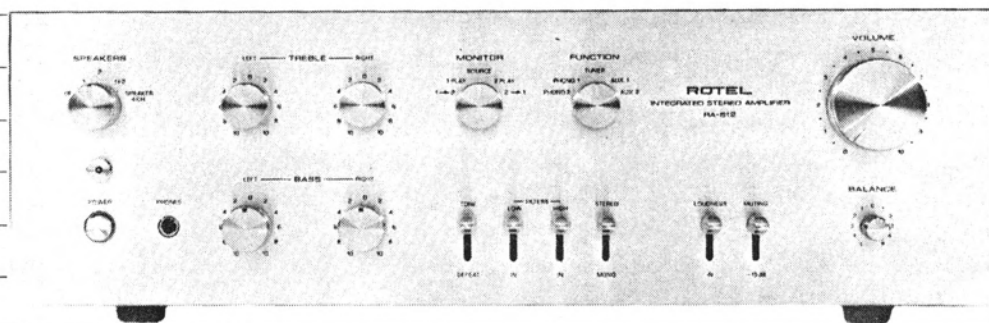


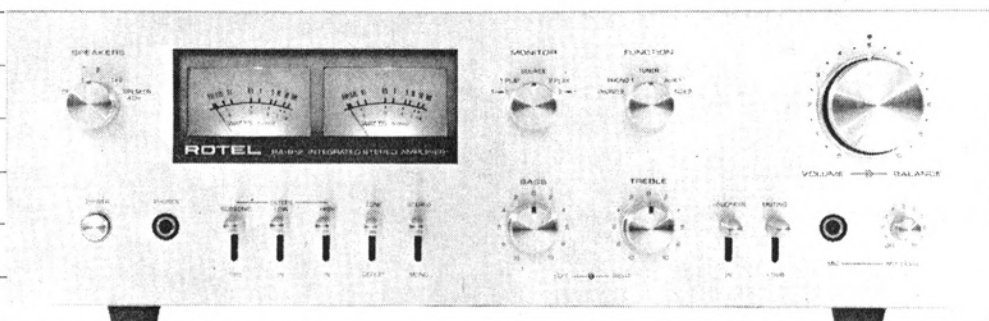
ROTEL

RA-612 — RA-812

INTEGRATED STEREO AMPLIFIER



RA-612



RA-812

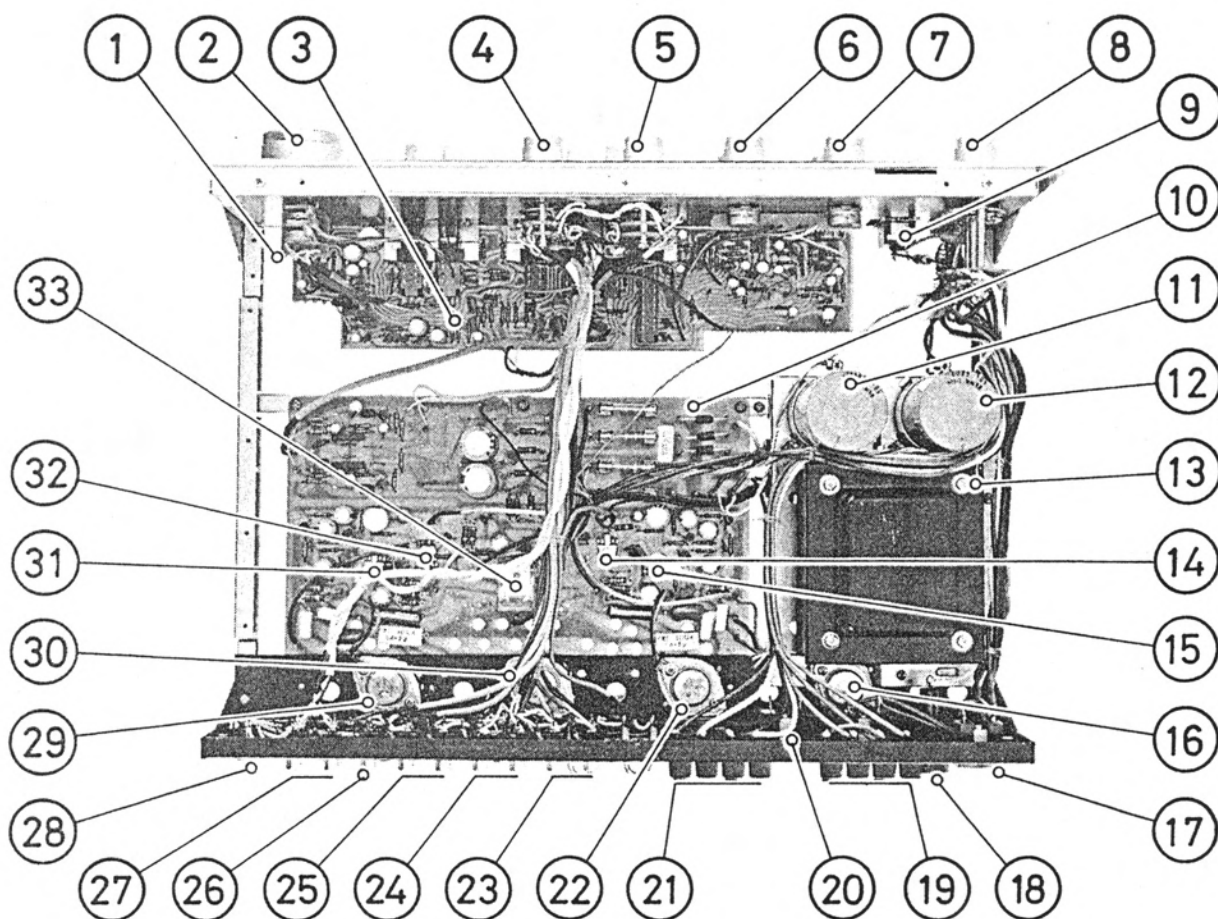
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TECHNICAL MANUAL

