

ROTEL®

RX-152

AM/ FM STEREO RECEIVER

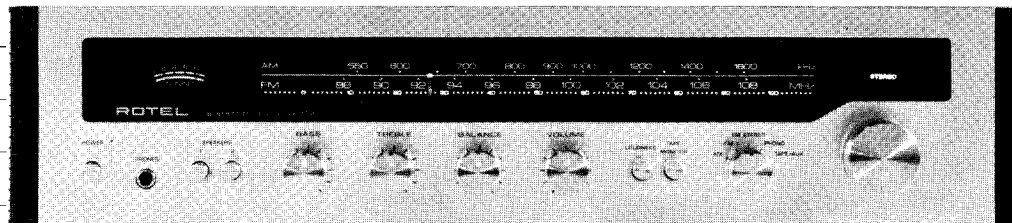


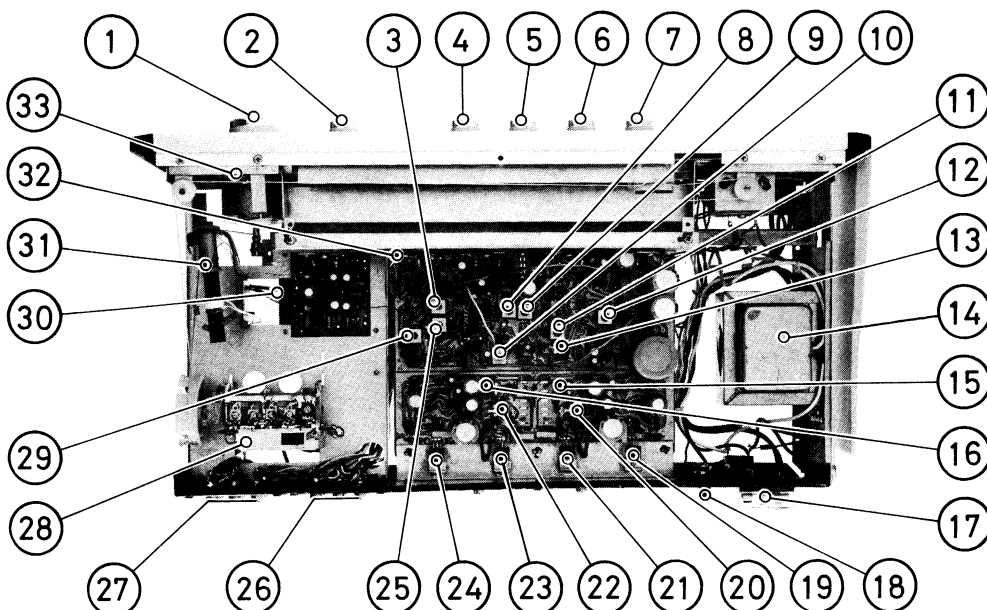
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TECHNICAL MANUAL

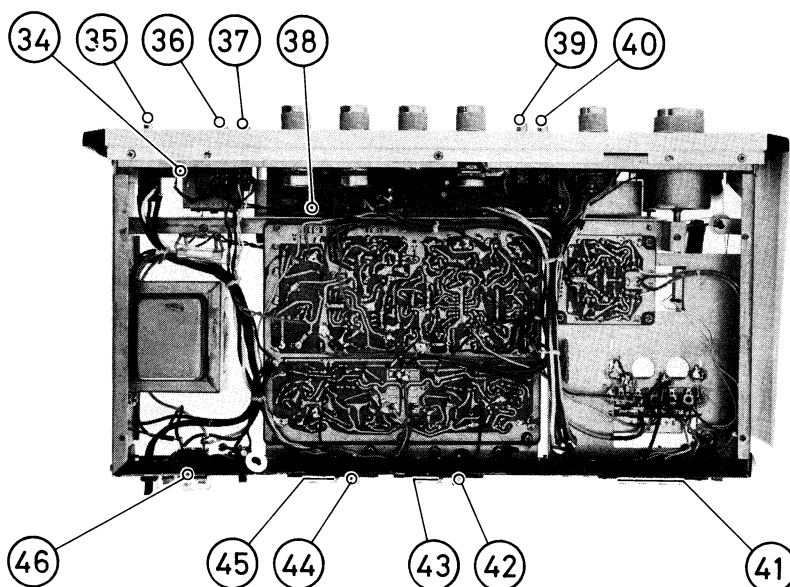
CHASSIS LAYOUT

1. Tuning Knob
2. Function Selector
3. L103, AM IFT, 2nd
4. Volume Control
5. Balance Control
7. Treble Control
8. L105, FM IFT, Ratio (Pri.)
9. L106, FM IFT, Ratio (Sec.)
10. L104, AM IFT, 3rd
11. L302, MPX Coil, 19 kHz Tune
12. L303, MPX Coil, 38 kHz Tune
13. VR301, Stereo Separation Adj.
14. T001, Power Transformer
15. VR601, DC Balance Adj., L-ch.
16. VR602, DC Balance Adj., R-ch.
17. DC Fuses
18. Speaker 4-ch. Switch
19. Q612, Power Amp., L-ch.
20. VR603, Bias Adj., L-ch.
21. Q611, Power Amp., L-ch.
22. VR604, Bias Adj., R-ch.
23. Q613, Power Amp., R-ch.
24. Q614, Power Amp., R-ch.
25. L102, AM IFT, 1st
26. Tape Jack
27. Input Jack, Phono, Aux
28. AM/FM Front End
29. L101, AM Local OSC. Coil



30. Phono Equalizer Amp. pcb
31. L002, AM Antenna Coil
32. VR101, AM Gain Adj.
33. FM Stereo Indicator

34. Phones Jack
35. Power Switch
36. Speakers-1 Switch
37. Speakers-2 Switch
38. Tone Control Amp. pcb
39. Loudness Switch
40. Tape Monitor Switch
41. Antenna Terminal Strip
42. Speaker-2 Jack, R-ch.
43. Speaker-1 Terminal, R-ch.
44. Speaker-2 Jack, L-ch.
45. Speaker-1 Terminal, L-ch.
46. AC Outlet



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. Replacements for output and driver transistors, if necessary, must be made from the same beta 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 transistors 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.

MAIN AMPLIFIER ADJUSTMENT

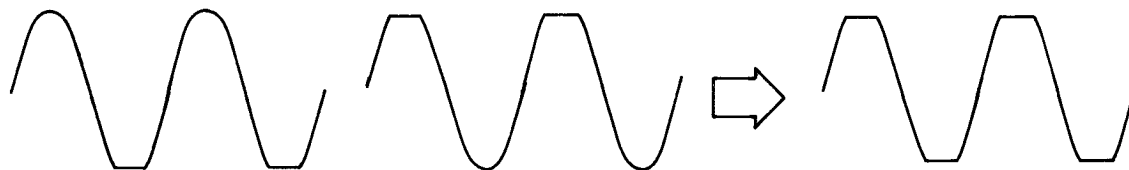
A. DC Balance Adjustment (under both channels driven).

