

ROTEL

Model RX-400A

AM/FM Stereo

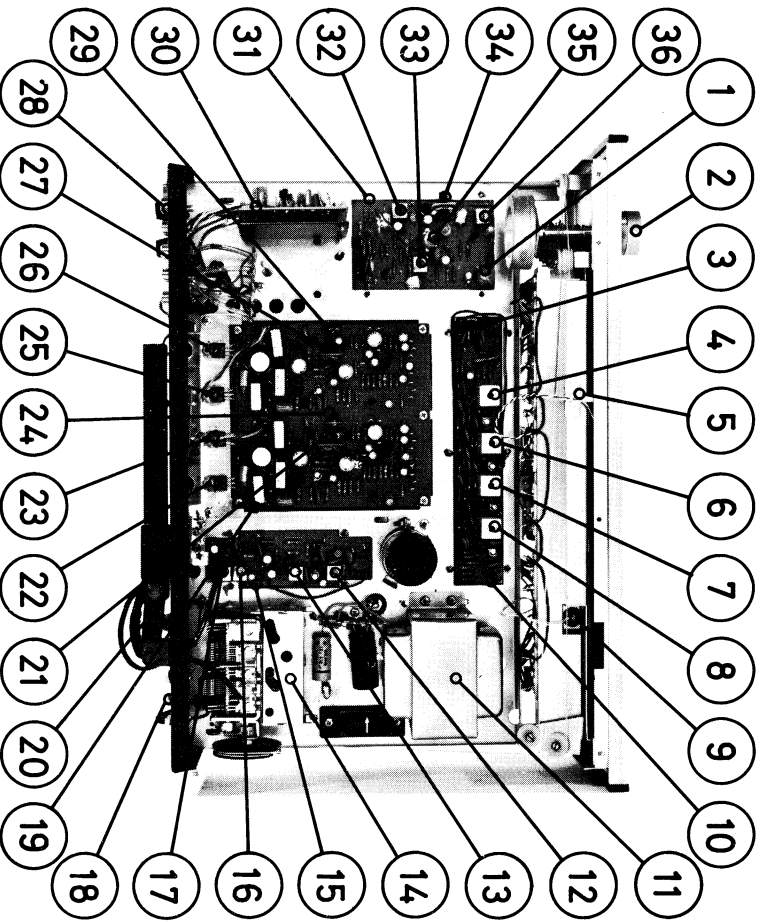
Solid State Receiver

Technical Manual

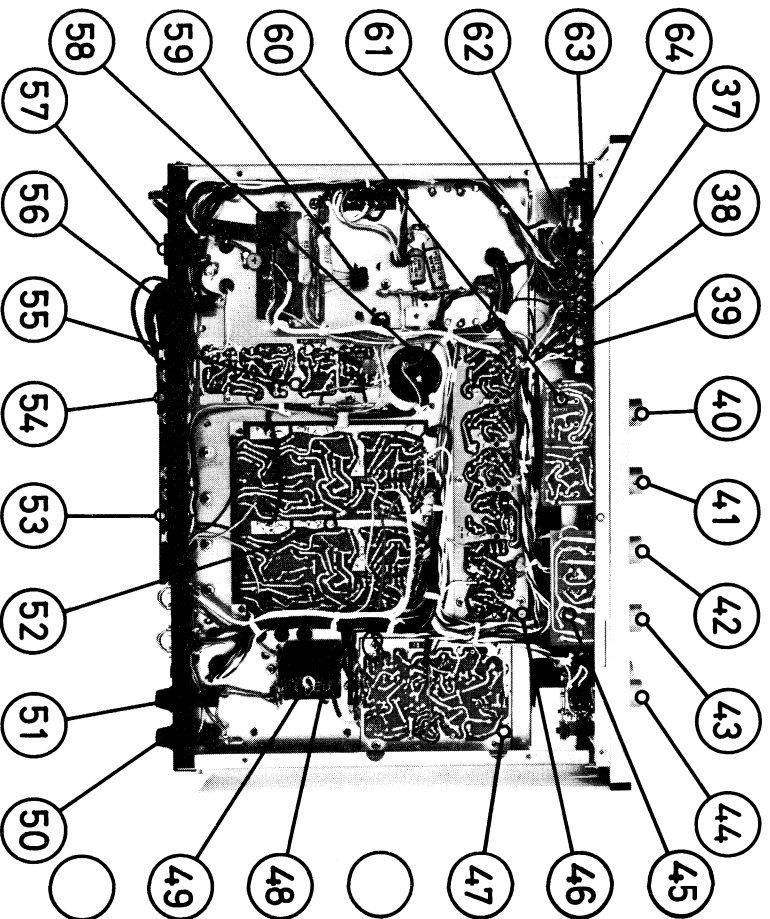
ROTEL

CHASSIS LAYOUT

Top View



Bottom 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

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 milli-volt meter, DC milli-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 milli-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)

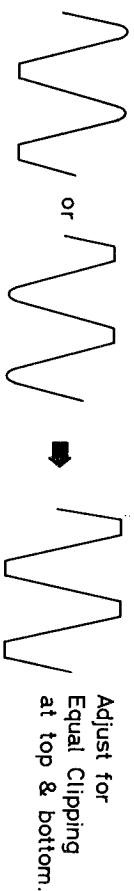
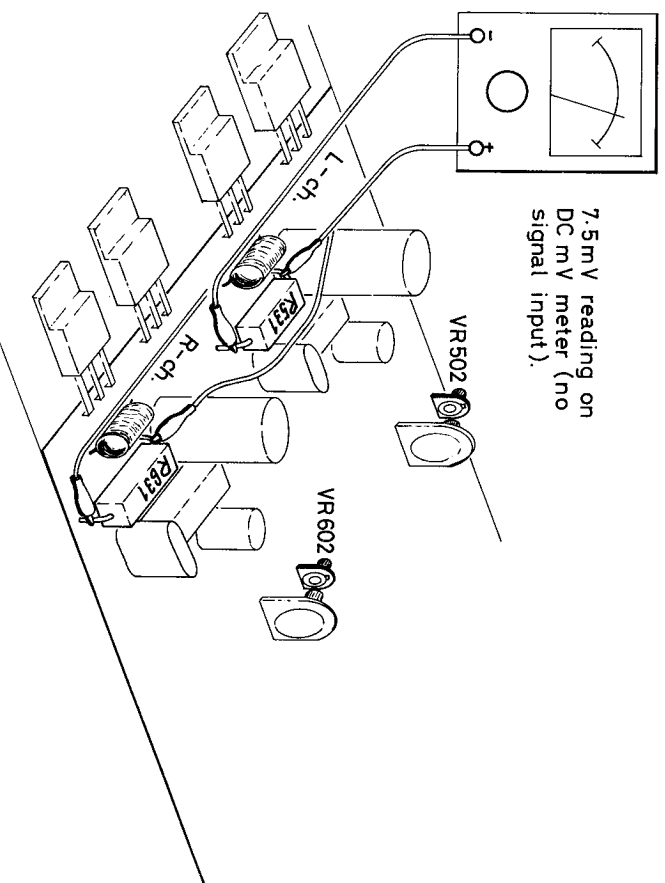


Fig. 2 Idling Current Adjustment Hook-up



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	Tr-201 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. CT5 (OSC) and CT4 (ANT) Trim. (on Front-end)	
3		1400 KHz (400 Hz 30% mod.)	1400 KHz			
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	90MHz (400Hz 100% mod.)	90MHz		L2 (OSC), L1 (RF) & T1 (ANT) (on Front end)	Maximum reading on VTVM.
5	-3db of limiter saturation.	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.
		72 KHz			
2				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	1 - 2%	VTVM & Oscilloscope to TP2	L301, T301, T302.	Maximum reading on VTVM.
2	Composite 1 KHz signal to Left channel only.	Pilot 10% Signal 70%	VTVM & Oscilloscope to Left channel OUTPUT jack.	T301	Maximum and undistorted sine wave on scope.
3	Composite 1 KHz signal to Right channel only.		VTVM & Oscilloscope 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 Modulation Frequency RF deviation
10% 1 KHz (Left or Right channel). ±45KHz
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

1. 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 T506, 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,
 - (2). (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.