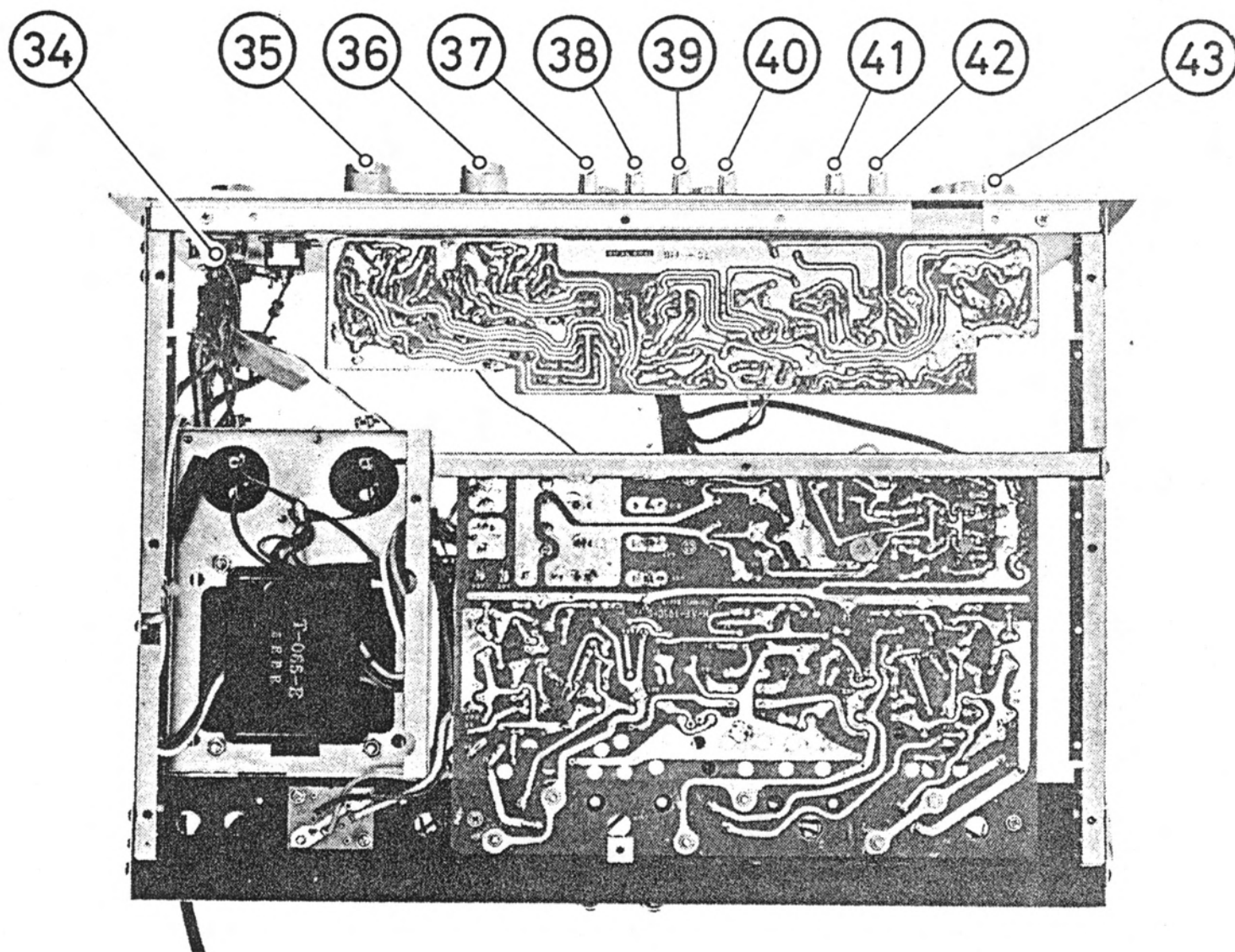
CHASSIS LAYOUT RA-612 TOP VIEW

- | | |
|--|---|
| 1. Volume Control Circuit Board | 18. AC Fuse |
| 2. Volume Control | 19. Speaker-2 Terminals |
| 3. Tone Control Amp. Circuit Board | 20. AC Outlet |
| 4. Function Selector Switch | 21. Speaker-1 Terminals |
| 5. Monitor Switch | 22. Q611, Power Transistor (Left) |
| 6. Treble Control (Right) | 23. Tape Monitor-2 Terminals |
| 7. Treble Control (Left) | 24. Tape Monitor-1 Terminals |
| 8. Speakers Switch | 25. AUX Terminals |
| 9. Headphone Jack | 26. Tuner Input Terminals |
| 10. Main Amp. Circuit Board | 27. Phono Input Terminals |
| 11. C001, Smoothing Capacitor | 28. Phono Input Din Jack |
| 12. C002, Smoothing Capacitor | 29. Q613, Power Transistor (Right) |
| 13. Power Transformer | 30. Q612, Power Transistor (Right) |
| 14. VR603, Overload Protection Level Adj. (Left) | 31. VR602, Bias Adj. (Right) |
| 15. VR601, Bias Adj. (Left) | 32. VR604, Overload Protection Level Adj. (Right) |
| 16. Q001, Power Transistor, (Left) | 33. RY601, Overload Protection Relay |
| 17. AC Outlet | |



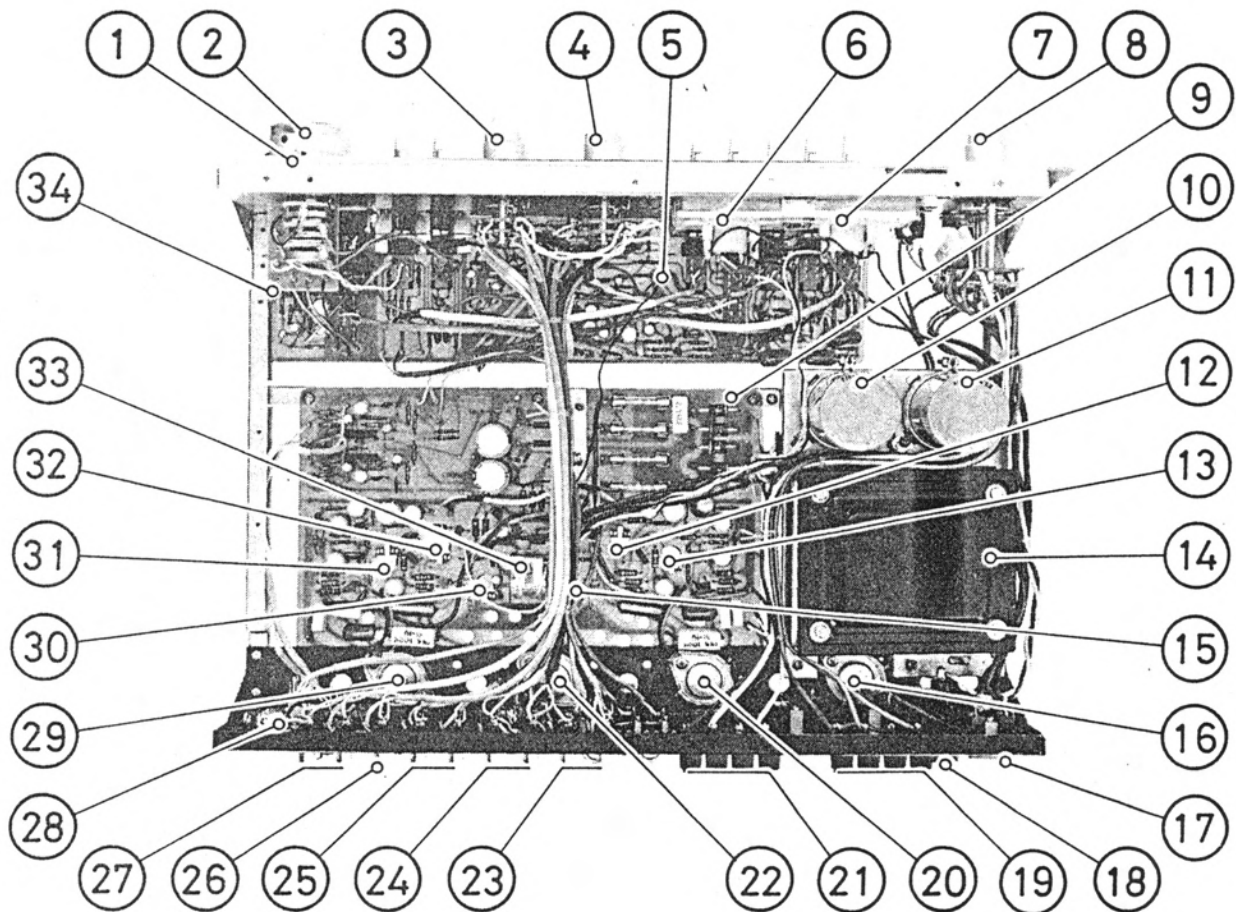
CHASSIS LAYOUT (RA-612) BOTTOM VIEW

- 34. Power Supply Switch
- 35. Bass Control (Left)
- 36. Bass Control (Right)
- 37. Tone Defeat Switch
- 38. Low Filter Switch
- 39. High Filter Switch
- 40. Mono Switch
- 41. Loudness Switch
- 42. Muting Switch
- 43. Balance Control



