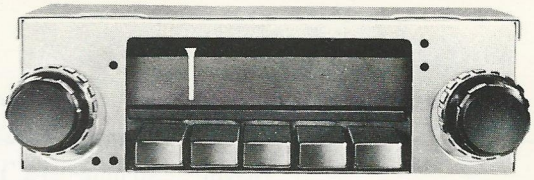

MITSUBISHI

CAR RADIO

MODEL: AR-5300

SERVICE NOTE

MITSUBISHI ELECTRIC CORPORATION

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1. Specifications

Circuit System :

Superheterodyne with RF amplifier

Tuning Range :

530 ~ 1605 KHz

Intermediate Frequency :

450 KHz

Power Output :

Undistorted 4.0 W Maximum 6.0 W

Power Source :

13.2 ± 2.4 V Negative ground only

Current Consumption :

0.2 ~ 0.65 A at 13.2 V

Shaft Pitch :

124 mm ($4\frac{29}{32}''$)
130 mm ($5\frac{1}{8}''$) Variable

Transistors :

2SC710–C	RF amplifier
2SC711–D	Converter
2SC710–C, D	IF amplifier
2SC711–D	Audio amplifier
2SC712–D	"
2SC1243–D_2 x 2	Power amplifier

Diode :

MD34	AGC detector
"	Audio detector

Varistor :

MV–1 x 2	Temperature compensation

Outside Dimentions :

Width	160 mm	(6½″)
Height	50 mm	(2″)
Depth	85 mm	($3^{11}/_{32}$″)

Weights :

0.95 kg (2.1 lbs)

2. Features

(1) Compact design

Compact size and strong construction, it can be installation with ease.

(2) High reliability

By the adoption of printed carbon resistor for electric circuit, we are proud of high performance and durability.

(3) High sensitivity

Owing to a tuned radio frequency amplifier and intermediate frequency amplifier which is products of many year's experiments and testing by one of the best car radio engineering staff, Model AR-5300 assures you the highest sensitivity and the highest selectivity.

(4) High power, highest tone quality

- By the adoption of specially designed transistor 2SC1243–D_2 for OTL (Output Transformer Less) circuit, Model AR-5300 gives you one of the largest power.
- Owing to specially designed high fidelity circuit Model AR-5300 assures the high fidelity sound which defeats the road noises even at a city or on a high way.

(5) High stability

- AR-5300 assures high stability against temperature by using five silicon planer transistors in RF, IF and AF circuit.

3. Component

Radio Ass'y	1
Knob (A)	2
Knob (B)	2
Terminal	1

4. Guide to Trouble Repair

4.1 Method of Adjustment

In case of readjustment, the test oscillator, vacuum tube voltmeter or tester should be available for carrying out adjustment according to the table of the sequence of adjustment.

- **Measurement of output voltage**

  Measure the voltage at both ends of the voice coil of the speaker by using the vacuum tube voltmeter (or AC range of tester).

- **Test oscillator and its connection**

  The test oscillator should be used at 400 Hz or 1000 Hz with 30 ~ 40% modulation. Connect the oscillator to VC_1 or the antenna receptacle in series with a capacitor or dummy antenna, while the cold side to the metal chassis, as shown in the Alignment Procedure List.

- **Procedure of adjustment**

  For tuning the screw core of the oscillator coil, etc., use of the driver made of bakelite stick is recommended for avoiding aberration due to adjusting.

List of Alignment Procedures

Procedures	Circuit	Signal generator coupling	Signal generator frequency	Radio dial setting	Indicator	Adjust	Remarks
1	IF circuit	Hot side to the VC_1 terminal through 1~3pF Cold side to chassis	450 KHz	Point of non interference near 1600 KHz	Output meter across voice coil	T_5, T_4	Try to equalize the degree of diminution near ± 10 KHz.
2						T_3, T_2	
3						Repeat procedures 1~2	
4	Oscillation and RF circuit	Through dummy (Fig. 1) to antenna socket	525 ± 5 KHz	Lower freq. stop end	"	T_1	
5			1650 ± 10 KHz	Higher freq. stop end	"	VC_3	
6					"	Repeat procedures 4~5	
7			1400 KHz	1400 KHz		VC_1 VC_2	Adjust VC_1, VC_2, and get the maximum voltage of the output.
8			600 KHz	600 KHz	"	T_1	Turn T_1 gradually and find the maximum sensitivity near 600 KHz.
9			1400 KHz	1400 KHz	"	VC_3	When the receiving point has moved because of adjusting 8 turn VC_3 in order to catch the wave near the same point.
10					"	Repeat procedures 7~9	Check the range of the frequency of the received wave. This is the end of the adjustment.