PHONE 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.

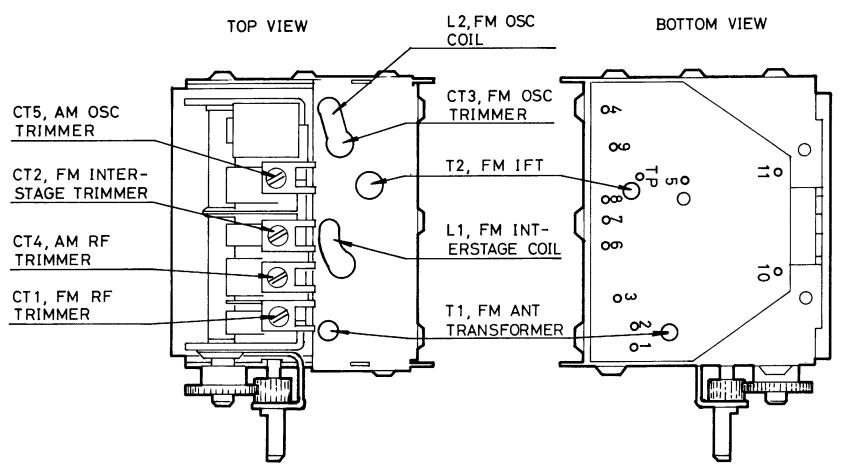
II. If only AM is inoperative,

- 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.

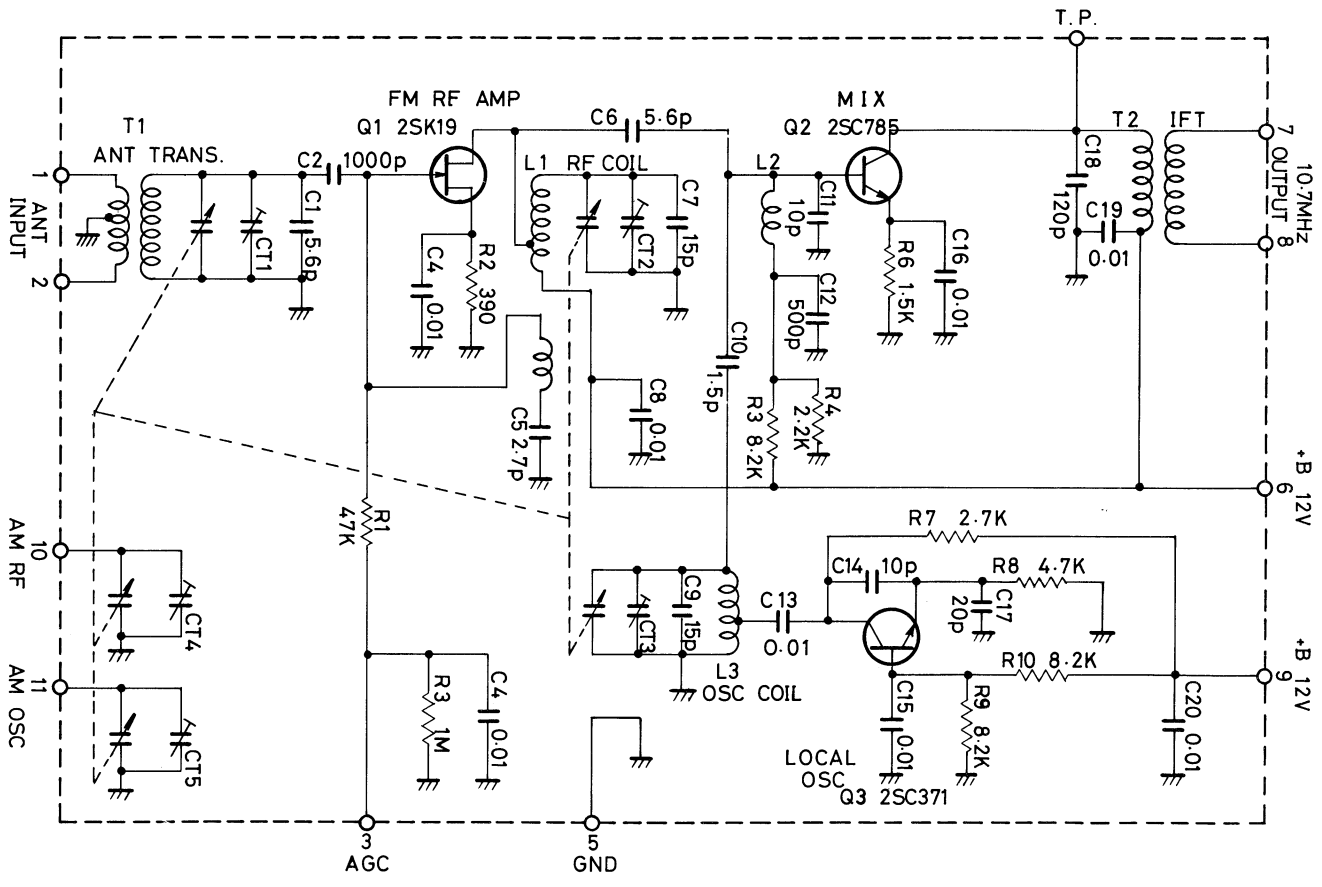
- 3. If there is proper voltage at B3,
 - a. And if there is no signal with Function switch set at FM,
 - (1). C301 is faulty.
 - b. If there is no signal with Function switch set at FM STEREO,
 - (1). Transistors Tr301, 302 or 303 are faulty.
 - c. If there is proper voltage at B4 but Stereo Lamp does 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,

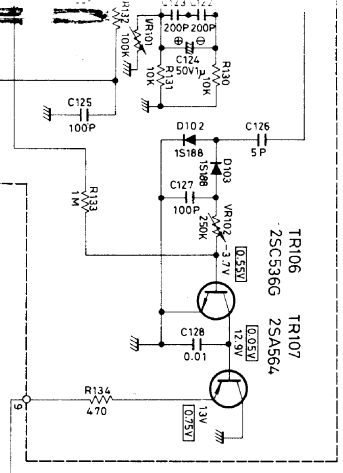
- a. And if FM Front end is faulty,
 - (1). Transistors Tr1, 2 or 3 are faulty, or
 - (2). C8, 19 or 20 are faulty.
- b. If FM Front end is OK,
 - (1). Input circuit is grounded, or
 - (2). FM antenna improperly connected.

