
ROTEL

Model RX-400A

AM/FM Stereo

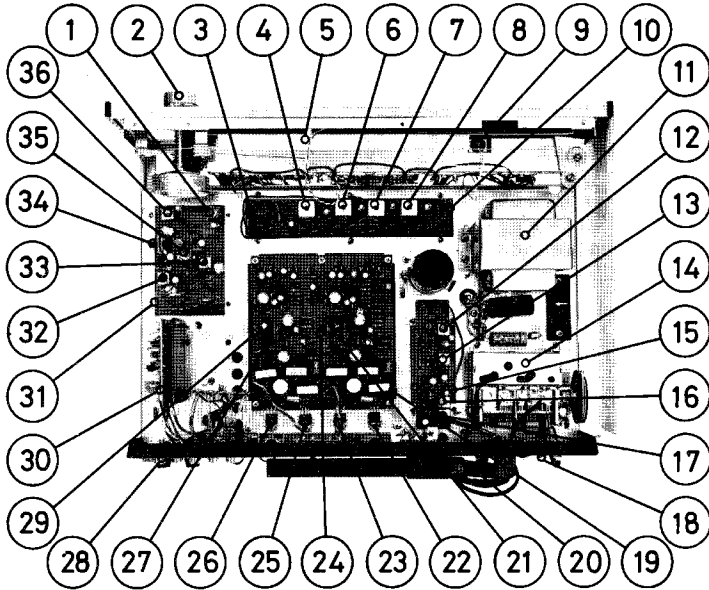
Solid State Receiver

Technical Manual

ROTEL

CHASSIS LAYOUT

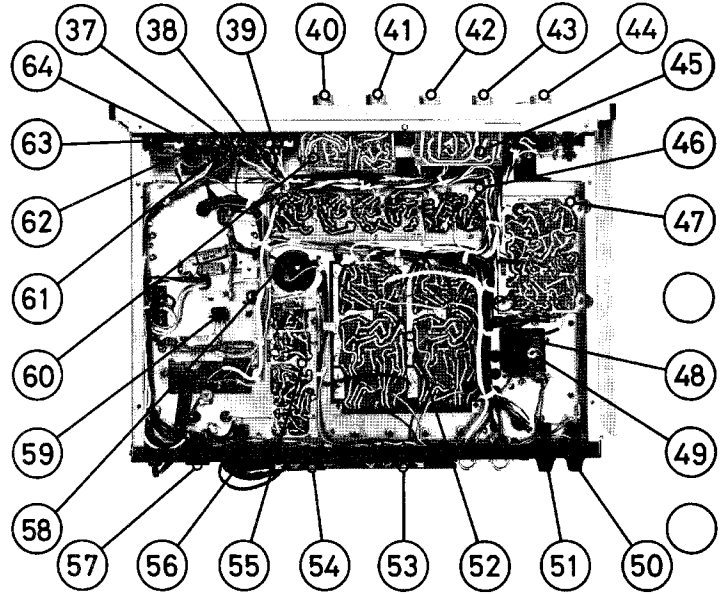
Top View



1. L303, SCA Trap, 72KHz
2. Tuning
3. VR102, FM Mono-Stereo Switching Level Adj.
4. T104, FM IFT, Ratio
5. Dial Pointer
6. T103, FM IFT, 4th
7. T102, FM IFT, 3rd
8. T101, FM IFT, 2nd
9. FM-Stereo Indicator
10. FM IF Amp. PCB
11. T901, Power Transformer
12. T203, AM IFT, 3rd
13. T202, AM IFT, 2nd
14. AM/FM Front end
15. AM Conv. and IF Amp. PCB
16. T201, AM IFT, 1st
17. L201, AM OSC Coil
18. Antenna Terminal
19. Pre, Main Amp. PCB
20. L901, AM Antenna Coil
21. VR601, DC Balance Adj., R-ch.

22. Tr610, Power Amp., R-ch.
23. Tr609, Power Amp., R-ch.
24. VR602, Idling Current Adj., R-ch.
25. Tr510, Power Amp., L-ch.
26. Tr509, Power Amp., L-ch.
27. VR501, DC Balance Adj., L-ch.
28. Input Terminal
29. VR502, Idling Current Adj., L-ch.
30. Equalizer Amp. PCB
31. FM-Stereo (MPX) PCB
32. T302, MPX Trans., 38KHz
33. T301, MPX Trans., 19KHz
34. VR301, Separation Adj.
35. L302, SCA Trap, 67KHz
36. L301, MPX Coil, 19KHz
37. Mode switch
38. Tape Monitor switch
39. Loudness switch
40. VR702, Bass control
41. VR701, Treble control
42. VR801, Balance control
43. VR802, Volume control

Bottom View



44. Func. Selector switch
45. Volume control PCB
46. FM IF Amp. PCB
47. FM-Stereo (MPX) PCB
48. C908
49. C909
50. F902, Speaker Fuse, R-ch.
51. F901, Speaker Fuse, L-ch.
52. Pre, Main amp. PCB
53. Output Terminal, R-ch.
54. Output Terminal, L-ch.
55. AM Conv. and IF Amp. PCB
56. F903, AC Fuse
57. AC Outlet
58. C907
59. D902, Rectifier
60. Tone control PCB
61. Speaker-2 switch
62. Power switch
63. Phone Jack
64. Speaker-1 switch

PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the transistors.
2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.
3. Replacement for output and driver transistors, if necessary, must be made from the same data group as the original type.
4. If one output transistor burns out (open or short) always remove all output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohm-meter before inserting a new transistor. All transistors in one channel will be destroyed if the base biasing circuit is open on the emitter end.
5. When mounting a replacement power transistor, be sure the bottom of the flange, the mica insulators and the surface of the heat sink are free of foreign matter, for they may cause transistor failure.
6. Silicon grease must be applied between the transistor and the mica insulator, and between the mica insulator and the heat sink for better heat conduction.

PREDRIVER/DRIVER ADJUSTMENT

1. Set Balance, Bass and Treble controls to mid-position.
2. Set Mode switch to "STEREO", Speaker switch to "ON", and Func. Selector switch to "AUX" position.
3. Connect 8-ohm, 50-watts resistor across Left channel speaker terminals. In parallel with the load resistor, connect the vertical input leads of the oscilloscope.
4. Connect an audio generator, set for 1,000Hz (sine wave), to Left channel AUX input.
5. Connect AC power cord and rotate volume control to colockwise position (full volume). Increase generator output until sine wave on scope just starts clipping. Adjust DC Balance potentiometer VR501 (on Pre, Main Amp. PCB) for equal clipping on the positive and negative half cycles of the signal. See Fig. 1.
6. Adjust idling current using a DC mili-volt meter, DC mili-volt meter across R531 resistor (on Pre, Main Amp PCB), rotate VR502 (on Pre, Main Amp PCB) to obtain a 7.5mV reading on DC mili-volt meter (no signal input). See Fig. 2.
7. Repeat the steps 3 thru 6 as above for Right channel. (Use VR601, 602 and R613).