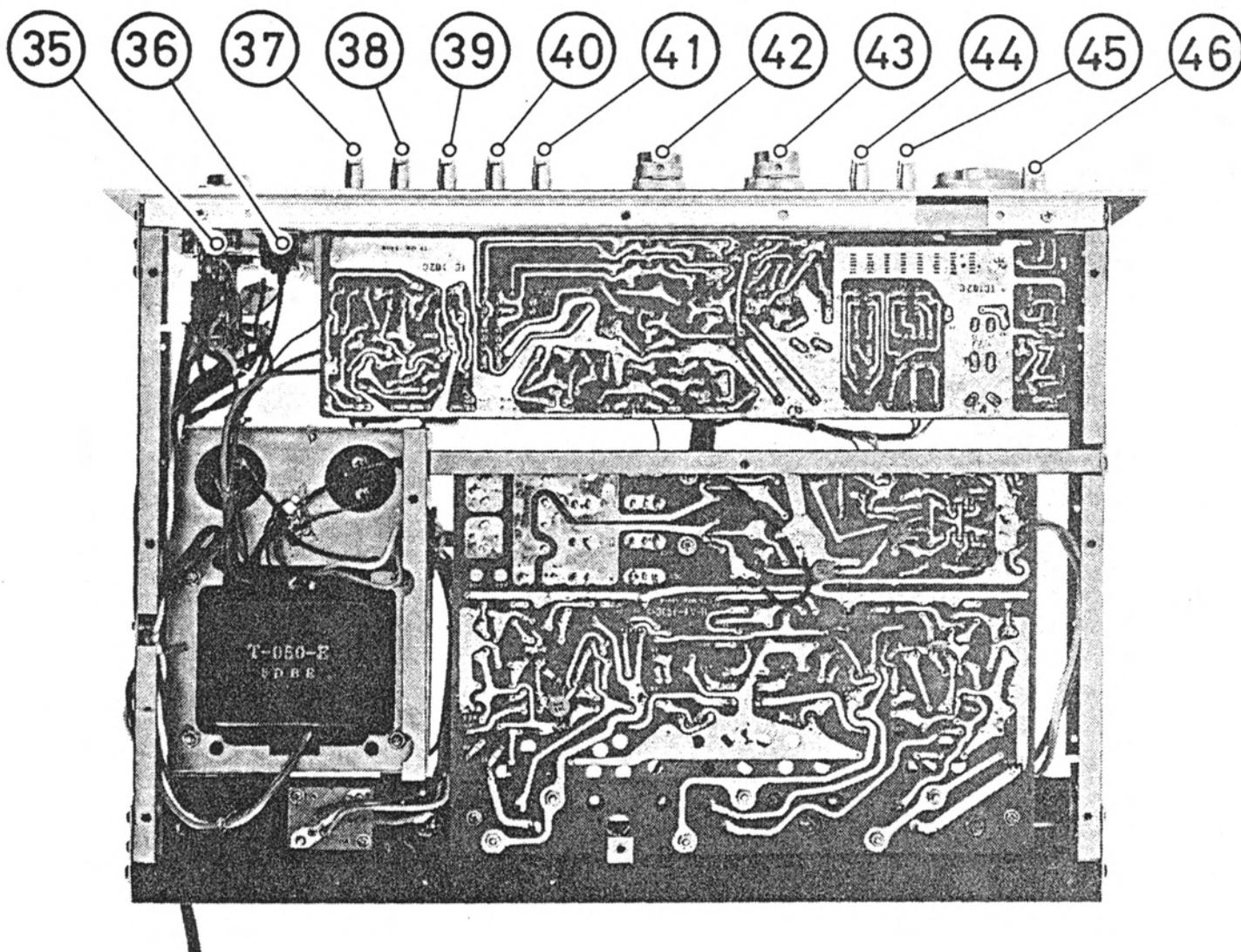
CHASSIS LAYOUT (RA-812) TOP VIEW

- | | |
|--|---|
| 1. Balance Control | 18. AC Fuse |
| 2. Volume Control | 19. Speaker-2 Terminals |
| 3. Function Selector | 20. Q611, Power Transistor (Left) |
| 4. Monitor Switch | 21. Speaker-1 Terminals |
| 5. Tone Control Amp. Circuit Board | 22. Q612, Power Transistor (Right) |
| 6. VU Meter (Right) | 23. Tape Monitor-2 Terminals |
| 7. VU Meter (Left) | 24. Tape Monitor-2 Terminals |
| 8. Speaker Switch | 25. AUX Terminals |
| 9. Main Amp. Circuit Board | 26. Tuner Input Terminals |
| 10. C001, Smoothing Capacitor | 27. Phono Input Terminals |
| 11. C002, Smoothing Capacitor | 28. Phono Input Level Switch Circuit Board |
| 12. VR603, Overload Protection Level Adj. (Left) | 29. Q613, Power Transistor (Right) |
| 13. VR601, Bias Adj. (Left) | 30. VR606, VU Meter Calibration Adj. (Right) |
| 14. Power Transformer | 31. VR602, Bias Adj. (Right) |
| 15. VR605, VU Meter Calibration Adj. (Left) | 32. VR604, Overload Protection Level Adj. (Right) |
| 16. Q001, Power Transistor (Left) | 33. RY601, Overload Protection Relay |
| 17. AC Outlet | 34. Volume Control Circuit Board |



CHASSIS LAYOUT (RA812) BOTTOM VIEW

- 35. Power Switch
- 36. Headphone Jack
- 37. Subsonic Switch
- 38. Low Filter Switch
- 39. High Filter Switch
- 40. Tone Defeat Switch
- 41. Mono Switch
- 42. Bass Control
- 43. Treble Control
- 44. Loudness Switch
- 45. Muting Switch
- 46. Microphone Volume Control and 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 and IC's.
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 hfe rank 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.

POWER AMPLIFIER BIAS ADJUSTMENTS

Instrument: DC milli-volt meter

- Set volume Control to minimum position.
 - Set potentiometers VR601 and 602 to Clockwise position before starting this procedure.
1. Connect the plus lead of a DC milli-volt meter to test point T3 (on main amp., pcb) and minus lead to test point T1.

2. Adjust the potentiometer VR601 to obtain a 15mV reading on the DC milli-volt meter (see Figure 1.).
3. Repeat the above steps 1 and 2 for Right Channel. (use test points Pin No.T4, T2 and potentiometer VR602.)

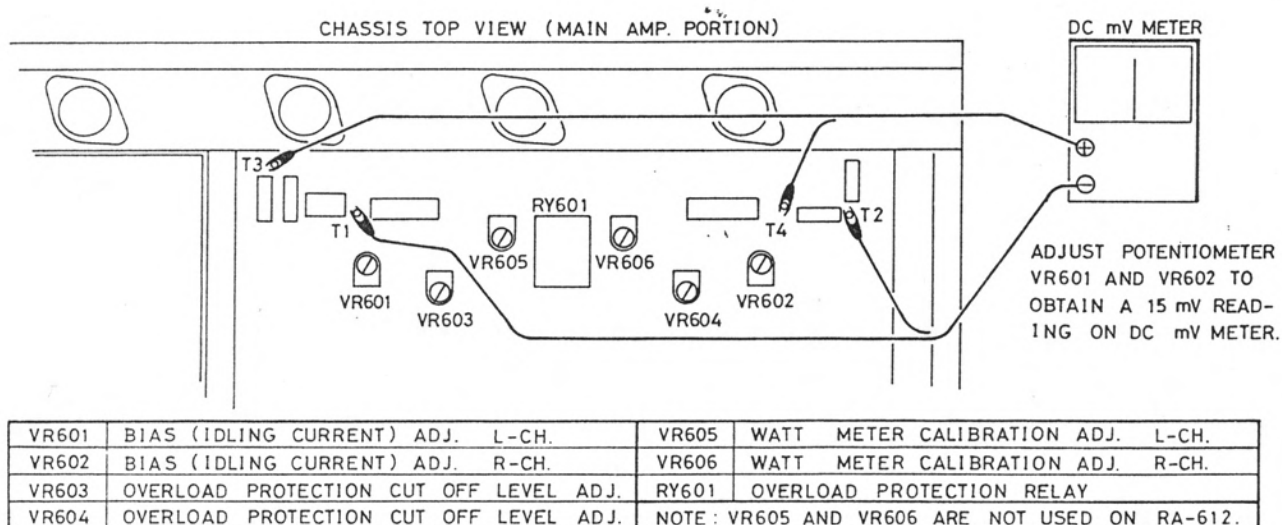


Figure 1. Bias (Idling Current) Adjustment Hook-up

OVERLOAD PROTECTION LEVEL ADJUSTMENT

Instruments: Audio Generator and AC VTVM
Set Function Selector to AUX-1 position.
Be sure to make this adjustment with one channel driven.

1. Connect 4Ω 100W resistor to output terminal (speaker-1) (L) or (R), then connect AC VTVM in parallel.
2. Turn potentiometer for level adjustment VR603 (L-ch.) fully clockwise and VR604 (R-ch.) fully counterclockwise.
3. Connect audio generator to AUX-1 input terminal (L) or (R) and apply 1KHz (sine wave) signal. Adjust input level so that reading on AC VTVM is $21V^{*1}$.

4. Turn potentiometer VR603 or VR604 so that the Protection Relay is disengaged (when indication on AC VTVM is zero).
5. Adjust input level to confirm that the Relay remains activated when the output level is $19V^{*2}$.
6. Proceed the above steps from 2 through 5 for the other channel.

*1 In RA-612, VR603 and VR604 should be so adjusted that the Relay is disengaged when the output level is $20V/4\Omega$.

*2 In RA-612, after finishing the adjustment, check that the Relay remains activated when the output level is $17.5V$.

METER CALIBRATION ADJUSTMENT (RA-812 only)

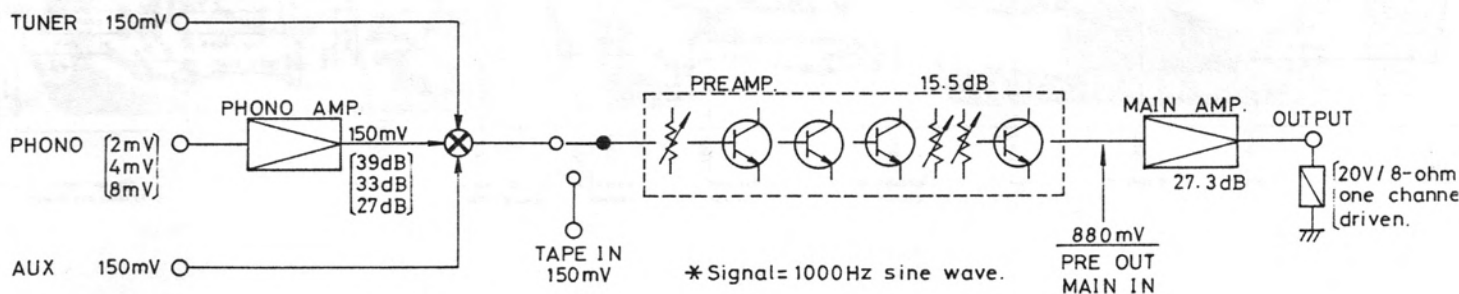
Instruments: Audio Generator and AC VTVM.
Set Function Selector to AUX-1 position.
Set Bass and Treble to "O" (Center) position or Tone Switch to Defeat position, and Muting, Loudness, Low and High Filter Switches to "OUT" position.

1. Connect 8Ω 50W resistors to right and left Speaker-1 terminals.
2. Connect AC VTVM in parallel with this 8Ω load of (L) or (R) channel.

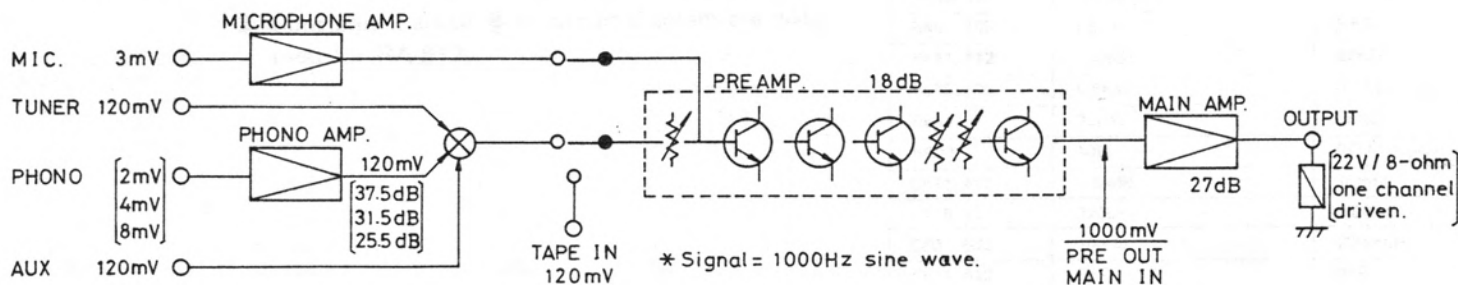
3. Connect Audio Generator to input terminal of AUX-1 (L) or (R) channel and apply 1KHz (sine wave) signal. Adjust input level so that reading on AC VTVM is $2.83V$ ($1W/8\Omega$).
4. Turn and adjust VR605 (L-ch.) or VR606 (R-ch.) so that VU meter indicates 1W.
5. Then, increase input level by 10dB (output $10W = 8.94V/8\Omega$) and make sure that reading on VU meter is 10W.