FRONT END LAYOUT

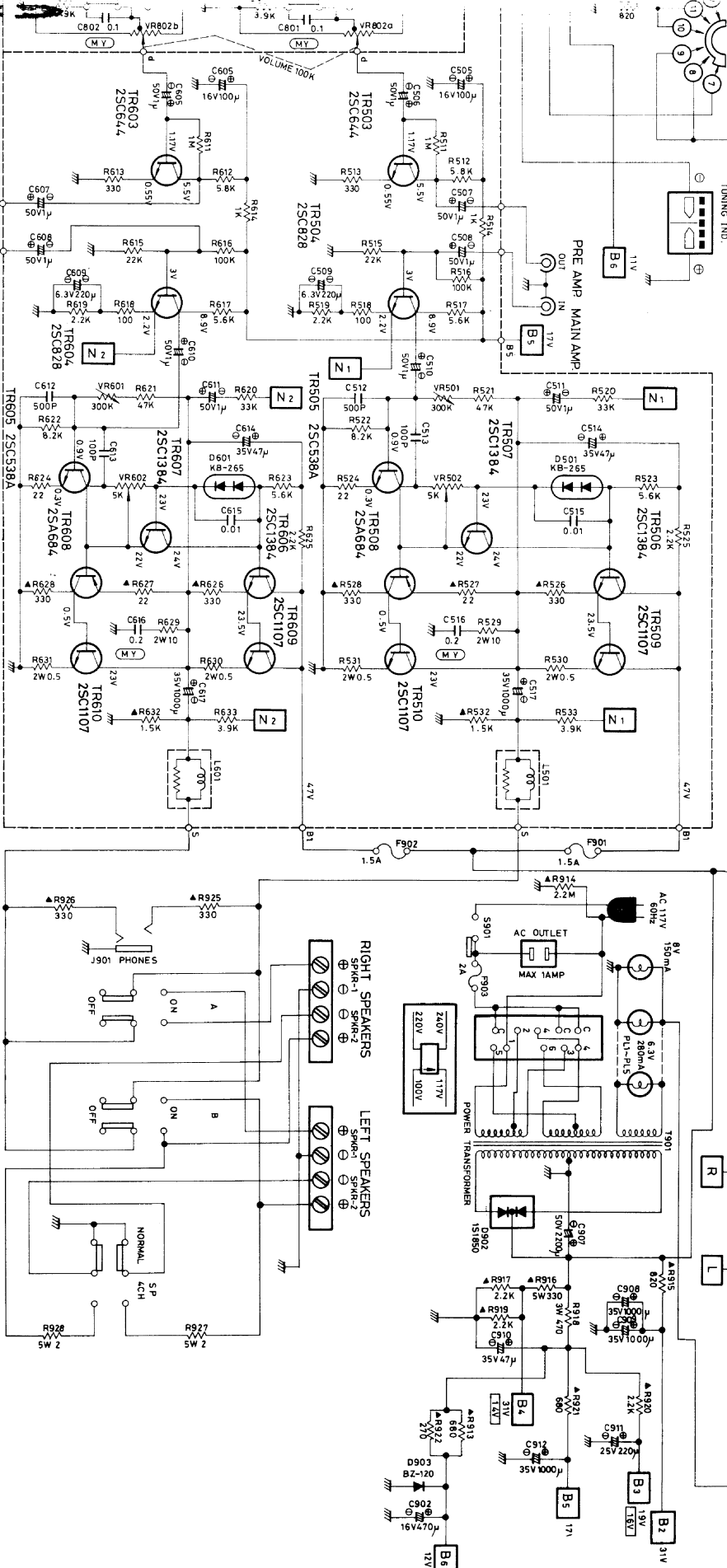
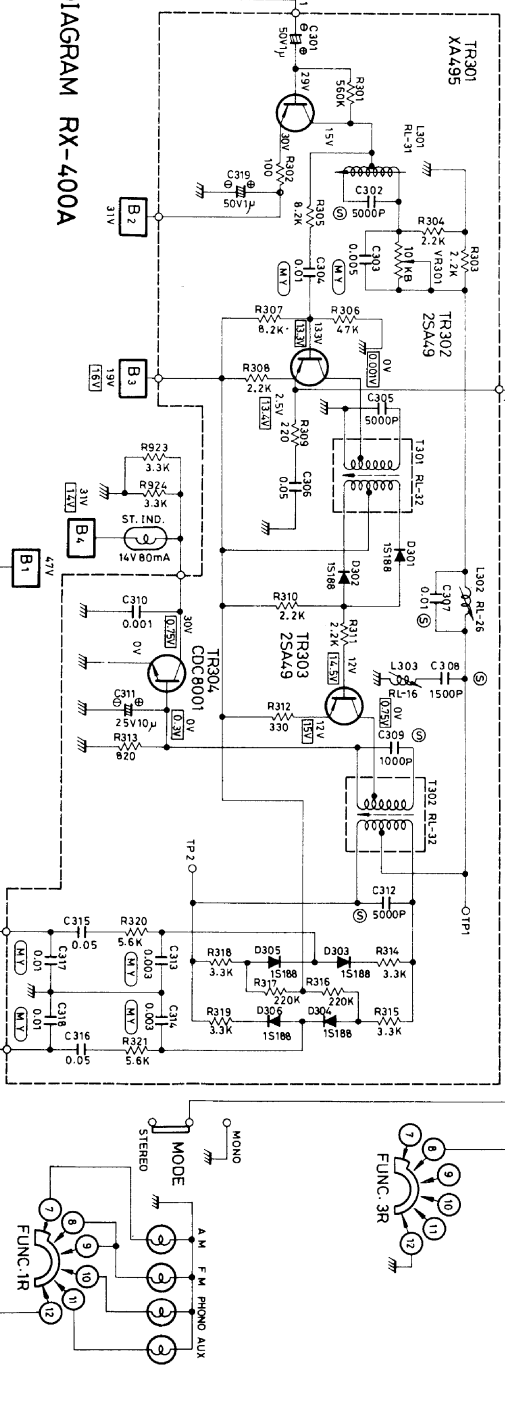


FRONT END SCHEMATIC DIAGRAM





SCHEMATIC DIAGRAM RX-400A



CERAMIC FILTER	
RED	WHITE
CENTER FREQ.	10.75MHZ
	±30KHZ

RESISTORS

- 10% TOLERANCE UNLESS OTHERWISE NOTED.
- K---KILO OHM M---MEGA OHM
- NON MARK---LOW NINE TYPE CARBON RESISTOR 1/4WATT.
- ▲---COMPOSITION RESISTORS 1/2WATT.

