

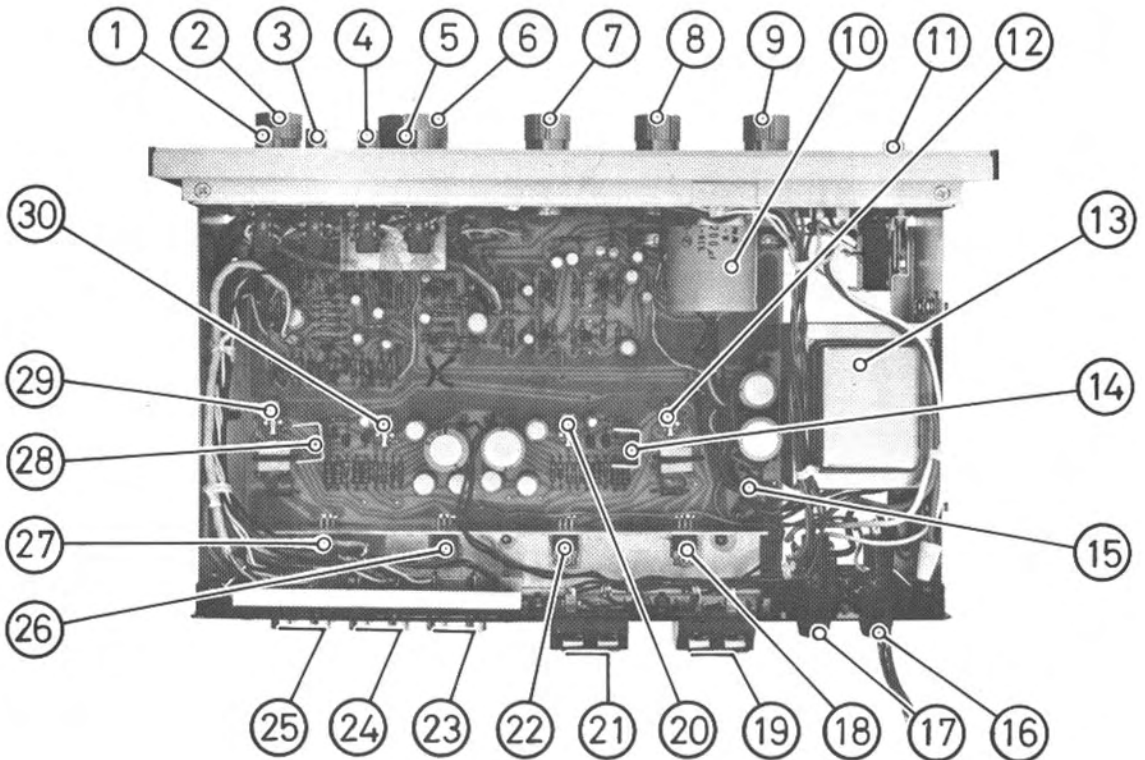
technical manual

TABLE OF CONTENTS

CHASSIS LAYOUT	2
PRECAUTIONS	3
MAIN AMPLIFIER ADJUSTMENT	3
TROUBLE SHOOTING	4
GAIN DIAGRAM	4
PRE/MAIN AMPLIFIER CIRCUIT BOARD DIAGRAM	5
PRE/MAIN AMPLIFIER CIRCUIT BOARD DIAGRAM	6
SCHEMATIC DIAGRAM	7
SCHEMATIC DIAGRAM	10
PARTS LIST	13

CHASSIS LAYOUT

1. Tape Monitor switch
2. Selector switch
3. Loudness switch
4. SPKR-2 switch
5. SPKR-1 switch
6. Volume Control
7. Balance Control
8. Treble Control
9. Bass Control
10. C001, Ripple Filter
11. Power switch
12. VR506, Idling Current Adj. (L-ch.)
13. T001, Power Transformer
14. Q506, Driver Transistor (L-ch.)
15. D701, Rectifier
16. F002, DC Fuse
17. F001, AC Fuse
18. Q508, Power Transistor (L-ch.)
19. SPKR-2 Terminal
20. VR505, DC Balance Adj. (L-ch.)
21. SPKR-1 Terminal
22. Q507, Power Transistor (L-ch.)
23. Tape Monitor Terminals
24. Tuner and AUX terminals
25. Phono Terminals
26. Q607, Power Transistor (R-ch.)
27. Q608, Power Transistor (R-ch.)
28. Q606, Driver Transistor (R-ch.)
29. VR508, Idling Current Adj. (R-ch.)
30. VR507, DC Balance Adj. (R-ch.)



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 beta group as the original type.
4. If one output transistor burns out (open or short) always remove all the 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 that 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 conduction.

MAIN AMPLIFIER ADJUSTMENT

A. DC Balance Adjustment

1. Set Tape Monitor switch to SOURCE and Selector switch to AUX position.
2. Connect 8-ohm 50W resistor across Left Front Speaker terminals. Then in parallel with load resistor, connect an AC VTVM and the vertical input leads of an oscilloscope.
3. Connect an audio signal generator to Left AUX input and apply 1,000Hz (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 VR505 for equal clipping on the positive and negative half cycle of the signal — see Figure 1.
5. Repeat the steps 2 thru 4 as above for Right channel (Use VR507).

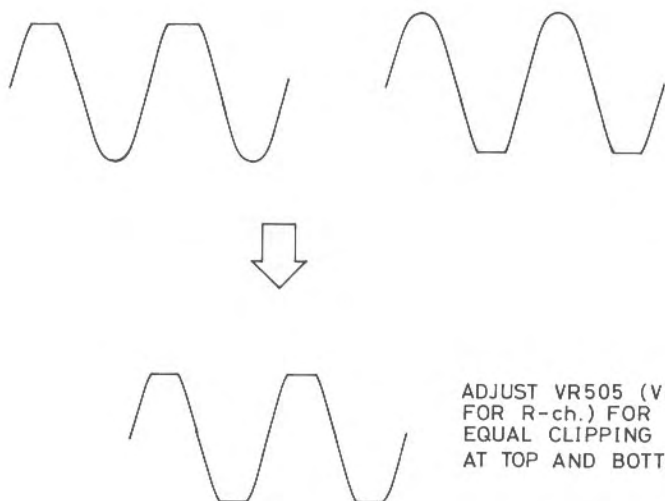


Figure 1

B. 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. 22 and the minus lead to Pin No. 24 — see Figure 2.
3. Rotate Idling Current Control VR506 to obtain a 7.5mV reading on DC milli-volt meter.
4. Repeat the steps 2 and 3 as above for Right channel (use Pin No. 21, 23 and VR508).

NOTE: In idling current adjustment of RA-211 "Series-2" connect a DC milli-Volt meter to the following pin numbers.

