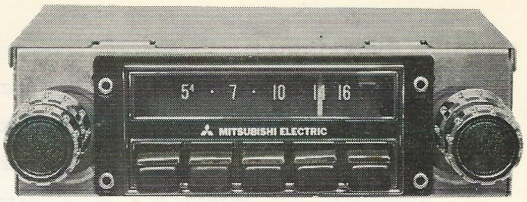
MITSUBISHI

CAR RADIO

SERVICE NOTE



MODEL: AR-1005SG-B
(LID ANTENNA)

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

Speaker :

6 × 4″ (150 × 100 mm) 4Ω

Transistors :

2SC460-B	RF amplifier
2SC454-B	Converter
2SC454-C	IF amplifier
2SC458-B	Audio amplifier
2SC458-C	〃
2SB367-B × 2	Power amplifier

Diode :

MD34	AGC detector
〃	Audio detector

Thermistors :

13D27 × 2	Temperature compensation

Outside Dimentions :

Radio ;	Width	6½″ (160 mm)
	Height	2″ (50 mm)
	Depth	4⅝″ (116 mm)
Speaker ;	Width	6″ (150 mm)
	Height	2¼″ (54 mm)
	Depth	4″ (100 mm)

Weights :

Radio ;	2.4 lbs.	(1.1 kg)
Speaker ;	0.57 lbs.	(0.26 kg)

2. Features

(1) 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-1005SG-B assures you the highest sensitivity and the highest selectivity.

(2) High power, highest tone quality

- By the adoption of specially designed transistor 2SB367 for car radio and OTL (Output Transformer Less) circuit, Model AR-1005SG-B gives you one of the largest power.
- Owing to specially designed high power speaker, Model AR-1005SG-B assures the high fidelity sound which defeats the road noises even at a city or on a high way.

(3) Hight stability

- AR-1005SG-B assures high stability against temperature by using five silicon planar transistors in RF, IF and AF circuit.

3. Components List

Parts	Components			
	Name	Service cord number	Quantity	
Radio Ass'y			1	
Speaker		480 P 61301	1	
Antenna Feeder		242 D 91802	1	
Accessories	Noise-Suppressor-C	284 L 00404	2	
	Ground-Cable	242M00101	1	
	Crip	549M00101	2	
	Washer	556 D 00702	2	
	〃	683 D 01006	1	
	〃	683 D 02701	4	
	Washer-Spring	680 P 25001	1	5 mm
	〃	680 P 24001	4	4 mm
	Nut-Hex	670 P 24001	4	4 mm
	Wing-Bolt	669 D 90601	1	5 mm
	Fuse (2A)	283 P 00102	1	
	Crip	549M00201	1	
	Knob (A)	704 D 95401	2	
	〃 (B)	943 D 00901	2	

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 st 400Hz or 1000Hz 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 CHART.

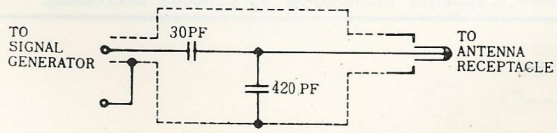
• Procedure of adjustment

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 Procedure

Procedures	Circuit	Signal generator coupling	Test oscillator frequency	Radio dial setting	Indicator	Adjust	Remarks
1	IF amplifier circuit	Hot side to the VC_1 terminal through 1~3pF Cold side to chassis	450 KHz (400Hz Mod.)	High freq. End stop.	Output meter across voice coil	$T_{5.4}$	These parts should so be adjusted that attenuation in the vicinity of ±10KHz may become equal, by repeating the procedures again and again.
2						$T_{3.2}$	
3						Repeat procedures 1~2	
4	Oscillator circuit and tuning circuit	Through dummy to antenna receptacle	525± 5 KHz	Minimum frequency	〃	T_1	These parts should be adjusted in such a way that the output voltage may become maximum, by repeating procedures again and again.
5			1650±10 KHz	Maximum frequency	〃	Oscillator trimmer VC_3	
6					〃	Repeat procedures 4.5	
7			1400 KHz	1400 KHz	〃	Antenna trimmer VC_1 RF tuning trimmer VC_2	
8			600 KHz	600 KHz	〃	T_1	
9			1400 KHz	1400 KHz	〃	Oscillator trimmer VC_3	
10						Repeat procedures 7~9 again and again	