1. Set Tape Monitor Switch to SOURCE and Function Selector to TAPE/AUX position.
2. Connect 8-ohm 20W resistors across both Left and Right Speaker-1 terminals. Then in parallel with Left load resistor, connect an AC VTVM and the vertical input leads of an oscilloscope.
3. Connect an audio signal generator to Left and Right inputs and apply 1,000 Hz (sine wave) signals.
4. Connect AC power cord and rotate Volume Control clockwise — full volume. Increase generator output until sine wave on scope just starts clipping. Adjust DC Balance Control VR601 (see Fig. 2) for equal clipping on the positive and negative half cycle of the signal. See Fig. 1.

5. Changing connections of AC VTVM and oscilloscope to Right load resistor, repeat the step 4 above with Right channel (use VR602).

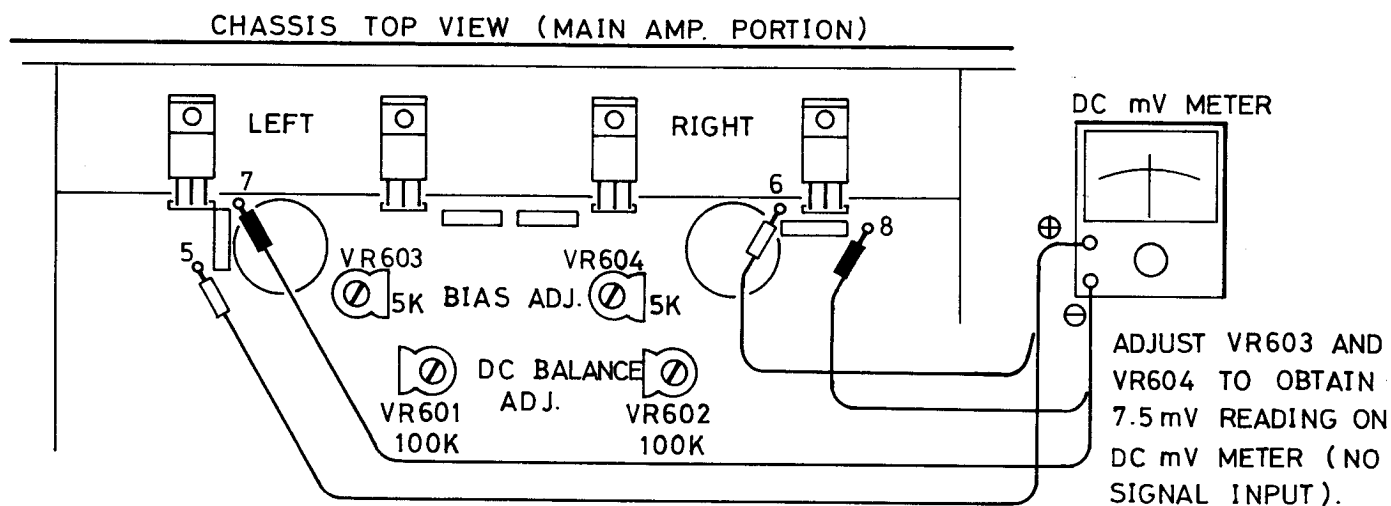
B. Bias (Idling Current) Adjustment.

1. Set Volume Control to minimum position — no signal input.
2. Connect the plus lead of a DC milli-volt meter to pin No. 5 and the minus lead to pin No. 7 ... See Fig. 2.
3. Rotate potentiometer VR603 to obtain a 7.5 mV reading on DC milli-volt meter.
4. Repeat the steps 2 and 3 above with Right channel (use Pin6, 8 and potentiometer VR604).



ADJUST VR603 (VR604 FOR RIGHT CHANNEL) FOR EQUAL CLIPPING AT TOP AND BOTTOM

Figure 1. DC Balance Adjustment Waveforms



AM ALIGNMENT PROCEDURE

Instruments: AM Signal Generator, AC VTVM and Oscilloscope.

Set Function Selector Switch to AM position.

Set VR101 (on IF Board) to mid-position before starting this procedure.

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	Q102 Base (on IF board ... Pin No.22) Through a 0.01 mfd capacitor.	455KHz (400Hz 30% Mod.)	Non interfering at low end of scale.	AC VTVM to TAPE OUT jack (L-ch. or R-ch.)	L102, 103 and 104 (see Fig. 3)	Maximum reading on VTVM.
2	Loop Antenna (see Fig. 3)	600KHz (400Hz 30% Mod.)	600KHz		L101 (OSC) and L002 (ANT)	
3		1400KHz (400Hz 30% Mod.)	1400KHz		CT5 (OSC) and CT4 (ANT) (on Front end)	
4	Repeat steps 2 and 3 until no further improvement is noticed.					
5	Same as above step 2: Adjust Signal Generator output so that input level of AM Antenna terminal comes to 100 μ V/m.	1000KHz (400Hz 30% Mod.)	1000KHz	Same as above Step 1.	VR101	Same as above Step 1.

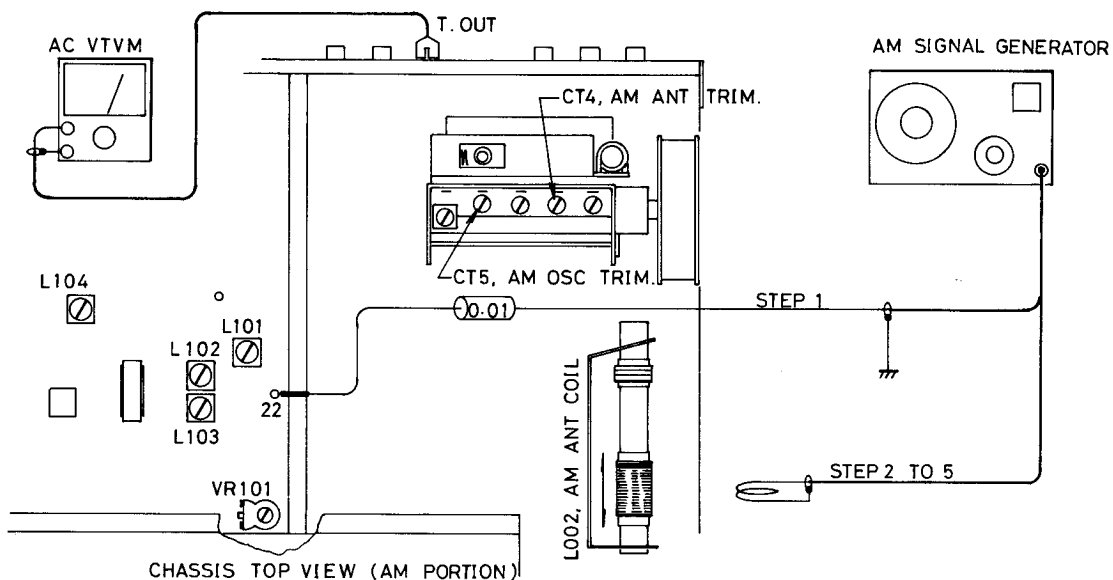


Figure 3. AM IF & RF Alignment Hook-up

FM IF & RF ALIGNMENT PROCEDURE

Instruments: FM Signal Generator, Oscilloscope and H.D. Analyzer

- Set Function Selector Switch to "FM" position.
- Connect FM Signal Generator to FM antenna terminals.
- Connect Oscilloscope and H.D. Analyzer to Tape Out jack.

A. FM IF Alignment

1. Set Signal Generator Frequency at 98 MHz (400 Hz, 100% Mod.) and tune the receiver to maximum output point. (The antenna terminal voltage should be 1 mV).
2. Adjust FM IFT, L106 and T1 (on Front-end) to obtain maximum deflection on scope.
3. Adjust FM IFT, L105 to obtain minimum reading on H.D. Analyzer.

