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Technical Manual

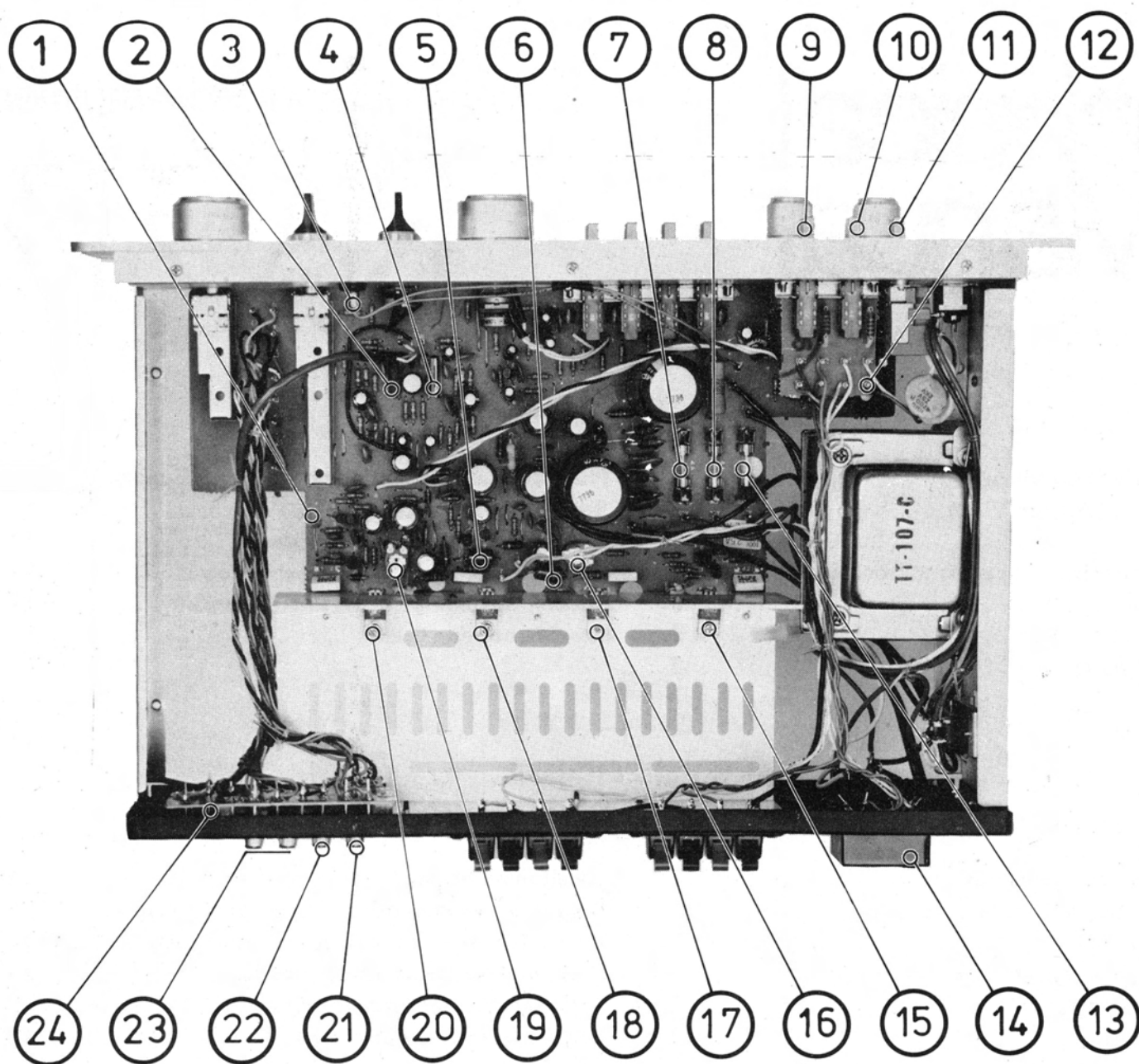
Stereo Integrated Amplifier

RA-313

TABLE OF CONTENTS

Chassis Layout (Top View)	2
Chassis Layout (Bottom View).	3
Precaution	4
Power Amplifier Bias Adjustment Procedure.	5
Gain Diagram	6
Repair Parts List	7
Schematic Diagram	8
Phono/Tone/Main Amplifier and Power Supply Circuit Board Diagram	11
Input Jack Circuit Board Diagram.	13
Tape Monitor Jack Circuit Board Diagram	13
Speaker Switching Circuit Board Diagram	13
Troubleshooting Guide.	14