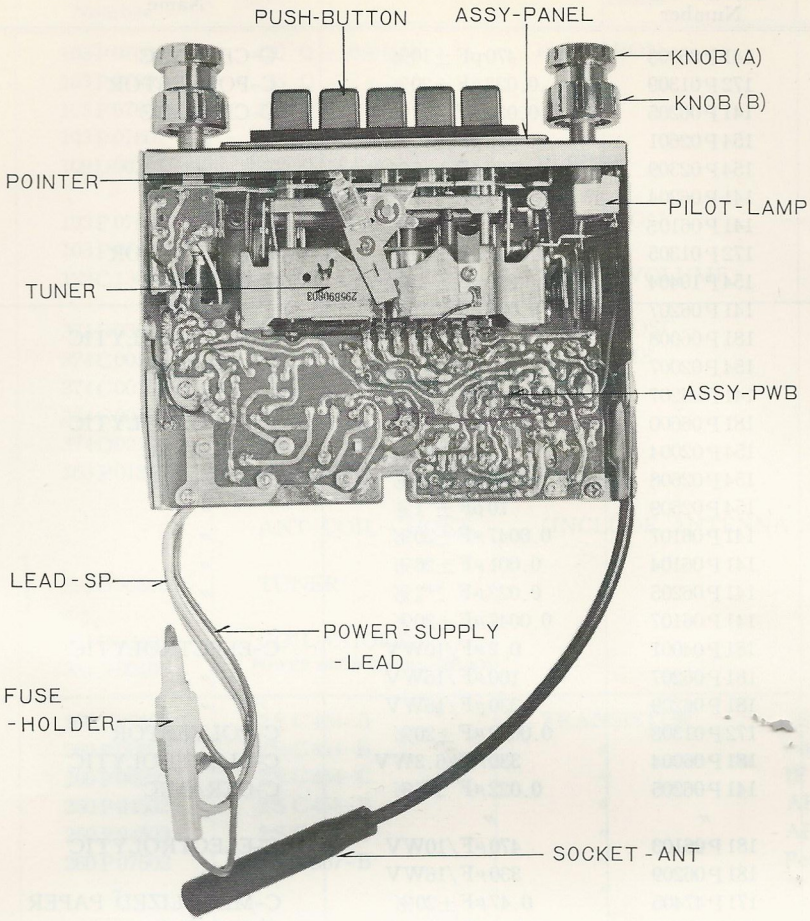
With radio installed in car and antenna fully extended, tund in a weak station near 1400 KHz and adjust VC_1 for maximum output.