- a. Left-channel Pin 17 and pin E3
- b. Right-channel Pin 18 and pin E4

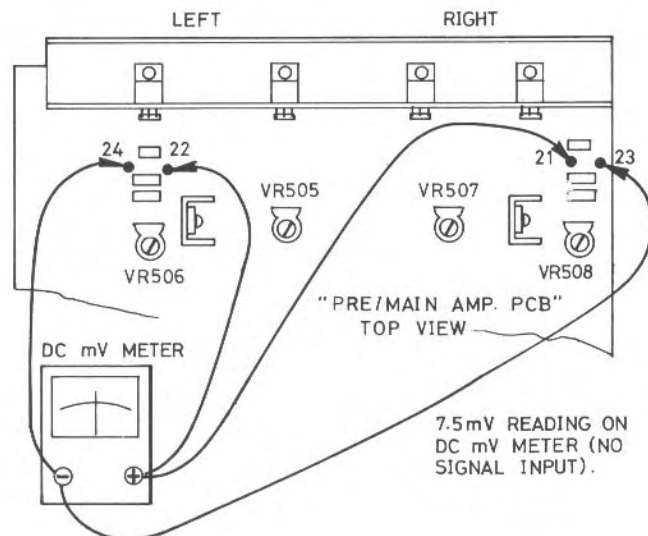
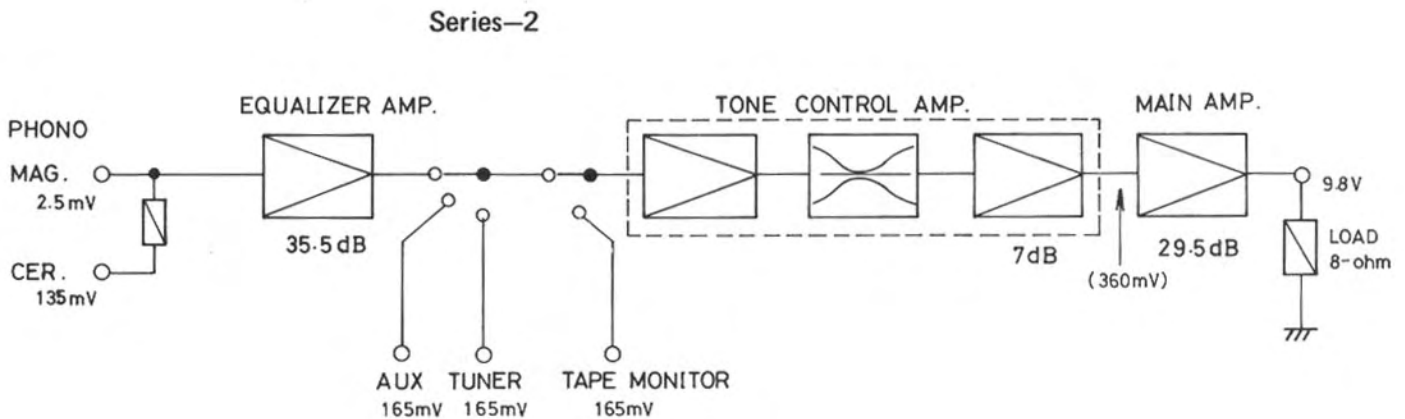
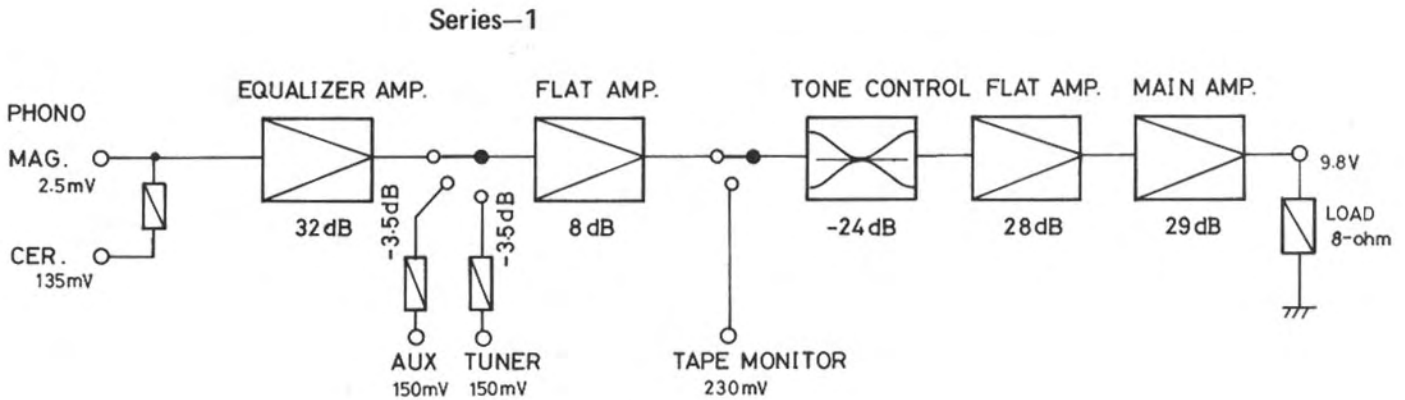