Fig. 1 DC Balance Adjustment (wave form)

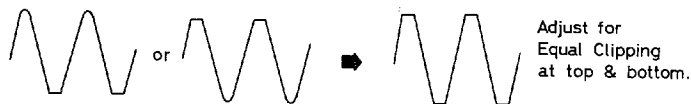
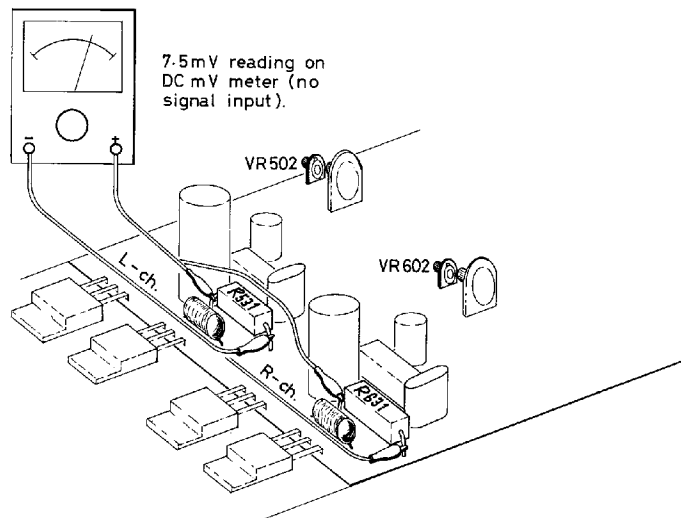


Fig. 2 Idling Current Adjustment Hook-up



AM ALIGNMENT PROCEDURE

Instruments: AM Signal Generator and AC VTVM.

Set Selector switch to AM.

NOTE: Input signal must be kept as low as possible to avoid AVC action.

Step	Generator		Tuning Dial Setting	Output Indicator Connected to	Adjust	Adjust for
	Coupling	Frequency				
1	Tr201 Base (Pin #2 on AM IF board) through a 0.01mfd capacitor.	455 KHz (400 Hz 30% mod.)	Non-interfering at low end of scale.	AC VTVM to TAPE OUT jack.	T204, 203, 202 & 201 (on AM IF board)	Maximum reading on VTVM.
2	Connect to short loop of wire. Radiate signal into ferrite loopstick antenna.	600 KHz (400 Hz 30% mod.)	600 KHz		L201 (OSC) coil (on AM IF board) and L901 ANT. Ring.	
3		1400 KHz (400 Hz 30% mod.)	1400 KHz		CT5 (OSC) and CT4 (ANT) Trim. (on Front-end)	
4	Repeat the steps 2 and 3 until no further improvement is noticed.					

FM ALIGNMENT PROCEDURE

Instruments: FM Sweep Generator, FM Signal Generator, AC VTVM and Oscilloscope.

Set Selector switch to FM.

Step	Generator		Tuning Dial Setting	Output Indicator Connected to	Adjust	Adjust for
	Connected to	Freq.				
1	FM Sweep Generator to junction of C901 and C902, (FM IF input, pin #1 on FM IF Board).	10.7 MHz	Quiet point on band.	Oscilloscope to junction of R132 and C125 (on FM IF board)	T104, 103, 102 & 101 (on FM IF board) Top and Bottom	Maximum and Balanced S curve on scope.
2	Disconnect FM Sweep Generator and connect FM Signal Generator to FM antenna terminals.					
3	FM Signal Generator to FM antenna terminals.	98MHz (400Hz 100% mod.)	Tune for maximum output point.	Oscilloscope and AC VTVM. to TAPE OUT jack.	T2, top & Bottom (on Front end) Touch up T101, 102, 103 & 104 if necessary.	Maximum and undistorted amplitude on scope.
4	* To align the steps 4 and 5, input signal level must be kept -3db of limiter saturation.	90MHz (400Hz 100% mod.)	90MHz		L2 (OSC), L1 (RF) & T1 (ANT) (on Front end)	Maximum reading on VTVM.
5		106MHz (400Hz 100% mod.)	106MHz		CT(OSC), CT2 (RF)& CT1 (ANT) (on Front end).	
6	Repeat the steps 4 and 5 until no further improvement is noticed.					

FM-STEREO ALIGNMENT PROCEDURE

NOTE: The FM IF Alignment must be completed before attempting this FM-Stereo Alignment. Poor IF alignment will result in poor FM-Stereo Alignment.

Set selector switch to FM STEREO.

1. Alignment of SCA Trap

Step	Audio Generator		Output Indicator Connected to	Adjust	Adjust for
	Connected to	Frequency			
1	To MPX Input (pin No.1 on MPX board)	67 KHz	VTVM to TP1	L302	Minimum reading on VTVM.
2		72 KHz		L303	

2. Alignment of FM-Stereo

Connect FM Stereo Generator to FM antenna terminals.

Set Separation Adj. VR301 (on MPX Board) to mid-position before starting this procedure.

Step	Stereo Generator		Output Indicator Connected to	Adjust	Adjust for
	Modulation	RF Deviation			
1	19 KHz Pilot only	1 — 2%	VTVM & Oscillo- scope to TP2	L301, T301, T302.	Maximum reading on VTVM.
2	Composite 1 KHz sig- nal to Left channel only.	Pilot 10% Signal 70%	VTVM & Oscillo- scope to Left channel OUTPUT jack.	T301	Maximum and un- distorted sine wave on scope.
3	Composite 1 KHz sig- nal to Right channel only.			VR301	Minimum reading on VTVM.
	Same as in Step 2		VTVM & Oscillo- scope to Right channel OUTPUT jack.		
5	Repeat steps 3 and 4 until on further improvement is noticed.				

FM MONO — STEREO AUTOMATIC SWITCHING LEVEL ADJUSTMENT PROCEDURE

1. Connect a VTVM and Oscilloscope to the OUTPUT jack (Left or Right channel).

2. Feed the FM signal whose MPX has been varied into the antenna terminals.

MPX variation	Pilot	10%
	Modulation Frequency	1 KHz (Left or Right channel).
	RF deviation	±45 KHz

3. Set the frequency at 98 MHz (when there are disrupting signal, choose another setting).

4. Set the Function switch to FM STEREO.

5. Turn CCW the MONO—STEREO Auto-switching Level Control VR101 (on FM IF circuit board): This is a condition in which Auto-switching does not function.

6. Adjust the FM-Stereo so that the distortion and separation will be best.

7. Adjust the VR101 so that when the antenna input level is 30uV or more, Stereo will switch in and when the input is below the 30uV level, Mono will switch in.

8. After adjustment, check to make sure that, indeed, when the antenna input level exceeds 30uV, Stereo will switch in.

ENTIRE UNIT INOPERATIVE

I. If the pilot lamp does not light,

A. Check to see if the AC Power Supply Cord is properly connected to the Power source, or

B. Check to see if there is adequate voltage from the power source, or

C. If A & B are OK, check to see if the AC fuse F903 is not blown.

1. If the AC fuse is OK,

a. AC Power Supply Cord is cut, or

b. Primary Winding in the Power Transformer is cut, or

c. Power switch connection is faulty.

2. If the AC fuse is blown,

a. Primary Winding in the Power Transformer is shorted out, or

b. Secondary Winding in the Power Transformer is shorted out, or

c. Rectifier D902 is shorted out.

II. If the pilot lamp does light,

A. Check to see if the DC fuse F901 or 902 is not blown.

1. If the DC fuse is blown,

a. Output circuits (including the speakers) are shorted out, or

b. +B circuits are shorted out, due to faulty C907 or faulty Transistors Tr506, 508, 510, 606, 608, 509, 609 or 610, or

- c. Faulty C571 or 617.
- 2. If the DC fuse is OK,
 - a. And if the B voltage is not OK,
 - (1). Rectifier D902 is open, or
 - (2). Secondary winding in the Power Transformer (center tap, black lead) is cut, or
 - (3). Faulty DC fuse connection.
 - b. And if the B voltage is OK,
 - (1). And if there is signal output at the TAPE OUT jacks,
 - (a). Tape Monitor switch connection is faulty, or
 - (b). Transistors Tr503, 504, 505, 603, 604 or 605 are faulty, or
 - (c). C502, C506, 507, 508, 510, 602, 606, 607, 608 or 610 are faulty.
 - (2). And if there is no signal output at the TAPE OUT jacks,
 - (a). Transistors Tr501, 502, 601 or 602 are shorted out or open, or
 - (b). C501, 503, 504, 601, 603 or 604 are open, or
 - (c). Wires from the Function switch are cut.

