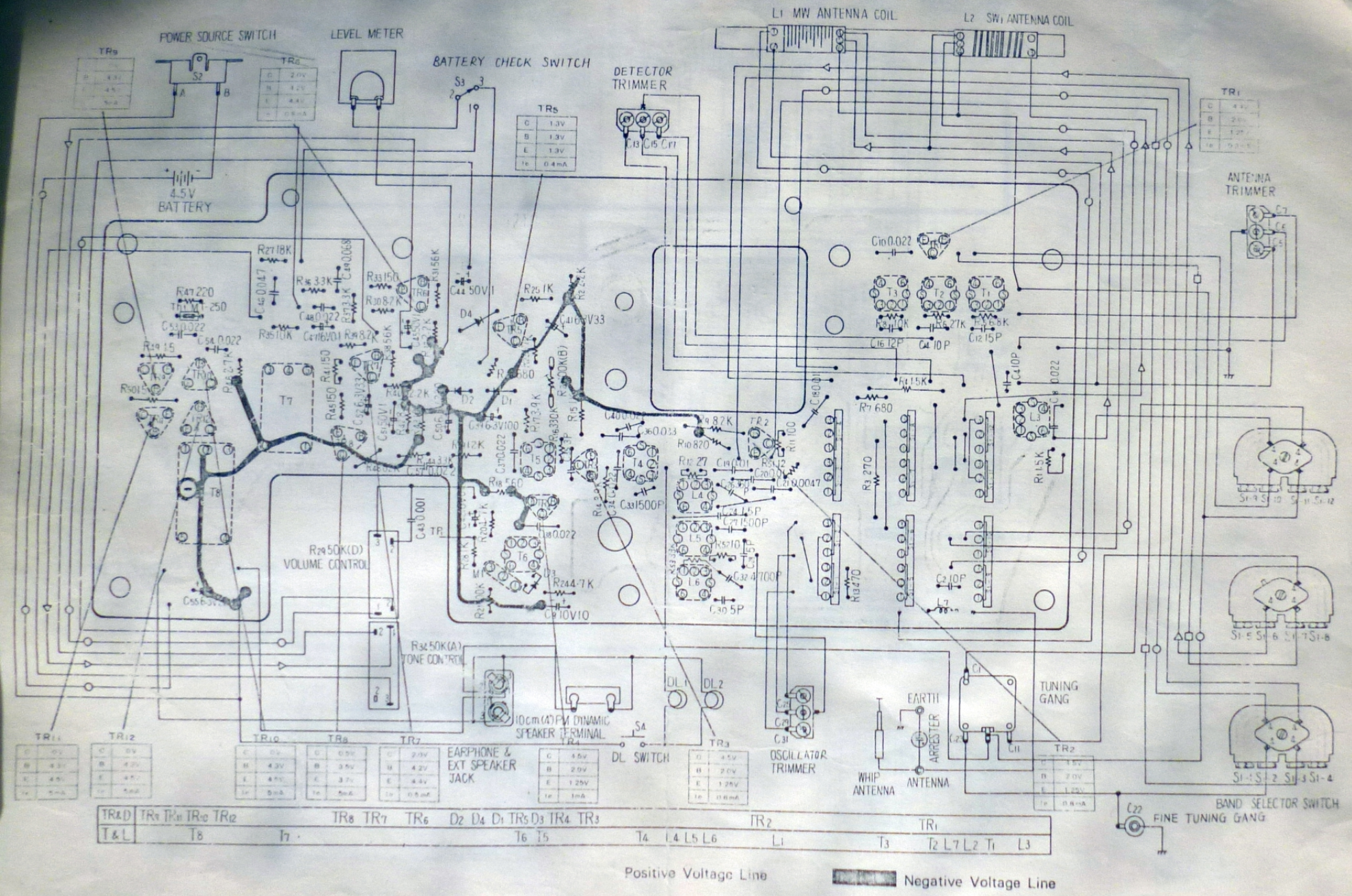
1. Remove dial back plate from chassis.
2. Dial cord length is 110cm (43⅜").
3. Tuning gang is positioned at minimum capacity.
4. Arrow marks (1~8) indicate correct order and direction of stringing dial cord.
5. Cement dial cord ends.