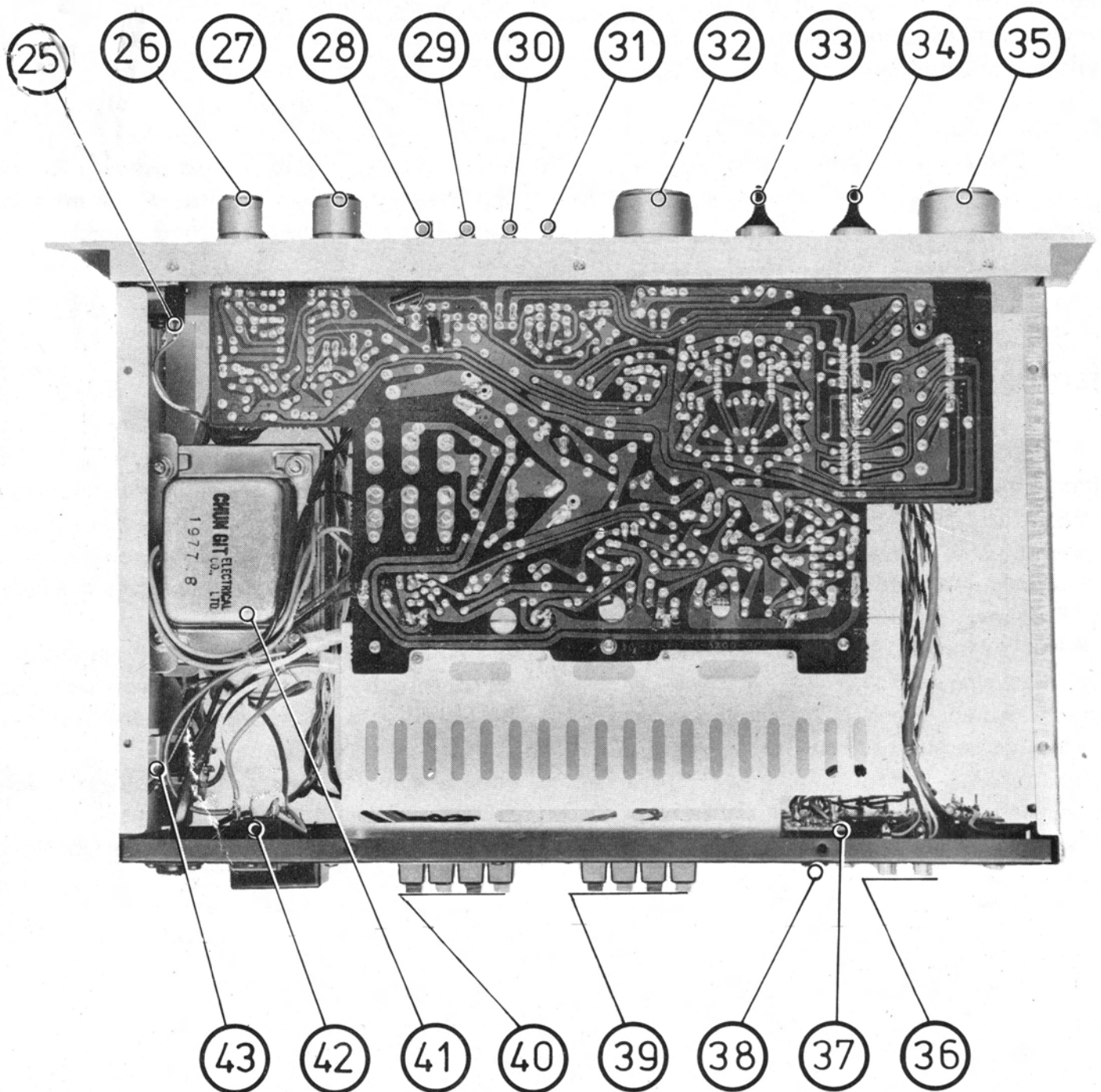
Chassis Layout (Top View)



1. Phono/Tone/Main Amp. & Power Supply PCB
2. IC401, Phono Amp. IC (L-ch)
3. PL001, Indicator Lamp
4. IC402, Phono Amp. IC (R-ch)
5. L602, Anti-Parasitic (R-ch)
6. L601, Anti-Parasitic (L-ch)
7. F902, AC Circuit Protection
8. F903, AC Circuit Protection
9. S7, Speaker B Switch
10. S8, Speaker A Switch
11. S9, Power Supply
12. Speaker Switching PCB

13. F901, AC Fuse
14. Speaker Fuse
15. Q613, Power Transistor (L-Ch)
16. VR601, Idling Current Adj. (L-ch)
17. Q611, Power Transistor (L-ch)
18. Q612, Power Transistor (R-ch)
19. VR602, Idling Current Adj. (R-ch)
20. Q614, Power Transistor (R-ch)
21. AUX Jack
22. TUNER Jack
23. PHONO Jack
24. Input Jack PCB

Chassis Layout (Bottom View)



- 25. J001, Headphone Jack
- 26. Bass Control
- 27. Treble Control
- 28. S6, Low-Filter Switch
- 29. S5, Hi-Filter Switch
- 30. S4, Mode Switch
- 31. S3, Loudness Switch
- 32. Volume Control
- 33. Balance Control
- 34. S2, Tape Monitor Selector

- 35. S1, Function Selector
- 36. TAPE MONITOR-1 Jack
- 37. TAPE MONITOR-2 Jack PCB
- 38. TAPE MONITOR-2 Jack
- 39. Speaker A Terminal
- 40. Speaker B Terminal
- 41. T001, Power Transformer
- 42. J002, J003, AC Outlet
- 43. Voltage Selector

Precaution

1. Always disconnect the chassis from power supply when soldering. Turning the power switch OFF is not enough. Power supply leakage passing through the heating element may destroy the transistor and IC's.
2. Never attempt to do any work on the transistor amplifier without first disconnecting the AC supply 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 haf 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 destory if the base biasing circuit is open on the emitter end.

5. When mounting a replacement power transistor, be sure the bottom of the flang, the mica insulators and 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 mica insulator, and between the mica insulator and the sink for better heat conduction.