ONLY PHONO SECTION INOPERATIVE

- I. If there is on fault in the wires to the Equalizer Amp board,
 - A. Transistors Tr401, 402, 403 or 404 are shorted out or open, or
 - B. C401, 405, 408, 409, 414 or 417 are faulty, or
 - C. Function switch connection is faulty.

TONE CONTROLS INEFFECTIVE

- I. C701, 702, 703, 704, 705, 706, 707 or 708 are faulty

LOUDNESS CONTROL INEFFECTIVE

- I. C801 or 802 is faulty, or
- II. Loudness switch connection is faulty.

RADIO SECTION INOPERATIVE

- I. If both AM and FM are inoperative,
 - A. Measure voltage at B6 (refer to circuit diagram),
 - 1. If there is no voltage at B6,
 - a. Zener diode D903 is shorted out, or
 - b. C902 is faulty.
 - 2. If there is proper voltage at B6,
 - a. Function switch connection is faulty, or
 - b. Wire to the Function switch is cut.

II. If only AM is inoperative,

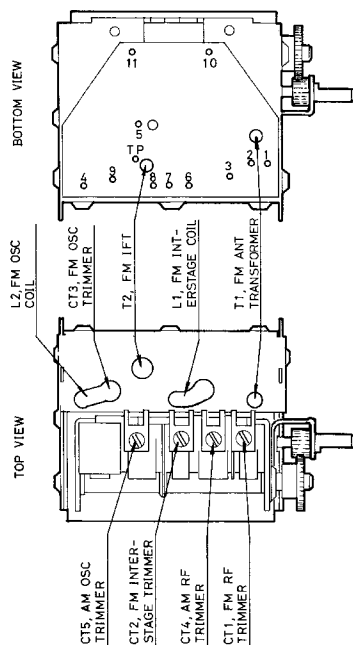
- A. Measure voltage of AM PCB (6),
 - 1. If there is no voltage,
 - a. Function switch connection is faulty, or
 - b. Wire from Function switch is cut, or
 - c. C213, 214 or 215 are faulty.
 - 2. If there is proper voltage,
 - a. C202, 209 or 210 are faulty, or
 - b. Transistors Tr201, 202 or 203 are faulty, or
 - c. Coils L201 or 901 is faulty, or
 - d. AM IFT T201, 202 or 203 are faulty.

III. If only FM is inoperative, check to see if MPX working properly.

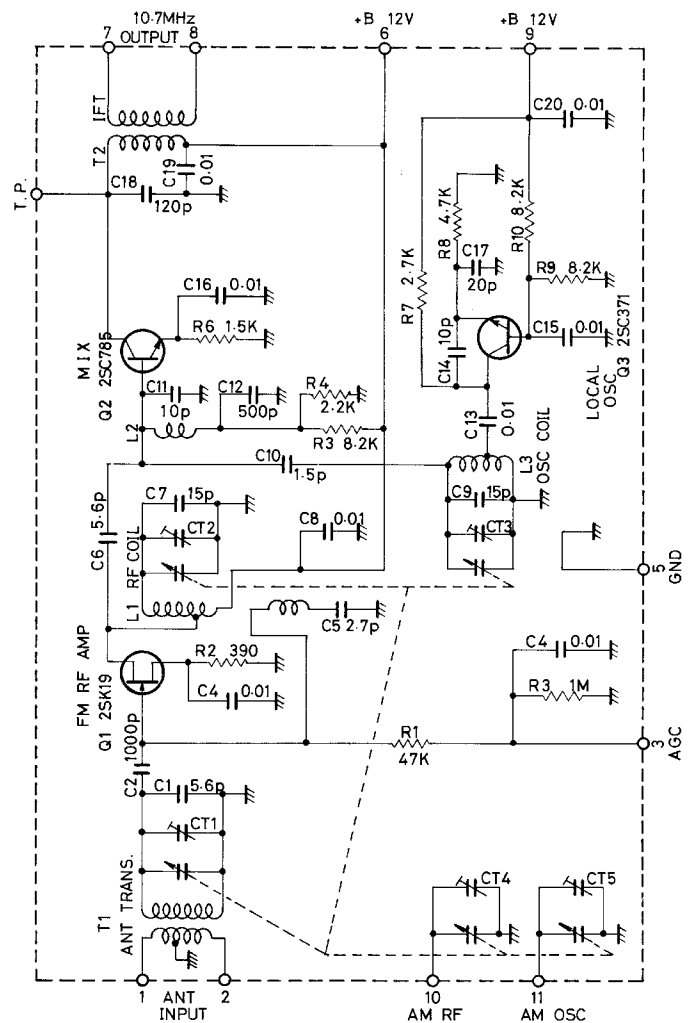
- A. If MPX is faulty, measure voltage at B2 and B3.
 - 1. If there is no voltage at B2,
 - a. C319, 908 or 909 are faulty, or
 - b. R915 is faulty.
 - 2. If there is no voltage at B3,
 - a. R920 is faulty, or
 - b. C911 is faulty.
 - 3. If there is proper voltage at B3,
 - a. And if there is no signal with Function switch set at FM,
 - (1). C301 is faulty.
 - b. If there is no signal with Function switch set at FM STEREO,
 - (1). Transistors Tr301, 302 or 303 are faulty.
 - c. If there is proper voltage at B4 but Stereo Lamp does not light,
 - (1). Check for audibility of stereo signal.
 - (a). If no stereo signal is heard from speakers, then, check the above mentioned transistors.
 - (b). If stereo signal is heard, then stereo lamp or transistor Tr304 is faulty.
 - d. If stereo lamp stays on when signal changes from stereo to mono,
 - (1). Transistor Tr304 is faulty.
- B. If MPX is OK, check FM IF circuit.
 - 1. If FM IF is not OK,
 - a. Measure voltage of FM IF PCB (2),
 - (1). If there is no voltage,
 - (a). Function switch connection is faulty, or
 - (b). Wire from Function switch is cut, or
 - (c). C102, 109, 115 or 118 are faulty.
 - (2). If there is proper voltage,
 - (a). Transistors Tr101, 102, 103 or 104 are faulty, or
 - (b). C103, 110, 114 or 119 are faulty.
 - 2. If FM IF is OK,