Figure 2

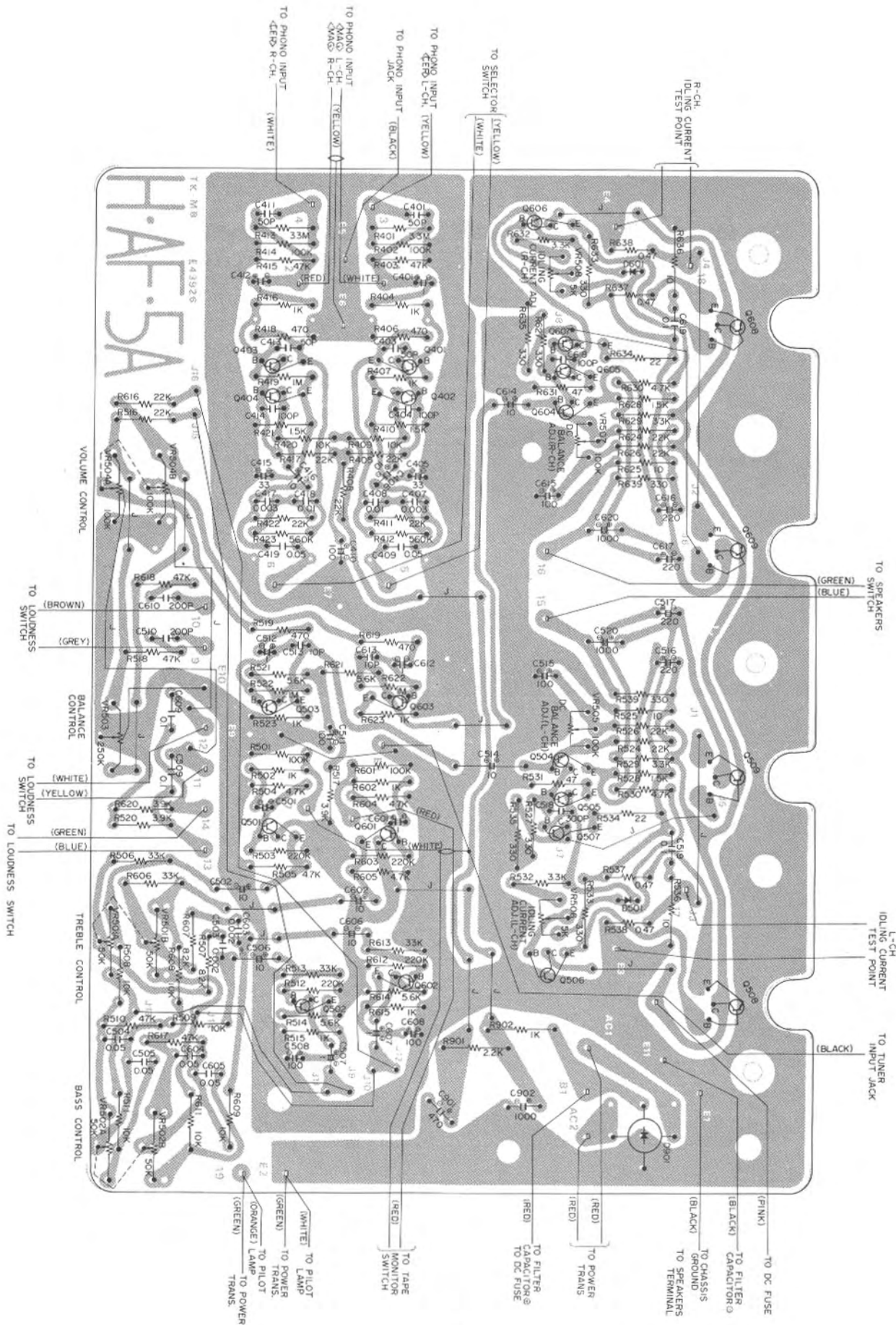
TROUBLE SHOOTING

- I. Complete inoperative.
 - A. If the pilot lamp does not light, check to see if the AC fuse is OK.
 1. And if the AC fuse is OK,
 - a. Power switch connection may be faulty, or
 - b. Power Transformer may be faulty.
 2. And if the AC fuse may be blown,
 - a. Rectifier, D701 may be shorted out. or
 - b. Power Transformer may be shorted out, or
 - c. Capacitor, C001 may be shorted out.
 - B. If the pilot lamp does light, check to see if the DC fuse is OK.
 1. And if the DC fuse is OK,
 - a. Transistor, Q501, 502 or 503 (Q601, 602 or 603 for R-ch.) may be faulty, or
 - b. Capacitor, C501, 502, 512 or 513 (C601, 602, 612 or 613 for R-ch.) may be faulty.
 2. And if the DC fuse is blown,
 - a. Power Transistor, Q507 or 508 (Q607 or 608 for R-ch.) may be faulty, or
 - b. Driver Transistor, Q505 or 506 (Q605 or 606 for R-ch.) may be faulty, or
 - c. Speaker circuit (including speaker systems) may be shorted out.
 - II. Only Phono section inoperative,
 - A. Transistor, Q401 or 402 (Q403 or 404 for R-ch.) may be faulty, or
 - B. Capacitor, C402 or 406 (C412 or 416 for R-ch.) may be faulty.
- NOTE: Follow the above procedure for the trouble shooting of RA-211 "Series-2" and in doing so, make sure to refer the symbol numbers to the given schematic and board diagrams, for the symbol numbers provided above do not correspond to ones in the schematic and board diagrams.

GAIN DIAGRAM

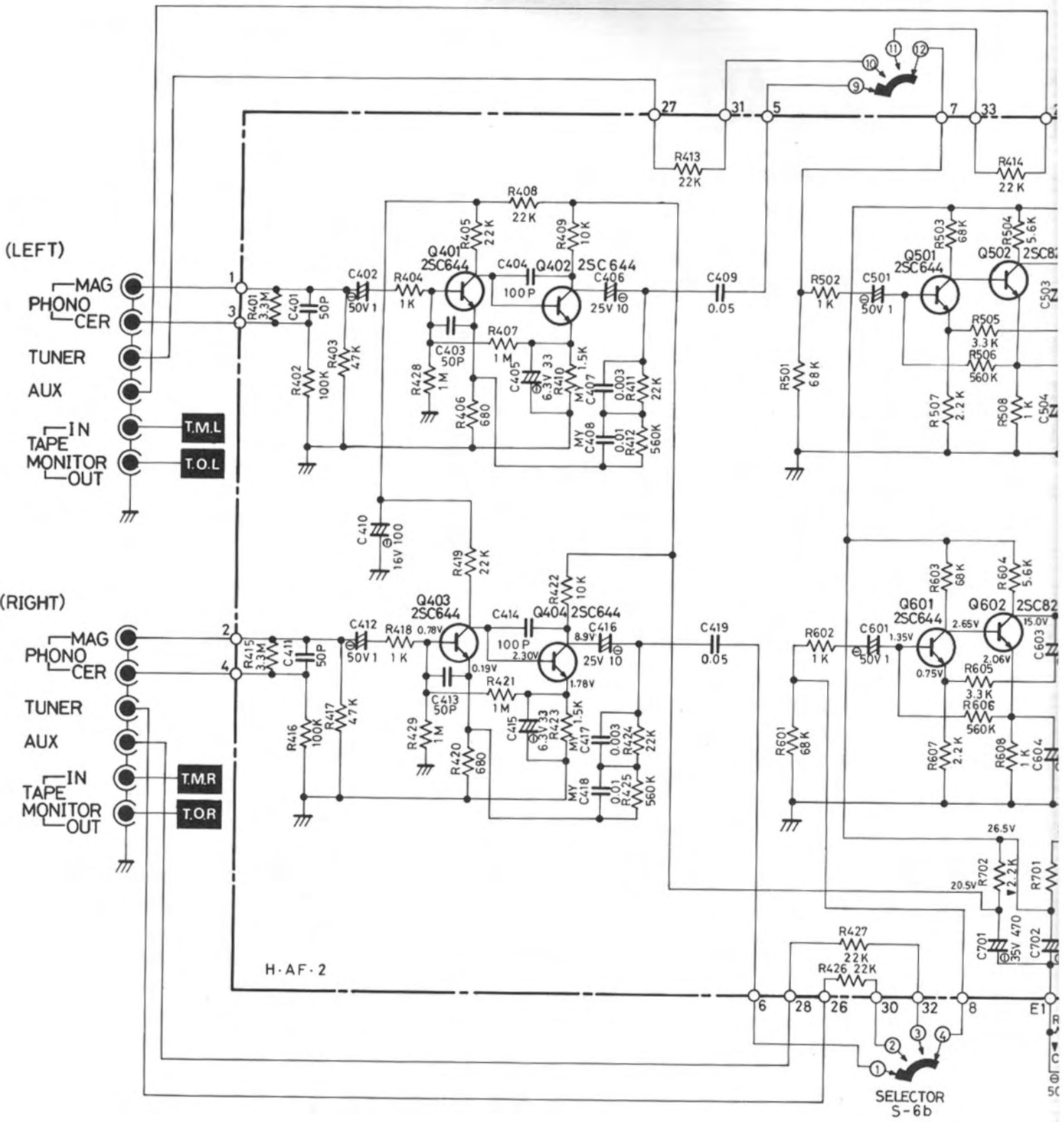


PRE/MAIN AMPLIFIER CIRCUIT BOARD (Series-2)



SCHEMATIC DIAGRAM (Series-1)