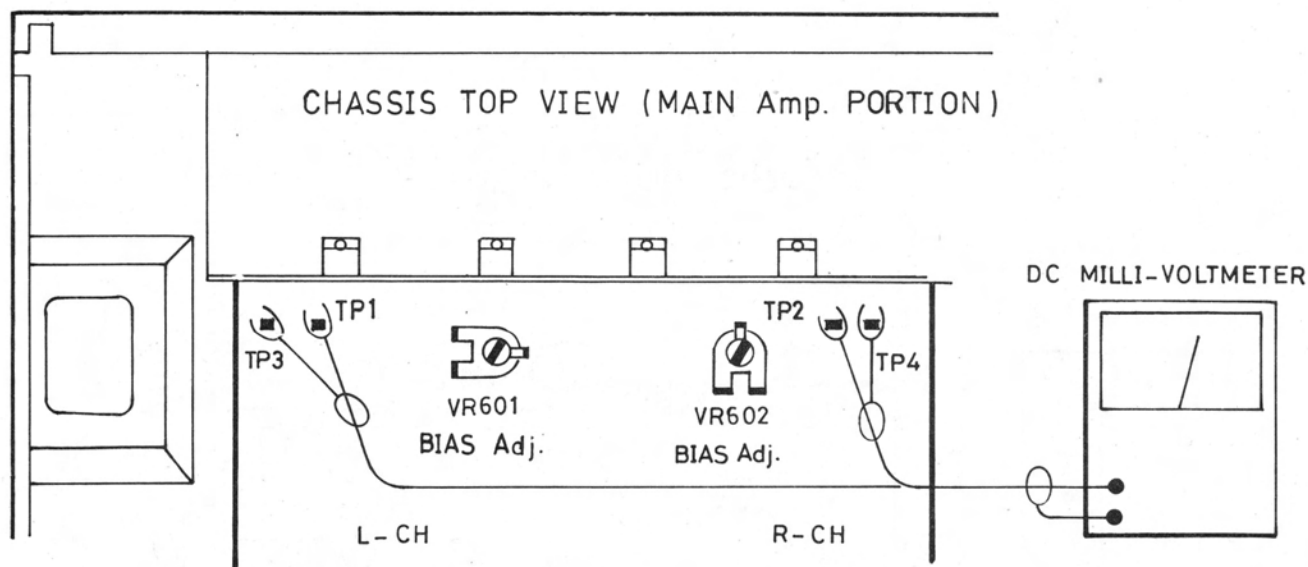


Fig. 1. Power Amplifier Bias Adjustment Hook-up

ADJUST VR601 AND VR602 TO OBTAIN 4.4mV READING ON DC MILLI-VOLTMETER

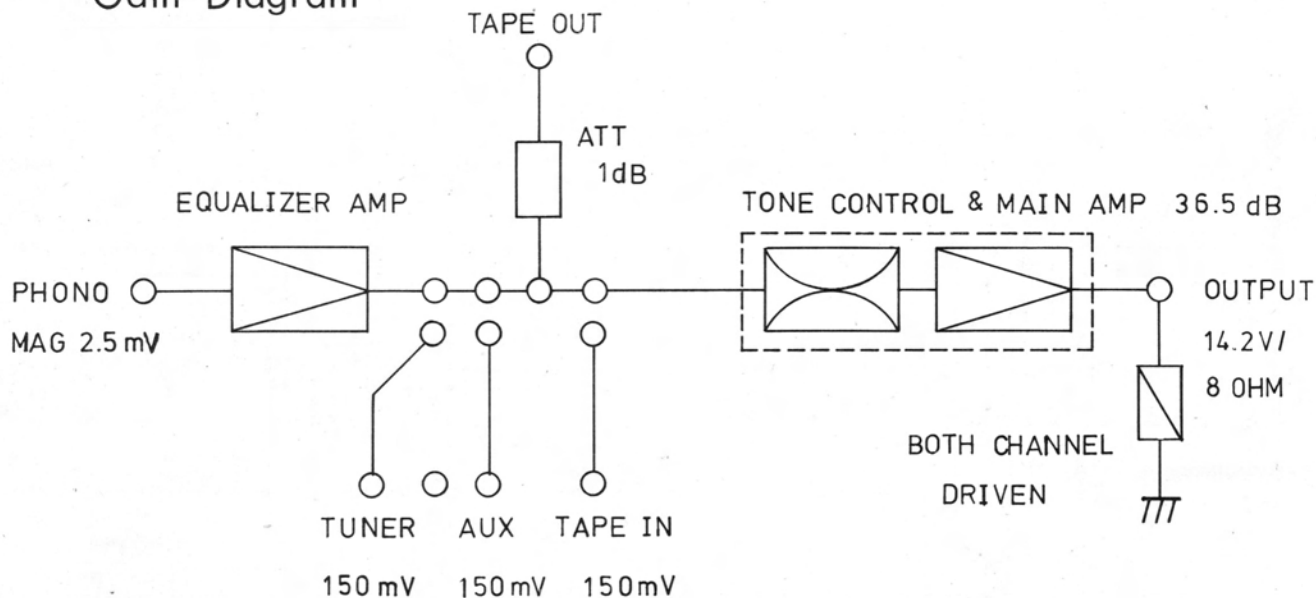
Power Amplifier Bias Adjustment Procedure

NOTE: Prior to Bias Adjustment, run about 5 minutes with rate output (8 ohm) and warm up power transistor and heat sink.
Prior to adjustment, move VR601 and VR602 potentiometers one full turn clockwise.
... In RA-313, Bias Current will decrease when VR601 and VR602 are turned clockwise, and it will increase when turned counterclockwise.