B. FM RF Alignment

1. Set Signal Generator Frequency at 106 MHz and also the receiver at 106 MHz on the dial scale. Then adjust FM OSC trimmer CT3 (on Front-end) to obtain maximum deflection on scope.
2. Set the receiver at 90 MHz on the dial scale, and change the frequency of Signal Generator so that the output of the receiver becomes maximum. Then make sure Signal Generator frequency stays within 90 MHz $\pm$ 150 kHz.

3. Sensitivity on this alignment must be attempted at 106 MHz by adjusting CT1 and CT2 (on Front-end) to obtain maximum deflection on scope, and fine adjust to balance sensitivity at 90 MHz and 106 MHz.

Caution: Bandpass Filters (X101 and X102) incorporated in FM IF circuit are classified into 5 divisions according to their center frequencies. It is thus necessary to use the same frequency division in case of exchanging the Bandpass Filters. Divisions of band-pass frequencies are indicated by colored dots as shown in the following chart.

COLOR	CENTER FREQ.	TOLERANCE
Red	10.70MHz	$\pm$ 30KHz
Blue	10.67MHz	$\pm$ 30KHz
Orange	10.73MHz	$\pm$ 30KHz
Black	10.64MHz	$\pm$ 30KHz
White	10.76MHz	$\pm$ 30KHz

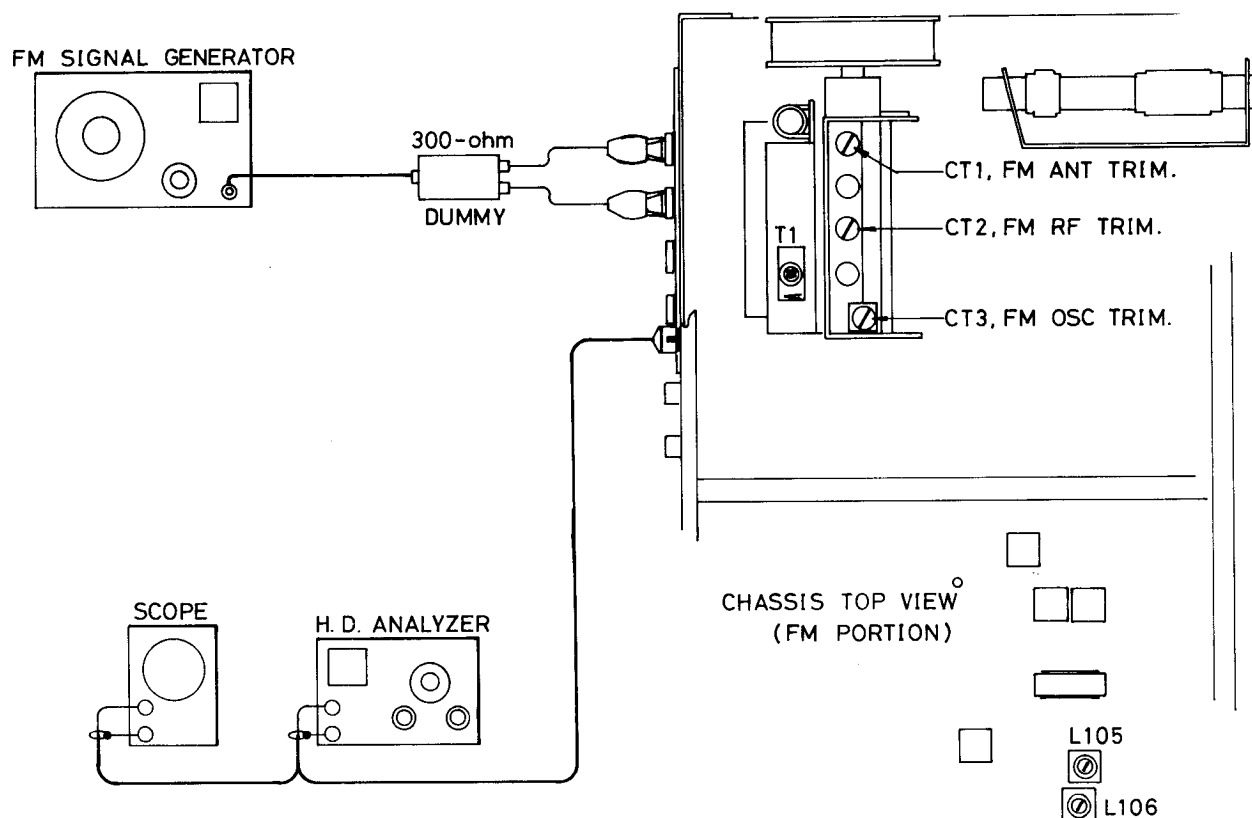


Figure 4. FM IF & RF Alignment Hook-up

FM MPX ALIGNMENT PROCEDURE

NOTE: The FM IF Alignment must be completed before attempting this FM–MPX Alignment.

Poor IF alignment will result in poor FM–MPX Alignment.

Set Function Selector Switch to FM STEREO.

Connect FM Stereo Generator to FM antenna terminals.

Set Potentiometer 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 & Oscilloscope to Test Point (See Fig.5)	L302, L303	Maximum reading on VTVM.
2	Composite 1 KHz signal to Left chan- nel only.	Pilot 10% Signal 70%	VTVM & Oscilloscope to Left channel Tape Out	L302	Maximum and undistorted sine wave on scope.
3	Composite 1 KHz signal to Right channel only.			VR301	Minimum reading on VTVM.
4	Same as in Step 2				
5	Repeat steps 3 and 4 until no further improvement is noticed.				