TO MOUNT DIAL POINTER

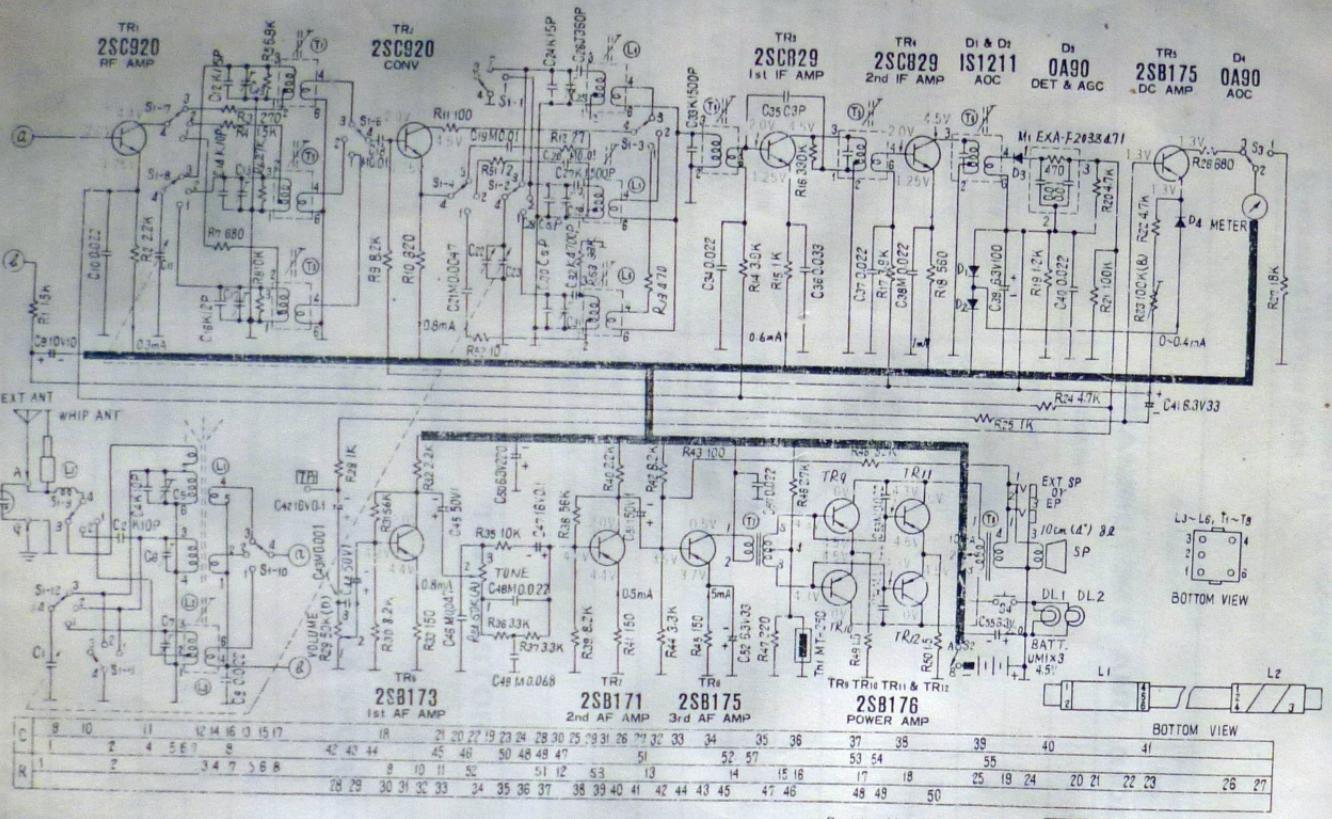
1. Set tuning gang fully closed position.
2. Set dial pointer to start point of pointer guide.
3. Attach dial cord to dial pointer.