Instrument: DC milli-voltmeter

1. Set volume control to minimum (i.e. no signal input).
2. Connect the plus lead of a DC milli-voltmeter to Test point No. TP3 and minus lead to No. TP1.
3. Adjust potentiometer VR601 to obtain a 4.4mV reading on DC millivoltmeter.
4. Repeat the above steps 1 and 2, for Right channel (use Test point No; TP2, TP4 and potentiometer VR602).

Gain Diagram

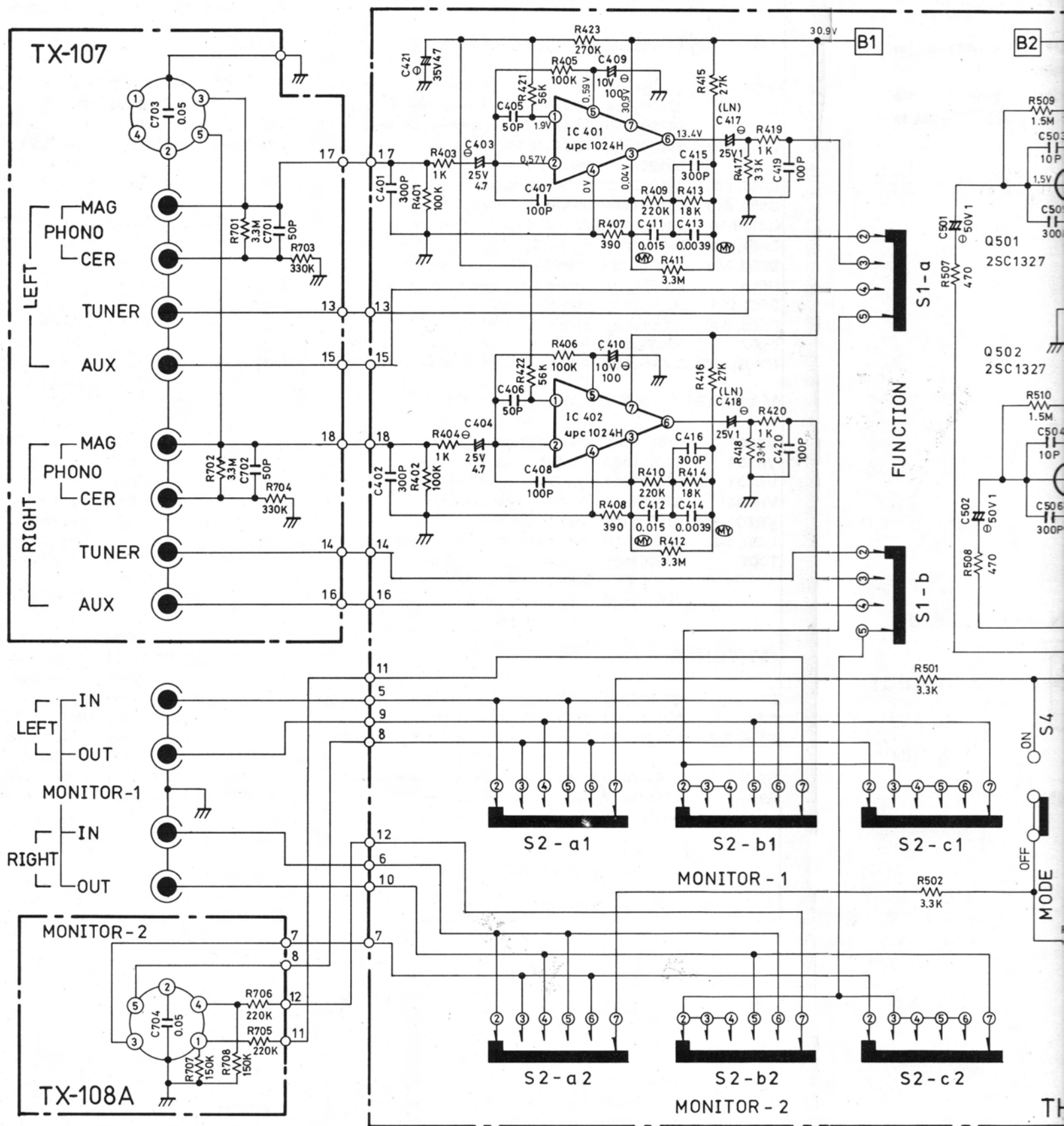


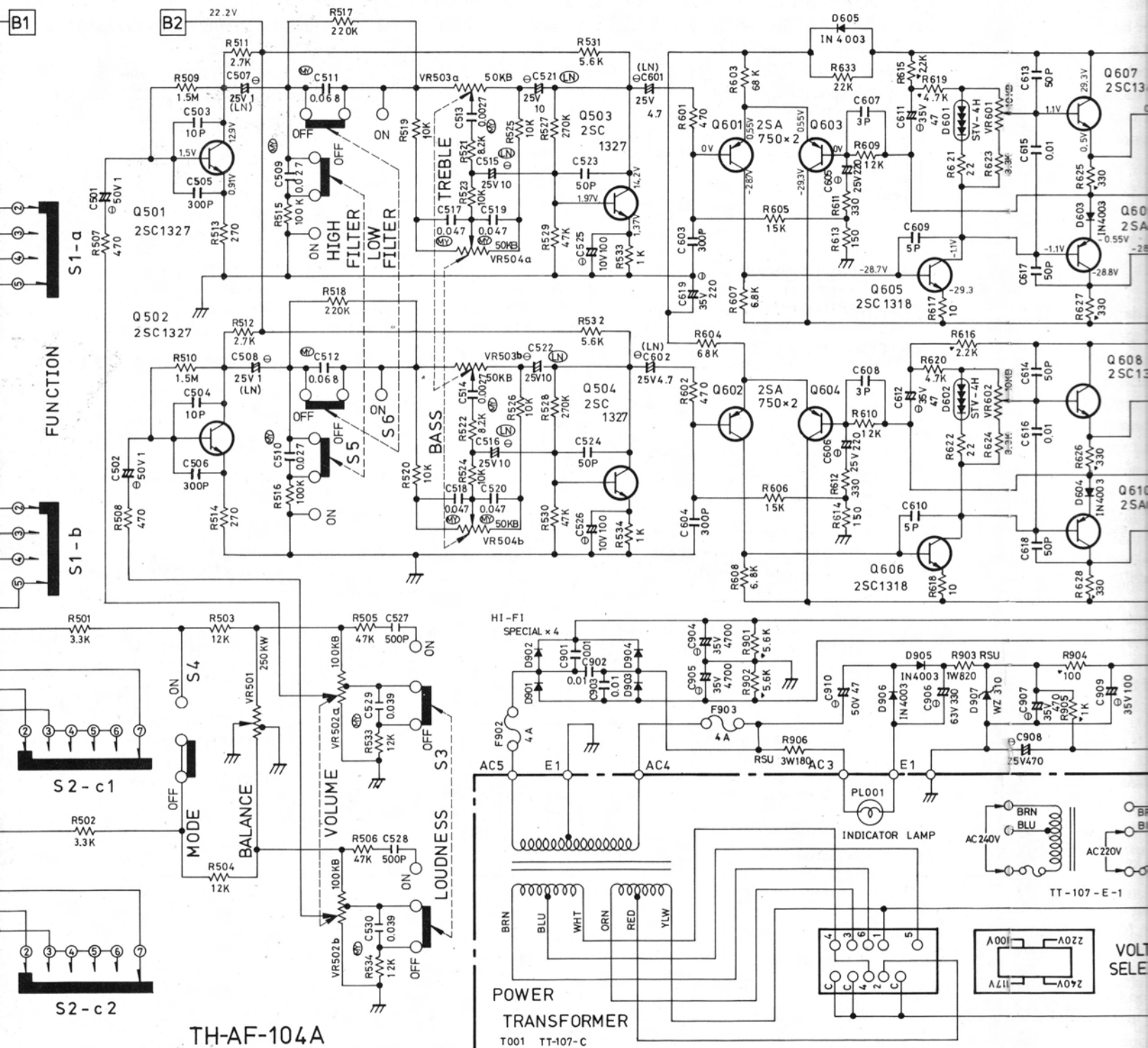
Repair Parts List

Schematic Location	Parts No.	Descriptions
TRANSISTORS, DIODES AND IC'S		
Q501-504	301201134	2SC1327 (S, T), Flat, Tone Amp.
Q601-604	301001134	2SA750-1 (E), Differential Amp.
	301001145	2SA921 (S, T), Differential Amp.
Q605, 606	301201155	2SC1318 (S), Pre-driver
	301201176	2SC1941 (K, L), Pre-driver
Q607, 608	301201132	2SC1384 (S, R), Driver
Q609, 610	301001140	2SA684 (S, R), Driver
Q611-614	301201177	2SC1986 (O, Y), Power Amp.
D601, 602	300212012	SV-5002, Temperature Compensator
D603, 604	300919026	1N4003, Circuit Protection
D605	300919026	1N4003, DC Balance Regulator
D901-904	300919028	1N5404, Rectifier
D905, 906	300919026	1N4003, Rectifier
D907	300313021	WZ-310, Zener Regulator 31V, 1W
IC401, 402	303452164	μPC-1024H, Phono Equalizer Amp.
VARIABLE RESISTORS AND COILS		
VR501	515121126	250KW, Balance Control
VR502	525121129	100KB, Volume Control
VR503	525101142	50KBx2, Treble Control
VR504	525101142	50KBx2, Bass Control
VR601, 602	510502153	10KB, Bias Adj.
L601, 602	228641105	Anti-Parastic
T001	206001426	Transformer, Power Supply (for BEAB, CEE, SEV)
	205001426	Transformer, Power Supply (Multi-Voltage)
SWITCHES		
S1	601011304	Switch, Function Selector
S2	601011307	Switch, Tape Monitor Selector
S3, 4, 5, 6	614040823	Switch, Push 4-Key, Loudness Mode Hi-Filter Low-Filter
S7, 8	614020402	Switch, Push 2-Key, Speaker B and A
S9	614010127	Switch, Power Supply