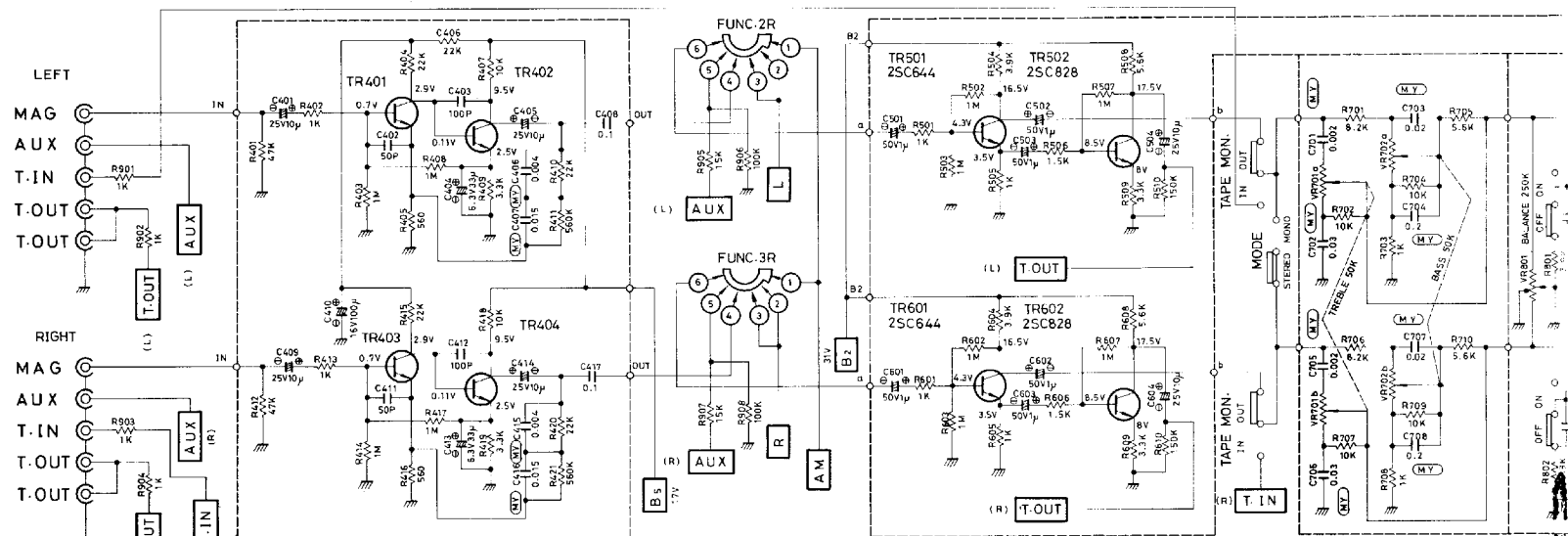
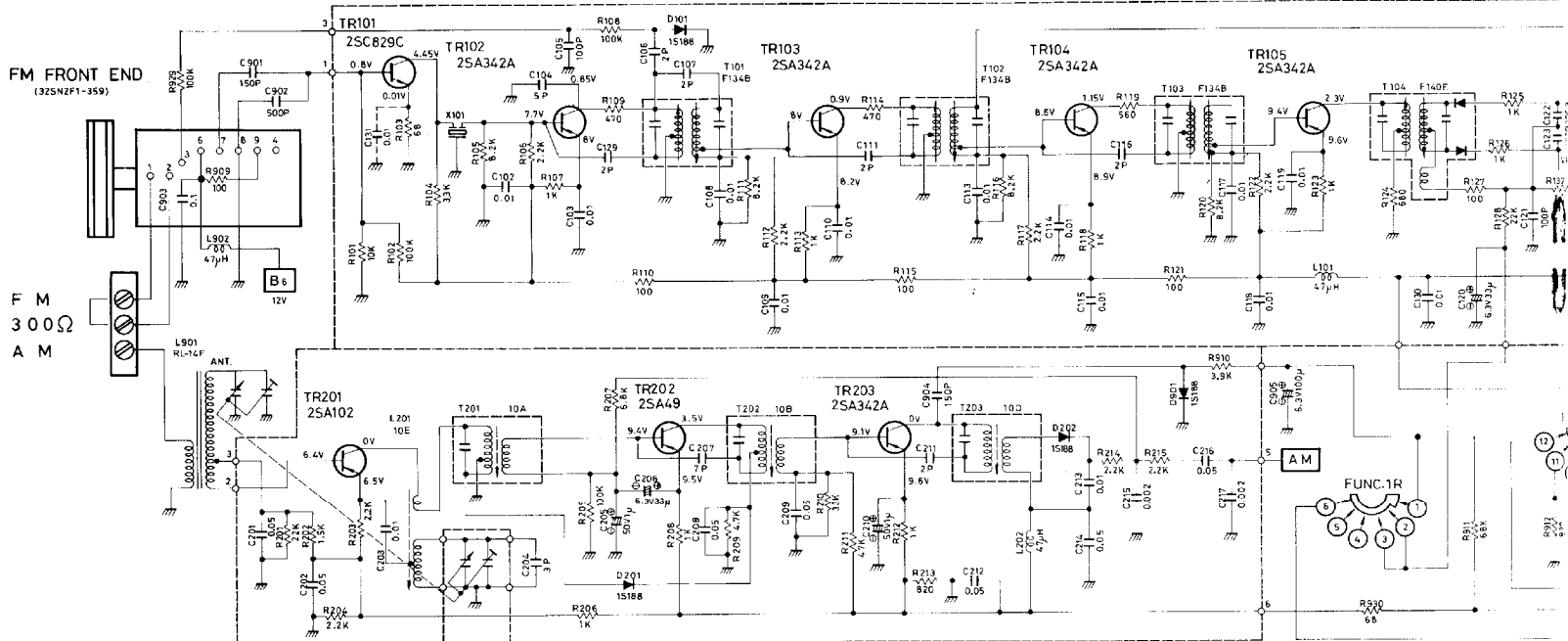
- a. And if FM Front end is faulty,
 - (1). Transistors Tr1, 2 or 3 are faulty, or
 - (2). C8, 19 or 20 are faulty.
- b. If FM Front end is OK,
 - (1). Input circuit is grounded, or
 - (2). FM antenna improperly connected.

FRONT END LAYOUT



FRONT END SCHEMATIC DIAGRAM



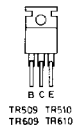
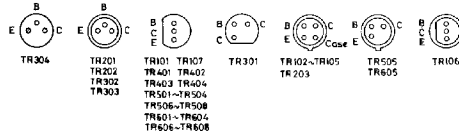


TR401-TR404 LOW NOISE TYPE 2SC644

NOTES.