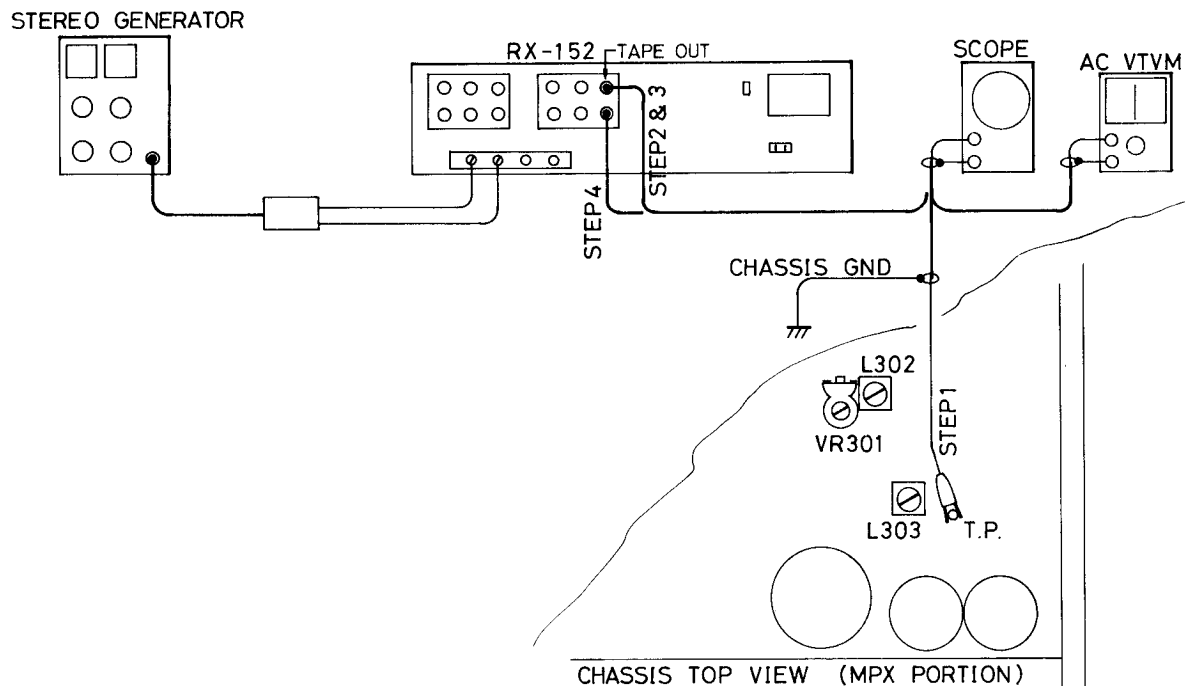


Figure 5. FM MPX Alignment Hook-up

TROUBLE SHOOTING

Unit inoperative (when power activated)

- I. If the pilot lamp does not light.
 - A. Check the flow at the AC Outlet, and if no voltage across.
 1. The AC cord may be broken, or
 2. Connections in the Power Switch may be faulty.
 - B. If there is proper voltage across, check the AC fuse F003 and
 1. If the AC fuse is blown,
 - a. Capacitor C903, 906 or 907 may be shorted, or
 - b. Rectifier D902 may be shorted, or
 - c. Primary or secondary winding of the Power Transformer T001 may be shorted.
- II. If the pilot lamp does light.
 - A. Measure voltage across B1 (see schematic diagram) and
 1. If no voltage across B1,
 - a. Rectifier D902 may be opened, or
 - b. Secondary winding of the Power Transformer may be opened.

Left channel or Right channel inoperative

- I. If the Left channel is inoperative, check the DC fuse F001 and
 - A. If the DC fuse is blown,
 1. Capacitor C625 may be shorted, or
 2. Transistor Q603, 607, 608, 611 or 612 may be faulty, or
 3. Speaker circuits (including speaker systems) may be shorted.
 - B. If the DC fuse is OK, check to see if there is a signal at the input terminal (Pin No. 1) of Main Amp.
 1. If there is a signal,
 - a. Capacitor C603 or 605 may be faulty, or
 - b. Transistor Q601 or 603 may be faulty.
 2. If there is no signal,
 - a. Capacitor C505 or 507 may be faulty, or
 - b. Transistor Q502 may be faulty.
- II. If the Right channel is inoperative, check to see the circuits according as item I above.

Only Phono section inoperative

- I. Capacitor C401, 409 or 415 (C402, 410 or 416 for

R-ch.) may be faulty, or

- II. Transistor Q401 or 403 (Q402 on 404 for R-ch.) may be faulty.

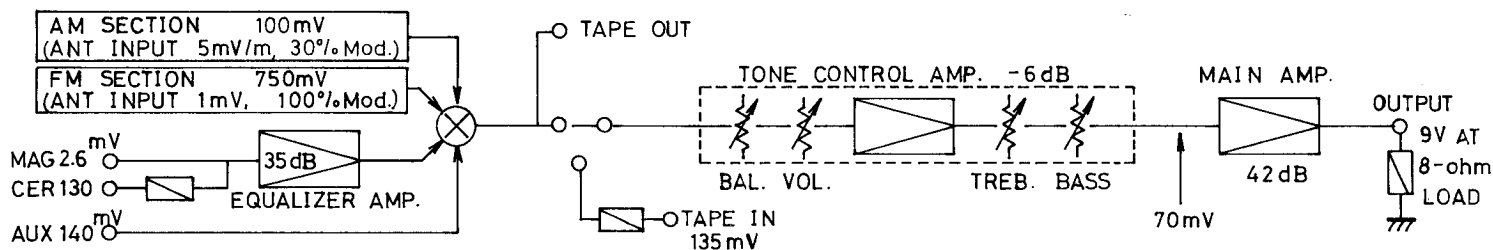
Radio section inoperative

- I. If AM is inoperative, measure voltage of AM Pin No. 23 (see schematic diagram) and
 - A. If no voltage,
 1. Connection of the Function Selector Switch may be faulty.
 - B. If there is proper voltage,
 1. Coil L002, 101, 102, 103 or 104 may be faulty, or
 2. Transistor Q102 or 103 may be faulty, or
 3. Capacitor C123 may be faulty.
- II. If FM is inoperative, measure voltage of FM IF Pin No. 26 (see schematic diagram) and
 - A. If there is no voltage,
 1. Connection of the Function Selector Switch may be faulty, or
 2. Front-end may be faulty (+B circuits on Front-end may be shorted).
 - B. If there is proper voltage,
 1. And if there is no signal with Function Selector set at FM or FM STEREO,
 - a. Transistor Q101 or 301 may be faulty, or
 - b. Coil L105, 106, 301 or 302 may be faulty, or
 - c. Capacitor C301 or 307 may be faulty.
 2. And if there is no signal with Function Selector set at FM STEREO only,
 - a. Transistor Q302 may be faulty, or
 - b. Coil L302 or 303 may be faulty
 - C. If there is proper voltage across B6 but FM Stereo indicator does not light.
 1. Transistor Q303 may be faulty, or
 2. Stereo indicator lamp PL7 may be faulty.
 - D. If FM Stereo indicator stays on when signal changes from Stereo to Mono
 1. Transistor Q303 may be shorted.