Circuit Board Wiring View-Model R-399

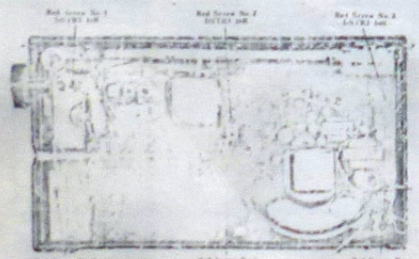


Schematic Diagram-Model R-399



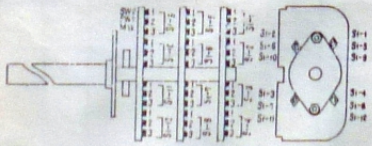
TO REMOVE CHASSIS

1. Remove two (2) control knobs from cabinet front.
2. Remove cabinet back cover mounting screw.
2. Remove cabinet back cover.
4. Remove six (6) red chassis-mounting screws, nos. 1~6, as illustrated in figure bellow.
5. To remove chassis completely, unsolder leadwires to speaker, battery check switch and dial light switch terminal.
6. To reassemble, reverse the above procedure.



Notes:

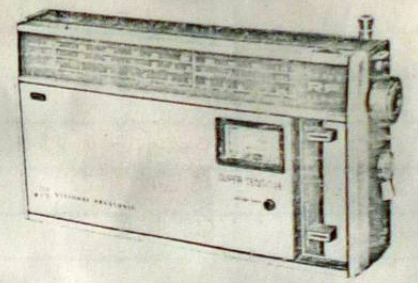
1. S_{1-1}~S_{1-14}: Band selectur switch in "MW" position.
2. S_2: Power source switch in "OFF" position.
3. S_3: Battery check switch in "SIGNAL STRENGTH" position.
4. S_4: Dial light switch in "OFF" position.
5. DC voltage measurements are taken with circuit tester 10 KΩ/V from negative terminal of battery.
6. Battery Current: 28mA (at no signal)
   240mA (at Maximum)



BAND SELECTOR SWITCH

6911027 ⓟ
Printed in Japan

REPLACEMENT PARTS LIST
RADIO MODEL R-399



NOTES: 1. Part numbers are indicated on most mechanical parts. Please use this number, for parts which have no Ref. No.
2. ISO metric thread screws & parts which employ ISO metric thread screws are identified by ISO marking (ISO)
3. Ⓝ indicates the New Parts.

R-399

Ref. No.	Part No.	Description	PerSet (Pcs.)	Remarks	Price	
TRANSISTORS AND DIODES						
TR_1	2SC920	RF Amplifier	1			
TR_2	2SC920	Converter	1			
TR_3	2SC829	1st IF Amplifier	1			
TR_4	2SC829	2nd IF Amplifier	1			
TR_5	2SB175	DC Amplifier	1			
TR_6	2SB173	1st AF Amplifier	1			
TR_7	2SB171	2nd AF Amplifier	1			
TR_8	2SB175	3rd AF Amplifier	1			
$TR_{9,10,11,12}$	2SB176	Power Amplifier (parallel push-pull)	4			
$D_{1,2}$	1S1211	Operation Compensator	2			
D_3	OA90	Detector & AGC	1			
D_4	OA90	Operation Compensator	1			
THERMISTOR						
Th	MT-250	Temperature Compensator	1			
COILS AND TRANSFORMERS						
$L_{1,2}$	RLF-5G45	MW, SW_1 Antenna Coil	1			
L_3	RLA-3B5-M	SW_2 Antenna Coil	1			
L_4	RLO-2B56-M	MW Oscillator Coil	1			
L_5	RLO-3B17-M	SW_1 Oscillator Coil	1			
L_6	RLO-3B9-M	SW_2 Oscillator Coil	1			
L_7	RLQ-Y15G-5	Choke Coil	1			
T_1	RLD-2B2-T	MW Detector Coil	1			
T_2	RLD-3B6-T	SW_1 Detector Coil	1	Ⓝ		
T_3	RLD-3B7-T	SW_2 Detector Coil	1	Ⓝ		