GAIN DIAGRAM

RA-612



RA-812



TROUBLE SHOOTING

I. Both channels inoperative

A. If pilot lamp (or meter lamp) does not light, check AC fuse and

1. If AC fuse is blown

- a. Rectifier D903, 904, 905 or 906 may be short-circuited, or
- b. Primary or secondary winding of power transformer may be short-circuited, or
- c. Capacitor C001 or 002 may be short-circuited.

2. If AC fuse is not blown (OK)

- a. Power switch may be faulty, or
- b. Primary winding of power transformer may be broken.

B. If pilot lamp (or meter lamp) does light, check +B and -B voltages.

1. If no voltage at +B and -B.

- a. Secondary winding of power transformer may be broken, or
- b. Rectifier D903, 904, 905 or 906 may be open-circuited.

2. If +B and -B voltages are present, check following item C.

C. Check if relay of Overload Protector is activated.

1. If relay is activated when power switch is on

- a. Contact of relay may be faulty.

2. If relay stays disengaged, check DC fuse

a. If DC fuse is blown

- (1) Main Amp. transistor Q601, 605, 609 or 611 may be faulty (or Q602, 606, 610 or 612 at R-ch.)

b. If DC fuse is not blown (OK)

- (1) Output circuit may be short-circuited, or
- (2) Relay may be faulty (disconnection of coil), or
- (3) Transistor Q614 may be faulty (open).

II. One channel inoperative

A. If DC fuse is blown

1. Main Amp. transistor Q603, 605, 607 or 001 (Q604, 606, 608 or 613 at R-ch.) may be faulty.

B. If DC fuse is not blown (OK), check if input signal is supplied to Main Amp. input terminal.

1. If input signal is not supplied to Main IN, terminal.

- a. Check all transistors in Tone Control Amp.
- b. Check all coupling capacitors in Tone Control Amp.

2. If input signal is supplied properly.

- a. C601 (R-ch. C602) may be faulty, or
- b. Contact of Overload Protector Relay may be faulty.

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 Q614 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.

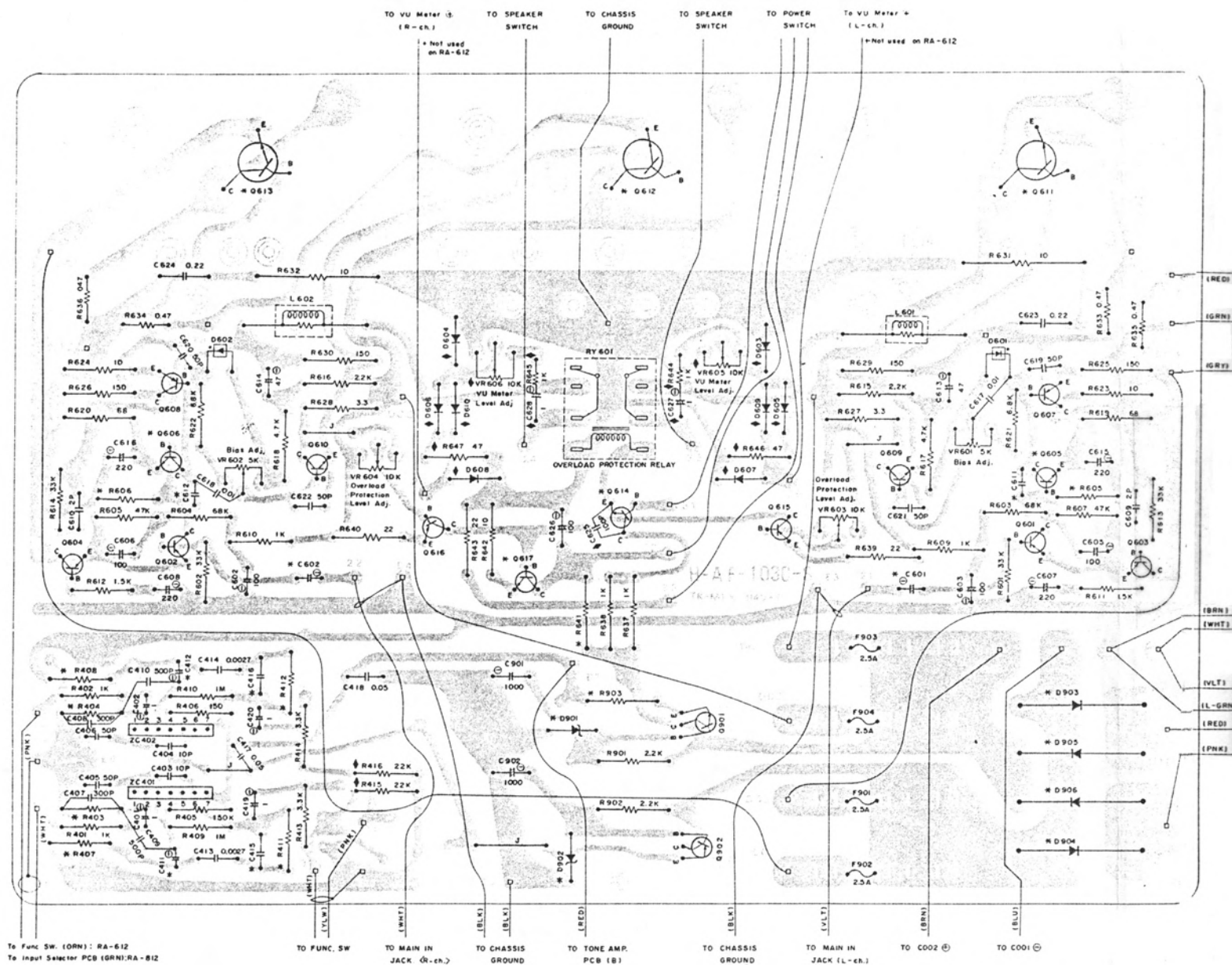
C. If there is hum or noise only in Phono Amp.

1. IC401 or IC402 may be faulty, or
2. Capacitor C401, 411 or 419 (R-ch. C402, 412 or 420) may be faulty.

D. If there is hum or noise only in MIC. Amp.

1. IC501 may be faulty, or
2. Capacitor C550, 553 or 555 may be faulty.

RA-812/RA-612 PHONO, MAIN AMP. & POWER SUPPLY CIRCUIT BOARD DIAGRAM

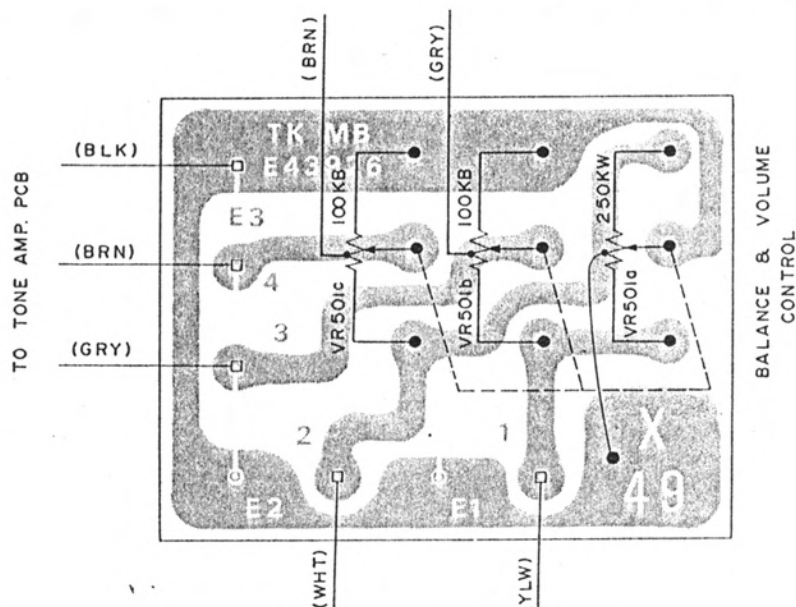


Notes:

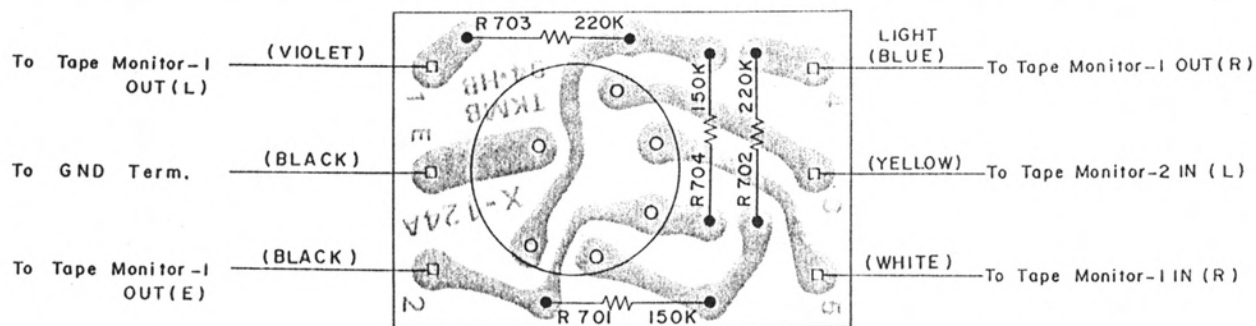
1. Constants marked * in circuit diagram differ for RA-612 and RA-812 as table right-hand.
2. Constants marked ♦ in circuit diagram are not used for RA-612.