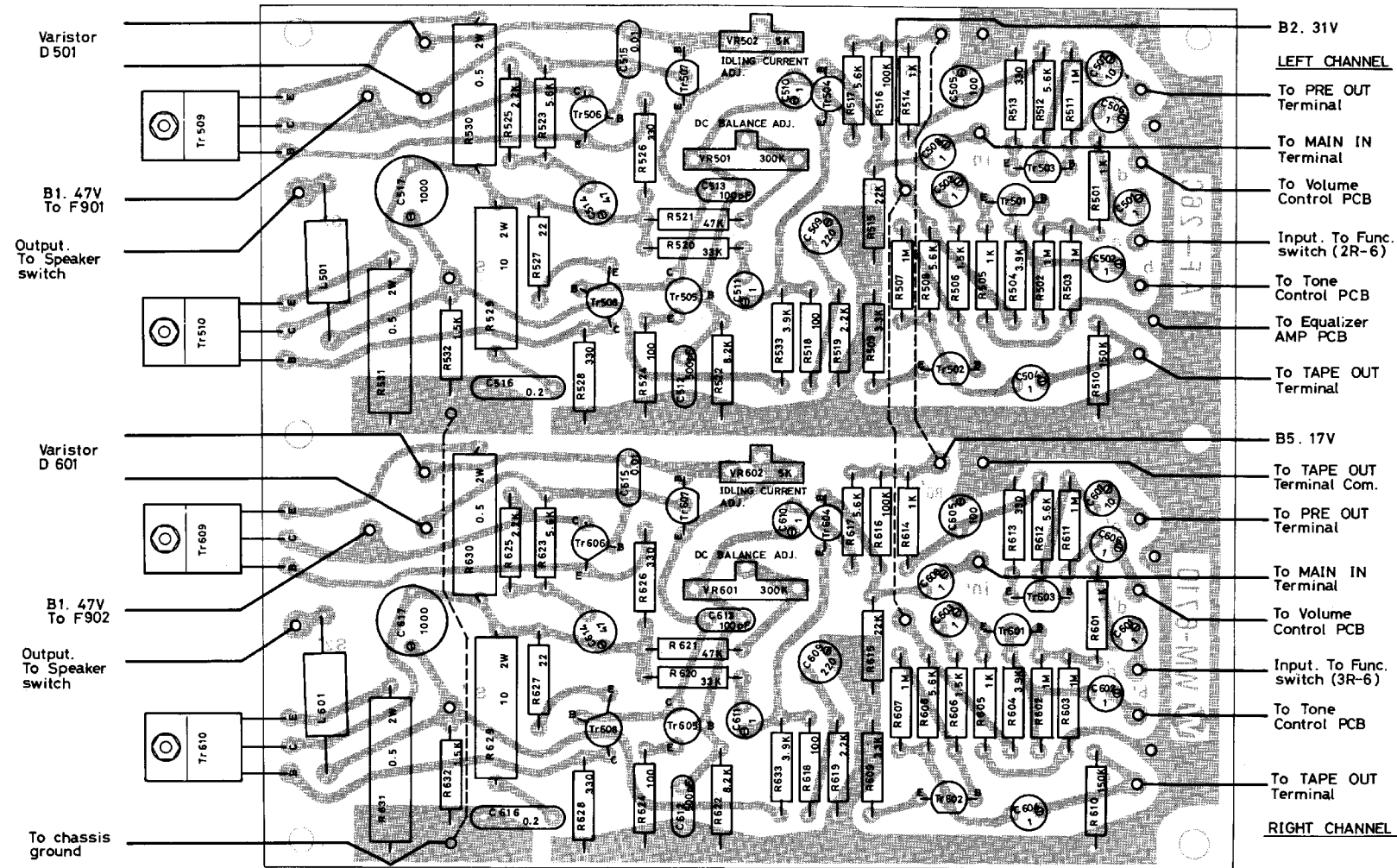
1. RESISTANCE IS SHOWN IN OHMS.
K=1,000 M=1,000,000
2. UNLESS OTHERWISE NOTED IN THE SCHEMATIC, ALL CAPACITOR VALUES ARE EXPRESSED IN MFD (MICROFARAD).
3. VOLTAGE READING WITH VTVM FROM THE POINT SHOWN TO THE CHASSIS GROUND (LINE VOLTAGE 120 VOLTS).
VOLTAGE IN INDICATED VALUE DURING THE CIRCUITS OPERATION.

4. VOLTAGE READING MAY VARY $\pm 20\%$.
5. VOLTAGES IN BOX OBTAINED WHEN RECEIVING
6. SELECTOR SWITCH IS IN.

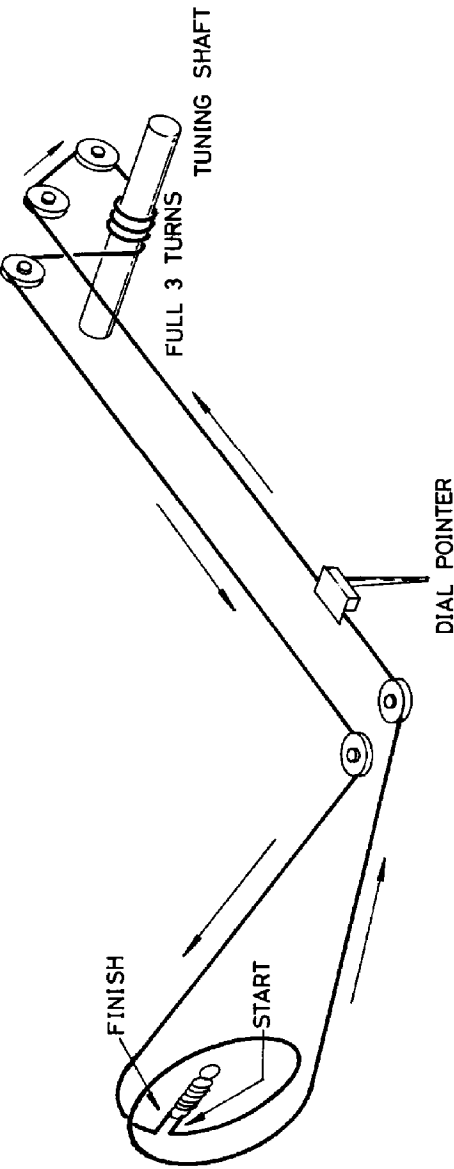


- (1) - (7) A M
(2) - (8) F M
(3) - (9) F M STEREO
(4) - (10) PHONO
(5) - (11) AUX

PRE, MAIN AMP CIRCUIT BOARD DIAGRAM



DIAL STRINGING DIAGRAM



Model RX-400A Parts List

CABINET AND CHASSIS

SYMBOL	DESCRIPTION	PART NO.
	Cabinet	131011228
	Front Panel Assembly	111911229
	Knob, Tuning	116310054
	Knob, Vol., Bal. and Func.	116310055
	Knob, Bass and Treble (Left channel)	116310056
	Knob, Bass and Treble (Right channel)	116310057
	Button, Push switch	116210007
	Chassis	121011269
	Dial Board	112011236
	Front end	321304359
	Front chassis	122011269
	Dial Pointer w/Illumination Lamp	151691117
	Dial Pulley	655311010
	Dial Spring	658601113
	Switch, Function selector	610111365
	Switch, Push 6 keys	614061205
	Switch, Speaker Matrix	613000021
	Jack, Headphone	626007702
	Shaft, Tuning w/Flywheel	654911282
	Meter, Tuning	231310018
	Bracket, Dial Lamp	640011112
	Lamp, Dial Illumination, 6.3V 0.28A	352063028
	Lamp, Stereo Indicator, 14V 80mA	351140008
	Lamp, Function Indicator, 8V 0.15A	351080015
	Rear chassis	123011269
	Terminal strip, 4P	641200104
	Pin jack, 4P	624100104
	Terminal strip, 3P	641200103
	Fuse Bracket	640253334
	Pin jack, 10P	624100210
F901	Fuse, 1.5A	341220015
F902	Fuse, 1.5A	341220015
F903	Fuse, 2A	341220020
	AC Outlet	620101114
	Screw, GND Terminal	761911113
R901	Resistor, Carbon Film, 1K $\pm 10\%$, 1/4W	552010223
R902	Resistor, Carbon Film, 1K $\pm 10\%$, 1/4W	552010223
R903	Resistor, Carbon Film, 1K $\pm 10\%$, 1/4W	552010223
R904	Resistor, Carbon Film, 1K $\pm 10\%$, 1/4W	552010223
R905	Resistor, Carbon Film, 15K $\pm 10\%$, 1/4W	552015323
R906	Resistor, Carbon Film, 100K $\pm 10\%$, 1/4W	552010423
R907	Resistor, Carbon Film, 15K $\pm 10\%$, 1/4W	552015323
R908	Resistor, Carbon Film, 100K $\pm 10\%$, 1/4W	552010423
R909	Resistor, Carbon Film, 100 $\pm 10\%$, 1/4W	552010123
R910	Resistor, Carbon Film, 3.9K $\pm 10\%$, 1/4W	552039223
R911	Resistor, Carbon Film, 68K $\pm 10\%$, 1/4W	552068323
R912	Resistor, Carbon Film, 820 $\pm 10\%$, 1/4W	552082123
R913	Resistor, Composition, 680 $\pm 10\%$, 1/2W	551068133
R914	Resistor, Composition, 2.2K $\pm 10\%$, 1/2W	551022533
R915	Resistor, Composition, 820 $\pm 10\%$, 1/2W	551082133
R916	Resistor, Metal Oxide, 330 $\pm 10\%$, 5W	553133173
R917	Resistor, Composition, 2.2K $\pm 10\%$, 1/2W	551022233
R918	Resistor, Metal Oxide, 470 $\pm 10\%$, 1/3W	553147163
R919	Resistor, Composition, 2.2K $\pm 10\%$, 1/2W	551022233
R920	Resistor, Composition, 2.2K $\pm 10\%$, 1/2W	551022233