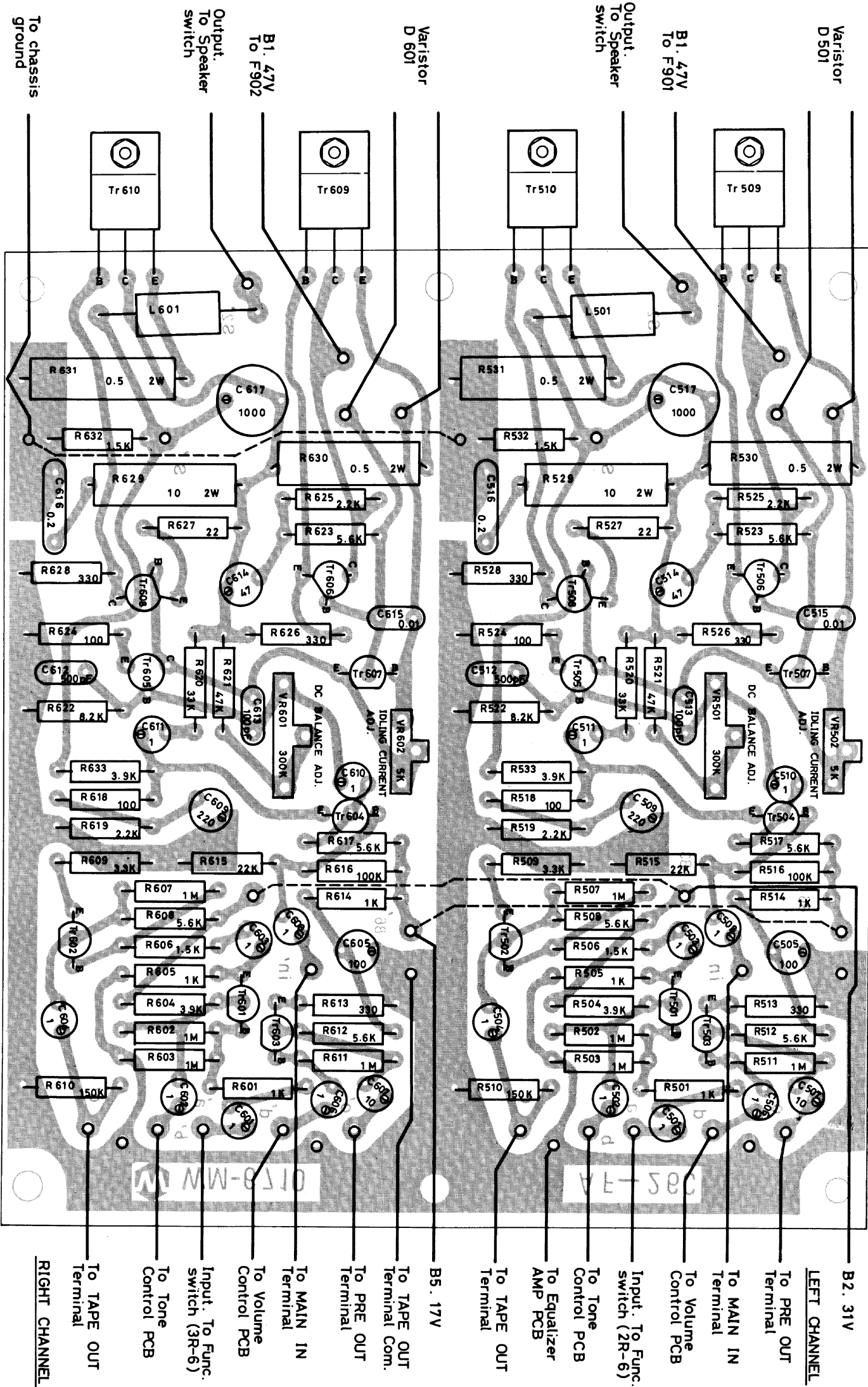
CAPACITORS

- 10% TOLERANCE UNLESS OTHERWISE NOTED
- MINERAL CAPACITORS
- (MY)---MYLAR FILM CAPACITORS
- (S)---PORY STYROL CAPACITORS
- ELECTROLYTIC CAPACITORS
- NON MARK---CERAMIC CAPACITORS

CONTROLS

- VR301 SEPARATION ADJ.
- VR701 TREBLE CONTROL 50KΩA
- VR702 BASS CONTROL 50KΩA
- VR801 BALANCE CONTROL 250KΩW
- VR802 VOLUME CONTROL 100KΩA
- VR501 VR601 BALANCE ADJ.
- VR502 VR602 BIAS ADJ.

PRE, MAIN AMP CIRCUIT BOARD DIAGRAM



Varistor
D 501

B1. 47V
To F901

Output.
To Speaker
switch

Varistor
D 601

B1. 47V
To F902

Output.
To Speaker
switch

To chassis
ground

B2. 31V

LEFT CHANNEL

To PRE OUT
Terminal

To MAIN IN
Terminal

To Volume
Control PCB

Input. To Func.
switch (2R-6)

To Tone
Control PCB

To Equalizer
AMP PCB

To TAPE OUT
Terminal

To TAPE OUT
Terminal Com.

To PRE OUT
Terminal

To MAIN IN
Terminal

To Volume
Control PCB

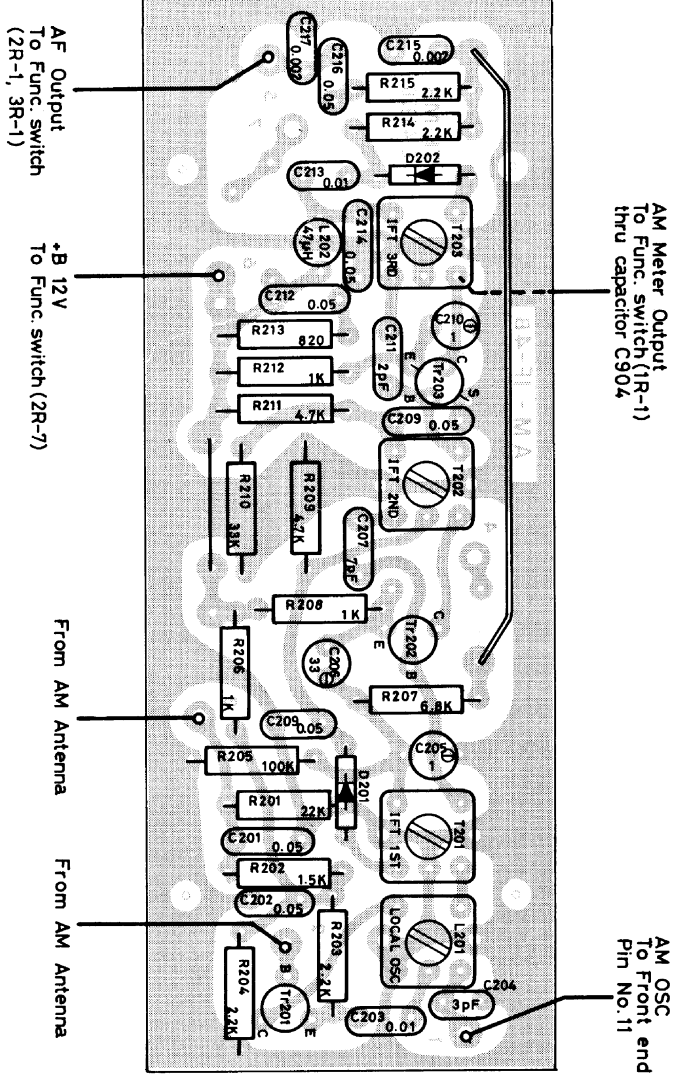
Input. To Func.
switch (3R-6)