SYMBOL NO.	RA-612	RA-812
R403, 404	47K Ω	100K Ω
R407, 408	1.5K Ω	5.6K Ω
R411, 412	100K Ω	82K Ω
R605, 606	5.6K Ω	4.7K Ω
R641	33K Ω	56K Ω
R903	10 Ω	0 Ω (Jumper)
C411, 412	4.7mfd	10mfd
C415, 416	820pF	0.001mfd
C601, 602	10mfd	220mfd
C611, 612	5pF	2pF
D901, 902	WZ-162 or WZ-160 (16V)	WZ-210 (?)
D903 ~ 906	Hi-Fi SPECIAL	ERD03-04

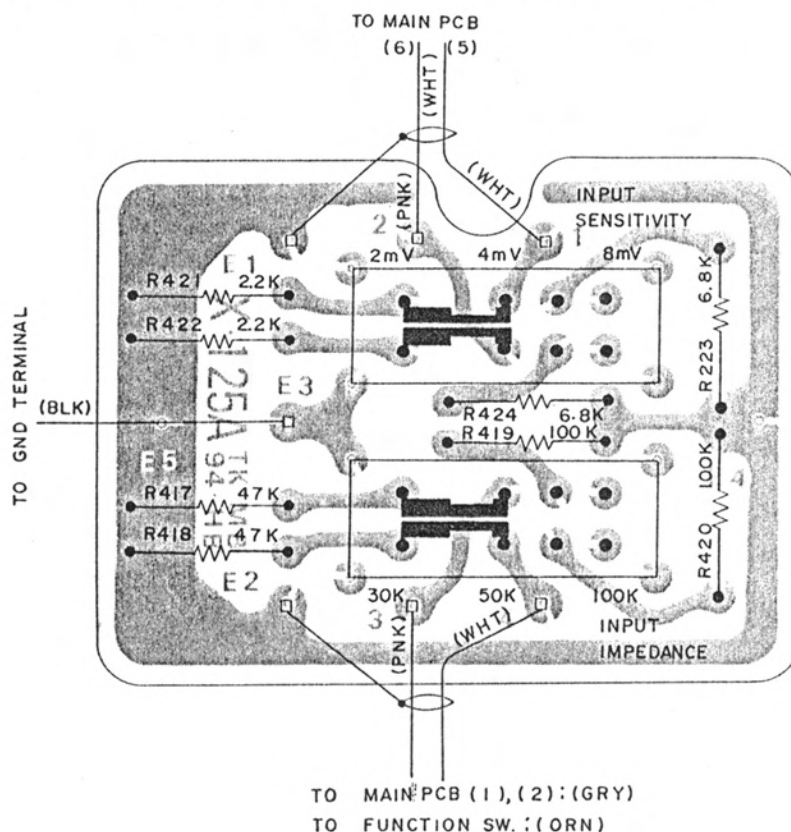
VOLUME CONTROL CIRCUIT BOARD DIAGRAM



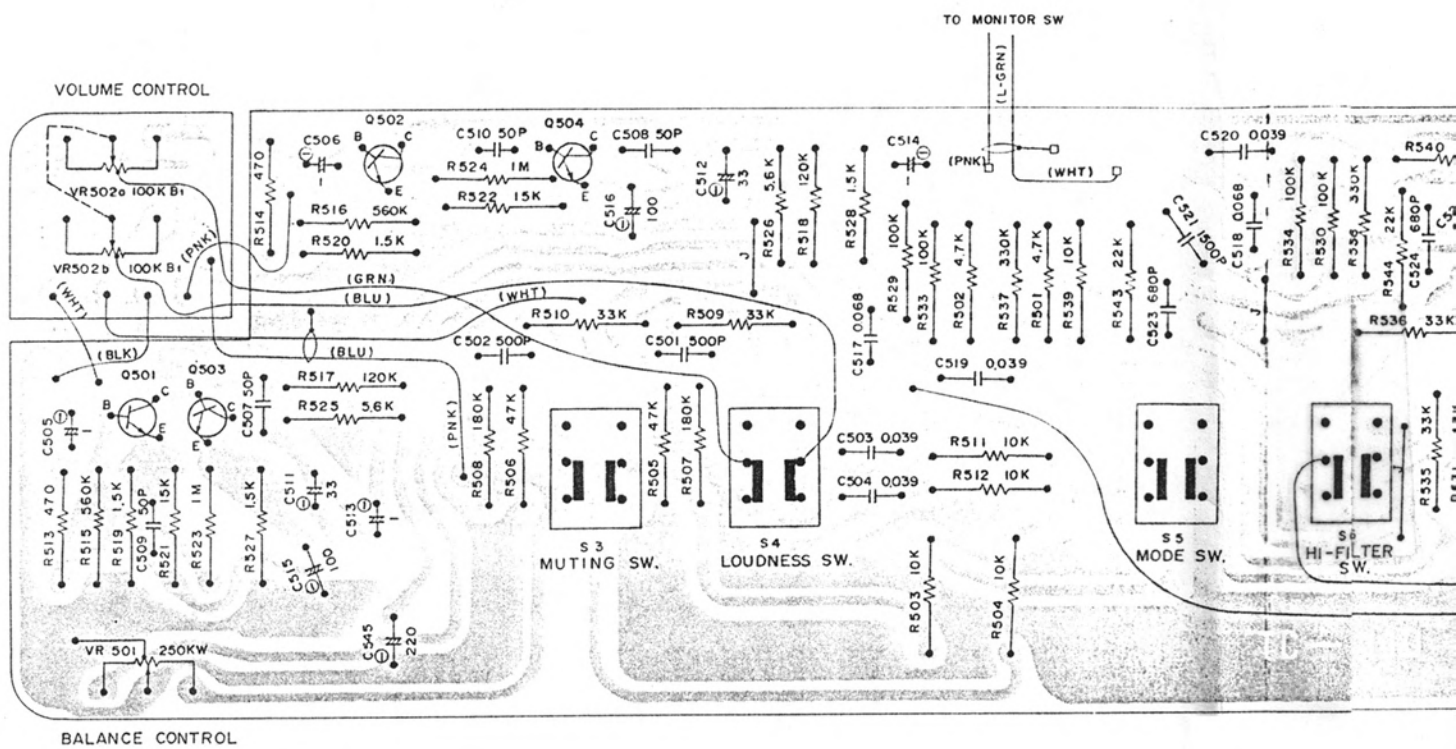
DIN TAPE MONITOR CIRCUIT BOARD DIAGRAM



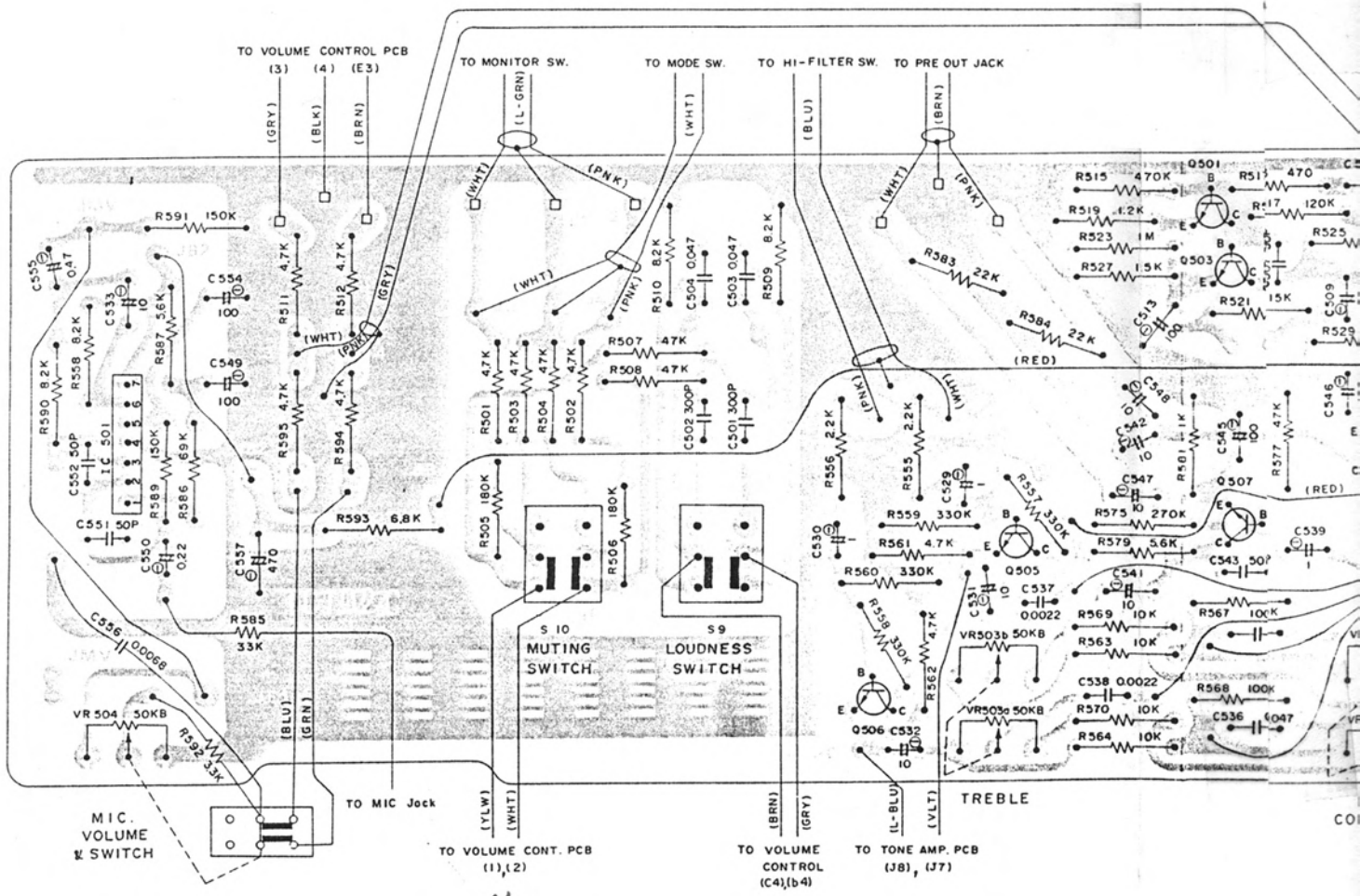
PHONO INPUT SELECTOR CIRCUIT BOARD DIAGRAM



