



Technical Manual

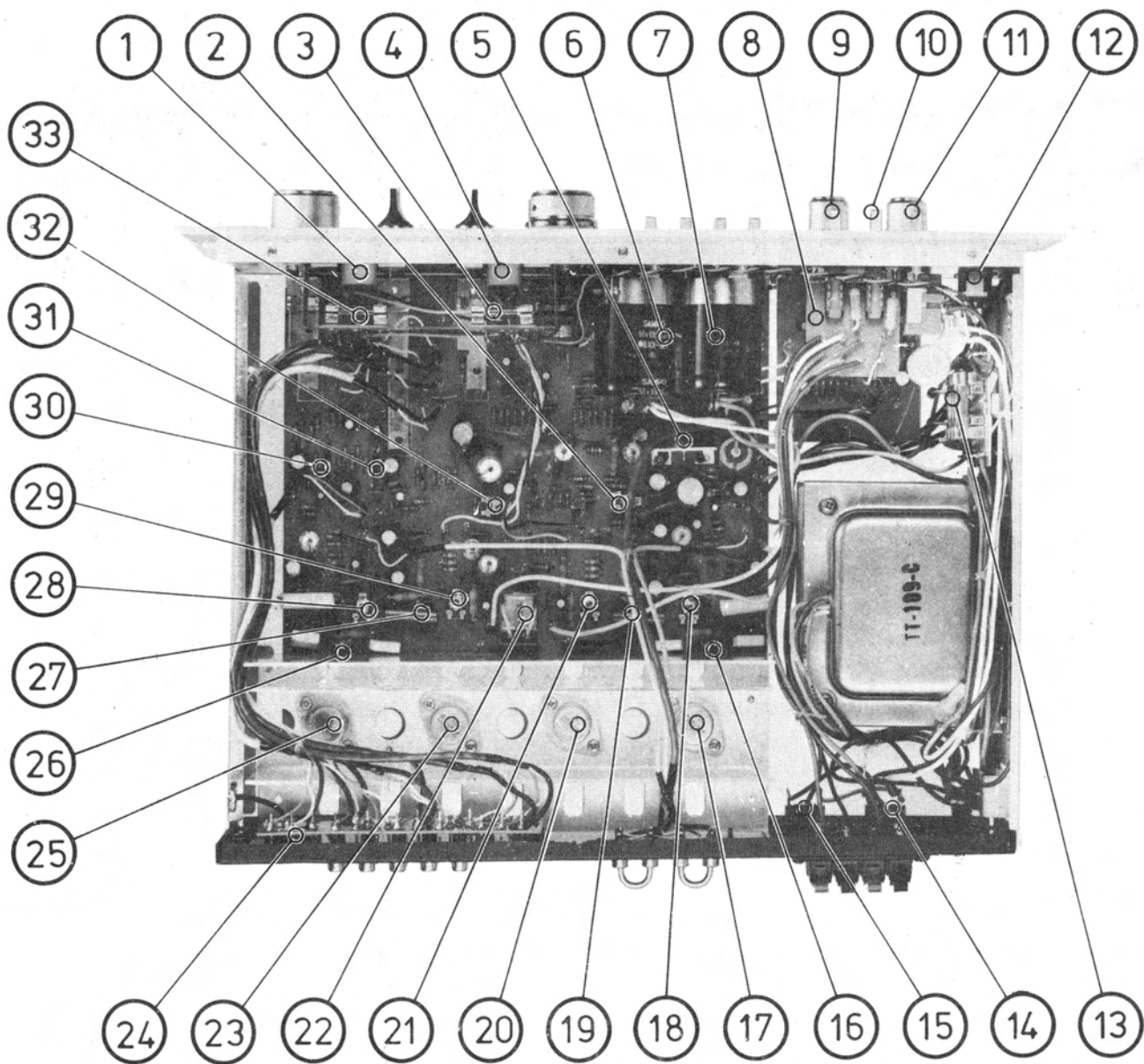
Stereo Integrated Amplifier

RA-713

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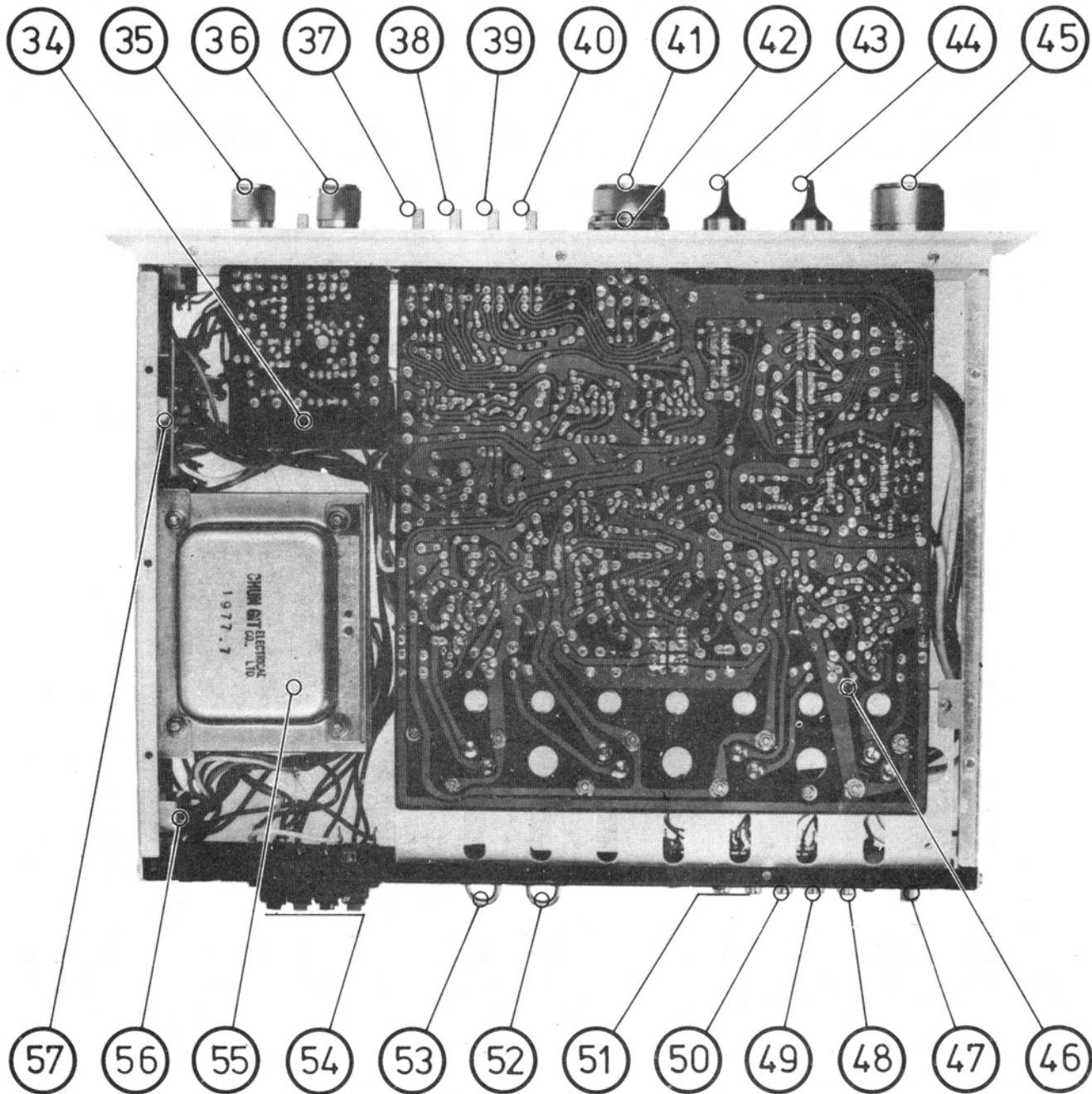
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Chassis Layout (Top View)



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|---|--|
| 1. M002, VU Meter (R-ch) | 18. VR601, Bias Adj. (L-ch) |
| 2. VR603, Overload Protection Level Adj. (L-ch) | 19. L601, Anti-Parasitic (L-ch) |
| 3. PL001, Dial Indicated Lamp | 20. Q629, Power transistor (L-ch) |
| 4. M001, VU Meter (L-ch) | 21. VR605, VU Meter calibration Adj. (L-ch) |
| 5. Q904, Regulator | 22. RY-901, Overload Protection Relay |
| 6. C002, B-, Smoothing Capacitor | 23. Q614, Power transistor (R-ch) |
| 7. C001, B+, Smoothing Capacitor | 24. Input & Output Jack PCB |
| 8. Speaker Switching PCB | 25. Q616, Power transistor (R-ch) |
| 9. S8, Speaker-B Switch | 26. D602, Varistor |
| 10. S9, Speaker-A Switch | 27. L602, Anti-Parasitic (R-ch) |
| 11. S10, Power Supply Switch | 28. VR602, Bias Adj. (R-ch) |
| 12. J001, Headphone Jack | 29. VR606, VU Meter Calibration Adj. (R-ch) |
| 13. AC Fuse, Lamp Fuse, AC Secondary Fuse | 30. IC401, Phono Amp. (L-ch) |
| 14. J002, AC Outlet | 31. IC402, Phono Amp. (R-ch) |
| 15. J003, AC Outlet | 32. VR104, Overload Protection Level Adj. (R-ch) |
| 16. D601, Varistor (L-ch) | 33. PL002, Dial Indicated Lamp |
| 17. Q615, Power transistor (L-ch) | |