To Tone
Control PCB

To TAPE OUT
Terminal

RIGHT CHANNEL

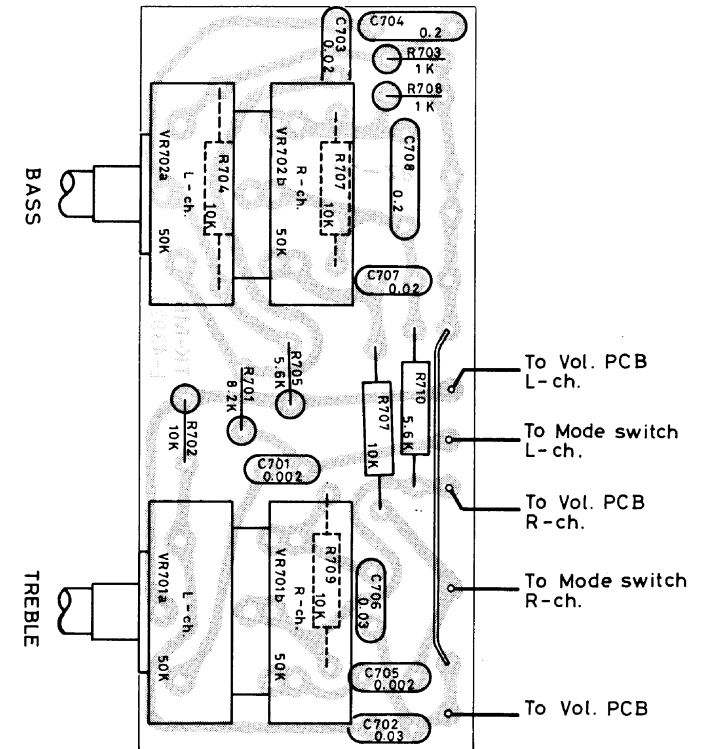
AM CIRCUIT BOARD DIAGRAM



FM IF AMP CIRCUIT BOARD DIAGRAM

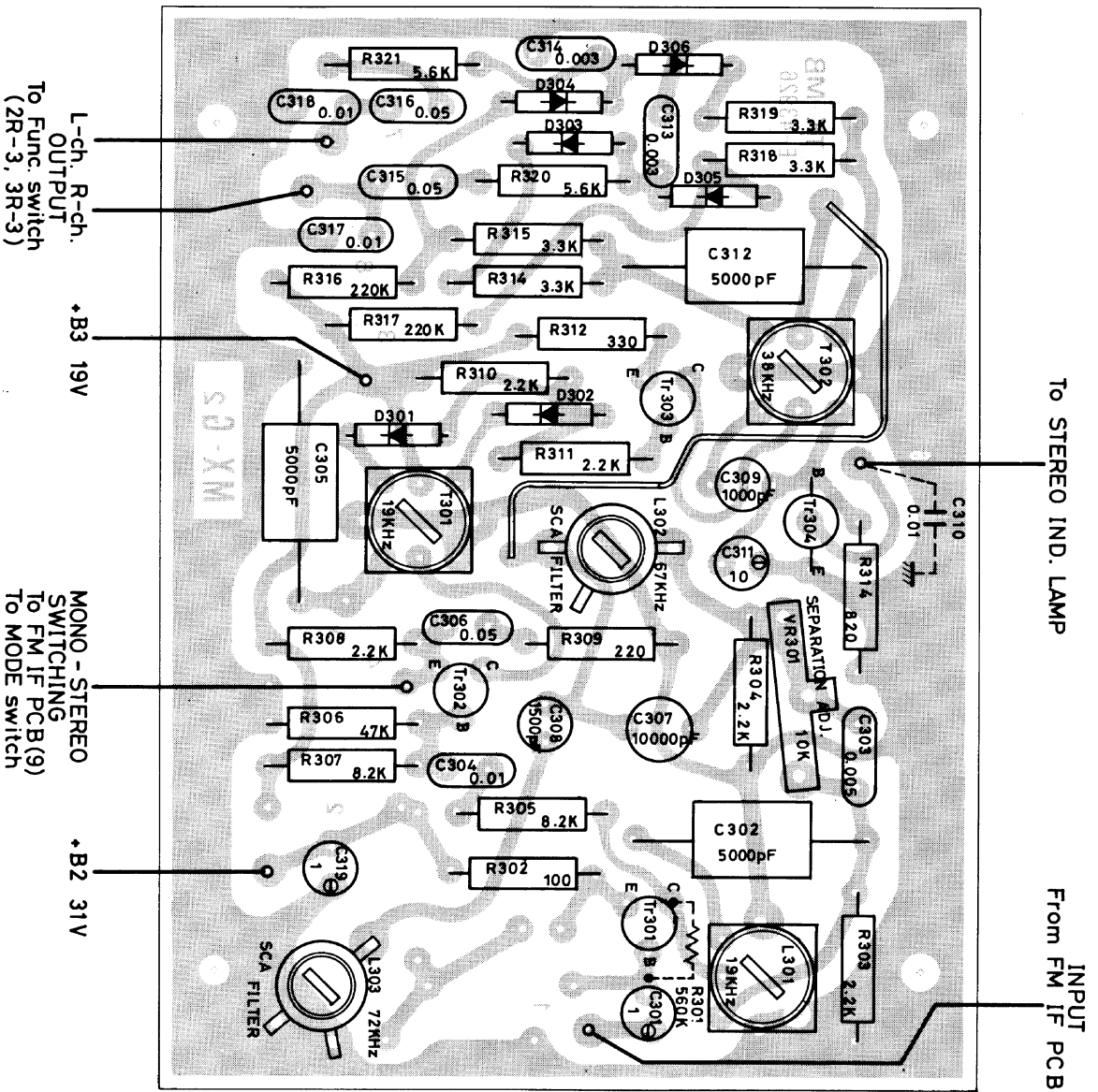


FM IF AMP CIRCUIT BOARD DIAGRAM

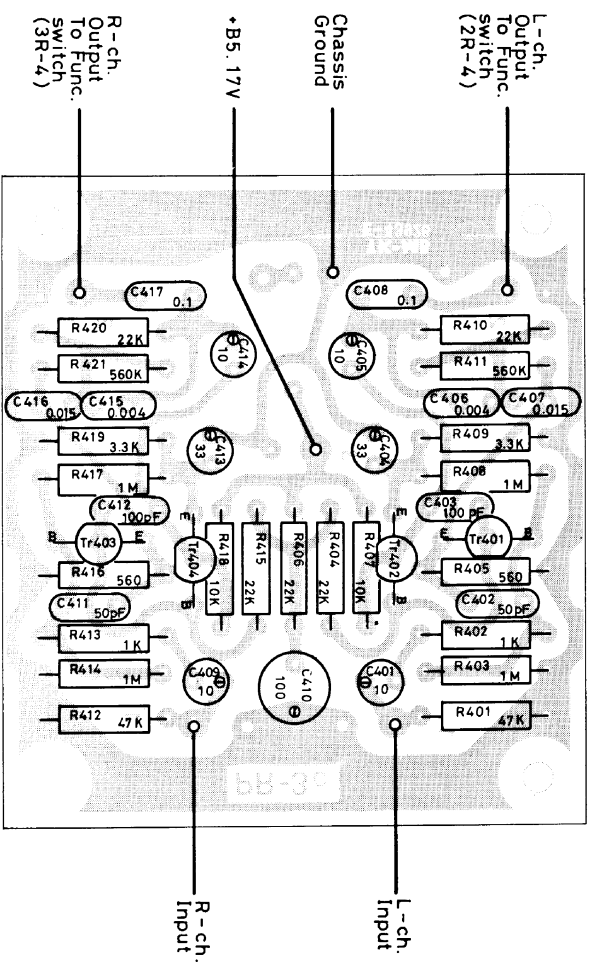


TONE CONTROL CIRCUIT BOARD DIAGRAM

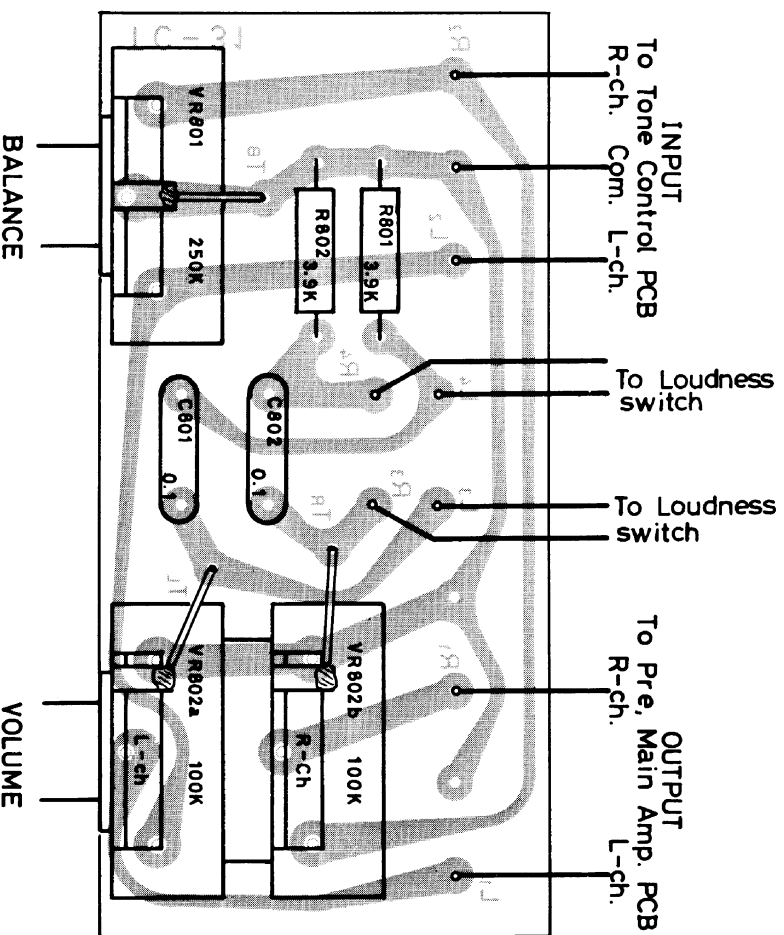
FM STEREO CIRCUIT BOARD DIAGRAM



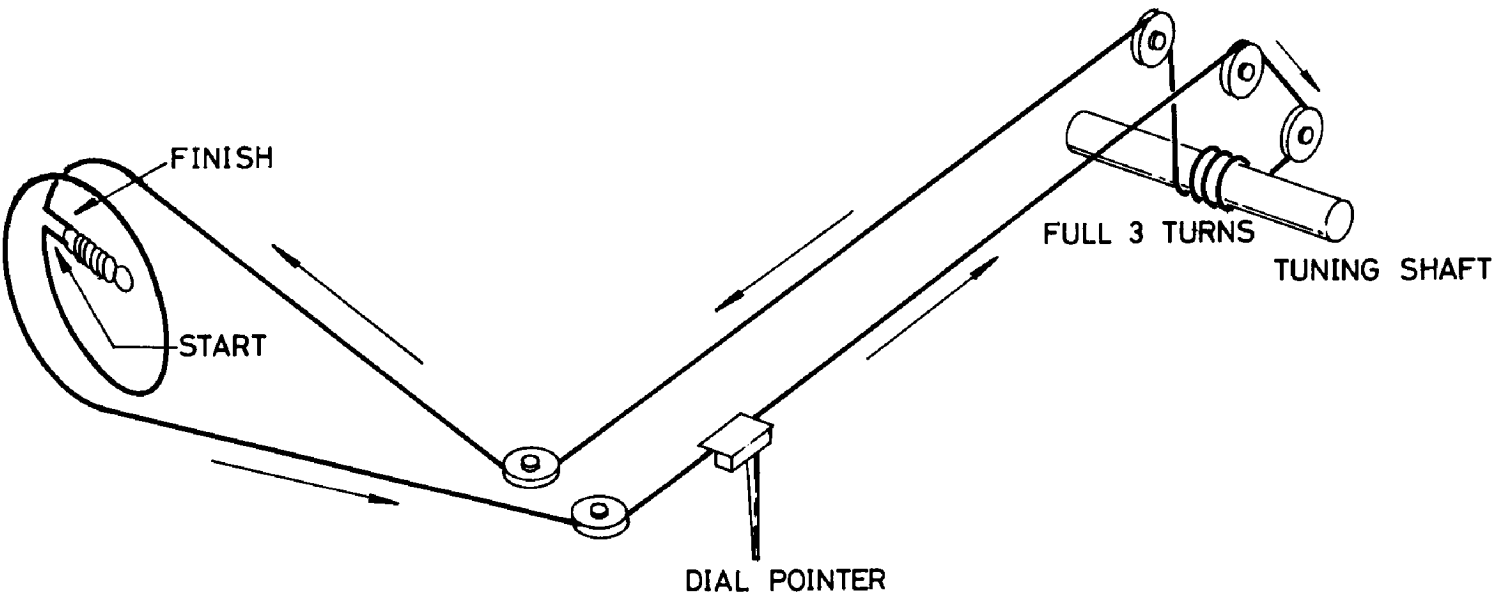
EQUALIZER AMP CIRCUIT BOARD DIAGRAM



VOLUME CONTROL 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, 1.5K $\pm 10\%$, 1/4W	552015323
R906	Resistor, Carbon Film, 100K $\pm 10\%$, 1/4W	552010423
R907	Resistor, Carbon Film, 15K $\pm 10\%$, 1/4W	552010423
R908	Resistor, Carbon Film, 100K $\pm 10\%$, 1/4W	552010423
R909	Resistor, Carbon Film, 100K $\pm 10\%$, 1/4W	552010423
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, Carbon Film, 820 $\pm 10\%$, 1/4W	551068133
R914	Resistor, Composition, 680 $\pm 10\%$, 1/2W	551022533
R915	Resistor, Composition, 2.2K $\pm 10\%$, 1/2W	551082133
R916	Resistor, Composition, 2.2K $\pm 10\%$, 1/2W	551082133
R917	Resistor, Metal Oxide, 330 $\pm 10\%$, 5W	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
R922	Resistor, Composition, 270 ±10%, 1/2W	551027133