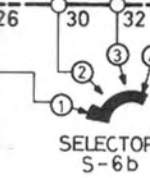
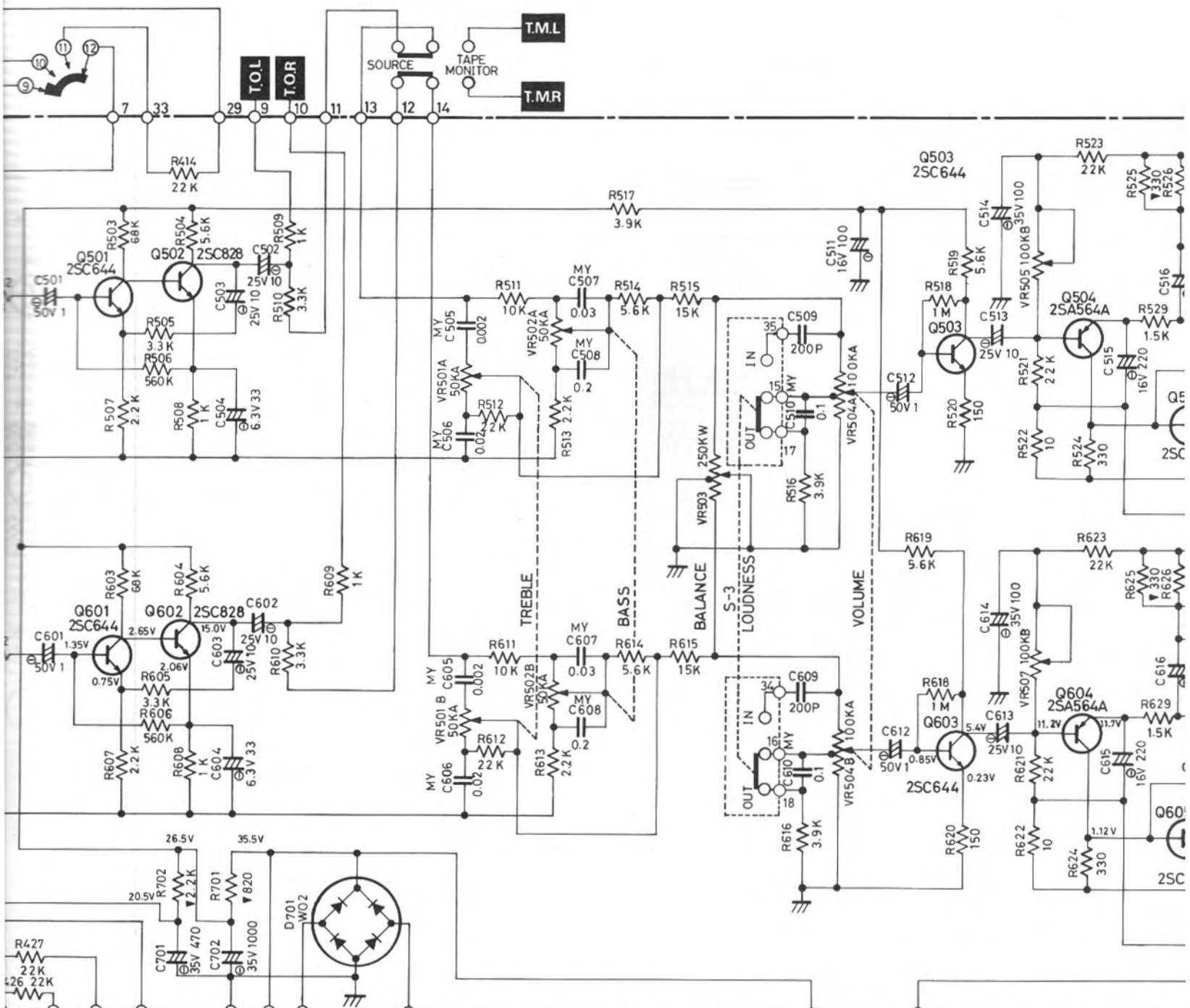
S-6a
SELECTOR



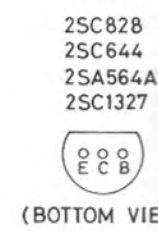
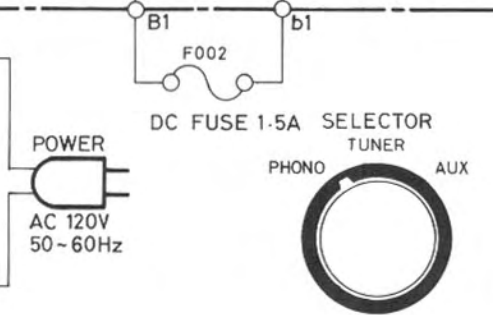
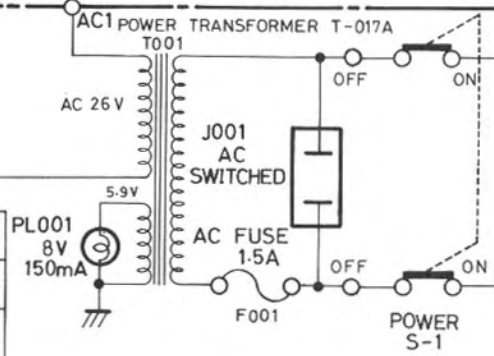
POWER TRANSFO	
T - 017A	1
T - 017D	1
T - 017E	2
T - 017F	1

S-6a
SELECTOR

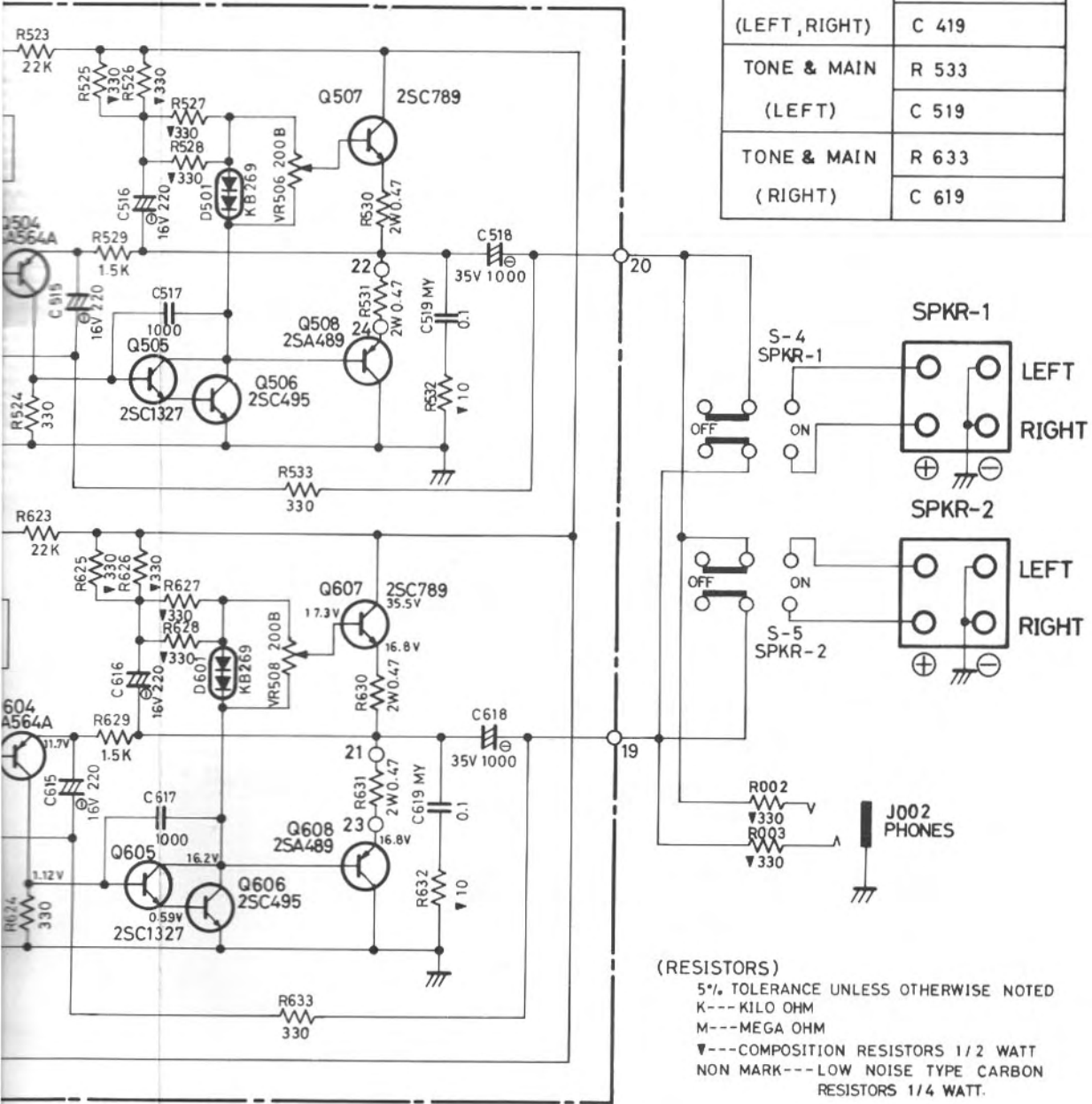
S-2
TAPE MONITOR



POWER TRANSFORMER	
T-017A	120V ONLY
T-017D	100V-120V
T-017E	220V-240V
T-017F	100V ONLY



ITEM	SCHEMATIC LOCATION (LAST)
CHASSIS	R 704
	C 701
EQUALIZER (LEFT, RIGHT)	R 427
	C 419
TONE & MAIN (LEFT)	R 533
	C 519
TONE & MAIN (RIGHT)	R 633
	C 619