Ref. No.	Part No.	Description	PerSet (Pcs.)	Remarks	Price	
T_4	RLI-2B152-M	1st IF Transformer	1			
T_5	RLI-2B250-M	2nd IF Transformer	1			
T_6	RLI-2B450-M	3rd IF Transformer	1			
T_7	RLT-3F33-W	Input Transformer, P=1.4KΩ : S=1.4KΩ	1			
T_8	RLT-2G11-(V)	Output Transformer, P=65Ω : S=8Ω	1			
		RESISTORS				
$R_{49, 50}$	ERD-14VK1R5	1.5Ω, ¼Watt, ±10%, Carbon	2			
R_{51}	ERD-14VK120	12Ω, ¼Watt, ±10%, Carbon	1			
R_{52}	ERD-14VK100	10Ω, ¼Watt, ±10%, Carbon	1			
R_{12}	ERD-14VK270	27Ω, ¼Watt, ±10%, Carbon	1			
$R_{11, 43}$	ERD-14VK101	100Ω, ¼Watt, ±10%, Carbon	2			
$R_{33, 41, 45}$	ERD-14VK151	150Ω, ¼Watt, ±10%, Carbon	3			
R_{47}	ERD-14VK221	220Ω, ¼Watt, ±10%, Carbon	1			
R_{18}	ERD-14VK561	560Ω, ¼Watt, ±10%, Carbon	1			
$R_{7, 26}$	ERD-14VK681	680Ω, ¼Watt, ±10%, Carbon	2			
R_{10}	ERD-14VK821	820Ω, ¼Watt, ±10%, Carbon	1			
$R_{15, 25}$	ERD-14VK102	1KΩ, ¼Watt, ±10%, Carbon	2			
R_{19}	ERD-14VK122	1.2KΩ, ¼Watt, ±10%, Carbon	1			
$R_{1, 4}$	ERD-14VK152	1.5KΩ, ¼Watt, ±10%, Carbon	2			
$R_{2, 32, 40}$	ERD-14VK222	2.2KΩ, ¼Watt, ±10%, Carbon	3			
R_{46}	ERD-14VK272	2.7KΩ, ¼Watt, ±10%, Carbon	1			
$R_{36, 37, 44}$	ERD-14VK332	3.3KΩ, ¼Watt, ±10%, Carbon	3			
$R_{14, 17}$	ERD-14VK392	3.9KΩ, ¼Watt, ±10%, Carbon	2			
$R_{20, 22, 24}$	ERD-14VK472	4.7KΩ, ¼Watt, ±10%, Carbon	3			
R_5	ERD-14VK682	6.8KΩ, ¼Watt, ±10%, Carbon	1			
$R_{30, 39, 42}$	ERD-14VK822	8.2KΩ, ¼Watt, ±10%, Carbon	3			
$R_{8, 35}$	ERD-14VK103	10KΩ, ¼Watt, ±10%, Carbon	2			
R_{27}	ERD-14VK183	18KΩ, ¼Watt, ±10%, Carbon	1			
R_6	ERD-14VK273	27KΩ, ¼Watt, ±10%, Carbon	1			
$R_{31, 38}$	ERD-14VK563	56KΩ, ¼Watt, ±10%, Carbon	2			
R_{48}	ERD-14VK823	82KΩ, ¼Watt, ±10%, Carbon	1			
R_{21}	ERD-14VK104	100KΩ, ¼Watt, ±10%, Carbon	1			
R_{16}	ERD-14VK334	330KΩ, ¼Watt, ±10%, Carbon	1			
R_3	ERD-14TK271	270Ω, ¼Watt, ±10%, Carbon	1			
R_{28}	ERD-14TK102	1KΩ, ¼Watt, ±10%, Carbon	1			