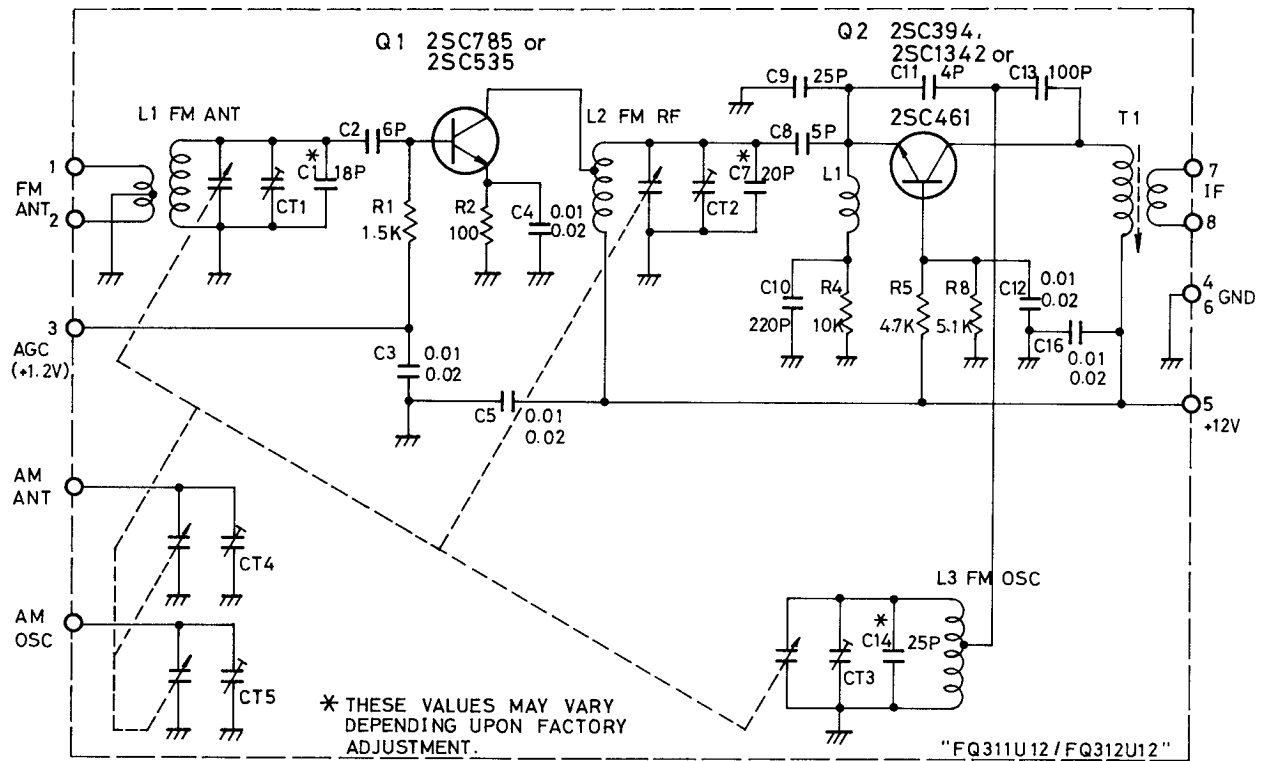
III. Both AM and FM are in operative,

- A. Integrated circuit IC101 may be faulty, or
- B. Capacitor C126 may be faulty.