RA-612 TONE CONTROL AMP. CIRCUIT BOARD DIAGRAM



RA-812 TONE CONTROL AMP. CIRCUIT BOARD DIAGRAM



AM

SW

(WHT)

R539

R543

C523

S5

S6

S7

S8

C520

C518

R534

R530

R539

R540

R541

R536

R542

C533

C534

C538

C540

C536

C530

C532

C537

C541

C542

C543

C544

C545

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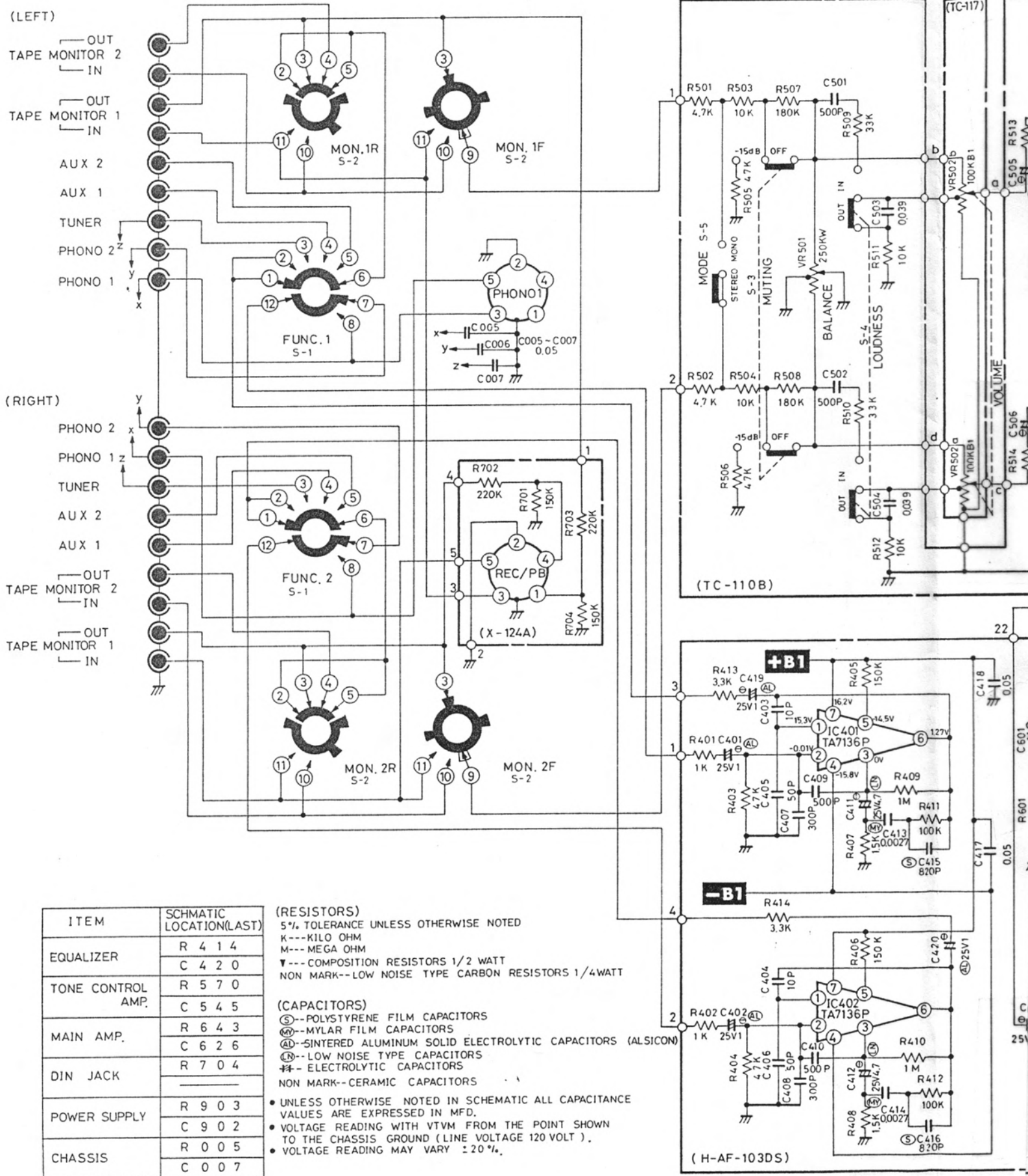
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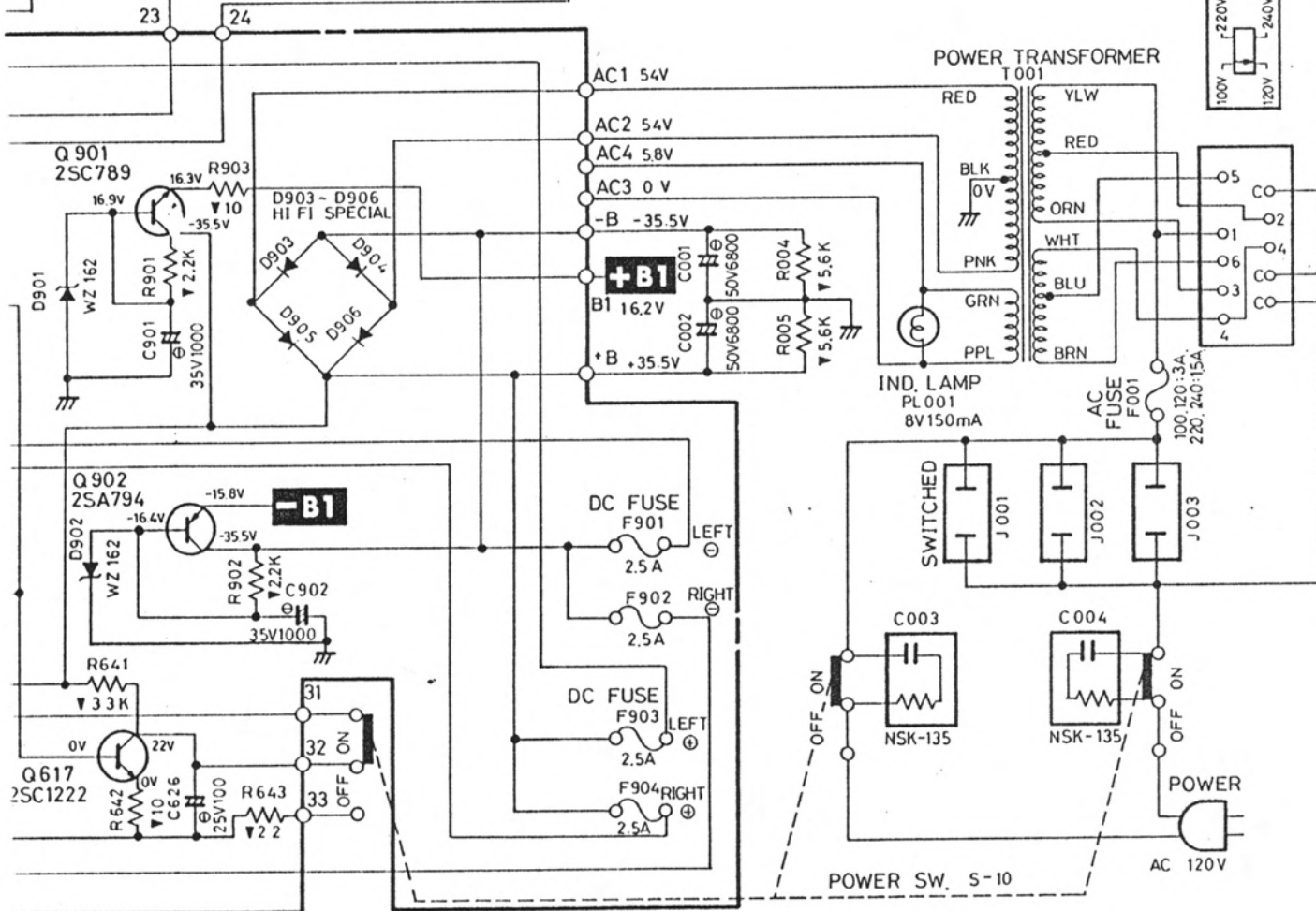
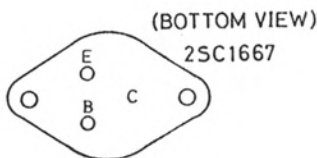
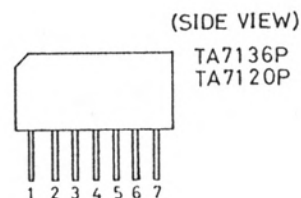
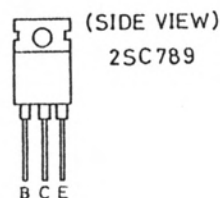
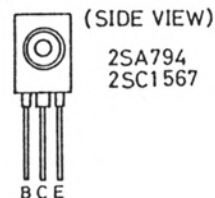
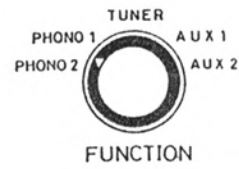
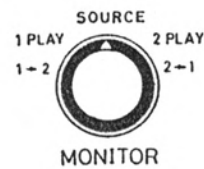
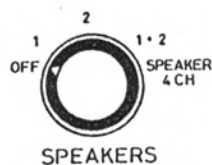
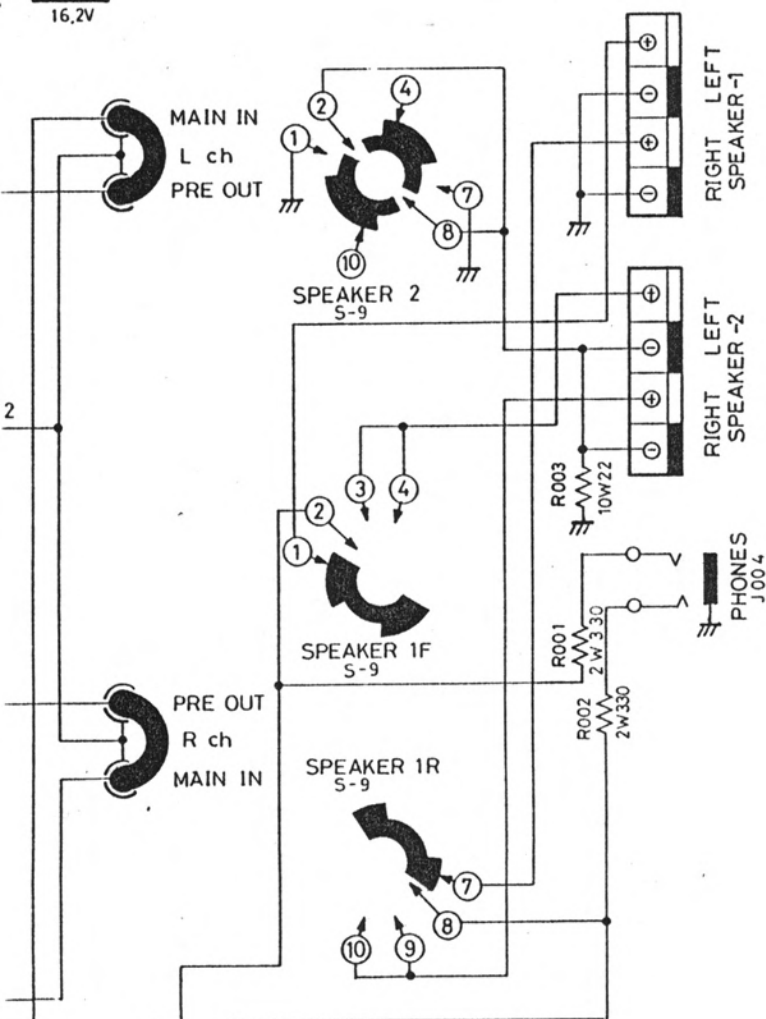
C891