When you have installed the set in the car stretch the antenna at its maximum length, receive a weak station near 1400 KHz, and adjust antenna trimmer VC_1, in order to get the maximum output.

Dummy Antenna

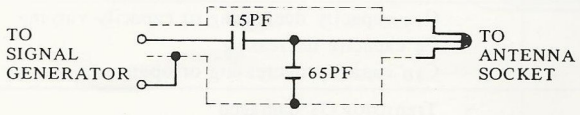
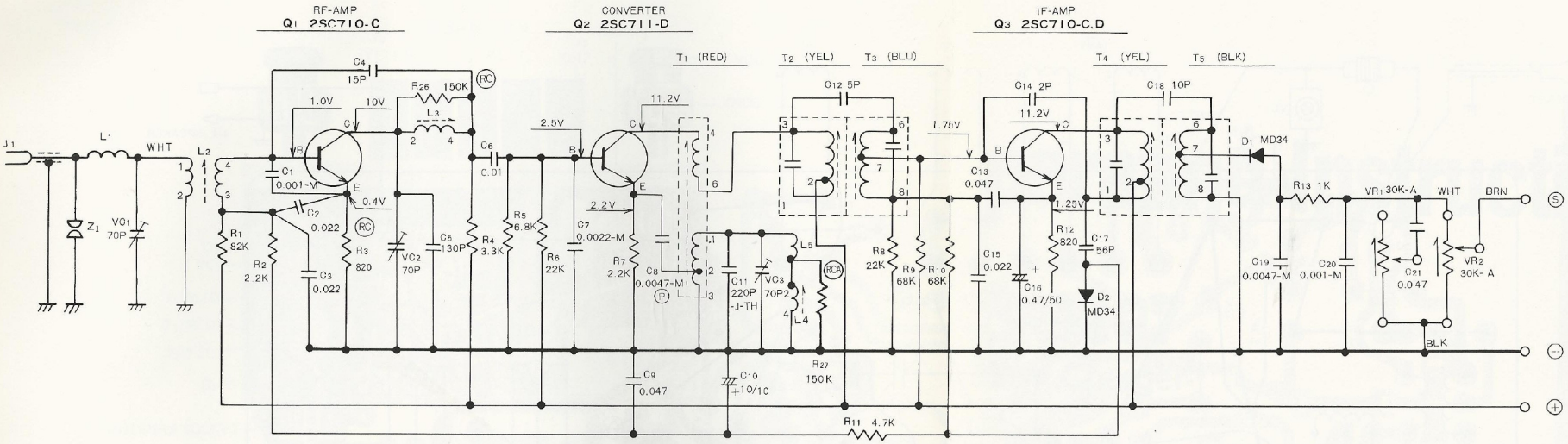