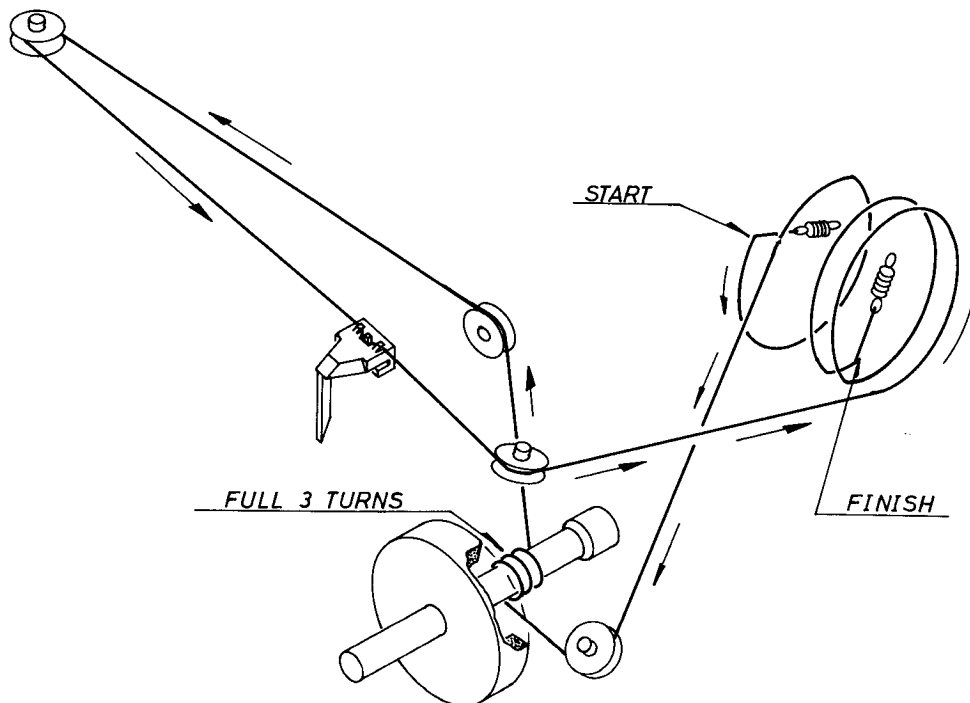
GAIN DIAGRAM



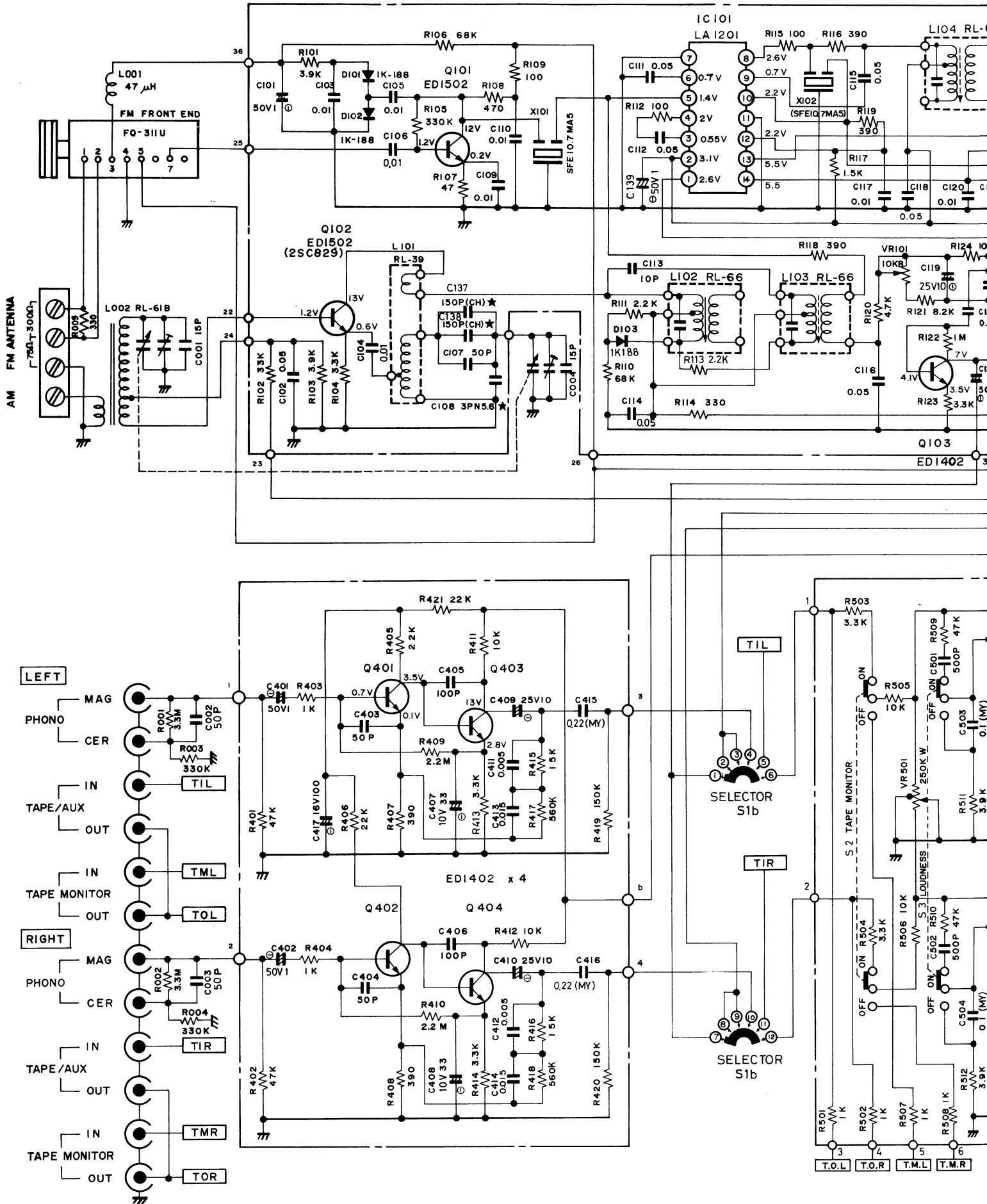
FRONT-END SCHEMATIC DIAGRAM

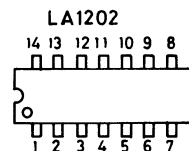
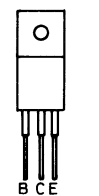
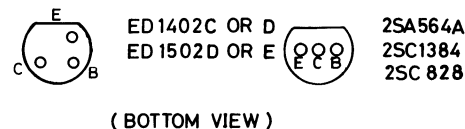
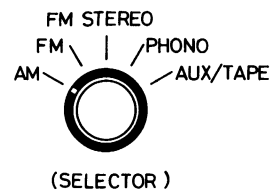
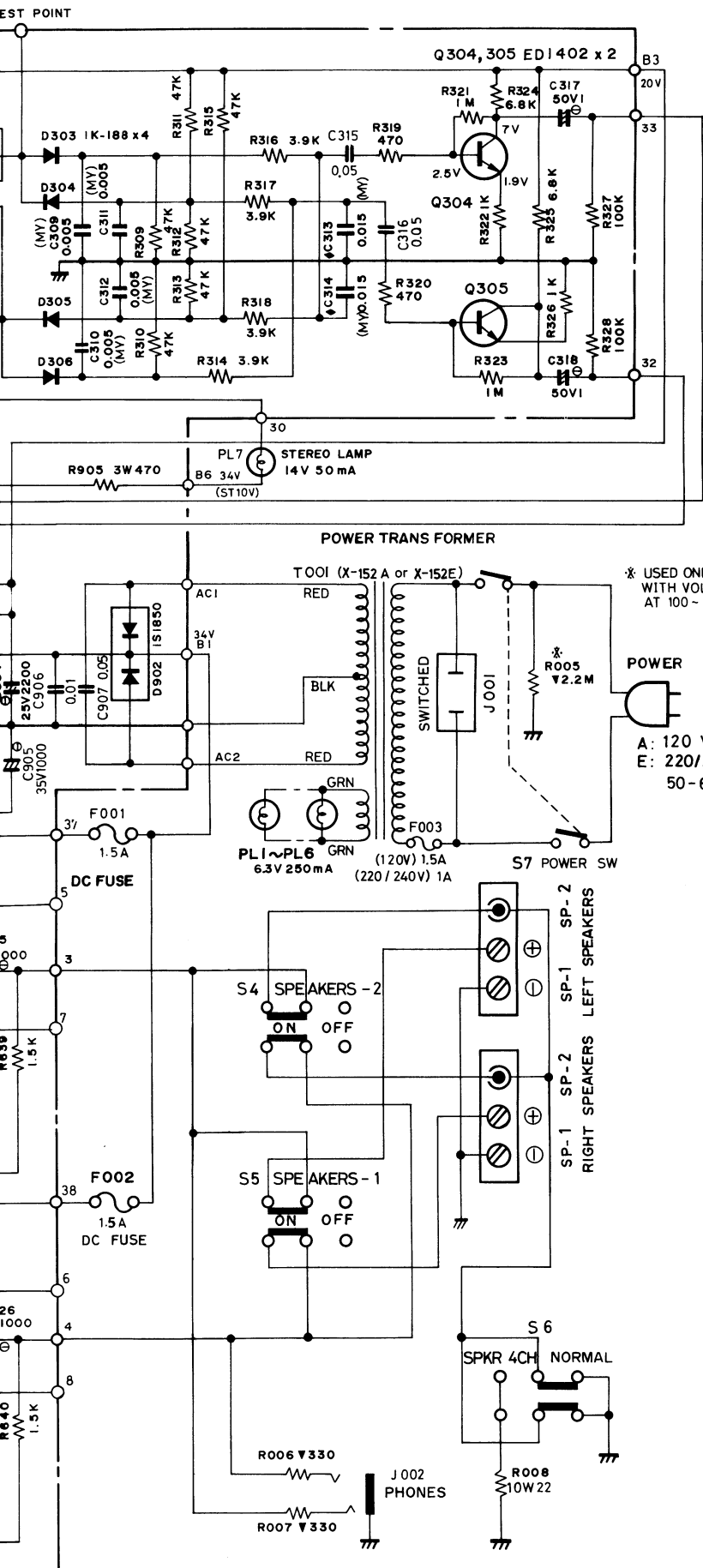


DIAL STRINGING DIAGRAM



SCHEMATIC DIAGRAM





I T E M	SCHEMATIC LOCATION (LAST)	
AM & FM IF AMP.	R141	C139
FM MPX DECODER	R328	C318
EQUALIZER AMP.	R421	C416
TONE CONTROL	R530	C516
MAIN AMP.	R640	C628
POWER SUPPLY	R904	C907
CHASSIS	R009	C003