RA-612 CHASSIS SCHEMATIC DIAGRAM

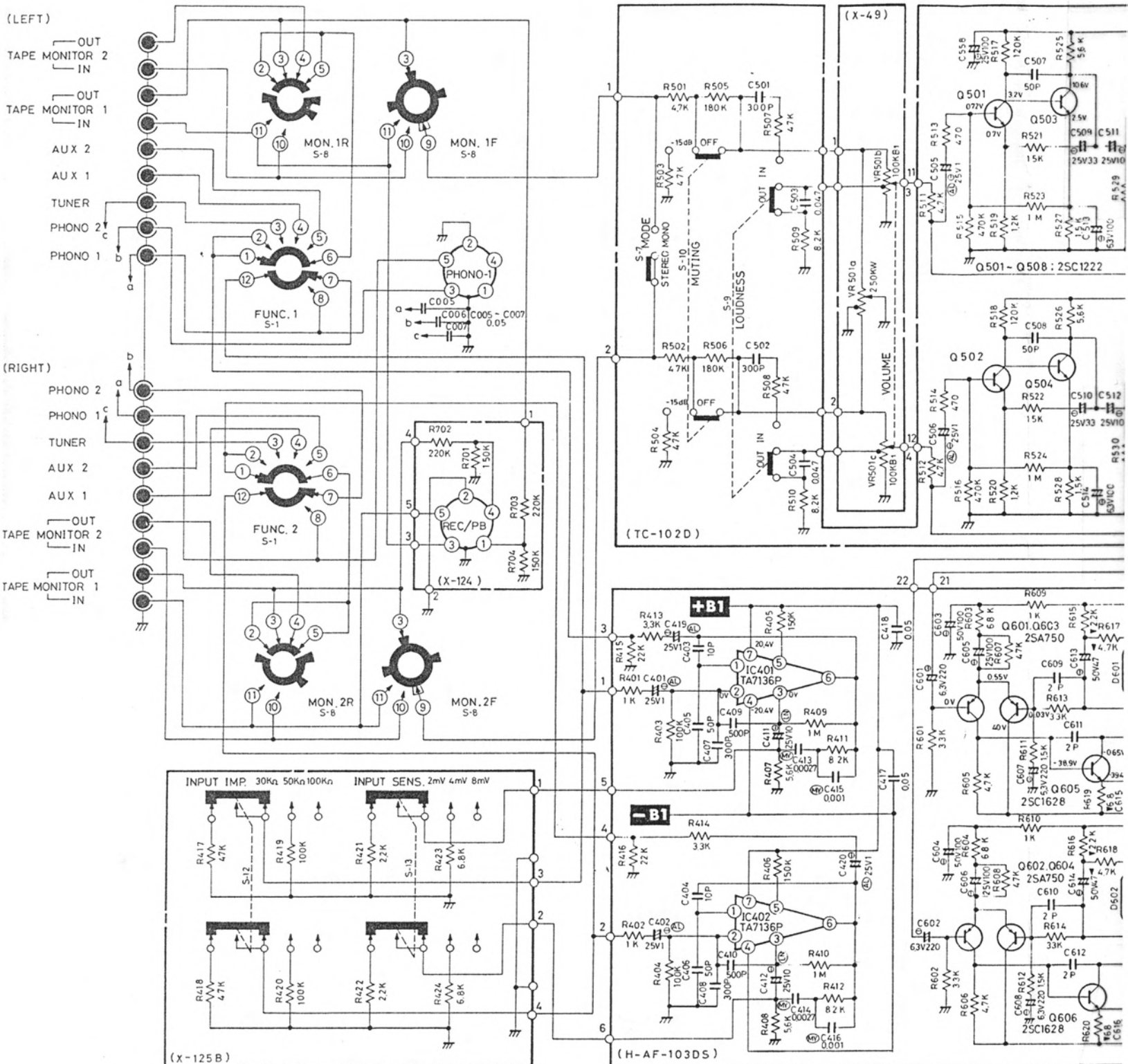


+B1

16.2V



RA-812 CHASSIS SCHEMATIC DIAGRAM



UNLESS OTHERWISE NOTED

RESISTORS 1/2 WATT
NOISE TYPE CARBON RESISTORS 1/4 WATT

FILM CAPACITORS
CAPACITORS
MINIMUM SOLID ELECTROLYTIC CAPACITORS (ALSICON)
TYPE CAPACITORS
C CAPACITORS
MIC CAPACITORS

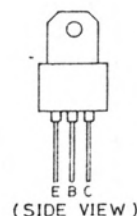
USE NOTED IN SCHEMATIC ALL CAPACITANCE
EXPRESSED IN MFD.