SYMBOL	DESCRIPTION	PART NO.							
R921	Resistor, Composition, 680 ±10%, 1/2W	551068133	C210	Capacitor, Electrolytic, 1mfd, 50V	402100749	R132	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223	
R922	Resistor, Composition, 270 ±10%, 1/2W	551027133	C211	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440201388	R133	Resistor, Carbon Film, 1M ±10%, 1/4W	552010523	
R923	Resistor, Composition, 3.3K ±10%, 1/2W	551033233	C212	Capacitor, Ceramic, 0.05mfd, 50V	440500935	R134	Resistor, Carbon Film, 470 ±10%, 1/4W	552010123	
R924	Resistor, Composition, 3.3K ±10%, 1/2W	551033233	C213	Capacitor, Ceramic, 0.01mfd, 250V	440100985				
R925	Resistor, Composition, 330 ±10%, 1/2W	551033133	C214	Capacitor, Ceramic, 0.05mfd, 50V	440500935	VR101	Variable Resistor, Meter Zero ADJ., 100K	510502120	
R926	Resistor, Composition, 330 ±10%, 1/2W	551033133	C215	Capacitor, Ceramic, 0.002mfd ±10%, 250V	442201083	VR102	Variable Resistor, Auto-switching Level Adj., 250K	510502116	
R927	Resistor, Bath-tub, 2 ±10%, 2W	554020853	C216	Capacitor, Ceramic, 0.05mfd 50V	440500935				
R928	Resistor, Bath-tub, 2 ±10%, 2W	554020853	C217	Capacitor, Ceramic, 0.002mfd ±10%, 250V	442201983				
R929	Resistor, Carbon Film, 100K ±10%, 1/4W	552010423				C101	Non used		
R930	Resistor, Carbon Film, 68 ±10%, 1/4W	552068023	Tr201	Transistor, 2SA102	301001124	C102	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
			Tr202	Transistor, 2SA49	301001111	C103	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
C901	Capacitor, Ceramic, 150pF ±10%, 250V	440151183	Tr203	Transistor, 2SA342	301001122	C104	Capacitor, Ceramic, 5pF ±0.5pF, 250V	440501388	
C902	Capacitor, Ceramic, 500pF ±10%, 250V	440501183				C105	Capacitor, Ceramic, 100pF ±10%, 250V	440101183	
C903	Capacitor, Ceramic, 0.1mfd, 50V	440100835	D201	Diode, 1S188	300111008	C106	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440201388	
C904	Capacitor, Ceramic, 150pF ±10%, 250V	440151183	D202	Diode, 1S188	300111008	C107	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440201388	
C905	Capacitor, Electrolytic, 100mfd, 6.3V	402100509				C108	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
C906	Capacitor, Electrolytic, 470mfd, 16V	401470519	L201	Coil, AM Local Oscillator	223301121	C109	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
C907	Capacitor, Electrolytic, 2200mfd, 50V	400220449	L202	Coil, RF Choke, 47 micro Henry	220001122	C110	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
C908	Capacitor, Electrolytic, 1000mfd, 35V	402100439				C111	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440201388	
C909	Capacitor, Electrolytic, 1000mfd, 35V	402100439	T201	Transformer, 455KHz 1st IF	225301121	C112	Non used		
C910	Capacitor, Electrolytic, 47mfd, 35V	401470639	T202	Transformer, 455KHz 2nd IF	225301122	C113	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
C911	Capacitor, Electrolytic, 220mfd, 25V	401220592	L203	Transformer, 455KHz 3rd IF	225301124	C114	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
C912	Capacitor, Electrolytic, 1000mfd, 35V	402100439				C115	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
				Printed Circuit Board	140100121	C116	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440201388	
L901	AM ANT Assembly	222391118		AM Circuit Board Assembly	141110127	C117	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
L902	Coil, RF Choke, 47 micro-Henry	220001122				C118	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
						C119	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
T901	Transformer, Power Supply	205001317				C120	Capacitor, Electrolytic, 33mfd, 6.3V	402130609	
D901	Diode, 1S188	300111008				C121	Capacitor, Ceramic, 100pF ±10%, 250V	440101183	
D902	Diode, 1S1850	300919005				C122	Capacitor, Ceramic, 200pF ±10%, 250V	440201183	
D903	Diode, BZ-120	300313004				C123	Capacitor, Ceramic, 200pF ±10%, 250V	440201183	
						C124	Capacitor, Electrolytic, 1mfd, 50V	402100749	
						C125	Capacitor, Ceramic, 100pF ±10%, 250V	440101183	
						C126	Capacitor, Ceramic, 5pF ±0.5pF, 250V	440501388	
						C127	Capacitor, Ceramic, 100pF ±10%, 250V	440101183	
						C128	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
						C129	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440501388	
						C130	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
						C131	Capacitor, Ceramic, 0.01mfd, 250V	440100985	
						Tr101	Transistor, 2SC829C	301201117	
						Tr102	Transistor, 2SA342	301001122	
						Tr103	Transistor, 2SA342	301001122	
						Tr104	Transistor, 2SA342	301001122	
						Tr105	Transistor, 2SA342	301001122	
						Tr106	Transistor, 2SC536G	301201112	
						Tr107	Transistor, 2SA564	301001117	
						D101	Diode, 1S118	300111008	
						D102	Diode, 1S188	300111008	
						D103	Diode, 1S188	300111008	
						L101	Coil, RF choke, 47 micro-Henry	220001122	
						T101	Transformer, 10.7MHz 1st IF	225501114	
						T102	Transformer, 10.7MHz 2nd IF	225501114	
						T103	Transformer, 10.7MHz 3rd IF	225501114	
						T104	Transformer, 10.7MHz Ratio Det.	225501119	
						X101	Ceramic Filter, 10.7MHz	229101125	
							Printed Circuit Board	140200121	
							FM IF Circuit Board Assembly	141210130	
C201	Capacitor, Ceramic, 0.05mfd, 50V	440500935							
C202	Capacitor, Ceramic, 0.05mfd, 50V	440500935							
C203	Capacitor, Ceramic, 0.05mfd, 50V	440500935							
C204	Capacitor, Ceramic, 3pF (N5.6), 50V	441301336							
C205	Capacitor, Electrolytic, 1mfd, 50V	402100749							
C206	Capacitor, Electrolytic, 33mfd, 6.3V	402330609							
C207	Capacitor, Ceramic, 7pF ±0.5%, 250V	440701388							
C208	Capacitor, Ceramic, 0.05mfd, 50V	440500935							
C209	Capacitor, Ceramic, 0.05mfd, 50V	440500935							