Chassis Layout (Bottom View)



- | | |
|-------------------------------|------------------------------------|
| 34. Tone Control PCB | 46. Control AMP PCB |
| 35. Bass Control | 47. GND Terminal |
| 36. Treble Control | 48. Phono Jack |
| 37. S7, Low-Filter Switch | 49. Tuner Jack |
| 38. S6, Hi-Filter Switch | 50. Aux Jack |
| 39. S5, Loudness Switch | 51. Tape Monitor-1 Jack |
| 40. S4, Mutting Switch | 52. Short Pin (L-ch) |
| 41. Volume Control | 53. Short Pin (R-ch) |
| 42. Balance Control | 54. Speaker B, Speaker A Terminals |
| 43. S3, Mode Selector | 55. T001, Power Transformer |
| 44. S2, Tape Monitor Selector | 56. Voltage Selector |
| 45. S1, Function Selector | 57. Fuse PCB |

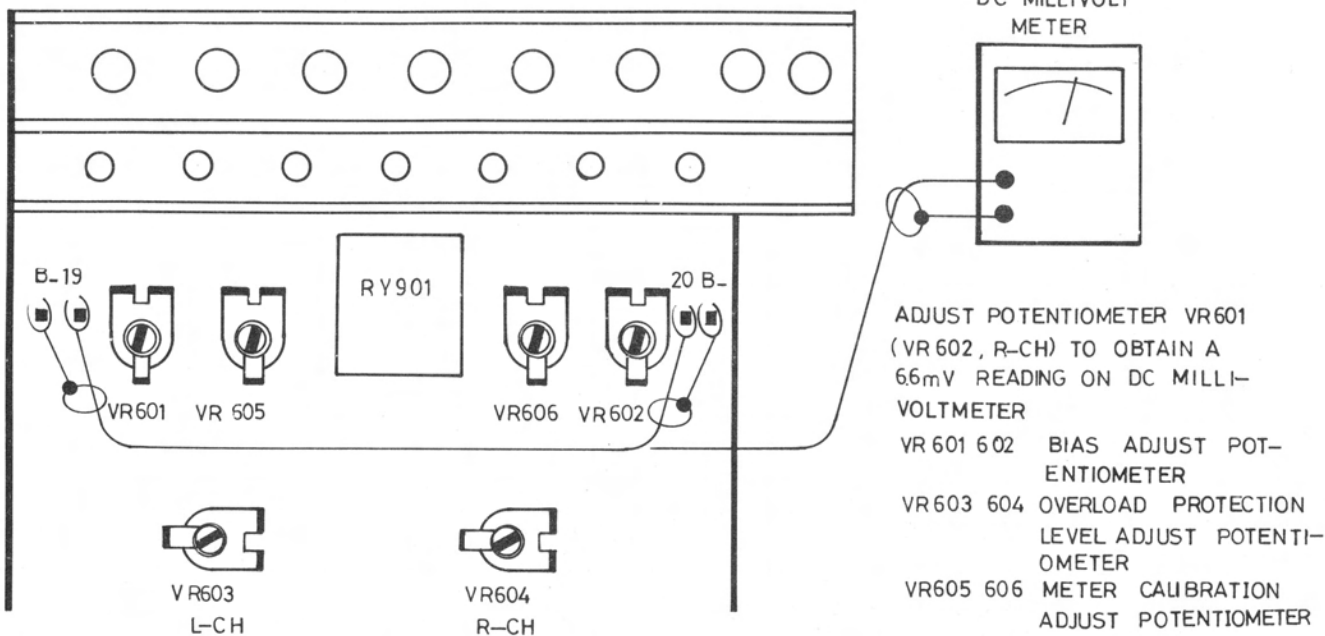


Fig. 1. Power Amplifier Bias Adjustment Hook-up

Power Amplifier Bias Adjustment Procedure

Note: Prior to BIAS ADJUSTMENT, run about 5 minutes with rated output (8ohm) and warm up Power Transistor and Heat Sink.
Prior to adjustment, move VR601 and 602 potentiometer one full turn clockwise.

Instruments: DC milli-voltmeter

1. Set volume control to minimum (i.e. no signal input).

2. Connect the plus lead of a DC millivoltmeter to Test Point No.19 and minus lead to B-.
3. Adjust potentiometer VR601 to obtain a 6.6mV reading on DC millivoltmeter.
4. Repeat the above step 1 and 2, for Right Channel (use Test Point No.20 and potentiometer VR602).