Ref. No.	Part No.	Description	PerSet (Pcs.)	Remarks	Price	
R_9	ERD-14TK822	8.2KΩ, ¼Watt, ±10%, Carbon	1			
R_{23}	EVL-TOAA00B15	100KΩ(B), Level Meter Control	1			
R_{29}	EVA-G3AB01D54	50KΩ(D), Volume Control	1			
R_{34}	EVA-G3AB01A54	50KΩ(A), Tone Control	1			
R_{13}	ERD-14VK471	470Ω, ¼Watt, ±10%, Carbon	1			
R_{53}	ERD-14TK333	33KΩ, ¼Watt, ±10%, Carbon	1			
		CAPACITORS				
C_{35}	ECC-D05030C	3mmf, 50WV, ±0.25mmf, Ceramic	1			
$C_{28, 30}$	ECC-D05050CC	5mmf, 50WV, ±0.25mmf, Ceramic	2			
$C_{2, 4, 14}$	ECC-D05100KC	10mmf, 50WV, ±10%, Ceramic	3			
C_{16}	ECC-D05120KC	12mmf, 50WV, ±10%, Ceramic	1			
$C_{12, 24}$	ECC-D05150KC	15mmf, 50WV, ±10%, Ceramic	2			
C_{21}	ECK-E05472MY	0.0047mfd, 50WV, ±20%, Ceramic	1			
$C_{18, 19, 20}$	ECK-E05103MY	0.01mfd, 50WV, ±20%, Ceramic	3			
$C_{8, 10, 34, 37, 40, 57}$	ECK-E05223P	0.022mfd, 50WV, $^{+100}_{-0}$%, Ceramic	6			
C_{36}	ECK-E05333P	0.033mfd, 50WV, $^{+100}_{-0}$%, Ceramic	1			
C_{26}	ECQ-S1361JZ	360mmf, 125WV, ± 5%, Styrol	1			
$C_{27, 33}$	ECQ-S05152KZ	1500mmf, 50WV, ±10%, Styrol	2			
C_{32}	ECQ-S05472KZ	4700mmf, 50WV, ±10%, Styrol	1			
C_{43}	ECQ-G05102MZ-N	0.001mfd, 50WV, ±20%, Polyester	1			
$C_{38, 48, 53, 54}$	ECQ-G05223MZ-N	0.02mfd, 50WV, ±20%, Polyester	4			
C_{46}	ECQ-G05473MZ-N	0.047mfd, 50WV, ±20%, Polyester	1			
C_{49}	ECQ-G05683MZ-N	0.068mfd, 50WV, ±20%, Polyester	1			
$C_{42, 47}$	ECA-G16ER1-Y	0.1mfd, 16WV, Electrolytic	2			
$C_{44, 45, 51}$	ECE-A50V1	1mfd, 50WV, Electrolytic	3			
$C_{41, 52}$	ECE-A6V33	33mfd, 6.3WV, Electrolytic	2			
C_{39}	ECE-A6V100	100mfd, 6.3WV, Electrolytic	1			
$C_{50, 55}$	ECE-A6V220	220mfd, 6.3WV, Electrolytic	2			
C_9	ECE-A10V10	10mfd, 10WV, Electrolytic	1			
$C_{3, 6, 7, 13, 15, 17, 25, 29, 31}$	ECV-3RW12W11Z	Trimmer	3			
$C_{1, 11, 23}$	PVC-3RA	Tuning Gang	1			
C_{22}	MVC-1B	Fine Tuning Gang	1			