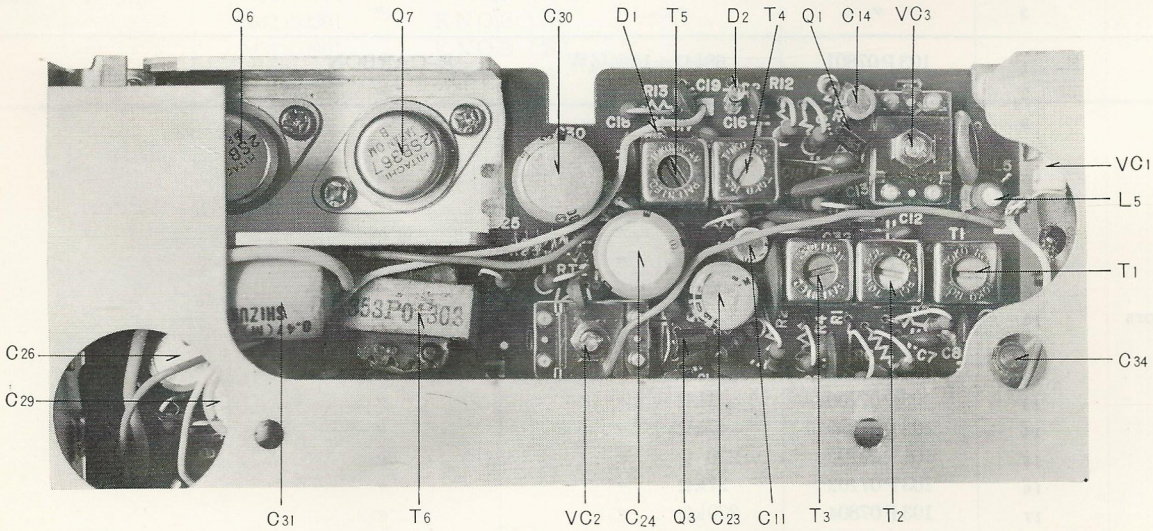


4. 2 Guide to Repair

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_{30}, C_{31} short • R_{26} 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_{18}, C_{19} short	• Replace • 〃
	RF amp. or IF amp.	• Transistor Q_1, Q_2, Q_3 damaged • C_{12}, C_{17} 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_{26}, C_{29} Capacity decreasing • C_{23}, C_{24} 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_{14} capacity decreasing • C_6, C_8 capacity decreasing or open • C_7 short • R_3, R_{11} resistance varying • R_1, 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_{27}, C_{28} short	• Replace • 〃 • 〃 • 〃
	AF amp.	• R_{15}, R_{19} resistance varying	• Replace
	AGC circuit	• R_2, R_{12} resistance varying or open	• Replace
Oscillatory case	Power source circuit	• C_{23}, C_{24}, C_{30} capacity decreasing	• Replace
	RF amp. or IF amp.	• C_{15} capacity decreasing or capacity varying • C_4 capacity decreasing • C_{11} 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_9 capacity decreasing or capacity varying • Capacitor included in T_2 capacity decreasing	• Replace • 〃 • 〃 • 〃 • 〃 • 〃