AM CIRCUIT BOARD

FM IF CIRCUIT BOARD

FM-STEREO CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.
R301	Resistor, Carbon Film, 560K $\pm 10\%$, 1/4W	552056423
R302	Resistor, Carbon Film, 100 $\pm 10\%$, 1/4W	552010123
R303	Resistor, Carbon Film, 2.2K $\pm 10\%$, 1/4W	552022223
R304	Resistor, Carbon Film, 2.2K $\pm 10\%$, 1/4W	552022223
R305	Resistor, Carbon Film, 8.2K $\pm 10\%$, 1/4W	552082223
R306	Resistor, Carbon Film, 47K $\pm 10\%$, 1/4W	552047323
R307	Resistor, Carbon Film, 8.2K $\pm 10\%$, 1/4W	552082223
R308	Resistor, Carbon Film, 2.2K $\pm 10\%$, 1/4W	552022223
R309	Resistor, Carbon Film, 220 $\pm 10\%$, 1/4W	552022123
R310	Resistor, Carbon Film, 2.2K $\pm 10\%$, 1/4W	552022223
R311	Resistor, Carbon Film, 2.2K $\pm 10\%$, 1/4W	552022223
R312	Resistor, Carbon Film, 330 $\pm 10\%$, 1/4W	552033123
R313	Resistor, Carbon Film, 820 $\pm 10\%$, 1/4W	552082123
R314	Resistor, Carbon Film, 3.3K $\pm 10\%$, 1/4W	552033223
R315	Resistor, Carbon Film, 3.3K $\pm 10\%$, 1/4W	552033223
R316	Resistor, Carbon Film, 220K $\pm 10\%$, 1/4W	552022423
R317	Resistor, Carbon Film, 220K $\pm 10\%$, 1/4W	552022423
R318	Resistor, Carbon Film, 3.3K $\pm 10\%$, 1/4W	552033223
R319	Resistor, Carbon Film, 3.3K $\pm 10\%$, 1/4W	552033223
R320	Resistor, Carbon Film, 5.6K $\pm 10\%$, 1/4W	552056223
R321	Resistor, Carbon Film, 5.6K $\pm 10\%$, 1/4W	552056223
VR301	Variable Resistor, Separation Adj. 10K	510502102
C301	Capacitor, Electrolytic, 1mfd, 50V	402100749
C302	Capacitor, Polystyrene Film, 5000pF $\pm 10\%$	453501033
C303	Capacitor, Ceramic, 0.005mfd $\pm 10\%$, 250V	442501083
C304	Capacitor, Mylar Film, 0.01mfd, $\pm 10\%$, 50V	450100933
C305	Capacitor, Polystyrene Film, 5000pF $\pm 10\%$	453501033
C306	Capacitor, Mylar Film, 0.05mfd, $\pm 10\%$, 50V	450500933
C307	Capacitor, Polystyrene Film, 10000pF $\pm 10\%$	454100933
C308	Capacitor, Polystyrene Film, 1500pF $\pm 10\%$	454151033
C309	Capacitor, Polystyrene Film, 1000pF $\pm 10\%$	454101073
C310	Capacitor, Ceramic, 0.001mfd, 250V	440101085
C311	Capacitor, Electrolytic, 10mfd, 25V	402100629
C312	Capacitor, Polystyrene Film, 5000pF $\pm 10\%$	453501033
C313	Capacitor, Ceramic, 0.003mfd $\pm 10\%$, 250V	442301083
C314	Capacitor, Ceramic, 0.003mfd $\pm 10\%$, 250V	442301083
C315	Capacitor, Ceramic, 0.05mfd, 50V	440500935
C316	Capacitor, Ceramic, 0.05mfd, 50V	440500935
C317	Capacitor, Mylar Film, 0.01mfd $\pm 10\%$, 50V	450100933
C318	Capacitor, Mylar Film, 0.01mfd $\pm 10\%$, 50V	450100933
C319	Capacitor, Electrolytic, 1mfd, 50V	402100749
Tr301	Transistor, XA495	301901120
Tr302	Transistor, 2SA49	301001111
Tr303	Transistor, 2SA49	301001111
Tr304	Transistor, CDC8001	301901117
D301	Diode, 1S188	300111008
D302	Diode, 1S188	300111008
D303	Diode, 1S188	300111008
D304	Diode, 1S188	300111008
D305	Diode, 1S188	300111008
D306	Diode, 1S188	300111008
L301	Coil, 19KHz Tune	225601125
L302	Coil, 67KHz Trap	228641110
L303	Coil, 72KHz Trap	228641109

STONE CONTROL CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.
T301	Transformer, 19KHz Tune	225601126
T302	Transformer, 38KHz Tune	225601126
	Printed Circuit Board	140400438
	FM-Stereo Circuit Board Assembly	141411419
R701	Resistor, Carbon Film, 8.2K $\pm 10\%$, 1/4W	552082223
R702	Resistor, Carbon Film, 10K $\pm 10\%$, 1/4W	552010323
R703	Resistor, Carbon Film, 1K $\pm 10\%$, 1/4W	552010223
R704	Resistor, Carbon Film, 10K $\pm 10\%$, 1/4W	552010323
R705	Resistor, Carbon Film, 5.6K $\pm 10\%$, 1/4W	552056223
R706	Resistor, Carbon Film, 8.2K $\pm 10\%$, 1/4W	552082223
R707	Resistor, Carbon Film, 10K $\pm 10\%$, 1/4W	552010323
R708	Resistor, Carbon Film, 1K $\pm 10\%$, 1/4W	552010223
R709	Resistor, Carbon Film, 10K $\pm 10\%$, 1/4W	552010323
R710	Resistor, Carbon Film, 5.6K $\pm 10\%$, 1/4W	552056223
C701	Capacitor, Mylar Film, 0.002mfd $\pm 10\%$, 50V	450201033
C702	Capacitor, Mylar Film, 0.03mfd $\pm 10\%$, 50V	450300933
C703	Capacitor, Mylar Film, 0.02mfd $\pm 10\%$, 50V	450200933
C704	Capacitor, Mylar Film, 0.2mfd $\pm 10\%$, 50V	450200833
C705	Capacitor, Mylar Film, 0.002mfd $\pm 10\%$, 50V	450201033
C706	Capacitor, Mylar Film, 0.03mfd $\pm 10\%$, 50V	450300933
C707	Capacitor, Mylar Film, 0.02mfd $\pm 10\%$, 1/4W	450200933
C708	Capacitor, Mylar Film, 0.2mfd $\pm 10\%$, 1/4W	450200833
VR701	Variable Resistor, Treble Control, 50KA	525101115
VR702	Variable Resistor, Bass Control, 50KA	525101115
	Printed Circuit Board	140700727
	Tone Control Circuit Board Assembly	141710216
C401	Capacitor, Electrolytic, 10mfd, 25V	402100629
C402	Capacitor, Ceramic, 50pF $\pm 10\%$, 250V	440501283
C403	Capacitor, Ceramic, 100pF $\pm 10\%$, 250V	440101183
C404	Capacitor, Electrolytic, 33mfd, 6.3V	402330609
C405	Capacitor, Electrolytic, 10mfd, 25V	402100629
C406	Capacitor, Ceramic, 0.004mfd $\pm 10\%$, 250V	442401083
C407	Capacitor, Mylar, 0.015mfd, $\pm 10\%$, 50V	450150933
C408	Capacitor, Ceramic, 0.1mfd, 50V	440100835
C409	Capacitor, Electrolytic, 10mfd, 25V	402100629
C410	Capacitor, Electrolytic, 100mfd, 16V	402100519
C411	Capacitor, Ceramic, 50pF $\pm 10\%$, 250V	440501283
C412	Capacitor, Ceramic, 100pF $\pm 10\%$, 250V	440101183
C413	Capacitor, Electrolytic, 33mfd, 6.3V	402330609
C414	Capacitor, Electrolytic, 10mfd, 25V	402100629
C415	Capacitor, Ceramic, 0.004mfd $\pm 10\%$, 250V	442401083
C416	Capacitor, Mylar, 0.015mfd $\pm 10\%$, 50V	450150933
C417	Capacitor, Ceramic, 0.1mfd, 50V	440100835
Tr401	Transistor, 2SC644	301201114
Tr402	Transistor, 2SC644	301201114
Tr403	Transistor, 2SC644	301201114
Tr404	Transistor, 2SC644	301201114
	Printed Circuit Board	140500522
	Equalizer Circuit Board Assembly	141510116