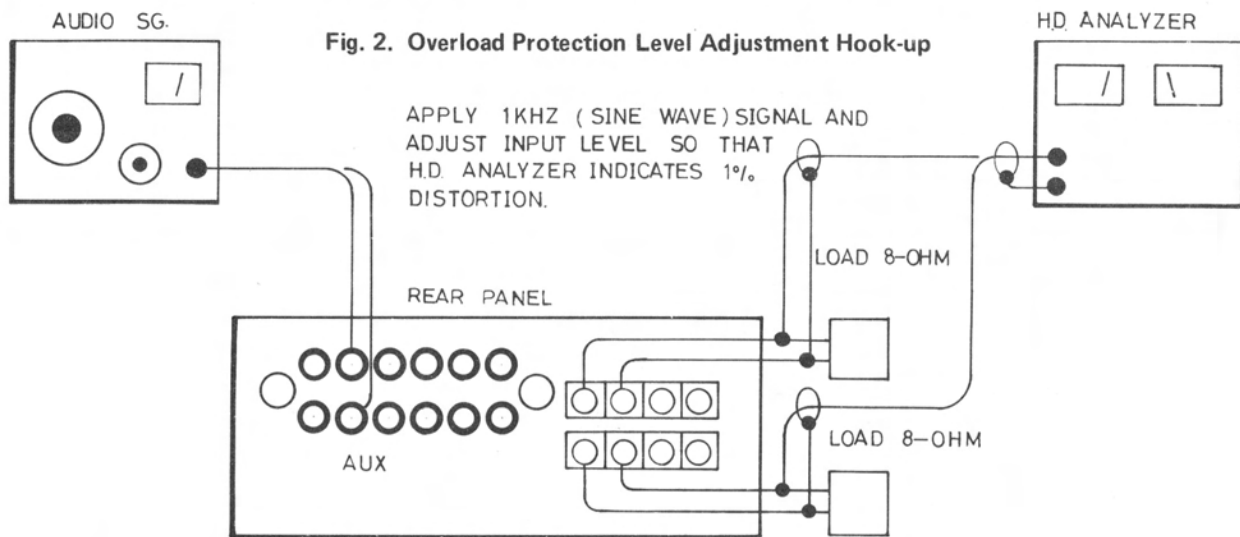


Fig. 2. Overload Protection Level Adjustment Hook-up

Overload Protection Level Adjustment Procedure

Instruments: Audio Generator and H.D. Analyzer

- Be sure to make this adjustment with one channel driven.
 - Set Function Selector to AUX position.
 - Set potentiometers VR603 and 604 to clockwise position before starting this procedure.