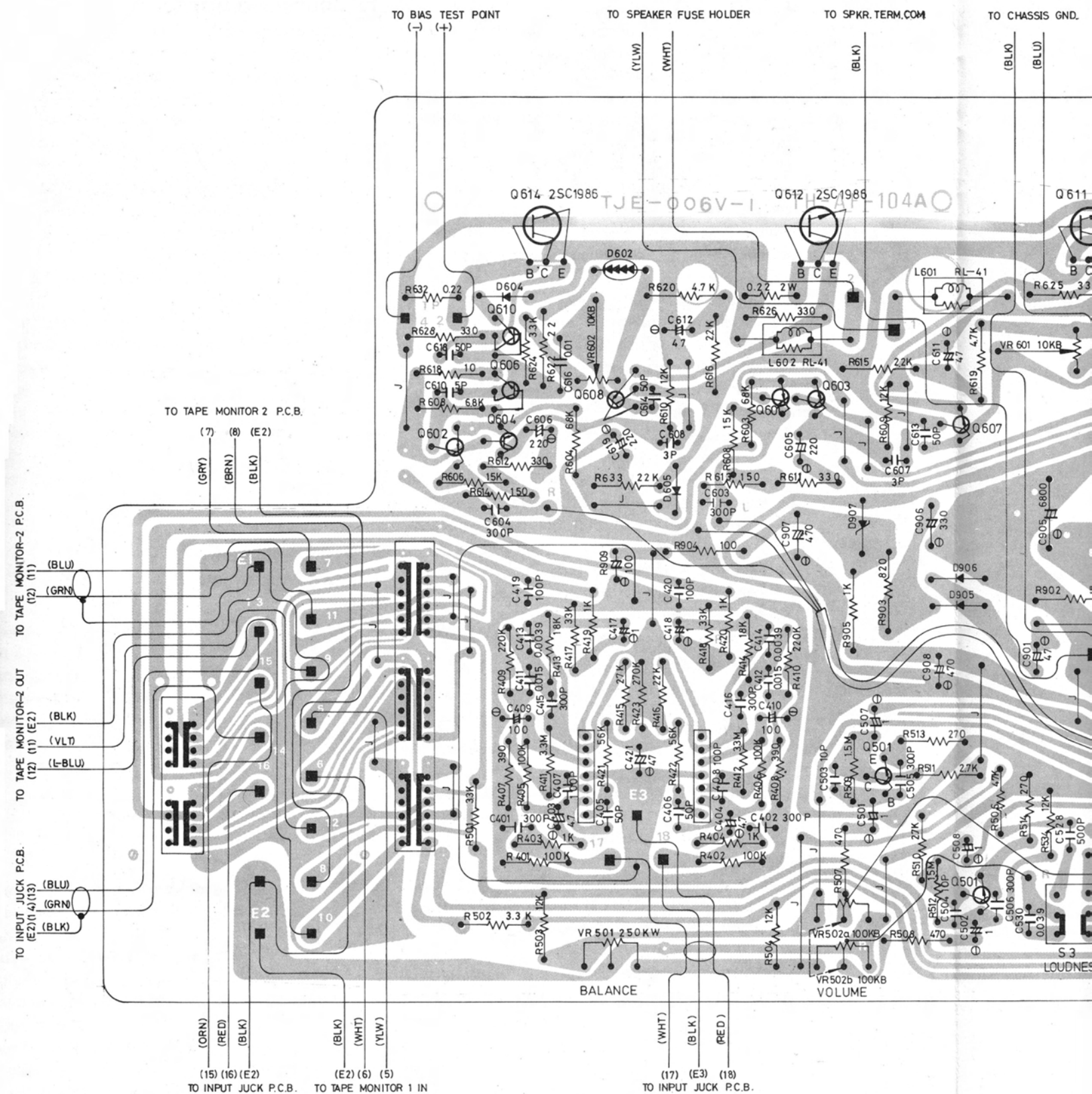
Schematic Location	Parts No.	Descriptions
OTHERS		
F001, 002	341220030	Fuse, 3A, Speaker Protection
	345220030	(Mini Size)
	345250031	(Mini Size with "S" "D" Mark)
F901	341220025	Fuse, 2.5A, AC Protection (100V, 120V)
	341220020	Fuse, 2A, AC Protection (220V, 240V)
	345220020	Fuse, 2A, AC Protection (Mini Size)
F902, 903	341220040	Fuse, 4A, AC Circuit Protection
	345220040	(Mini Size)
	345250040	(Mini Size with "S" "D" Mark)
PL001	351140005	Lamp, 14V 50mA, Indicator
C001, 002	440471093	Spark Killer, 400V 4700P
	470101124	Spark Killer, 4700pF Y Type
J001	626110023	Jack, Headphone
	141610302	Phono/Tone/Main Amp. & Power Supply PCB Ass'y (for 100, 120V)
	141610306	(for 220V, 240V)
	141610303	(for Mini 220V, 240V)
	141610305	(for EL)
	141610304	(for BEAB, CEE, SEV)
	141810762	Input Jack PCB Ass'y
	141810764	Speaker Switching PCB Ass'y
	141810763	Tape Monitor Jack PCB Ass'y
	111911388	Front Panel Ass'y
	116310208	Knob (for Bass, Treble Control)
	116310219	Knob (for Balance, Monitor Control)
	116310218	Knob (for Function Selector)
	116210039	Push Button
	648211157	Fuse Holder, 2P, Speaker
	648211162	Fuse Holder, 2P, Speaker (Mini Size)
	642400109	Terminal, Push 4P, Speaker
	624300208	Jack, 8P (PCB Type)
	624110204	Jack, 4P (no PCB Type)
	625001114	DIN Jack, 5P (PCB Type)
	138011286	Upper Cover
	124011292	Bottom Board