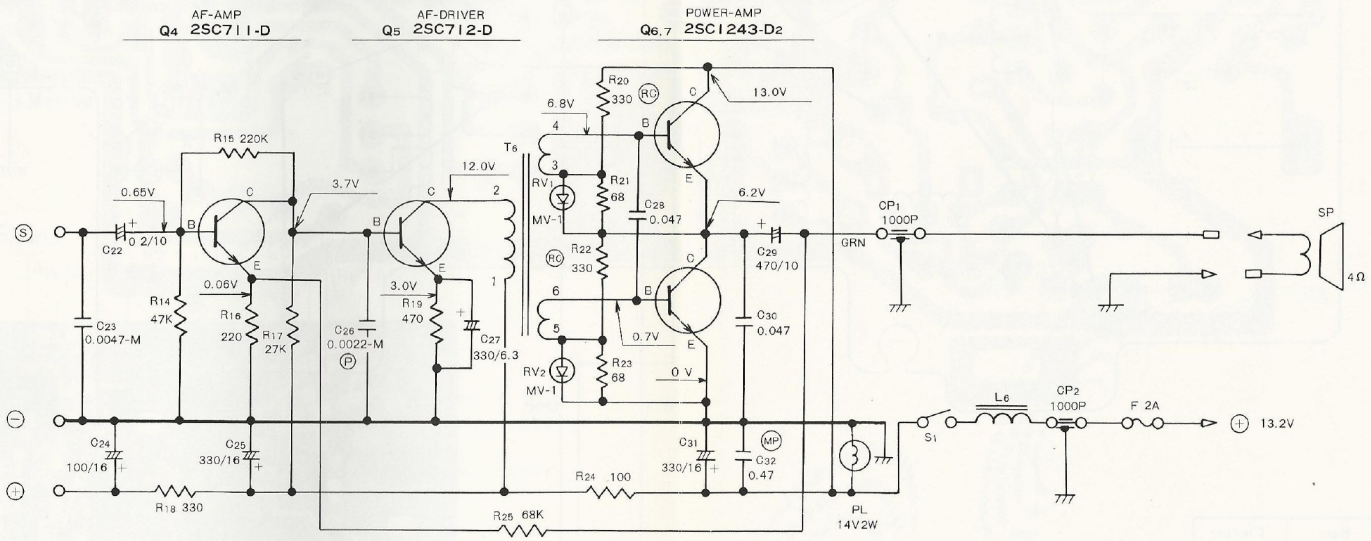
Fig. 1

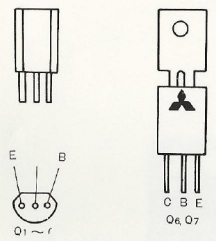
4.2 Guide to Repair

Phenomena	Circuits	Causes	Repairs
Not making a sound at all	Power source circuit	· Fuse open · Power source choke coil L_6 opens · Switch S_1 on volume control damaged · C_{31}, C_{32} short · R_{24} open	· Replace · Replace of soldering · Replace · ,, · ,,
	Output amp.	· Voice coil of speaker open · CP_1 short · C_{29} open · Transistor Q_6, Q_7 open or short · Primary side winding of T_6 open	· Replace · ,, · Replace of soldering · Replace · ,,
	Audio frequency amp.	· Transistor Q_4, Q_5 open or short · C_{22} open · C_{26} short · Volume control VR_2 damaged	· Replace · ,, · ,, · ,,
	Audio detector	· Diode D_1 open · C_{19}, C_{20} short	· Replace · ,,
	RF amp. or IF amp.	· Transistor Q_1, Q_2, Q_3 damaged · C_{12}, C_{18} open · T_1, T_2, T_4, T_5 open · L_1, L_2, L_3, L_4 open	· Replace · ,, · ,, · ,,
Small sound and low sensitivity	AF amp. or output amp.	· Transistor Q_4, Q_5, Q_6, Q_7 deteriorated · C_{22}, C_{27}, C_{29} Capacity decreasing · C_{24}, C_{25} deteriorated · R_{14}, R_{15}, R_{16}, R_{17}, R_{19} Resistance varying	· Replace · ,, · ,, · ,,
	RF amp., IF amp. or audio detector	· Diode D_1 deteriorated · Dust core of L_2 or L_3 are cracked · Trimmer VC_1 short · C_2, C_5, C_{16} capacity decreasing · C_7, C_8 capacity decreasing or open · Transistor Q_1, Q_2, Q_3 damaged · R_3, R_{10} resistance varying · R_1, R_4, R_6, R_9 resistance varying or open	· Replace · ,, · ,, · ,, · ,, · ,, · ,, · ,,
Distorted sound	Output amp.	· Transistor Q_6, Q_7 damaged · R_{20}, R_{21}, R_{22}, R_{23} resistance varying or open · Secondary side winding of T_6 open or short · C_{25}, C_{26} short	· Replace · ,, · ,, · ,,
	AF amp.	· R_{16}, R_{19} resistance varying	· Replace
	AGC circuit	· R_2, R_{11} resistance varying or open	· Replace
Oscillatory case	Power source circuit	· C_{24}, C_{25}, C_{31}, C_{32} capacity decreasing	· Replace
	RF amp. or IF amp.	· C_{14} capacity decreasing or capacity varying · C_4 capacity decreasing · C_{10} capacity decreasing or open	· Replace · ,, · ,,
Not be able to receive or not be able to tune beside being able to receive	Converter	· Transistor Q_2 damaged · T_1, L_5 open · Dust core of L_4 is cracked · R_5, R_6, R_7 resistance varying or open · C_{11} capacity decreasing or capacity varying · Capacitor included in T_2 capacity decreasing	· Replace · ,, · ,, · ,, · ,, · ,,