R923	Resistor, Composition, 3.3K ±10%, 1/2W	551033233
R924	Resistor, Composition, 3.3K ±10%, 1/2W	551033323
R925	Resistor, Composition, 330 ±10%, 1/2W	551033133
R926	Resistor, Composition, 330 ±10%, 1/2W	551033313
R927	Resistor, Bath-tub, 2 ±10%, 2W	554020853
R928	Resistor, Bath-tub, 2 ±10%, 2W	554020853
R929	Resistor, Carbon Film, 100K ±10%, 1/4W	552010423
R930	Resistor, Carbon Film, 68 ±10%, 1/4W	552068023
C901	Capacitor, Ceramic, 150pF ±10%, 250V	440151183
C902	Capacitor, Ceramic, 500pF ±10%, 250V	440501183
C903	Capacitor, Ceramic, 0.1mfd, 50V	440100835
C904	Capacitor, Ceramic, 150pF ±10%, 250V	440151183
C905	Capacitor, Electrolytic, 100fmd, 6.3V	402100509
C906	Capacitor, Electrolytic, 470mfd, 16V	401470519
C907	Capacitor, Electrolytic, 2200mfd, 50V	400220449
C908	Capacitor, Electrolytic, 1000mfd, 35V	402100439
C909	Capacitor, Electrolytic, 1000mfd, 35V	402100439
C910	Capacitor, Electrolytic, 47mfd, 35V	401470639
C911	Capacitor, Electrolytic, 220mfd, 25V	401220592
C912	Capacitor, Electrolytic, 1000mfd, 35V	402100439
L901	AM ANT Assembly	222391118
L902	Coil, RF Choke, 47 micro-Henry	220001122
T901	Transformer, Power Supply	205001317
D901	Diode, 1S188	300111008
D902	Diode, 1S1850	300919005
D903	Diode, BZ-120	300313004