5 WITH VTVM FROM THE POINT SHOWN
GROUND (LINE VOLTAGE 120 VOLT),
5 MAY VARY $\pm 20\%$.

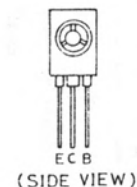
SPEAKERS

MONITOR

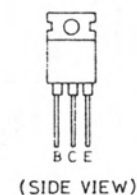
FUNCTION



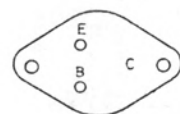
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2SA794
2SC1567

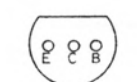


2SC789



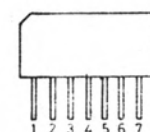
2SD427

(BOTTOM VIEW)



2SC1384
2SC1222
2SA750

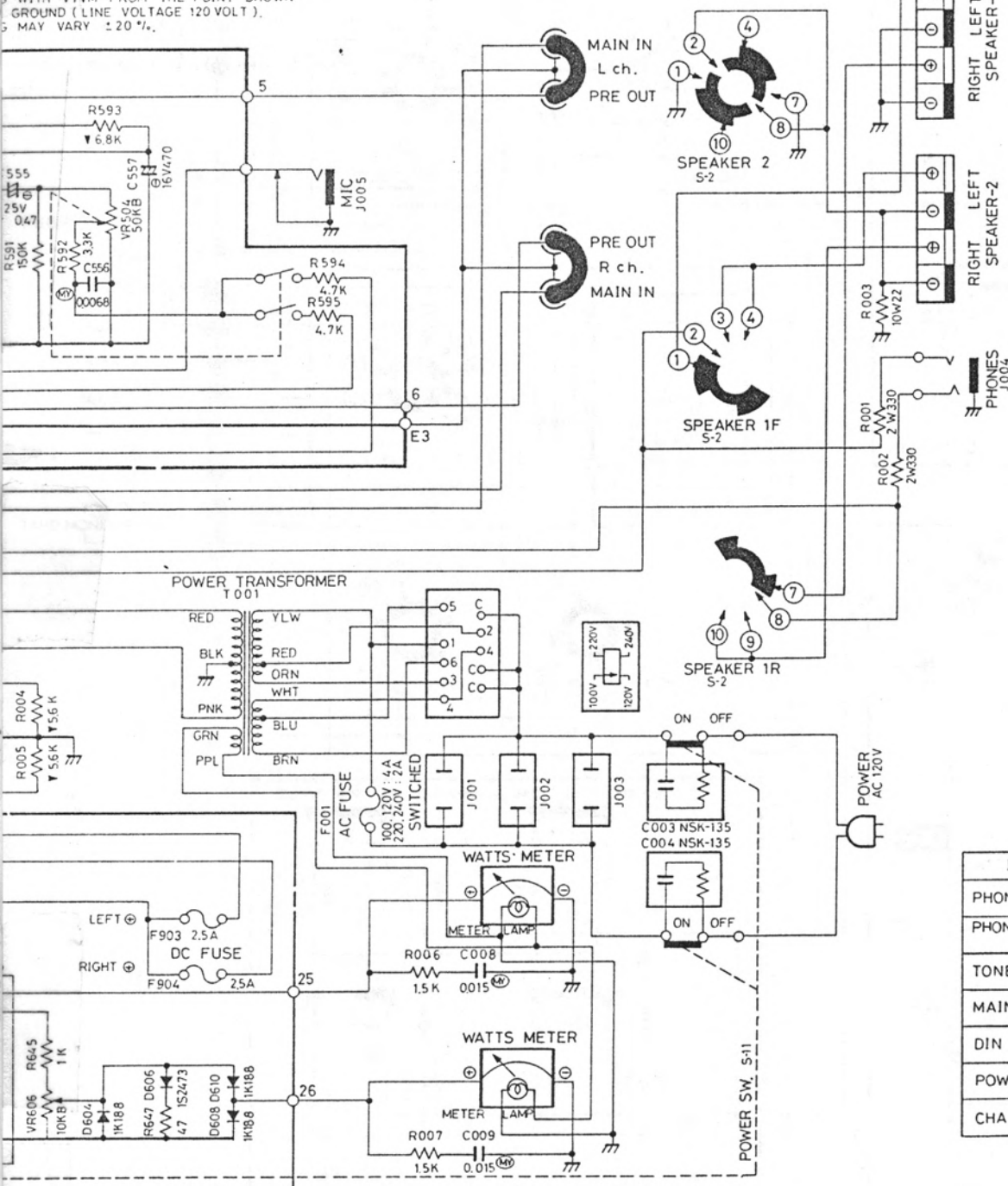
(BOTTOM VIEW)



TA7136P
TA7120P

(SIDE VIEW)

ITEM	SCHEMATIC LOCATION(LAST)	
PHONO AMP.	R 4 1 6	C 4 2 0
PHONO INPUT SELECTION	R 4 2 4	—
TONE CONTROL AMP.	R 5 9 6	C 5 5 8
MAIN AMP.	R 6 4 7	C 6 2 8
DIN JACK	R 7 0 4	—
POWER SUPPLY	R 9 0 2	C 9 0 2
CHASSIS	R 0 0 7	C 0 0 9



REPAIR PARTS LIST

(RA-612 only)

Symbol No.	Part No.	Description
Q605, 606	301201150	2SC1567, Predriver
Q611, 612 } Q613, 001 }	301201154	2SC1667, Power Amp.
Q614	301201132	2SC1384, Protection Relay Driver
Q617	301201157	2SC1222, Overload Protection Threshold
D901, 902	300313017	WZ-162, Zener Regulator, 16V
D903, 904 } D905, 906 }	300919017	Hi-Fi Special, Rectifier
VR501	515121123	250KW, Balance Control
VR502	525121129	100KBTx2, Volume Control
VR503, 504 } VR505, 506 }	515101202	50KB, Bass, Treble Control
S5, 6, 7, 8	611001635	Switch, Lever 4-key, Tone Defeat, etc.
PL001	351080015	Lamp, 8V, 150mA, Pilot
F001	341220030	Fuse, 3A, 3AG, AC Circuit Protection (Line Voltage 100V or 120V only)
	341220015	Fuse, 1.5A, 3AG, AC Circuit Protection (Line Voltage 220V or 240V only)
T001	205001389	Transformer, Power Supply (Multi-voltage)
	204001389	Transformer, Power Supply (100V/120V)
	206001389	Transformer, Power Supply (220V/240V)
	111911317	Front Panel Assembly
	626110023	Jack, Headphones
	141710262	Tone Control Amp. Circuit Board Assembly
	141710263	Treble Control Circuit Board Assembly
	141710264	Volume Control Circuit Board Assembly
	141610270	Phono, Main Amp. and Rectifier Circuit Board Assembly without Power Amp. Transistors.

(RA-812 only)

Symbol No.	Part No.	Description
IC501	303452155	TA7120P, Mic. Amp.
Q605, 606	301201161	2SC1628, Predriver
Q611, 612 } Q613, 001 }	301301128	2SD427(O), Power Amp.
Q614	301201150	2SC1567, Protection Relay Driver
Q617	301201132	2SC1384, Overload Protection Threshold
D603, 604 } D607, 608 }	300111008	1K188, VU Meter Rect.
D609, 610 }		
D605, 606	300111010	1S2473, VU Meter Rect.
D901, 902	300313016	WZ-210, Zener Regulator, 21V
D903, 904 } D905, 906 }	300919020	ERD03-02, Rectifier
VR501	525121131	250KW+100KB1x2, Balance and Volume Control
VR502, 503	525101130	50KBx2, Bass, Treble Control
VR504	515101201	50KBx1 W/SW, Mic Volume Control
VR605, 606	510502126	10KB, VU Meter Level Adj.
S3, 4, 5, 6, 7	611001633	Switch, Lever 5-key, Tone Defeat, etc.
S12, 13	613000023	Switch, Phono Input Selector
F001	341220040	Fuse, 4A, 3AG, AC Circuit Protection (Line Voltage at 100V or 120V only)
	341220020	Fuse, 2A, 3AG AC Circuit Protection (Line Voltage at 220V or 240V only)
T001	205001387	Transformer, Power Supply (Multi-Voltage)
	204001387	Transformer, Power Supply (100V/120V)
	206001387	Transformer, Power Supply (220V/240V)
	231310048	VU Meter
	627117823	Jack, Mic.
	626110025	Jack, Headphones
	111911318	Front Panel Assembly
	116310148	Knob, Balance Control
	116310100	Knob, Tone Control (L-ch.)
	116310101	Knob, Tone Control (R-ch.)
	141710265	Tone Control Amp. Circuit Board Assembly
	141810614	Volume Control Amp. Circuit Board Assembly
	141610271	Phono, Main Amp. and Rectifier Circuit Board Assembly without Power Amp. Transistors
	141810612	Tape Monitor (Din Jack) Circuit Board Assembly
	141810613	Phono Input Selector Circuit Board Assembly

(Both of RA-612 & RA-812)

Symbol No.	Part No.	Description
IC401, 402	303452154	TA7136P, Phono Amp.
Q501, 502	301201157	2SC1222, Tone Amp.
Q503, 504		
Q505, 506		
Q507, 508		
Q601, 602	301001133	2SA750(E), Differential Amp., Overload Protection Amp.
Q603, 604		
Q615, 616		
Q607, 608	301001135	2SA794, Driver, -B Stabilizer
Q902		
Q609, 610	301201150	2SC1567, Driver
Q901	301201142	2SC789, +B Stabilizer
D601, 602	300212009	STV-4H, Varistor
VR601, 602	510502128	Potentiometer, 5KB, Bias Adj.
VR603, 604	510502126	Potentiometer, 10KB, Overload Protection Level Adj.
	601011270	Switch, Function Selector
	601011271	Switch, Monitor
	601011264	Switch, Speaker Selector
	611001634	Switch, Lever 2-key, Loudness, Muting
	614010117	Switch, Power Supply
RY601	240111225	Relay, Overload Protection
C001, 002	400680449	Capacitor, Electrolytic, 6800mfd, 50V
F901, 902	341220025	Fuse, 2.5A, 3AG, DC Circuit Protector
F903, 904		
	116310146	Knob, Volume Control
	116310104	Knob, Func. Speaker, Monitor, etc.
	116310099	Knob, Bal. (RA612), Mic Vol. (RA-812)
	116210009	Knob, Power Switch
	116210147	Knob, Loudness, Muting, etc.
	624200206	Pin Jack, 6P, RCA Type
	624100104	Pin Jack, 4P, RCA Type
	625001114	Pin Jack, 5P
	642400106	Speaker Terminal
	648211144	Bracket, AC Fuse