RESISTORS

IN OHMS, 5% TOLERANCE, 1/4 WATT UNLESS OTHERWISE NOTED IN SCHEMATIC

▼---- COMPOSITION RESISTORS 1/2 WATT

K = KILO OHMS M = MEGA OHMS

CAPACITORS

ALL CAPACITANCE VALUES ARE EXPRESSED IN MFD UNLESS OTHERWISE NOTED

MY---MYLAR FILM CAPACITORS

S---POLYSTYRENE FILM CAPACITORS

*---TEMPERATURE COEFFICIENT CAPACITORS

†---ELECTROLYTIC CAPACITORS

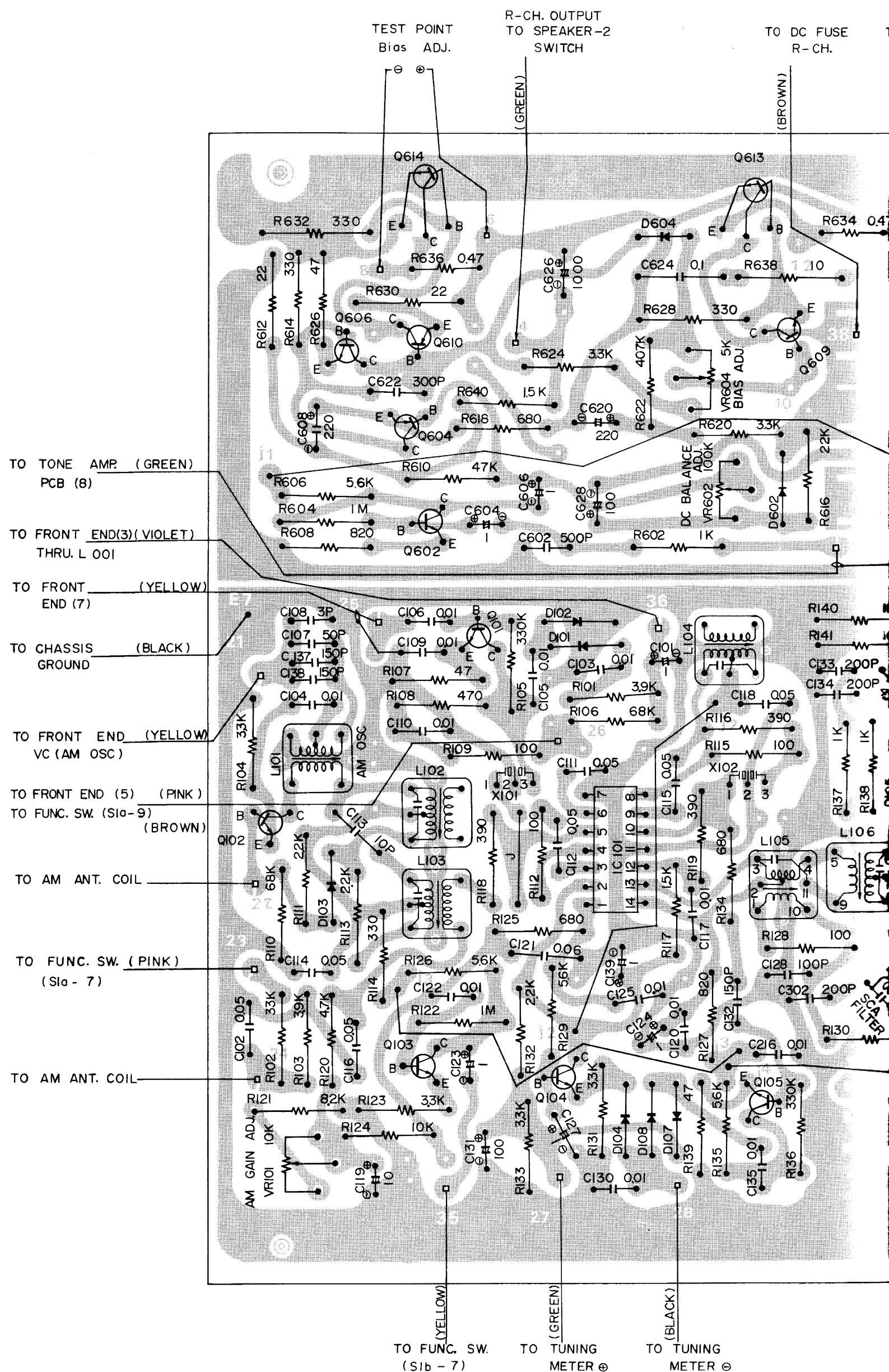
NOTES

VALUES OF C313 AND C314 (MARKED WITH ♦) INDICATED IN SCHEMATIC ARE FOR DE-EMPHASIS AT 75 μS. WHEN DE-EMPHASIS AT 50 μS, THESE VALUES WILL BE 0.01 MFD

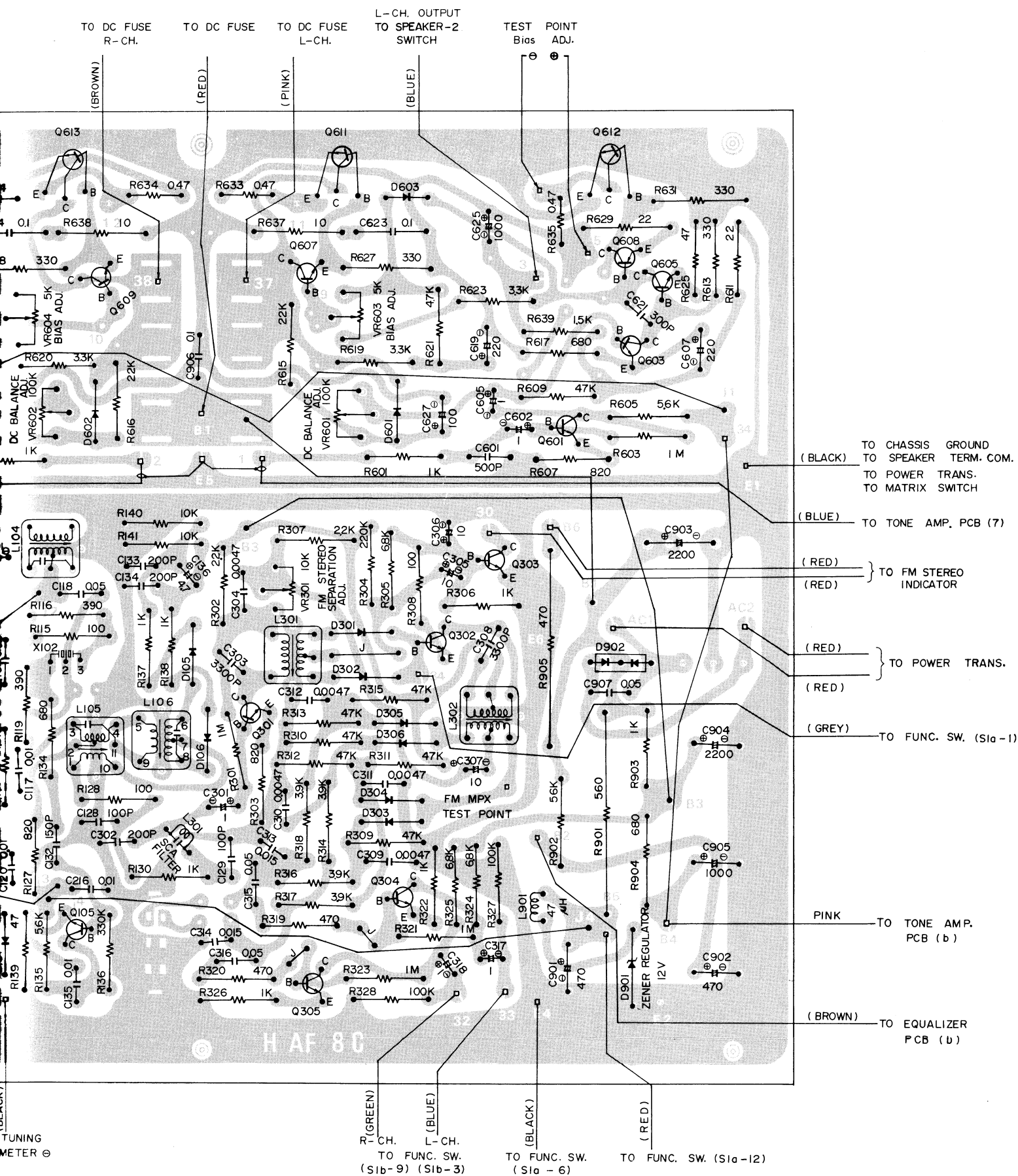
VOLTAGE READING WITH VTVM FROM THE POINT SHOWN TO THE CHASSIS GROUND (LINE VOLTAGE AT 120 VOLTS)

VOLTAGE READING MAY VARY ±20%.

AM / FM IF / MPX MAIN & RECTIFIER CIRCUIT BOARD



CIRCUIT BOARD DIAGRAM



TO MAG. INPUT (L-CH) (GREY)

TO MAG. INPUT (R-CH) (BROWN)

(BROWN) TO +B2

(VIOLET) TO FUNC. SW.

(BLACK) TO TONE AMP PCB(E1)

(LIGHT-BLUE) TO FUNC. SW.