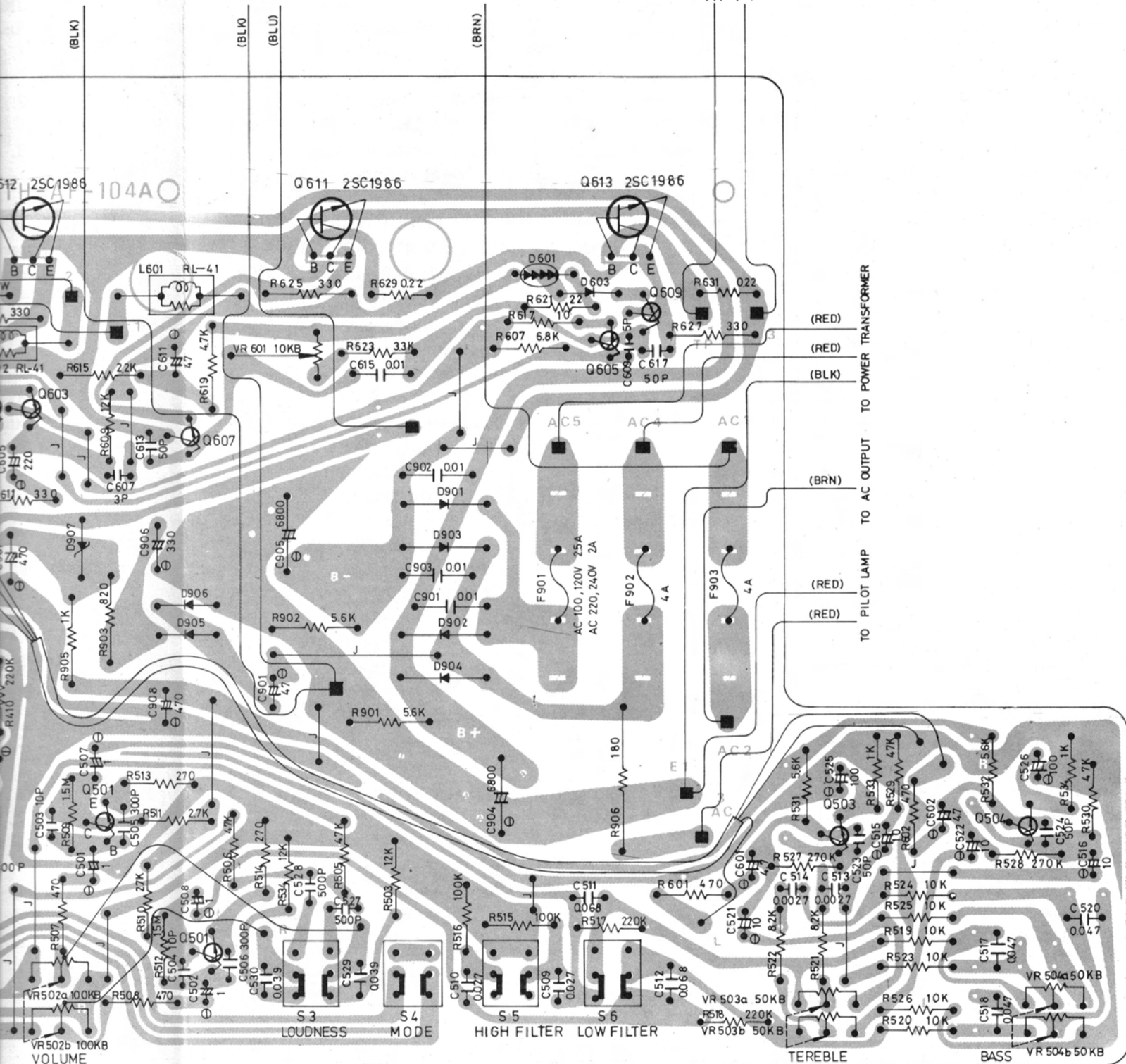
Schematic Diagram



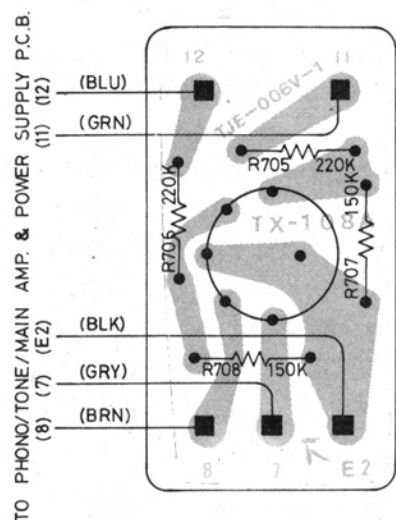


Phono/Tone/Main Amplifier and Power Supply Circuit Board Diagram

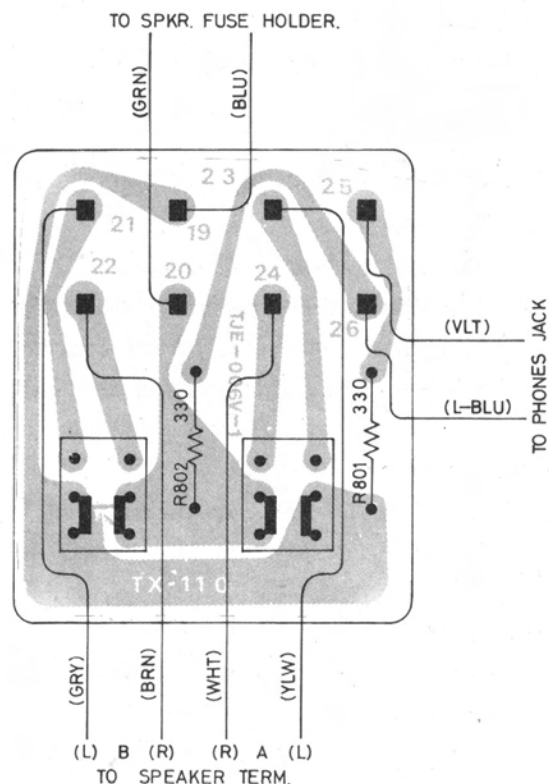




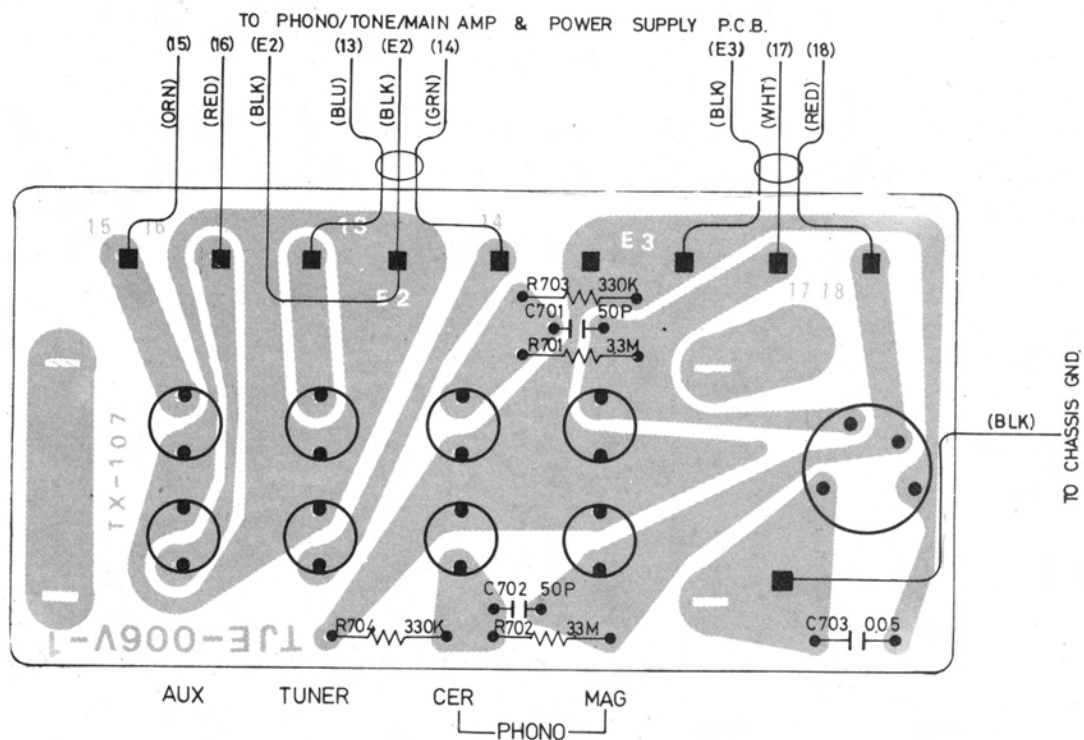
Tape Monitor Jack Circuit Board Diagram



Speaker Switching Circuit Board Diagram



Input Jack Circuit Board Diagram



Troubleshooting Guide

I. If the lamp does not illuminate. Check the flow at the AC Outlet and

A. 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 F901 and

a. If the AC fuse is blown

1. Rectifier D901, 902, 903, 904 may be shorted. or
2. Capacitor C901, 902, 903, 904 or 905 may be shorted. or
3. Primary or secondary winding of the power transformer T001 may be shorted.

II. If the pilot lamp does illuminate, measure voltage across B+, B- and B1, B2 (See the schematic diagram) and

A. If no voltage across

- a. Rectifier D901, 902, 903, 904 may be opened.
- b. Secondary winding of the power transformer may be opened.

B. If there is proper voltage across, check the speaker fuse and

a. If the speaker fuse is blown.

1. Transistor Q611 or 613 (Q612 or 614 for R-ch) may be shorted, or