(RESISTORS)

5% TOLERANCE UNLESS OTHERWISE NOTED
 K---KILO OHM
 M---MEGA OHM
 ▽---COMPOSITION RESISTORS 1/2 WATT
 NON MARK---LOW NOISE TYPE CARBON
 RESISTORS 1/4 WATT.

(CAPACITORS)

MY---MYLAR FILM CAPACITORS
 ⚡---ELECTROLYTIC CAPACITORS
 NON MARK---CERAMIC CAPACITORS
 UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITOR
 VALUES ARE EXPRESSED IN MFD.
 VOLTAGE READING WITH VTVM FROM THE POINT SHOWN TO
 THE CHASSIS GROUND (LINE VOLTAGE 120 VOLT)
 VOLTAGE READING MAY VARY ±20%.

2SC828
 2SC644
 2SA564A
 2SC1327



(BOTTOM VIEW)

2SC789
 2SA489

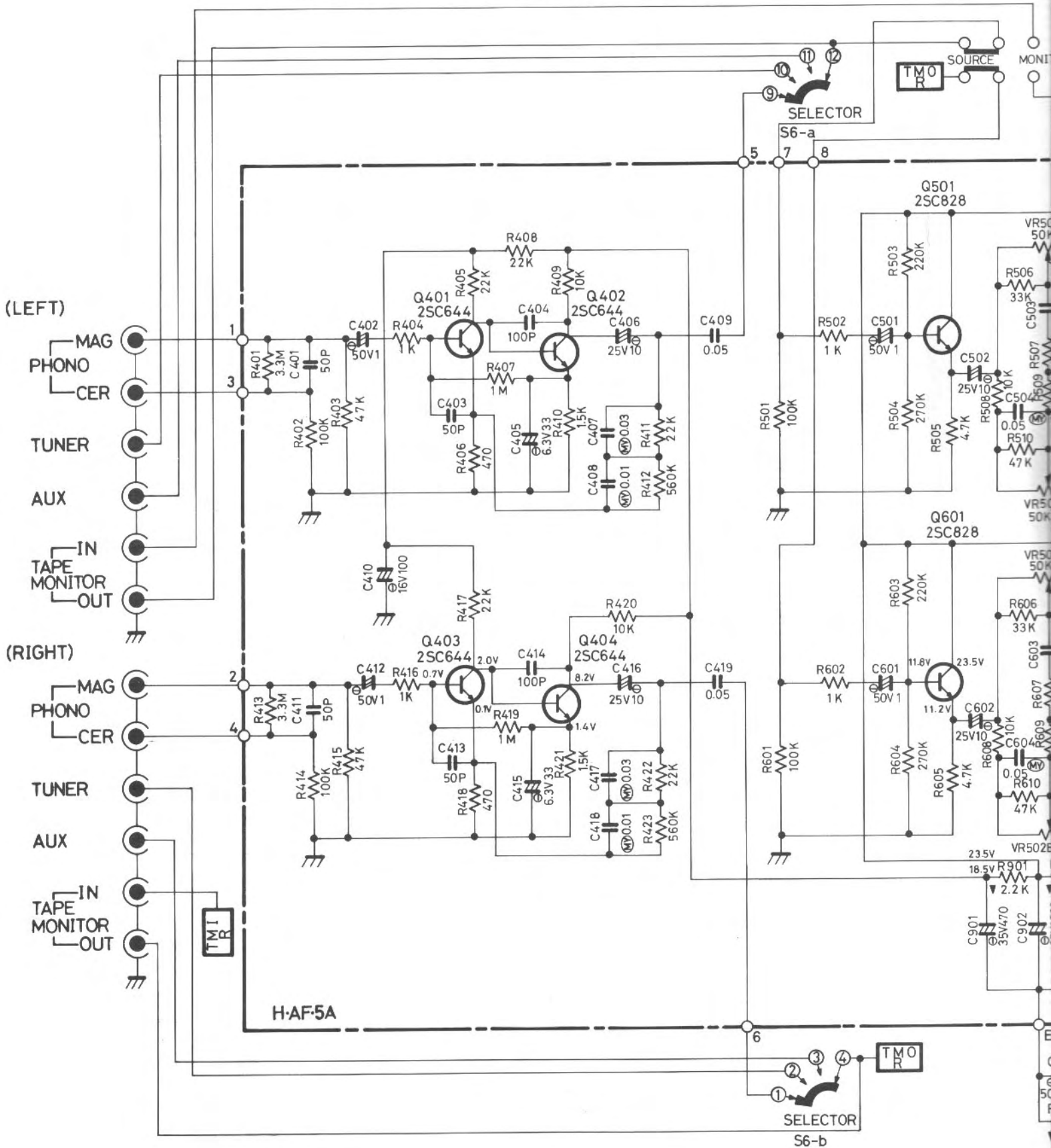


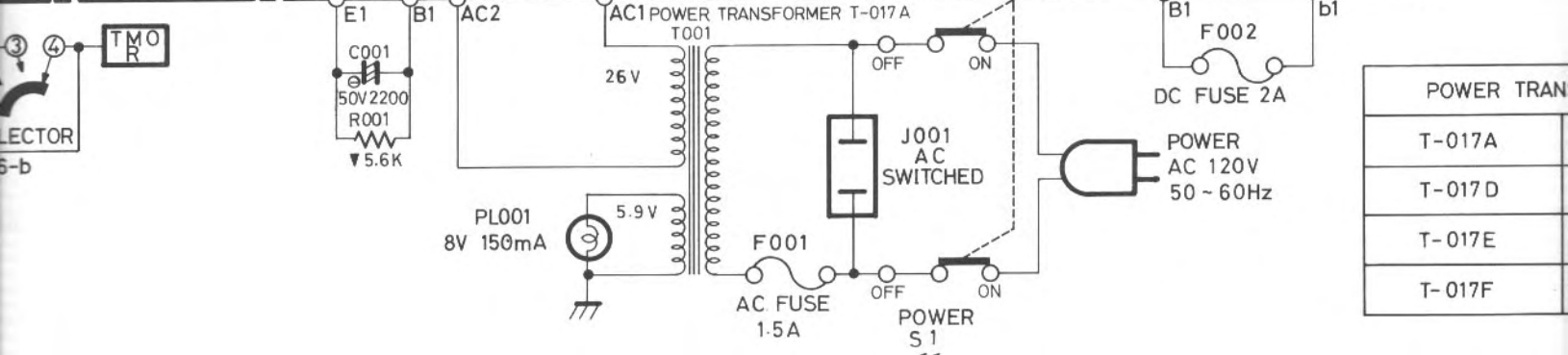
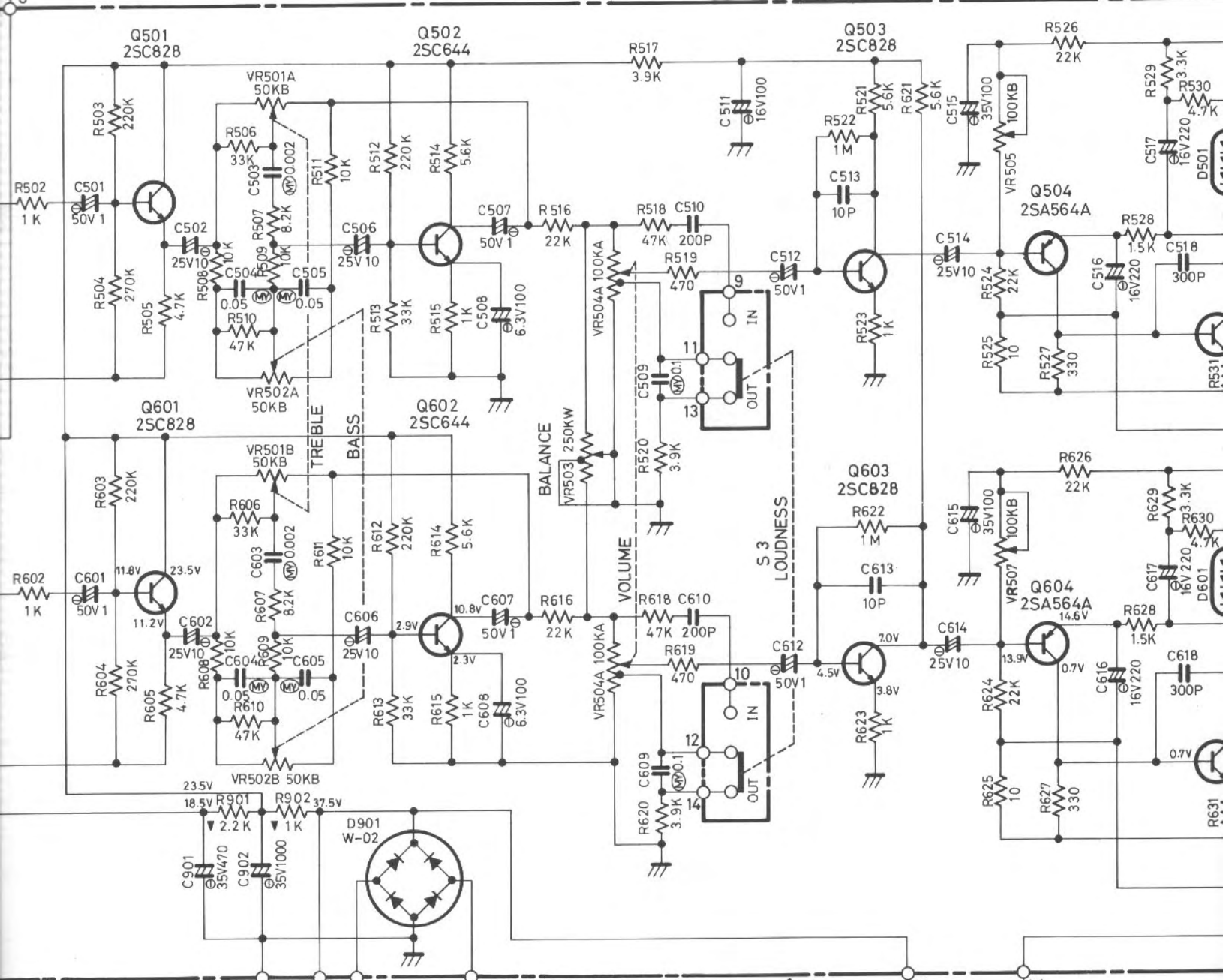
(TOP VIEW)

2SC495



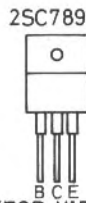
SCHEMATIC DIAGRAM (Series-2)





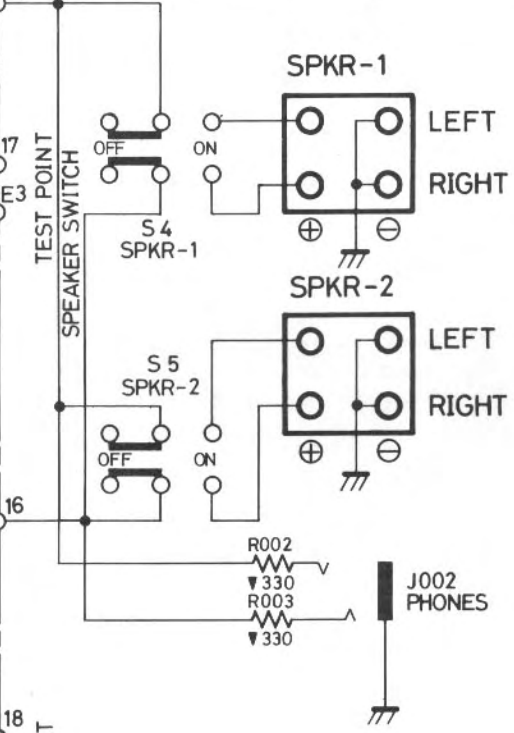
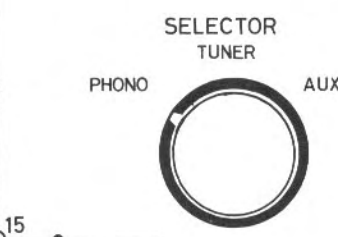
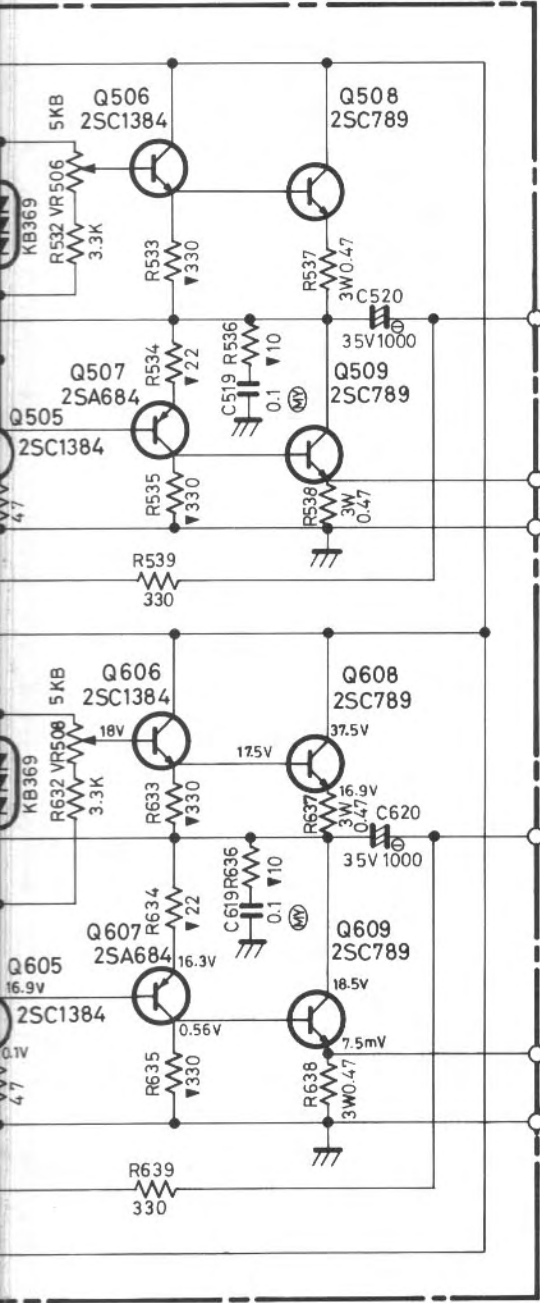
POWER TRAN	
T-017A	
T-017D	
T-017E	
T-017F	