1. Connect 4-ohm 100watts load resistor to output terminals (speaker-A) "L" or "R", then connect H.D. Analyzer in parallel.
 2. Connect Audio Generator to AUX input terminal

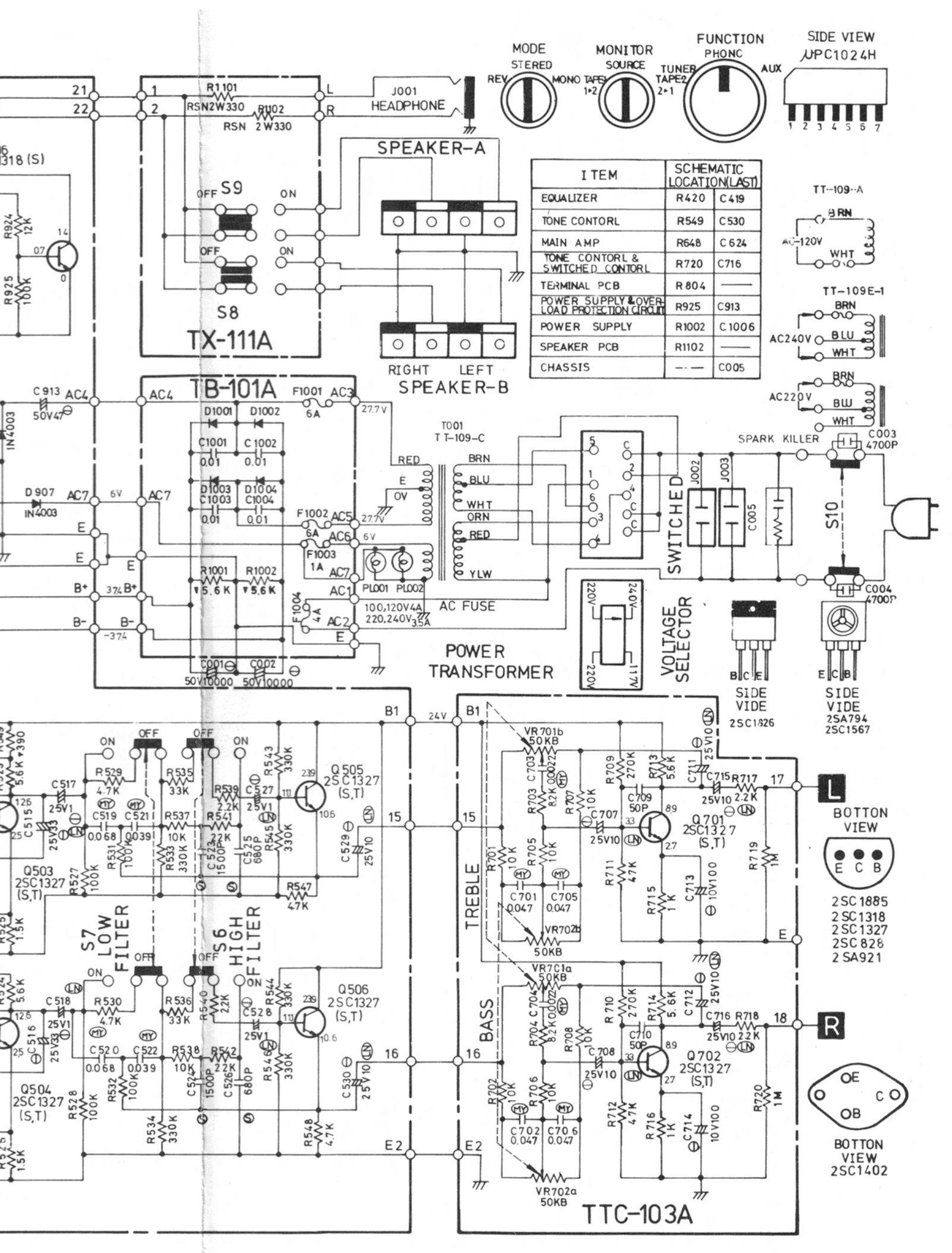
"L" or "R" and apply 1KHz (sine wave) signal. Adjust input level so that reading on H.D. Analyzer is 1% distortion.