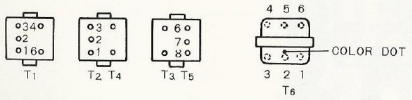
Model AR-5300 Schematic Diagram







TRANSISTOR TERMINAL GUIDE



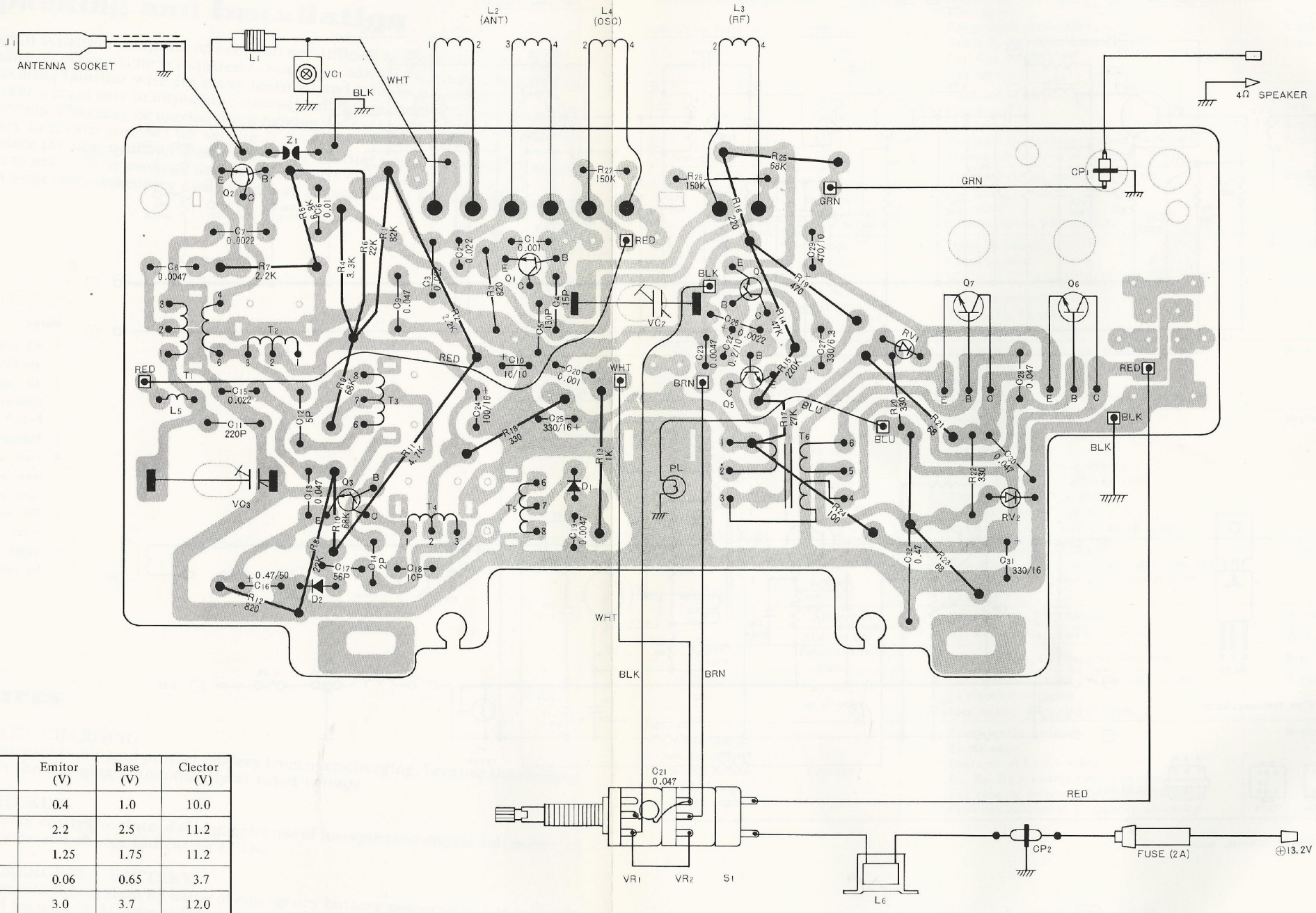
TRANSFORMER TERMINAL GUIDE

Notice

1. All resistors are ohms unless otherwise specified. $K=10^3$ ohms. $M=10^6$ ohms.
2. All capacitors are in microfarads unless otherwise specified. $P=10^{-6}$ microfarad.
3. Voltage measurements taken with tester.
4. Each terminal is measured at the minimum position of tone volume when no signal is given. (near 1000 KHz)
5. The standard point to measure voltage is on chassis.
6. Supply voltage maintained at rated value for voltage readings. (13.2 V)

Resistor	(RCA)	Mark is Carbon resistor
Resistor	(RC)	Mark is composition resistor
Capacitor	(P)	Mark is Polyester film capacitor
Capacitor	(MP)	Mark is Metalized paper capacitor
Capacitor	(S)	Mark is Styrol capacitor

Model AR-5300 Printed Circuit Board Diagram (Printed Side)