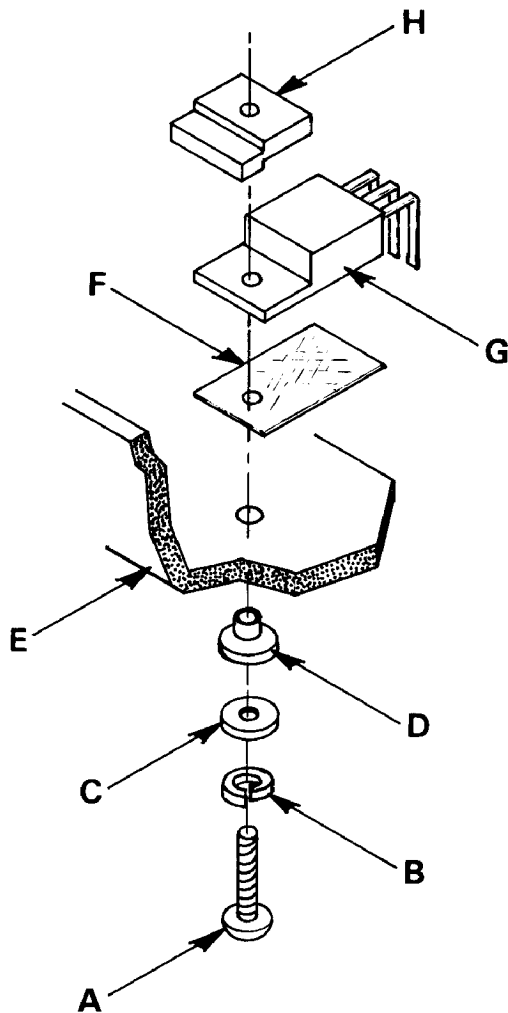
INSTALLATION OF POWER TRANSISTOR

When changing power transistor, give much consideration to the following points.

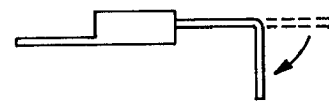
1. When bending transistor's leg, do so at the mid-section of it as shown in figure B (1), adding no excessive force to a joint of the leg.
Pulling the leg strongly towards axis, or moving the leg so that the joint of leg suffers strong stress upwards and downwards or right and left may result in damage of transistor.
2. When fixing power transistor on the Heat Sink, do it in correct way as shown in figure C (1).

Incorrect installation as shown in figure C (2) may cause above troubles by adding excessive force to the leg of transistor.

3. Power transistor is required to be fixed firmly on the Heat Sink. It is necessary to fasten screws securely by moderate force, because too much fastening of screws by extremely strong force may cause distortion on surface installed, and result in deterioration of power transistor.
* Fastening torque from 4kg to 5kg is sufficient.
4. Watch for precautions from Nos.3 to 6.



(1) Desirable Bending



(2) Undesirable Bending

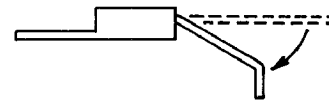


Figure B. Bending of Power Transistor Leg

(1) Correct Installation

(2) Incorrect Installation

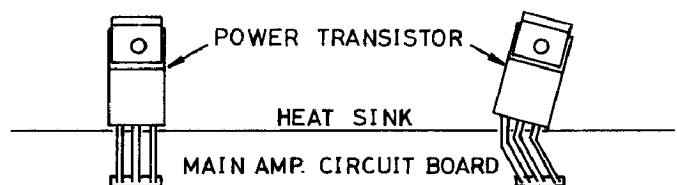


Figure C. Installation of Power Transistor

A	Screw, $\oplus$ 3x12mm	E	Heat Sink
B	Spring Washer, 3mm dia	F	Mica Film
C	Washer, 3mm dia	G	Power Transistor
D	Spacer (992001111)	H	Nut (761911144)

Figure A. Transistor Installation Exploded View

REPAIR PARTS LIST

Schematic Location	Part No.	Description
COILS and TRANSFORMERS		
L101	223301127	AM Local Oscillator
L102	225301131	AM IFT, 1st
L103	225301131	AM IFT, 2nd
L104	225301133	AM IFT, 3rd
L105	225501125	FM IFT, Ratio (Pri.)
L106	225501126	FM IFT, Ratio (Cec.)
L301	228641116	SCA Filter
L302	225601133	MPX, 19 kHz Tune
L303	225601134	MPX, 38 kHz Tune
L901, 001	220001121	RF Choke, 47 Micro-Henry
L002	222301204	AM Antenna Coil
T001	201001366	Power Transformer (Pri. 120V)
	206001366	Power Transformer (Pri. 220/240V)
X101, 102	229101134	FM IF Bandpass Filter
TRANSISTORS and DIODES		
Q101, 102, Q104, 105 Q103, 301, Q302, 304, Q305, 401, Q402, 403, Q404, 501, Q502, 601, Q602, 605, Q606	301901130	ED1502E, FM IF 1st Amp., AM Conv. etc.
Q303	301201132	2SC1384, FM Stereo Ind., Driver
Q603, 604, Q608, 610	301001117	2SA564A, Driver, etc.
Q607, 609	301201115	2SC828, Driver
Q611, 612, Q613, 614	301201142	2SC789, Power Amp.
D101, 102, D103, 104, D105, 106, D107, 108, D301, 302, D303, 304, D305, 306	300111008	1K188, AM Det., FM Det., MPX Dec., etc.

Schematic Location	Part No.	Description
D601, 602	300919008	SM-1-02
D603, 604	300212006	KB-369, Varistor
D901	300313013	WZ-120, Zener, 12V
D902	300919005	1S1850, Rectifier
IC101	303452148	LA1201, AM IF and FM IF Amp.
VARIABLE RESISTORS		
VR101, 301	510502126	10KB, AM Gain., FM Stereo Separation Adj.
VR501	515121120	250KW, Balance Control
VR502	525121123	100KAT x 2, Volume Control
VR503, 504	525101127	50KA x 2, Bass & Treble Control
VR601, 602	510502130	100KB, DC Balance Adj.
VR603, 604	510502128	5KB, Bias Adj.
MISCELLANEOUS		
PL1 - 6	352063025	6.3V, 0.25A, Dial Lamp
PL7	351140005	14V, 50mA, FM Stereo Ind., Lamp
	321304374	AM/FM Front End
	231310019	Tuning Meter
	601011255	Function Selector Switch
	614010107	Power Switch
	614020405	Push Switch, 2-key Loudness and Tape Monitor
	614020403	Push Switch, 2-key, Speaker-1 and Speaker-2
	613000022	Speaker 4-ch. Switch
	624100206	Pin Jack Board, 6P, RCA Type
	649201111	Speaker Terminal Strip
	141510144	Phono Equalizer Amp. Circuit Assembly
	141710253	Tone Control Amp. Circuit Assembly
	141010101	AM, FM, MPX & Main Amp. Circuit Assembly (without Power Tr's & Heat Sink)

ROLAND ELECTRONICS CO., LTD.
 ROTEL ELECTRONICS CO., LTD.
 ROTEL OF AMERICA, INC.

1-36-8 OHOKAYAMA, MEGURO-KU, TOKYO, JAPAN
 310 SEC. 5, NANKING E. ROAD, TAIPEI, TAIWAN
 2642 CENTRAL PARK AVE., YONKERS, N.Y. 10710, U.S.A.