3. Turn potentiometer VR603 or 604 so that the Protection Relay is disengaged.
4. Adjust input level to confirm that the Relay remains activated when the output distortion is 0.1%.
5. Proceed the above step from 2. to 4. for the other channel.

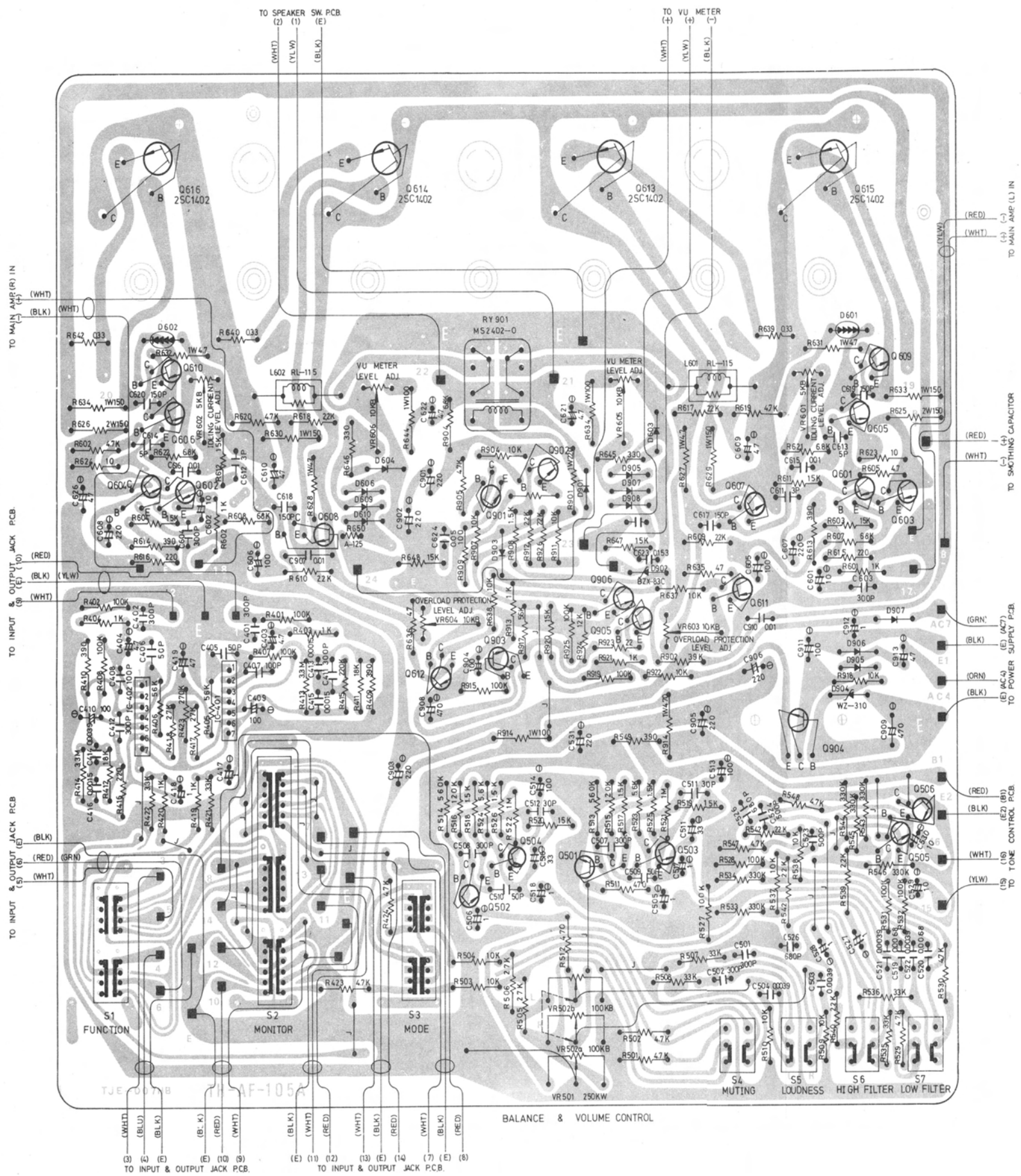
Repair Parts List

Schematic Location	Parts No.	Description
TRANSISTORS, DIODES AND IC'S		
Q501-504	301201134	2SC1327 (S,T), Flat Amp.
Q505, 506	301201134	2SC1327 (S,T), Tone Amp.
Q601-604	301001134	2SC750 (1)-E, Differential Amp.
	301001145	2SA921 (S,T), Differential Amp.
Q605, 606	301201164	2SC1885 (S), Pre-driver
Q607, 608	301201150	2SC1567 (R,S), Driver
Q609, 610	301001135	2SA794 (R,S), Driver
Q611, 612	301001134	2SA750 (1)-E, Overload Protection
Q613-616	301201139	2SC1402, Power Amp.
Q901	301201134	2SC1327 (S,T), Overload Protection
Q902	301001145	2SA921 (S,T), Overload Protection
Q903	301201115	2SC828 (R), Overload Threshold
Q904	301201169	2SC1826, Power Regulator
Q905	301201115	2SC828 (E), Overload Threshold
Q906	301201155	2SC1318 (S), Protection Relay Driver
D601, 602	300212009	STV-4H, Temperature Compensator
D603, 604	300111010	1S2473, VU Meter Rectifier
D605-610	300111008	1K188, VU Meter Rectifier
D901	300111010	1S2473, Relay Overload Protection
D902	300313023	BZX83C, Zener Regulator, 12V 1/2W
D903	300111010	1S2473, Auto Switching
D904	300313021	WZ-310, Zener Regulator, 31V 1W
D905-907	300919026	1N4003, Rectifier
D1001, 1004	300919028	1N5404, Rectifier
TR601, 602	511001111	TD5-A125, Thermistor
IC401, 402	303452164	μPC1024H, Phono Equalizer Amp.
VARIABLE RESISTORS AND COILS		
VR501, 502	525121134	250KW + 100KBx2, Balance & (1 Set) Volume Control
VR601, 602	510502152	5KB, Idling Current Level Adj.
VR603, 604	510502153	10KB, Overload Protection Level Adj.
VR605, 606	510502153	10KB, VU Meter Level Adj.
VR701, 702	525101142	50KBx2, Treble & Bass Control
L601, 602	228641126	Anti-Parasitic
T001	201001428	Transformer, Power Supply (120V only)
	205001428	Transformer, Power Supply (Multi-Voltage)
	206001428	Transformer, Power Supply (220V, 240V)