AM CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.
R201	Resistor, Carbon Film, 22K ±10%, 1/4W	552022323
R202	Resistor, Carbon Film, 1.5K ±20%, 1/4W	552015223
R203	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R204	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R205	Resistor, Carbon Film, 100K ±10%, 1/4W	552010423
R206	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R207	Resistor, Carbon Film, 6.8K ±10%, 1/4W	552068223
R208	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R209	Resistor, Carbon Film, 4.7K ±10%, 1/4W	552047223
R210	Resistor, Carbon Film, 33K ±10%, 1/4W	552033323
R211	Resistor, Carbon Film, 4.7K ±10%, 1/4W	552047223
R212	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R213	Resistor, Carbon Film, 820 ±10%, 1/4W	552082123
R214	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R215	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223

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

FM IF CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.
R101	Resistor, Carbon Film, 10K ±10%, 1/4W	552010323
R102	Resistor, Carbon Film, 100K ±10%, 1/4W	552010423
R103	Resistor, Carbon Film, 68 ±10%, 1/4W	5520368023
R104	Resistor, Carbon Film, 3.3K ±10%, 1/4W	552033223
R105	Resistor, Carbon Film, 8.2K ±10%, 1/4W	552082223
R106	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R107	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R108	Resistor, Carbon Film, 100K ±10%, 1/4W	552010423
R109	Resistor, Carbon Film, 470 ±10%, 1/4W	552047123
R110	Resistor, Carbon Film, 100 ±10%, 1/4W	552010123
R111	Resistor, Carbon Film, 8.2K ±10%, 1/4W	552082223
R112	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R113	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R114	Resistor, Carbon Film, 470 ±10%, 1/4W	552047123
R115	Resistor, Carbon Film, 100 ±10%, 1/4W	552010123
R116	Resistor, Carbon Film, 8.2K ±10%, 1/4W	552082223
R117	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R118	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R119	Resistor, Carbon Film, 560 ±10%, 1/4W	552056123
R120	Resistor, Carbon Film, 8.2K ±10%, 1/4W	552082223
R121	Resistor, Carbon Film, 100 ±10%, 1/4W	552010123
R122	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R123	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R124	Resistor, Carbon Film, 680 ±10%, 1/4W	552068123
R125	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R126	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R127	Resistor, Carbon Film, 100 ±10%, 1/4W	552010123
R128	Resistor, Carbon Film, 22K ±10%, 1/4W	5520222323
R129	Non used	
R130	Resistor, Carbon Film, 10K ±10%, 1/4W	552010323
R131	Resistor, Carbon Film, 10K ±10%, 1/4W	552010323

FM IF CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.
C101	Capacitor, Electrolytic, 1mfd, 50V	402100749
C211	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440201388
C212	Capacitor, Ceramic, 0.05mfd, 50V	440500935
C213	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C214	Capacitor, Ceramic, 0.05mfd, 50V	440500935
C215	Capacitor, Ceramic, 0.002mfd ±10%, 250V	442201083
C216	Capacitor, Ceramic, 0.05mfd 50V	440500935
C217	Capacitor, Ceramic, 0.002mfd ±10%, 250V	442201983
Tr201	Transistor, 2SA102	301001124
Tr202	Transistor, 2SA49	301001111
Tr203	Transistor, 2SA342	301001122
D201	Diode, 1S188	300111008
D202	Diode, 1S188	300111008
L201	Coil, AM Local Oscillator	223301121
L202	Coil, RF Choke, 47 micro-Henry	220001122
T201	Transformer, 455KHz 1st IF	225301121
T202	Transformer, 455KHz 2nd IF	225301122
T203	Transformer, 455KHz 3rd IF	225301124
	Printed Circuit Board	140100121
	AM Circuit Board Assembly	141110127

R132	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R133	Resistor, Carbon Film, 1M ±10%, 1/4W	552010523
R134	Resistor, Carbon Film, 470 ±10%, 1/4W	552047123
VR101	Variable Resistor, Meter Zero Adj., 100K	510502120
VR102	Variable Resistor, Auto-switching Level Adj., 250K	510502116
C101	Non used	
C102	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C103	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C104	Capacitor, Ceramic, 5pF ±0.5pF, 250V	440501388
C105	Capacitor, Ceramic, 100pF ±10%, 250V	440101183
C106	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440201388
C107	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440201388
C108	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C109	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C110	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C111	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440201388
C112	Non used	
C113	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C114	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C115	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C116	Capacitor, Ceramic, 2pF ±0.5pF, 250V	440201388
C117	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C118	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C119	Capacitor, Ceramic, 0.01mfd, 250V	440100985
C120	Capacitor, Electrolytic, 33mfd, 6.3V	4402330609
C121	Capacitor, Ceramic, 100pF ±10%, 250V	440101183
C122	Capacitor, Ceramic, 200pF ±10%, 250V	440201183
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

FM-STEREO CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.
R301	Resistor, Carbon Film, 560K ±10%, 1/4W	552056423
R302	Resistor, Carbon Film, 100 ±10%, 1/4W	552010123
R303	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R304	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R305	Resistor, Carbon Film, 8.2K ±10%, 1/4W	552082223
R306	Resistor, Carbon Film, 47K ±10%, 1/4W	552047323
R307	Resistor, Carbon Film, 8.2K ±10%, 1/4W	552082223
R308	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R309	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R310	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R311	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552023223
R312	Resistor, Carbon Film, 330 ±10%, 1/4W	552033123
R313	Resistor, Carbon Film, 820 ±10%, 1/4W	552082123
R314	Resistor, Carbon Film, 3.3K ±10%, 1/4W	552033223
R315	Resistor, Carbon Film, 3.3K ±10%, 1/4W	552033223
R316	Resistor, Carbon Film, 220K ±10%, 1/4W	552022423
R317	Resistor, Carbon Film, 220K ±10%, 1/4W	552022423
R318	Resistor, Carbon Film, 3.3K ±10%, 1/4W	552033223
R319	Resistor, Carbon Film, 3.3K ±10%, 1/4W	552033223
R320	Resistor, Carbon Film, 5.6K ±10%, 1/4W	552056223
R321	Resistor, Carbon Film, 5.6K ±10%, 1/4W	552056223
VR301	Variable Resistor, Separation Adj. 10K	510502102

SYMBOL	DESCRIPTION	PART NO.
T301	Transformer, 19KHz Tune	225601126
T302	Transformer, 38KHz Tune	225601126
	Printed Circuit Board	140400438
	FM-Stereo Circuit Board Assembly	141411419