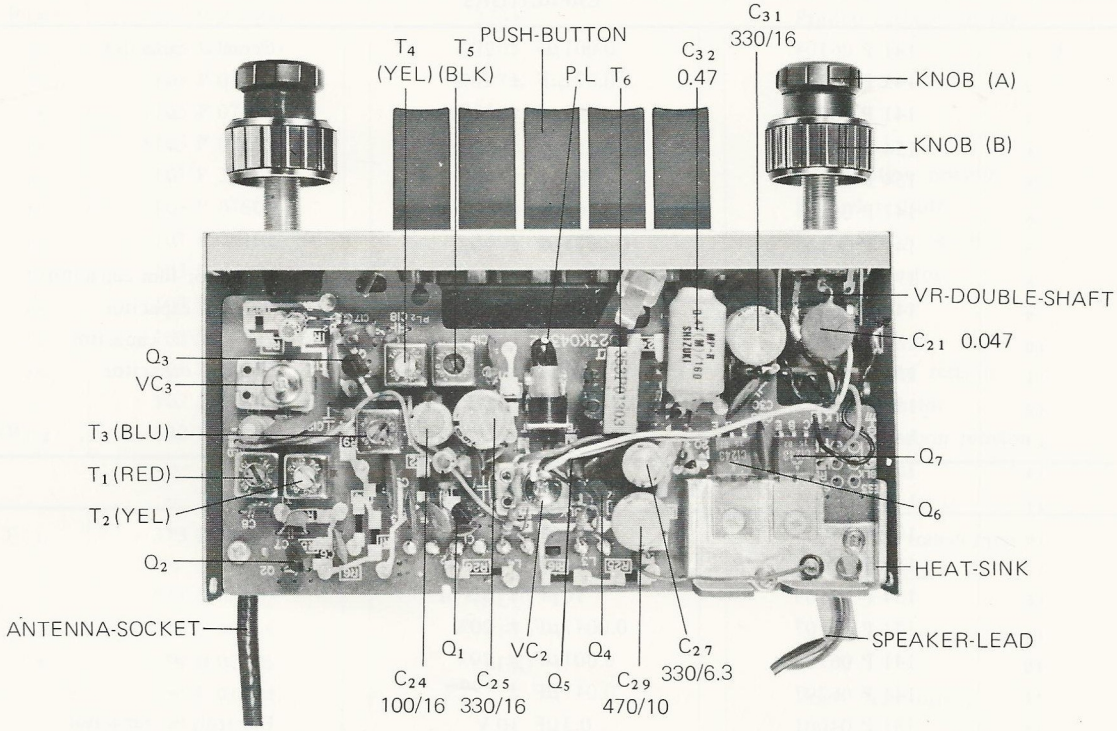


Voltage

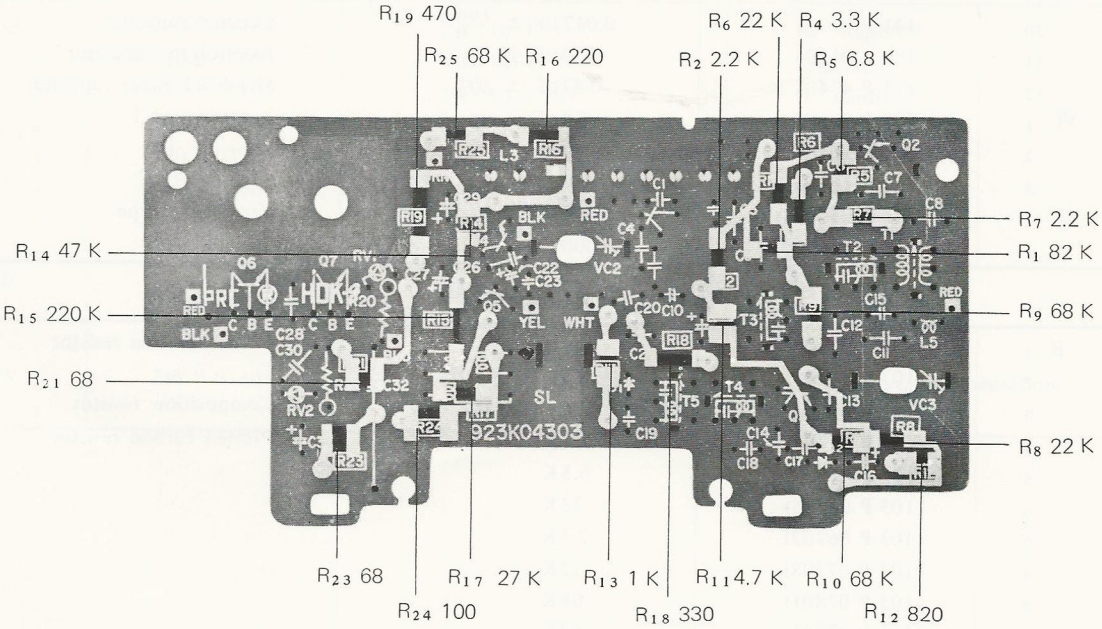
	Transistor	Emitor (V)	Base (V)	Clector (V)
Q_1	2SC710–C	0.4	1.0	10.0
Q_2	2SC711–D	2.2	2.5	11.2
Q_3	2SC710–C.D	1.25	1.75	11.2
Q_4	2SC711–D	0.06	0.65	3.7
Q_5	2SC712–D	3.0	3.7	12.0
Q_6	2SC1243–D_2	6.2	6.8	13.0
Q_7	2SC1243–D_2	0	0.7	6.2

MARK : PRINTED RESISTORS

8. Parts Disposition



View of Chassis



View of Printed Circuit

9. Parts List

Mark	Service Cord Number	Description	Remarks
		CAPACITORS	
C 1	141 P 06104	0.001 μF ± 20%	Ceramic capacitor
2	141 P 06205	0.022 μF ± 20%	,,
3	141 P 06205	0.0047 μF ± $^{100}_{0}$%	,,
4	154 P 02601	15 pF ± 0.5 pF	,,
5	154 P 02309	130 pF ± 5%	,,
6	141 P 06204	0.01 μF ± $^{100}_{0}$%	,,
7	141 P 06105	0.0022 μF ± 20%	,,
8	172 P 01305	0.0047 μF ± 20%	Polyestor film capacitor
9	141 P 06207	0.047 μF ± $^{100}_{0}$%	Ceramic capacitor
10	181 P 06008	10 μF 10 V	Electrolytic capacitor
11	154 P 13404	220 pF ± 5% –TH	Ceramic capacitor
12	154 P 02007	5 pF ± 0.5 pF	,,
13	141 P 06207	0.047 μF ± $^{100}_{0}$%	,,
14	154 P 02004	2 pF ± 0.5 pF	,,
15	141 P 06205	0.022 μF ± $^{100}_{0}$%	,,
16	181 P 06600	0.47 μF 50 V	,,
17	154 P 02608	56 pF ± 0.5 pF	,,
18	154 P 02509	10 pF ± 0.5 pF	,,
19	141 P 06107	0.0047 μF ± 20%	,,