6. Parts Disposition



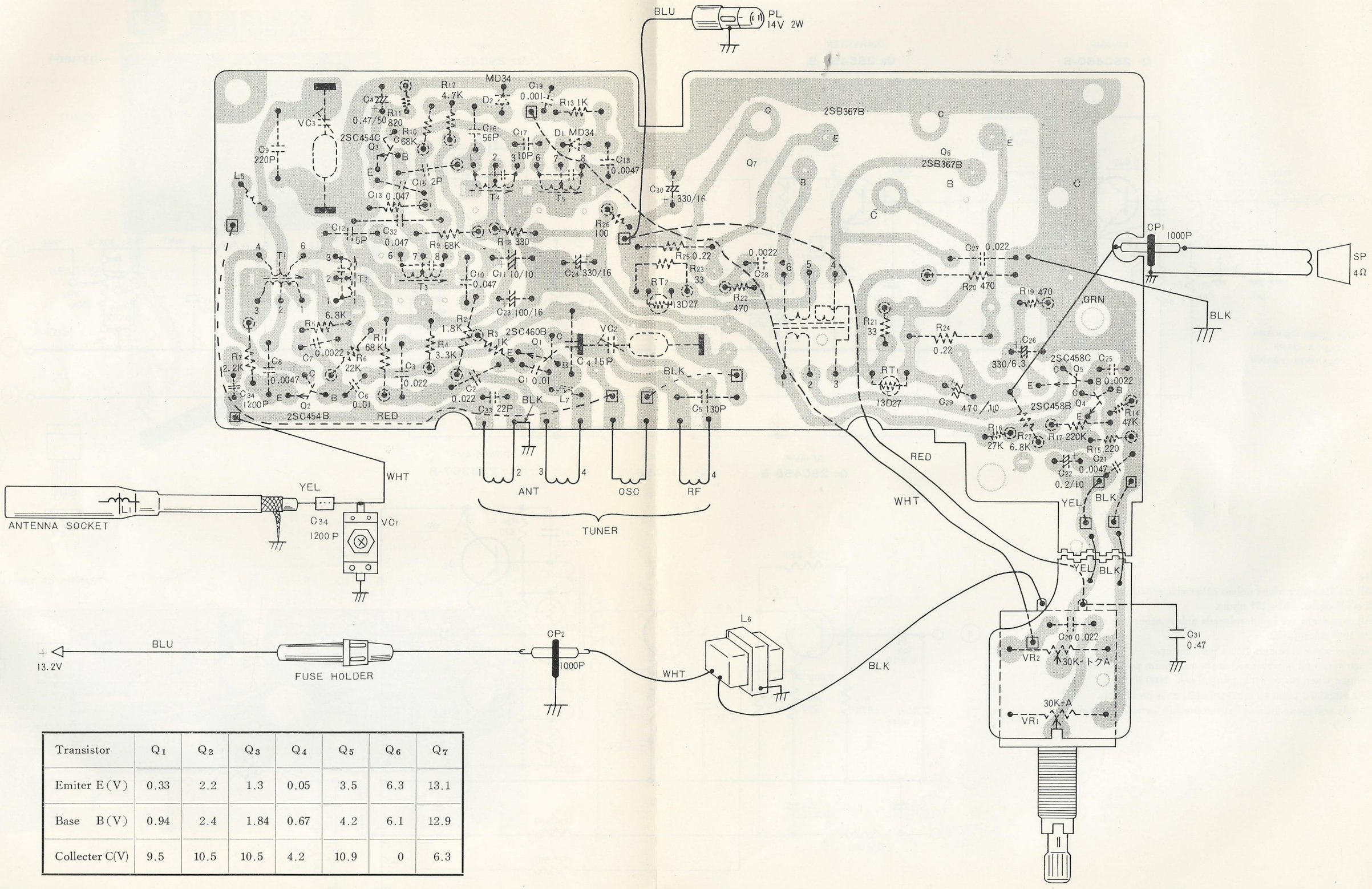


7. Parts List

Parts	Mark	Service Cord Number		Name
Capacitors	C 1	141 P 06003	470 pF ±10%	C-CERAMIC
	2	172 P 01309	0.022 μF ±20%	C-POLYESTOR
	3	141 P 06205	0.022 μF $^{+100}_{-0}$%	C-CERAMIC
	4	154 P 02601	15 pF ±10%	〃
	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%	C-POLYESTOR
	9	154 P 10404	220 pF ± 5%	C-CERAMIC
	10	141 P 06207	0.047 μF $^{+100}_{-0}$%	〃
	11	181 P 06008	10 μF/10WV	C-ELECTROLYTIC
	12	154 P 02007	5 pF ±0.5 pF	C-CERAMIC
	13	141 P 06207	0.047 μF $^{+100}_{-0}$%	〃
	14	181 P 06600	0.47 μF/50WV	C-ELECTROLYTIC
	15	154 P 02004	2 pF ±0.5 pF	C-CERAMIC
	16	154 P 02608	56 pF ±10%	〃
	17	154 P 02509	10 pF ± 1%	〃
	18	141 P 06107	0.0047 μF ±20%	〃
	19	141 P 06104	0.001 μF ±20%	〃
	20	141 P 06205	0.022 μF $^{+100}_{-0}$%	〃
	21	141 P 06107	0.0047 μF ±20%	〃
	22	181 P 04001	0.2 μF/10WV	C-ELECTROLYTIC
	23	181 P 06207	100 μF/16WV	〃
	24	181 P 06209	330 μF/16WV	〃
	25	172 P 01303	0.0022 μF ±20%	C-POLYESTOR
	26	181 P 06004	330 μF/6.3WV	C-ELECTROLYTIC
	27	141 P 06205	0.022 μF $^{+100}_{-0}$%	C-CERAMIC
	28	〃	〃	〃
	29	181 P 06103	470 μF/10WV	C-ELECTROLYTIC
	30	181 P 06209	330 μF/16WV	〃
	31	171 P 47405	0.47 μF ±20%	C-METALIZED PAPER
	32	141 P 06207	0.047 μF $^{+100}_{-0}$%	C-CERAMIC
	33	154 P 02603	22 pF ±10%	〃
	34	189 D 01901	1200 pF ± 5%	C-STYROL
	34	172 P 06009	1000 pF ± 5%	〃
	CP 1	141 P 05001	1000 pF	C-CERAMIC (Feed three type)
	2	〃	1000 pF	〃
	VC 1	202 P 10302	Max. 50 pF	C-TRIMMER
	2	202 P 10601	Max. 70 μF	〃
	3	〃	〃	〃
Resistors	R 1	103 P 07801	68 kΩ ±10% ¼W	R-CARBON
	2	103 P 07005	1.8 kΩ 〃	〃
	3	101 P 10202	1 kΩ 〃	〃
	4	103 P 07703	3.3 kΩ 〃	〃
	5	103 P 07705	6.8 kΩ 〃	〃
	6	103 P 07708	22 kΩ 〃	〃
	7	101 P 22202	2.2 kΩ 〃	〃
	8	103 P 07708	22 kΩ 〃	〃
	9	103 P 07801	68 kΩ 〃	〃
	10	〃	〃 〃	〃
	11	101 P 82102	820 Ω 〃	〃
	12	103 P 07704	4.7 kΩ 〃	〃
	13	103 P 07700	1 kΩ 〃	〃
	14	103 P 07800	47 kΩ 〃	〃
	15	101 P 22102	220 Ω 〃	〃
	16	103 P 07102	27 kΩ 〃	〃
	17	103 P 07804	220 kΩ 〃	〃
	18	103 P 07607	330 Ω 〃	〃
	19	101 P 47102	470 Ω 〃	〃