2SA564A
2SA684
2SC644
2SC828
2SC1384



(BOTTOM VIEW) (TOP VIEW)

ITEM	SCHEMATIC LOCATION(LAST)
CHASSIS	R 002
	C 001
EQUALIZER (LEFT,RIGHT)	R 423
	C 419
TONE & MAIN (LEFT)	R 539
	C 520
TONE & MAIN (RIGHT)	R 639
	C 620



(RESISTORS)

5% TOLERANCE UNLESS OTHERWISE NOTED.
K---KILO OHM
M---MEGA OHM
▼---COMPOSITION RESISTORS 1/2 WATT
NON MARK---LOW NOISE TYPE CARBON RESISTORS 1/4 WATT

(CAPACITORS)

Ⓜ---MYLAR FILM CAPACITORS
Ⓜ---ELECTROLYTIC CAPACITORS
NON MARK---CERAMIC CAPACITORS
UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITOR VALUES ARE EXPRESSED IN MFD.
VOLTAGE READING WITH VTVM FROM THE POINT SHOWN TO THE CHASSIS GROUND (LINE VOLTAGE 120 VOLT).
VOLTAGE READING MAY VARY ± 20%.

FORMER
120V ONLY
100V-120V
220V-240V
100V ONLY

PARTS LIST

PRE/MAIN AMPLIFIER CIRCUIT BOARD

Schematic Location	Part No.	Description		
RESISTORS				
R401, 415	552033522	Carbon Film, 3.3M ±5%, 1/4W		
R402, 416	552010422	Carbon Film, 100K ±5%, 1/4W		
R403, 417	552047322	Carbon Film, 47K ±5%, 1/4W		
R404, 418, R502, 508, R509, 602, R608, 609	552010222	Carbon Film, 1K ±5%, 1/4W		
R405, 408, R411, 413, R414, 419, R424, 426, R427, 512, R521, 523, R612, 621, R623				
R406, 420			552068122	Carbon Film, 680 ±5%, 1/4W
R407, 421, R518, 618			552010522	Carbon Film, 1M ±5%, 1/4W
R409, 422, R511, 611				
R410, 423, R529, 629	552015222	Carbon Film, 1.5K ±5%, 1/4W		
R412, 425, R506, 606	552056422	Carbon Film, 560K ±5%, 1/4W		
R501, 503, R601, 603	552068322	Carbon Film, 68K ±5%, 1/4W		
R504, 514, R519, 604, R614, 619	552056222	Carbon Film, 5.6K ±5%, 1/4W		
R505, 510, R605, 610	552033222	Carbon Film, 3.3K ±5%, 1/4W		
R507, 513, R607, 613	552022222	Carbon Film, 2.2K ±5%, 1/4W		
R515, 615	552015322	Carbon Film, 15K ±5%, 1/4W		
R516, 517, R616	552039222	Carbon Film, 3.9K ±5%, 1/4W		
R520, 620	552015122	Carbon Film, 150 ±5%, 1/4W		
R522, 622	552010022	Carbon Film, 10 ±5%, 1/4W		
R524, 533, R624, 633	552033122	Carbon Film, 330 ±5%, 1/4W		
R525, 526, R527, 528, R625, 626, R627, 628	551033133	Composition, 330 ±10%, 1/2W		
R530, 531, R630, 631,	554147953	MPC, 0.47 ±10%, 2W		
R532, 632	551010033	Composition, 10 ±10%, 1/2W		
R701	551082133	Composition, 820 ±10%, 1/2W		
R702	551022233	Composition, 2.2K ±10%, 1/2W		
VR501, 502	525101119	Variable, 50KA x2, Bass & Treble Cont.		
VR503	515121115	Variable, 250KW, Balance Cont.		
VR504	525121113	Variable, 100KA x2, Volume Cont.		
VR505, 507	510502130	Potentiometer, 100KB, DC Balance Adj.		
VR506, 508	510502129	Potentiometer, 200 B, Bias Adj.		

Schematic Location	Part No.	Description		
CAPACITORS				
C401, 403, C411, 413	440501283	Ceramic, 50pF ±10%, 250V		
C402, 412, C501, 512, C601, 612				
C404, 414	440101183	Ceramic, 100pF ±10%, 250V		
C405, 415, C504, 604	402331619	Electrolytic, 33mfd, 6.3V		
C406, 416, C502, 503, C513 602, C603, 613				
C407, 417	450301033	Mylar Film, 0.003mfd ±10%, 50V		
C408, 418	450100933	Mylar Film, 0.01mfd ±10%, 50V		
C409, 419	440500935	Ceramic, 0.05mfd, 50V		
C410, 511	402100519	Electrolytic, 100mfd, 16V		
C505, 605, C506, 606	450201033	Mylar Film, 0.002mfd ±10%, 50V		
C507, 607	450300933	Mylar Film, 0.03mfd ±10%, 50V		
C508, 608	450200833	Mylar Film, 0.2mfd ±10%, 50V		
C509, 609	440201183	Ceramic, 200pF ±10%, 250V		
C510, 519, C610, 619	450100833	Mylar Film, 0.1mfd ±10%, 50V		
C514, 614				
C515, 516, C615, 616	402220519	Electrolytic, 220mfd, 16V		
C517, 617				
C518, 618, C702	402100439	Electrolytic, 1000mfd, 35V		
C701				
C701	40240539	Electrolytic, 470mfd, 35V		
TRANSISTORS AND DIODES				
Q401, 402, Q403, 404, Q501, 503, Q601, 603	301201114	2SC644, Phono Amp., Pre 1st & 3rd Amp.		
Q502, 602			301201115	2SC828, Pre 2nd Amp.
Q504, 604			301001117	2SA564A, Predriver
Q505, 605			301201143	2SC1327, Driver
Q506, 606	301201129	2SC495 (Y), Driver		
Q507, 607	301201112	2SC789 (Y), Power Amp.		
Q508, 608	301001127	2SA489 (Y), Power Amp.		
D501, 601	300212004	KB-269, Varistor		
D701	300919011	W-02, Rectifier		
	127012118	Heat sink for Q506 & Q606		
	127012117	Heat sink for Q507, 508, 607 & 608		
	770101224	Pin, Terminal		
	705213010	Screw, + 3x10mm, Power Transistor Mtg.		
	714203006	Screw w/washer, + 3x6mm, Heat sink Mtg.		
	740011130	Nut, 3mm, Power Transistor Mtg.		
	756001030	Washer, Spring, 3mm dia, Power Transistor Mtg.		
	140600658	Printed Circuit Board "H-AF-2"		
	141610242	Pre/Main Amp. Circuit Assembly		