20	141 P 06104	0.001 μF ± 20%	,,
21	141 P 06207	0.047 μF ± $^{100}_{0}$%	,,
22	181 P 04001	0.2 μF 10 V	Electrolytic capacitor
23	141 P 06107	0.0047 μF ± 20%	Ceramic capacitor
24	181 L 01202	100 μF 16 V	Electrolytic capacitor
25	181 L 01204	330 μF 16 V	,,
26	172 P 01303	0.0022 μF ± 20%	Polyestor film capacitor
27	181 L 01002	330 μF 6.3 V	Electrolytic capacitor
28	141 P 06207	0.047 μF ± $^{100}_{0}$%	Ceramic capacitor
29	181 L 01102	470 μF 10 V	Electrolytic capacitor
30	141 P 06207	0.047 μF ± $^{100}_{0}$%	Ceramic capacitor
31	181 L 01204	330 μF 16 V	Electrolytic capacitor
32	171 P 47405	0.47 μF ± 20%	Metalized paper capacitor
VC 1	202 L 00102	70 pF	Trimmer, ANT
2	202 P 10601	70 pF	,, RF
3	202 P 10601	70 pF	,, OSC
CP 1	141 P 05001	1000 pF	Feed three type
2	141 P 05001	1000 pF	,,
		RESISTORS	
R 1	(103 P 07105)	82 K	Printed carbon resistor
2	(103 P 06702)	2.2 K	,,
3	101 P 82102	820 ± 10% ¼W	Composition resistor
4	(103 P 07703)	3.3 K	Printed carbon resistor
5	(103 P 07705)	6.8 K	,,
6	(103 P 07708)	22 K	,,
7	(103 P 06702)	2.2 K	,,
8	(103 P 07708)	22 K	,,
9	(103 P 07801)	68 K	,,
10	(103 P 07801)	68 K	,,
11	(103 P 07704)	4.7 K	,,
12	(103 P 06003)	820	,,
13	(103 P 07700)	1 K	,,
14	(103 P 07800)	47 K	,,