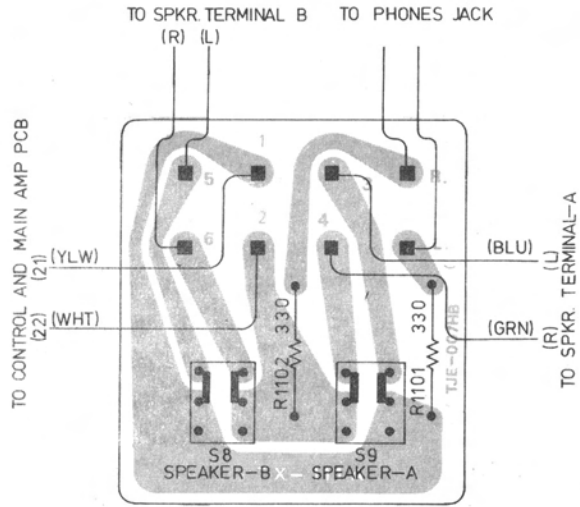
Schematic Location	Parts No.	Description
SWITCHES		
S1	601011304	Switch, Function Selector
S2	601011307	Switch, Tape Monitor Selector
S3	601011306	Switch, Mode Selector
S4, 5, 6, 7 (1 Set)	614040824	Switch, Push 4-Key, Muting, Loudness, High-Filter and Low-Filter
S8, 9	614020402	Switch, Push 2-Key, Speaker B and A
S10	614010127	Switch, Power Supply
	614010118	Switch, Power Supply (for UL Approve)
OTHERS		
RY901	240111225	Relay, Overload Protector
PL001, 002	359101116	Lamp, 6.3V, 250mA, Meter Illumination
F1001, 1002	341220060	Fuse, 6A, AC Circuit Protection (Mini Size)
	345220060	(Mini Size with "S" "D" Mark)
	345250063	(Mini Size with "S" "D" Mark)
F1003	341220010	Fuse, 1A, Lamp Protection (Mini Size)
	345220010	(Mini Size with "S" "D" Mark)
	345250010	(Mini Size with "S" "D" Mark)
F1004	341220040	Fuse, 4A, AC Protection (100V, 120V)
	341220025	Fuse, 2.5A, AC Protection (220V, 240V)
	345220025	Fuse, 2.5A, AC Protection (Mini Size)
M001, 002	231310080	Watt Meter
J001	626110023	Jack, Headphone
	141610312	Control/Main Amp. PCB Ass'y
	141710292	Tone Control Amp. PCB Ass'y
	141810767	Input and Output Jack PCB Ass'y
	111911390	Front Panel Ass'y
	624300210	Jack, 10P (PCB Type)
	624100104	Jack, 4P, (MAIN/PRE Amp.)
	642400109	Push Terminal, 4P, Speaker
	648211121	Voltage Selector
	138011288	Upper Cover
	124011294	Bottom Board
	116310218	Knob (for Function Selector)
	116310208	Knob (for Treble, Bass Control)
	116310219	Knob (for Mode, Monitor Control)
	116310202	Knob (for Volume)
	116310220	Knob (for Balance Control)
	116210039	Push Button



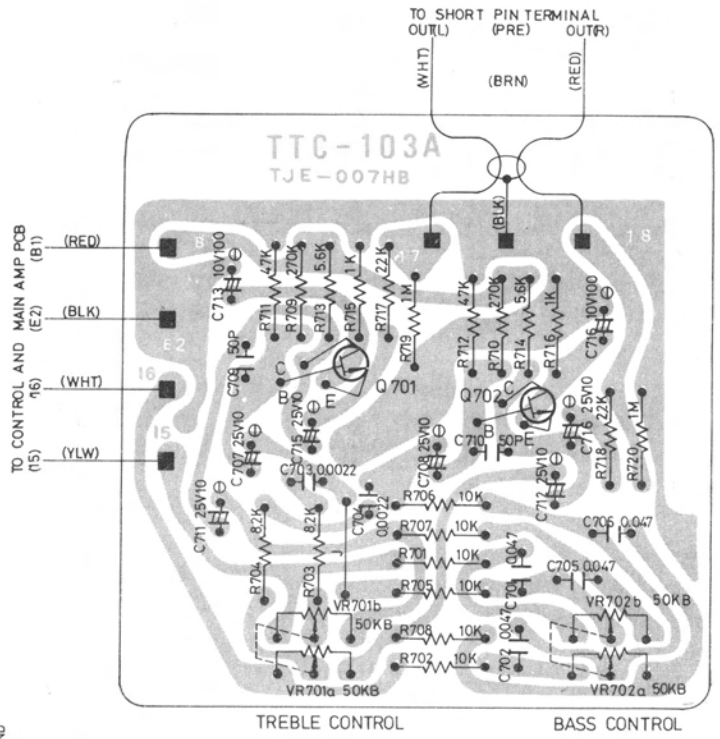
Control and Main Amplifier Circuit Board Diagram