PRE, MAIN AMP CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.			
R501 R601	Resistor, Carbon Film, 1K $\pm 10\%$, 1/4W	552010223	C515 C615	Capacitor, Ceramic, 0.01mfd, 250V	440100985
R502 R602	Resistor, Carbon Film, 1M $\pm 10\%$, 1/4W	552010523	C516 C616	Capacitor, Mylar Film, 0.2mfd $\pm 10\%$, 50V	450200833
R503 R603	Resistor, Carbon Film, 1M $\pm 10\%$, 1/4W	552010523	C517 C617	Capacitor, Electrolytic, 1000mfd, 35V	402100439
R504 R604	Resistor, Carbon Film, 3.9K $\pm 10\%$, 1/4W	552039223			
R505 R605	Resistor, Carbon Film, 1K $\pm 10\%$, 1/4W	552010223	Tr501 Tr601	Transistor, 2SC644	301201114
R506 R606	Resistor, Carbon Film, 1.5K $\pm 10\%$, 1/4W	552015223	Tr502 Tr602	Transistor, 2SC828	301201115
R507 R607	Resistor, Carbon Film, 1M $\pm 10\%$, 1/4W	552010523	Tr503 Tr603	Transistor, 2SC644	301201114
R508 R608	Resistor, Carbon Film, 5.6K $\pm 10\%$, 1/4W	552056223	Tr504 Tr604	Transistor, 2SC828	301201115
R509 R609	Resistor, Carbon Film, 3.3K $\pm 10\%$, 1/4W	552033223	Tr505 Tr605	Transistor, 2SC538A	301201113
R510 R610	Resistor, Carbon Film, 150K $\pm 10\%$, 1/4W	552015423	Tr506 Tr606	Transistor, 2SC1384	301201132
R511 R611	Resistor, Carbon Film, 1M $\pm 10\%$, 1/4W	552010523	Tr507 Tr607	Transistor, 2SC1384	301201132
R512 R612	Resistor, Carbon Film, 5.6K $\pm 10\%$, 1/4W	552056223	Tr508 Tr608	Transistor, 2SA684	301001123
R513 R613	Resistor, Carbon Film, 330 $\pm 10\%$, 1/4W	552033123	Tr509 Tr609	Transistor, 2SD317 or 2SC1107 (301201133)	301301122
R514 R614	Resistor, Carbon Film, 1K $\pm 10\%$, 1/4W	552010223	Tr510 Tr610	Transistor, 2SD317 or 2SC1107 (301201133)	301301122
R515 R615	Resistor, Carbon Film, 22K $\pm 10\%$, 1/4W	552022323	D501 D601	Diode, Varistor, KB-265	300212002
R516 R616	Resistor, Carbon Film, 100K $\pm 10\%$, 1/4W	552010423			
R517 R617	Resistor, Carbon Film, 5.6K $\pm 10\%$, 1/4W	552056223	L501 L601	Coil, Anti-parasitic	220401120
R518 R618	Resistor, Carbon Film, 100 $\pm 10\%$, 1/4W	552010123			
R519 R619	Resistor, Carbon Film, 2.2K $\pm 10\%$, 1/4W	552022223	VR501 VR601	Resistor, Variable, DC Bal. Adj., 300K	510502122
R520 R620	Resistor, Carbon Film, 33K $\pm 10\%$, 1/4W	552033323	VR502 VR602	Resistor, Variable, Idling Current Adj., 5K	510502121
R521 R621	Resistor, Carbon Film, 47K $\pm 10\%$, 1/4W	552047323			
R522 R622	Resistor, Carbon Film, 8.2K $\pm 10\%$, 1/4W	552082223		Heat Sink, for Power Transistor,	127012096
R523 R623	Resistor, Carbon Film, 5.6K $\pm 10\%$, 1/4W	552056223		Printed Circuit Board	140600646
R524 R624	Resistor, Carbon Film, 22 $\pm 10\%$, 1/4W	552022023		Pre, Main Amp Circuit Board Assembly	141610219
R525 R625	Resistor, Carbon Film, 2.2K $\pm 10\%$, 1/4W	552022223			
R526 R626	Resistor, Composition, 330 $\pm 10\%$, 1/2W	551033133			
R527 R627	Resistor, Composition, 22 $\pm 10\%$, 1/2W	551022033			
R528 R628	Resistor, Composition, 330 $\pm 10\%$, 1/2W	551033133			
R529 R629	Resistor, Bath-tub, 10 $\pm 10\%$, 2W	554010053			
R530 R630	Resistor, Bath-tub, 0.5 $\pm 10\%$, 2W	554050953			
R531 R631	Resistor, Bath-tub, 0.5 $\pm 10\%$, 2W	554050953			
R532 R632	Resistor, Composition, 1.5K $\pm 10\%$, 1/2W	551015233			
R533 R633	Resistor, Carbon Film, 3.9K $\pm 10\%$, 1/4W	552039223			
C501 C601	Capacitor, Electrolytic, 1mfd, 50V	402100749	R801	Resistor, Carbon Film, 3.9K $\pm 10\%$, 1/4W	552039223
C502 C602	Capacitor, Electrolytic, 1mfd, 50V	402100749	R802	Resistor, Carbon Film, 3.9K $\pm 10\%$, 1/4W	552039223
C503 C603	Capacitor, Electrolytic, 1mfd, 50V	402100749			
C504 C604	Capacitor, Electrolytic, 10mfd, 25V	402100629	VR801	Variable Resistor, Balance Control, 250K	515121114
C505 C605	Capacitor, Electrolytic, 100mfd, 16V	402100519	VR802	Variable Resistor, Volume Control, 100K	525121114
C506 C606	Capacitor, Electrolytic, 1mfd, 50V	402100749			
C507 C607	Capacitor, Electrolytic, 1mfd, 50V	402100749			
C508 C608	Capacitor, Electrolytic, 1mfd, 50V	402100749	C801	Capacitor, Mylar Film, 0.1mfd $\pm 10\%$, 50V	450100833
C509 C609	Capacitor, Electrolytic, 220mfd, 6.3V	402220509	C802	Capacitor, Mylar Film, 0.1mfd $\pm 10\%$, 50V	450100833
C510 C610	Capacitor, Electrolytic, 1mfd, 50V	402100749			
C511 C611	Capacitor, Electrolytic, 1mfd, 50V	402100749		Printed Circuit Board	140800133
C512 C612	Capacitor, Ceramic, 500pF $\pm 10\%$, 250V	440501183		Volume Control Circuit Board	141810118
C513 C613	Capacitor, Ceramic, 100pF $\pm 10\%$, 250V	440101183			
C514 C614	Capacitor, Electrolytic, 47mfd, 35V	402470639			

VOLUME CONTROL CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.
R801	Resistor, Carbon Film, 3.9K $\pm 10\%$, 1/4W	552039223
R802	Resistor, Carbon Film, 3.9K $\pm 10\%$, 1/4W	552039223
VR801	Variable Resistor, Balance Control, 250K	515121114
VR802	Variable Resistor, Volume Control, 100K	525121114
C801	Capacitor, Mylar Film, 0.1mfd $\pm 10\%$, 50V	450100833
C802	Capacitor, Mylar Film, 0.1mfd $\pm 10\%$, 50V	450100833
	Printed Circuit Board	140800133
	Volume Control Circuit Board	141810118

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