Mark	Service Cord Number	Description	Remarks
R_{15}	(103 P 07804)	220K	Printed carbon resistor
16	(103 P 06606)	220	"
17	(103 P 07102)	27K	"
18	(103 P 07607)	330	"
19	(103 P 07608)	470	"
20	101 P 33102	330 ±20% ¼ W	Composition resistor
21	(103 P 07603)	68	Printed resistor
22	101 P 33102	330 ±20% ¼ W	Composition resistor
23	(103 P 07603)	68	Printed resistor
24	(103 P 07604)	100	"
25	(103 P 07801)	68K	"
26	101 P 15402	150K ±10% ¼ W	Composition resistor
27	103 P 07803	150K ±10% ¼ W	Carbon resistor
$VR_{1,2}$	122 L 04003	30K – A x 2	Variable carbon resistor
		TRANSFORMERS AND COILS	
T 1	373 D 03502	(RED)	Oscillation transformer
2	374 C 00105	(YEL)	IF Transformer
3	374 C 00102	(BLU)	"
4	374 C 00105	(YEL)	"
5	374 D 02106	(BLK)	"
6	353 P 01303		Input transformer
L 1	351 C 00805		Antenna choke coil
$L_{2\sim4}$	295 K 00801		Tuner
5	351 D 02103		Oscillation series coil
6	351 P 00105		Power source choke coil
		TRANSISTORS, DIODES, AND VARISTORS	
Q 1	260 P 17103	2SC710–C	RF amplifier
2	260 P 17503	2SC711–D	Converter
3	260 P 17102	2SC710–C . D	IF amplifier
4	260 P 17503	2SC711–D	AF amplifier
5	260 P 07704	2SC712–D	AF driver
6	260 P 31006	$2SC1243–D_2$	Power amplifer
7	260 P 31006	$2SC1243–D_2$	"
D 1	264 P 00401	MD–34	AF detector
2	"	"	AGC detector
RV 1	265 P 03301	MV–1	Temperature compensation
2	"	"	"

Mark	Service Cord Number	Description	Remarks
		OTHERS	
F	283 P 00102	2A	Fuse
PL	253 D 00303	14 V 2 W	Pilot lamp
J_1	449 L 00308		Antenna socket
	590 M 21301		Heat sink
	704 M 04101		Knob (A)
	704 M 04201		Knob (B)
	923 K 04303		PWB assembly
	668 D 00301	3 x 6 mm	Plastic screw
	445 C 00108		Lamp socket
	242 D 91203		Power supply lead
	242 L 03203		Speaker lead
Z_1	224 D 01901		Air gap

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