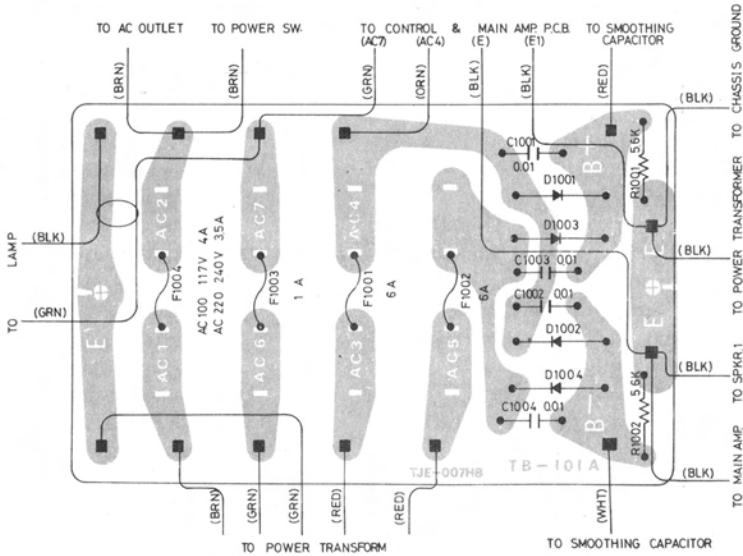
Speaker Switching Circuit Board Diagram



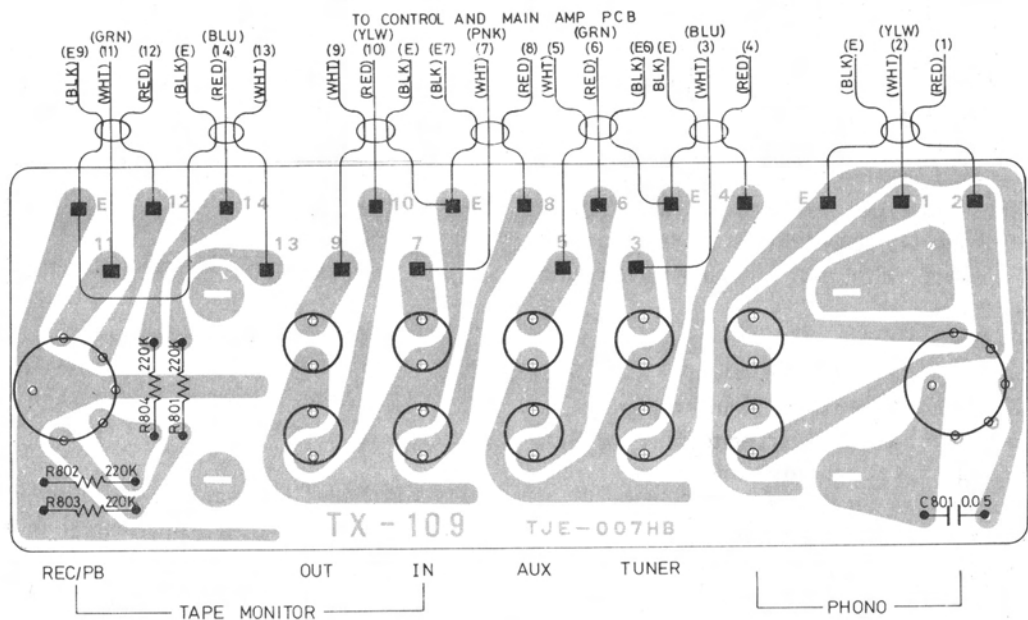
Tone Control Circuit Board Diagram



Fuse Circuit Board Diagram



Input and Output Jack Circuit Board Diagram



Troubleshooting Guide

I. Unit Inoperative

A. Meter lamp do not light

1. Power switch may be faulty, or
2. Power transformer may be faulty.

B. Meter lamp light, check to see if AC Fuse F901 is blown

1. If AC Fuse is blown.
 - a. Rectifier D1001, 1002, 1003, 1004, 905, 906 or 907 may be shorted, or
 - b. Capacitor C1001, 1002, 1003, 1004, 907 or 910 may be faulty.
2. If AC Fuse is OK, check to see if Overload Protection Relay, RY901, operates properly.
 - a. If the Relay does not operate.
 - 1) Main Amp. Circuit may be shorted, or
 - 2) Output Circuit (including speaker system) may be shorted, or
 - 3) Relay, RY901, may be faulty, or
 - 4) Relay switch (gang with Power Switch) may be faulty.

II. Left or Right channel inoperative, check to see if there is a signal at PRE OUT Terminal

A. If there is a signal.

1. Main Amp. Circuit may be faulty, or
2. PRE-MAIN Connector may be faulty, or
3. Contact point of Protection Relay may be faulty.

B. If there is no signal.

1. Check the each transistor of preamplifier circuits.
2. Check the each coupling capacitor it pre-amplifier circuits.

III. Overload protector inoperative

A. If Relay is disengaged or comes ON and OFF at the peak of signal.

1. There may be excessive input, or
2. Overload Detector Level may be miss-aligned.

B. If Relay is disengaged or comes ON and OFF at the small signal.

1. Overload Detector Level may be miss-aligned.

C. If Relay does not deactivate at the excessive input or short-circuit of output circuit.

1. Transistor Q906 for driving Relay may be short-circuited.

IV. Hum and Noise

A. If there is hum at minimum volume

1. Check each transistor in Main Amp.
2. Check each coupling capacitor in Tone Amp.

B. If there is noise at minimum volume

1. Check each transistor in Tone Amp.
2. Check each coupling capacitor in Tone Amp.
3. Check each resistor at collector, base and emitter ends of each transistor.

C. If there is Hum or Noise only in Phone Amp.

1. IC401 (IC402 for R-ch) may be faulty, or
2. Capacitor C401, 409 or 417 (C402, 410 or 418 for R-ch) may be faulty.