EQUALIZER AMP CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.
R401	Resistor, Carbon Film, 47K ±10%, 1/4W	552047323
R402	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R403	Resistor, Carbon Film, 1M ±10%, 1/4W	552010523
R404	Resistor, Carbon Film, 22K ±10%, 1/4W	552022323
R405	Resistor, Carbon Film, 560 ±10%, 1/4W	552056123
R406	Resistor, Carbon Film, 22K ±10%, 1/4W	552022323
R407	Resistor, Carbon Film, 10K ±10%, 1/4W	552010323
R408	Resistor, Carbon Film, 1M ±10%, 1/4W	552010523
R409	Resistor, Carbon Film, 3.3K ±10%, 1/4W	552033223
R410	Resistor, Carbon Film, 22K ±10%, 1/4W	552022323
R411	Resistor, Carbon Film, 560K ±10%, 1/4W	552056423
R412	Resistor, Carbon Film, 47K ±10%, 1/4W	552047323
R413	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R414	Resistor, Carbon Film, 1M ±10%, 1/4W	552010523
R415	Resistor, Carbon Film, 22K ±10%, 1/4W	552022323
R416	Resistor, Carbon Film, 560 ±10%, 1/4W	552056123
R417	Resistor, Carbon Film, 1M ±10%, 1/4W	552010523
R418	Resistor, Carbon Film, 10K ±10%, 1/4W	552010323
R419	Resistor, Carbon Film, 3.3K ±10%, 1/4W	552033223
R420	Resistor, Carbon Film, 22K ±10%, 1/4W	552022323
R421	Resistor, Carbon Film, 560K ±10%, 1/4W	552056423
C401	Capacitor, Electrolytic, 10mfd, 25V	402100629
C402	Capacitor, Ceramic, 50pF ±10%, 250V	440501283
C403	Capacitor, Ceramic, 100pF ±10%, 250V	440101183
C404	Capacitor, Electrolytic, 33mfd, 6.3V	402330609
C405	Capacitor, Electrolytic, 10mfd, 25V	402100629
C406	Capacitor, Ceramic, 0.004mfd ±10%, 250V	442401083
C407	Capacitor, Mylar, 0.015mfd, ±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 ±10%, 250V	440501283
C412	Capacitor, Ceramic, 100pF ±10%, 250V	440101183
C413	Capacitor, Electrolytic, 33mfd, 6.3V	402330609
C414	Capacitor, Electrolytic, 10mfd, 25V	402100629
C415	Capacitor, Ceramic, 0.004mfd ±10%, 250V	442401083
C416	Capacitor, Mylar, 0.015mfd ±10%, 50V	450150933
C417	Capacitor, Ceramic, 0.1mfd, 50V	440100835
T401	Transistor, 2SC644	301201114
T402	Transistor, 2SC644	301201114
T403	Transistor, 2SC644	301201114
T404	Transistor, 2SC644	301201114

TONE CONTROL CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.
R701	Resistor, Carbon Film, 8.2K ±10%, 1/4W	552082223
R702	Resistor, Carbon Film, 10K ±10%, 1/4W	552010323
R703	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R704	Resistor, Carbon Film, 10K ±10%, 1/4W	552010323
R705	Resistor, Carbon Film, 5.6K ±10%, 1/4W	552056223
R706	Resistor, Carbon Film, 8.2K ±10%, 1/4W	552082223
R707	Resistor, Carbon Film, 10K ±10%, 1/4W	552010323
R708	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R709	Resistor, Carbon Film, 10K ±10%, 1/4W	552010323
R710	Resistor, Carbon Film, 5.6K ±10%, 1/4W	552056223
C701	Capacitor, Mylar Film, 0.002mfd ±10%, 50V	450201033
C702	Capacitor, Mylar Film, 0.03mfd ±10%, 50V	450300933
C703	Capacitor, Mylar Film, 0.02mfd ±10%, 50V	450200933
C704	Capacitor, Mylar Film, 0.2mfd ±10%, 50V	450200833
C705	Capacitor, Mylar Film, 0.002mfd ±10%, 50V	450201033
C706	Capacitor, Mylar Film, 0.03mfd ±10%, 50V	450300933
C707	Capacitor, Mylar Film, 0.02mfd ±10%, 1/4W	450200933
C708	Capacitor, Mylar Film, 0.2mfd ±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

L301	Coil, 19KHz Tune	225601125
L302	Coil, 67KHz Trap	228641110
L303	Coil, 72KHz Trap	228641109

Printed Circuit Board	140500522
Equalizer Circuit Board Assembly	141510116

PRE, MAIN AMP CIRCUIT BOARD

SYMBOL	DESCRIPTION	PART NO.
R501 R601	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R502 R602	Resistor, Carbon Film, 1M ±10%, 1/4W	552010523
R503 R603	Resistor, Carbon Film, 1M ±10%, 1/4W	552010523
R504 R604	Resistor, Carbon Film, 3.9K ±10%, 1/4W	552039223
R505 R605	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R506 R606	Resistor, Carbon Film, 1.5K ±10%, 1/4W	552015223
R507 R607	Resistor, Carbon Film, 1M ±10%, 1/4W	552010523
R508 R608	Resistor, Carbon Film, 5.6K ±10%, 1/4W	552056223
R509 R609	Resistor, Carbon Film, 3.3K ±10%, 1/4W	552033223
R510 R610	Resistor, Carbon Film, 150K ±10%, 1/4W	552015423
R511 R611	Resistor, Carbon Film, 1M ±10%, 1/4W	552010523
R512 R612	Resistor, Carbon Film, 5.6K ±10%, 1/4W	552056223
R513 R613	Resistor, Carbon Film, 330 ±10%, 1/4W	552033123
R514 R614	Resistor, Carbon Film, 1K ±10%, 1/4W	552010223
R515 R615	Resistor, Carbon Film, 22K ±10%, 1/4W	552022323
R516 R616	Resistor, Carbon Film, 100K ±10%, 1/4W	552010423
R517 R617	Resistor, Carbon Film, 5.6K ±10%, 1/4W	552056223
R518 R618	Resistor, Carbon Film, 100 ±10%, 1/4W	552010123
R519 R619	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R520 R620	Resistor, Carbon Film, 33K ±10%, 1/4W	552033323
R521 R621	Resistor, Carbon Film, 47K ±10%, 1/4W	552047323
R522 R622	Resistor, Carbon Film, 8.2K ±10%, 1/4W	552082223
R523 R623	Resistor, Carbon Film, 5.6K ±10%, 1/4W	552056223
R524 R624	Resistor, Carbon Film, 2.2 ±10%, 1/4W	552022223
R525 R625	Resistor, Carbon Film, 2.2K ±10%, 1/4W	552022223
R526 R626	Resistor, Composition, 330 ±10%, 1/2W	551033133
R527 R627	Resistor, Composition, 22 ±10%, 1/2W	551022033
R528 R628	Resistor, Composition, 330 ±10%, 1/2W	551033133
R529 R629	Resistor, Bath-tub, 10 ±10%, 2W	554010053
R530 R630	Resistor, Bath-tub, 0.5 ±10%, 2W	554050953
R531 R631	Resistor, Bath-tub, 0.5 ±10%, 2W	554050953
R532 R632	Resistor, Composition, 1.5K ±10%, 1/2W	551015233
R533 R633	Resistor, Carbon Film, 3.9K ±10%, 1/4W	552039223

VOLUME CONTROL CIRCUIT BOARD

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

**ROTEL®
RX-400A**

Roland Electronics Co., Ltd. Main Office: 1-36-8 Ohbukayama, Meguro-ku, Tokyo, Japan
 Chofu Plant: 3-60-3 Kamiishihara, Chofu-shi, Tokyo, Japan
Rotel Electronics Co., Ltd. Offices & Plants: 310, Sec. 5, Nanjing E. Road, Taipei, Taiwan
Rolecor of America Inc. Main Office: 2640 Central Ave., Yonkers, New York 10710, U.S.A.