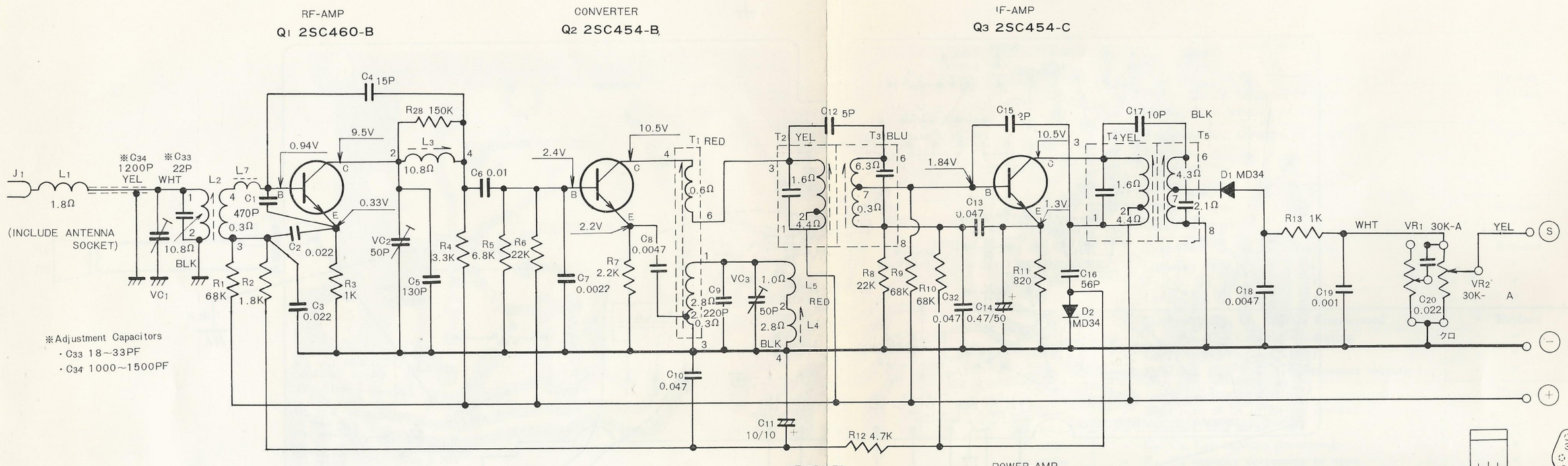
Parts	Mark	Service Cord Number	Name		
Resistors	R 20	103P07608	470 Ω ±10% ¼W	R-CARBON	
	21	103P07601	33 Ω 〃	〃	
	22	103P07608	470 Ω 〃	〃	
	23	103P07601	33 Ω 〃	〃	
	24	109D00201	0.22 Ω	R-WIRE	
	25	〃	0.22 Ω	〃	
	26	103P07604	100 Ω ±10% ¼W	R-CARBON	
	27	103P07801	68kΩ 〃	〃	
	RV1, 2	122C13001	30K-A (TONE)	30K-A (VOLUME)	
Trans-formers Coils	T 1	373D03501	(RED)	TRANS-OSC	
	2	374C00105	(YEL)	TRANS-IF	
	3	374C00102	(BLU)	〃	
	4	374C00105	(YEL)	〃	
	5	374D02106	(BLK)	〃	
	6	353P01303	TRANS-IP		
	L 1		ANT-COIL-CHOKE	(INCLUDE ANTENNA SOCKET)	
	2				
	3	295B90803	TUNER		
	4				
	5	351D02103	COIL-CHOKE		
	6	351P00105	POWER SOURCE-COIL-CHOKE		
Transistors Diodes	Q 1	260P07002	2SC460-B	TRANSISTOR	RF amplifier
	2	260P06902	2SC454-B	〃	Convertor
	3	260P06903	2SC454-C	〃	IF amplifier
	4	260P04502	2SC458-B	〃	AF amplifier
	5	260P04503	2SC458-C	〃	AF driver
	6	260P07502	2SB367-B	〃	Power amplifier
	7	〃		〃	〃
	D1, 2	264P00401	MD-34	DIODE	AF, AGC detector
	RT1, 2	265P00101	13D-27	THERMISTOR	Temperature compensation
Others	F	283P00102	2A	FUSE	
	PL	253D00303	14V 2W	LAMP	
	SP	481P61301		SPEAKER	
	J1	449L00101	SOCKET-ANT		
		704D92301	KNOB (A)		
		943D00901	KNOB (B)		
		923K00502	ASSY-PWB		