Ref. No.	Part No.	Description	PerSet (Pcs.)	Remarks	Price	
		COMPONENT COMBINATION				
M_1	EXA-F203Z471	0.01mfd, 0.01mfd & 470Ω	1			
		SWITCHES				
S_{1-1}~S_{1-12}	ESR-E3C3L40AE	Band Selector Switch	1	Ⓝ		
S_2	RST-16	Power Source Switch	1			
		SPEAKER				
SP	EAS-10P05SC	10cm(4") PM Dynamic Speaker, 8Ω	1	Ⓝ		
		CABINET				
	RYAR399X	Cabinet (Complete)	1	Ⓝ		
	RYMR399X	Cabinet Front (Complete)	1	Ⓝ		
CA_1	RKM-3830	Cabinet Only	1			
CA_2	RKT-7S	Metal Fitting, Handle M'tg.	2	Ⓝ		
	⊕B3 – 6NS	Screw, Metal Fitting M'tg.	2			
CA_3	RKD-6330	Scale, Dial	1	Ⓝ		
CA_4	RGM-2820	Metal Grille	1	Ⓝ		
CA_5	RGB-2	Badge	1			
CA_6	RGB-368	Badge	1			
CA_7	RGX-801	Ornament	1			
CA_8	RGX-802	Ornament	1			
CA_9	RGX-810	Ornament	1	Ⓝ		
CA_{10}	RGX-804	Ornament	1			
CA_{11}	RGX-805	Ornament	1			
CA_{12}	RGK-564	Indicating Plate	1			
CA_{13}	RGK-568	Indicating Plate	1	Ⓝ		
CA_{14}	RBC-25-2	Button, Dial Light	1	Ⓝ		
CA_{15}	RBC-43-1	Button, Battery Check	1	Ⓝ		
	RVL-207-1	Dial Light, 6V 40mA	1			
	RVL-207-2	Dial Light, 6V 40mA	1			
	RUS-169	Spring, Dial Light M'tg.	2			
	RYFR399X	Cover (Complete), Cabinet Back	1	Ⓝ		
CA_{16}	RKF-3120	Cover Only, Cabinet Back	1	Ⓝ		
	RJC-102	Terminal, Battery	1			
	RJC-502	Spring, Battery	1			

Ref. No.	Part No.	Description	PerSet (Pcs.)	Remarks	Price	
CA_{17}	RJS-40	Jack, Antenna & Earth	2			
CA_{18}	RJB-1012-1	Case Battery	1			
CA_{19}	RGT-1342	Name Plate	1	Ⓝ		
CA_{20}	RVL-410	Neon Lamp	1			
CA_{21}	RKK-561	Cover Only, Battery Compartment	1	Ⓝ		
CA_{22}	XEARDV145HAS	Whip Antenna	1			
	⊕B3-8NS	Screw, Whip Antenna M'tg.	1			
	RNT-302	Lock Washer, Whip Antenna M'tg.	1			
CA_{23}	V-45G	Level Meter	1	Ⓝ		
	⊕B3-8NS	Screw, Cabinet Back Cover M'tg.	1			
CA_{24}	RBS-73	Knob, Band Selector	1	Ⓝ		
CA_{25}	RBT-146	Knob, Tuning	1			
CA_{26}	RBV-155	Knob, Volume & Tone	2			
CA_{27}	RBF-33	Knob, Fine Tuning	1	Ⓝ		
		CHASSIS				
	RDT-5181A	Shaft, Tuning	1			
CH_1	RDD-3029	Drum, Dial	1			
CH_2	RDG-605-1	Gear, Dial	1			
	RDG-7-1	Gear, Dial	1			
CH_3	RDH-326	Dial Back Plate	1			
CH_4	RDP-345	Pointer, Dial	1			
CH_5	RDS-309	Spring, Dial	2			
	RDZ-05-3	Cord, Dial	1			
	RHG-14	Rubber Cushion, Tuning Gang M'tg.	1			
	XYNR3D6RS	Red Screw, Chassis M'tg.	1			
	DSTR3-10R	Red Screw, Chassis M'tg.	5			
	RJJ-62	Jack, Earphone & EXT Speaker	1			
	RHG-109	Rubber Cushion, Core Antenna M'tg.	2			
	RUS-80	Spring, Gear	1			
		ACCESSORIES				
A_1	RQK4A	Shoulder Case (Complete)	1	Ⓝ		
A_2	EAE-1FB	Earphone	1			
A_3	RJP-39	Plug, Antenna	1			
A_4	RJP-39-1	Plug, Earth	1			

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TUNE
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SIGNAL STRENGTH
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