CABINET AND CHASSIS

Schematic		
Location	Part No.	Description
	131011239	Cabinet
	111911269	Front Panel Assembly
	116310067	Knob, Volume Control
	116310055	Knob, Selector, Bass, Treble and Balance
	116210008	Button, Push switch
	116210012	Button, Power switch
R001	551056233	Resistor, Composition, 5.6K \pm 10%, 1/2W
R002, 003	551033133	Resistor, Composition, 330 \pm 10%, 1/2W
C001	400220449	Capacitor, Electrolytic, 2200mfd, 50V
S1	614010106	Switch, Power
S2, 3, 4, S5, (1set)	614040810	Switch, Push 4-keys

Schematic		
Location	Part No.	Description
S6	601011247	Switch, Selector
T001	201001340	Power Transformer, (Pri. voltage 120v)
	206001340	Power Transformer, (Pri. voltage 220V/24V)
PL001	315080015	Lamp, Pilot, 8V, 0.15A
F001	341220015	Fuse, 1.5A-3AG (line voltage at 120V)
	341220010	Fuse, 1A-3AG (line voltage at 220V - 240V)
F002	341220015	Fuse, 1.5A-3AG, Power Amp. Protector
J001	648211126	AC Outlet
J002	626110023	Headphone Jack

PRE/MAIN AMPLIFIER CIRCUIT BOARD (Series-2)

Schematic				
Location	Part No.	Description		
RESISTORS				
R401, 413	552033522	Carbon Film, 3.3M \pm 5%, 1/4W		
R402, 414	552010422	Carbon Film, 100K \pm 5%, 1/4W		
R403, 415	552047322	Carbon Film, 47K \pm 5%, 1/4W		
R404, 416	552010222	Carbon Film, 1K \pm 5%, 1/4W		
R405, 408, R411, 417, R422	552022322	Carbon Film, 22K \pm 5%, 1/4W		
R407, 419			552010522	Carbon Film, 1M \pm 5%, 1/4W
R409, 420			552010322	Carbon Film, 10K \pm 5%, 1/4W
R410, 421	552015222	Carbon Film, 1.5K \pm 5%, 1/4W		
R412, 423	552056422	Carbon Film, 560K \pm 5%, 1/4W		
R501, 601	552010422	Carbon Film, 100K \pm 5%, 1/4W		
R502, 515, R523, 602, R615, 623	552010222	Carbon Film, 1K \pm 5%, 1/4W		
R503, 512, R603, 612			552022422	Carbon Film, 220K \pm 5%, 1/4W
R504, 604				
R505, 530, R605, 630	552047222	Carbon Film, 4.7K \pm 5%, 1/4W		
R506, 513, R606, 613			552033322	Carbon Film, 33K \pm 5%, 1/4W
R507, 607	552082222	Carbon Film, 8.2K \pm 5%, 1/4W		
R508, 509, R511, 608, R609 611	552010322	Carbon Film, 10K \pm 5%, 1/4W		
R510, 518, R610, 618			552047322	Carbon Film, 47K \pm 5%, 1/4W
R514, 521, R614, 621				
R516, 524, R526, 616, R624, 626	552022322	Carbon Film, 22K \pm 5%, 1/4W		

Schematic		
Location	Part No.	Description
R517, 520, R620	552039222	Carbon Film, 3.9K \pm 5%, 1/4W
R519, 619		
R522, 622	552010522	Carbon Film, 1M \pm 5%, 1/4W
R525, 625	552010022	Carbon Film, 10 \pm 5%, 1/4W
R527, 539, R627, 639	552033122	Carbon Film, 330 \pm 5%, 1/4W
R528, 628		
R529, 532, R629, 632	552033222	Carbon Film, 3.3K \pm 5%, 1/4W
R531, 631		
R533, 535, R633, 635	551033133	Composition, 330 \pm 10%, 1/2W
R534, 634		
R536, 636	551010033	Composition, 10 \pm 10%, 1/2W
R537, 538, R637, 638	554147963	MPC, 0.47 \pm 10%, 3W
VR501, 502		
VR503	515121115	Variable, 250KWT, Balance Cont.
VR504	525121113	Variable, 100KAT x2, Volume Cont.
VR505, 507	510502130	Potentiometer, 100K, DC Balance Adj.
VR506, 508	510502128	Potentiometer, 5K, Idling Current Adj.
R901	551022233	Composition, 2.2K \pm 10%, 1/2W
R902	551010233	Composition, 1K \pm 10%, 1/2W
CAPACITORS		
C401, 403, C411, 413	440501283	Ceramic, 50pF \pm 10%, 250V
C402, 412		
C404, 414	440101183	Ceramic, 100pF \pm 10%, 250V
C405, 415	402330609	Electrolytic, 33mfd, 6.3V
C406, 416	402100629	Electrolytic, 10mfd, 25V
C407, 417	450300933	Mylar Film, 0.03mfd \pm 10%, 50V
C408, 418	450100933	Mylar Film, 0.01mfd \pm 10%, 50V

Schematic		
Location	Part No.	Description
C409, 419	440500935	Ceramic, 0.05mfd, 50V
C501, 507,	402100749	Electrolytic, 1mfd, 50V
C512, 601,		
C607, 612		
C502, 506,	402100629	Electrolytic, 10mfd, 25V
C514, 602,		
C606, 614		
C503, 603	450201033	Mylar Film, 0.002mfd $\pm 10\%$, 50V
C504, 505,	450500933	Mylar Film, 0.05mfd $\pm 10\%$, 50V
C604, 605		
C508, 608	402100509	Electrolytic, 100mfd, 6.3V
C509, 519,	450100833	Mylar Film, 0.1mfd $\pm 10\%$, 50V
C609, 619		
C510, 610	440201183	Ceramic, 200pF $\pm 10\%$, 250V
C511	402100519	Electrolytic, 100mfd, 16V
C513, 613	440101283	Ceramic, 10pF $\pm 10\%$, 250V
C515, 615	402100539	Electrolytic, 100mfd, 35V
C516, 517,	402220519	Electrolytic, 220mfd, 16V
C616, 617		
C518, 618	440301183	Ceramic, 300pF $\pm 10\%$, 250V
C520, 620	402100439	Electrolytic, 100mfd, 35V
C901	402471539	Electrolytic, 470mfd, 35V
C902	402100439	Electrolytic, 1000mfd, 35V

Schematic		
Location	Part No.	Description
TRANSISTORS AND DIODES		
Q401, 402,	301201114	2SC644, Equalizer Amp.
Q403, 404		
Q501, 503,	301201115	2SC828, Flat Amp.
Q601, 603		
Q502, 602	301201114	2SC644, Flat Amp.
Q504, 604	301001117	2SA564, Flat Amp.
Q505, 506,	301201132	2SC1384, Predriver, Driver
Q605, 606		
Q507, 607	301001123	2SA684, Driver
Q508, 509,	301201142	2SC789, Power Amp.
Q608, 609		
D501, 601	300212006	KB-369, Varistor
D901	300919011	W-02, Rectifier
	127012117	Heat sink, Power Transistor Mtg.
	770101225	Pin, Terminal
	992001111	Grommet, Power Transistor Mtg.
	705213012	Screw, + 3x12mm, Power Transistor Mtg.
	756001030	Spring washer, 3mm, Power Transistor Mtg.
	751901403	Washer, 3mm, Power Transistor Mtg.
	761911144	Nut, 3mm, Power Transistor Mtg.
	714203006	Screw w/washer, + 3x6mm, Heat sink Mtg.
	140600659	Printed Circuit Board "H-AF-5"
	141610224	Pre/Main Amplifier Circuit Assembly

NOTE: Only the board parts which are different from those of "Series-1" are provided in this RA-211 "Series-2" parts list. Cabinet and chassis parts are exactly the same as "Series-1".