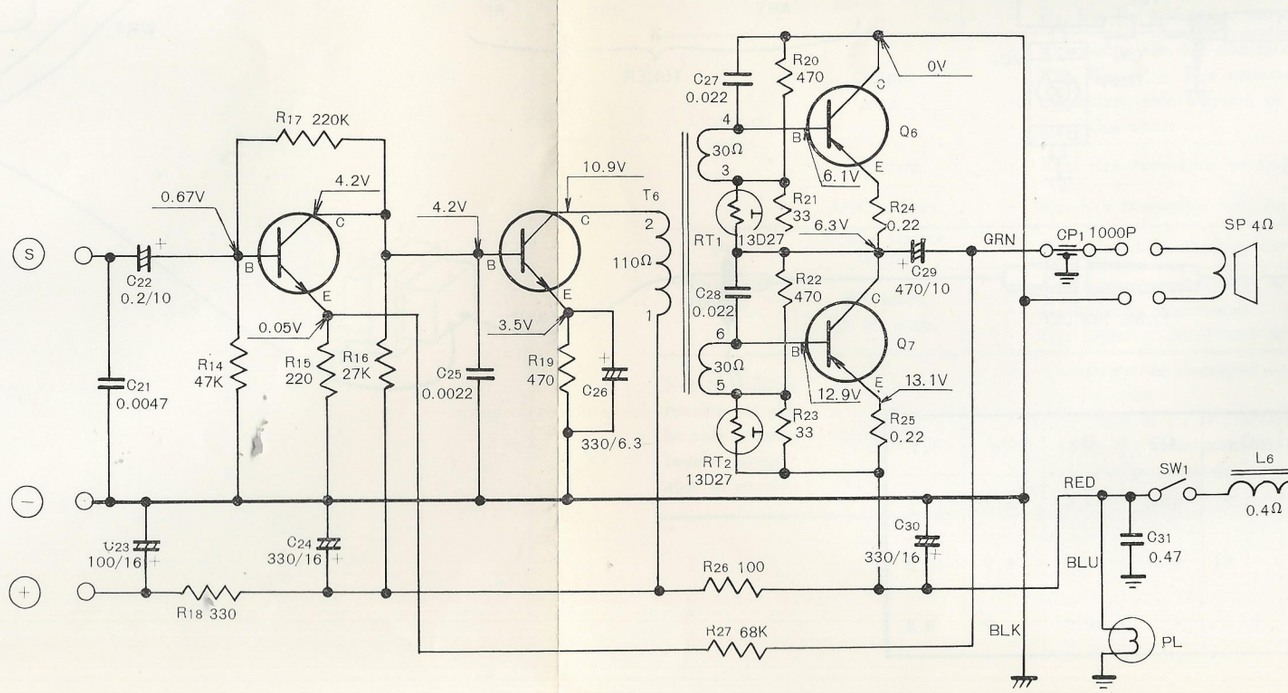
Model AR-1005SG-B Printed Circuit Board (Printed Side)

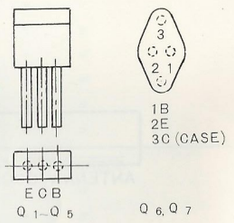


Transistor	Q_1	Q_2	Q_3	Q_4	Q_5	Q_6	Q_7
Emiter E (V)	0.33	2.2	1.3	0.05	3.5	6.3	13.1
Base B (V)	0.94	2.4	1.84	0.67	4.2	6.1	12.9
Collecter C(V)	9.5	10.5	10.5	4.2	10.9	0	6.3

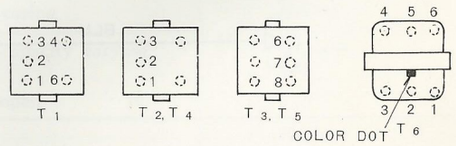
Model AR-1005SG-B Schematic Diagram







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. (13.2V)