2. Transistor Q601, 603, 605, 607 or 609 (Q602, 604, 606, 608 or 610 for R-ch) may be faulty. or
3. Output circuit (including speaker system) may be shorted, or
4. The fuse may be worn out.

b. If the speaker fuse is normal and check the minus (—) point of C601 (C602 for R-ch).

1. If there is no signal

- i. Transistor Q501 or 503 (Q502 or 504 for R-ch) may be faulty, or
- ii. Capacitor C501, 507, 521 or 601 (C502, 508, 522 or 602 for R-ch) may be faulty, or

2. If there is a signal

- i. Transistor Q601, 603, 605, 607 or 609 (Q602, 604, 606, 608 or 610 for R-ch) may be faulty.

III. Only PHONO SECTION inoperative

A. IC401 (IC402 for R-ch) may be faulty, or

B. Capacitor C403, 409 or 417 (C404, 410 or 418 for R-ch) may be faulty.

IV. HUM and/or NOISE

A. Hum and/or Noise produced with Volume Control set at minimum.

1. Transistor Q501 or 503 (Q502 or 504 for R-ch) may be faulty, or
2. Capacitor C501, 507, 521 or 525 (C502, 508, 522 or 526 for R-ch) may be faulty, or
3. Resistor R509, 511 or 527 (R510, 512 or 528 for R-ch) may be faulty.

B. Hum and/or Noise produced only in PHONO

1. IC401 (IC402 for R-ch) may be faulty, or
2. Capacitor C403, 409, 417, 906, 907, 908 or 909 (C404, 410 or 418 for R-ch) may be faulty.