

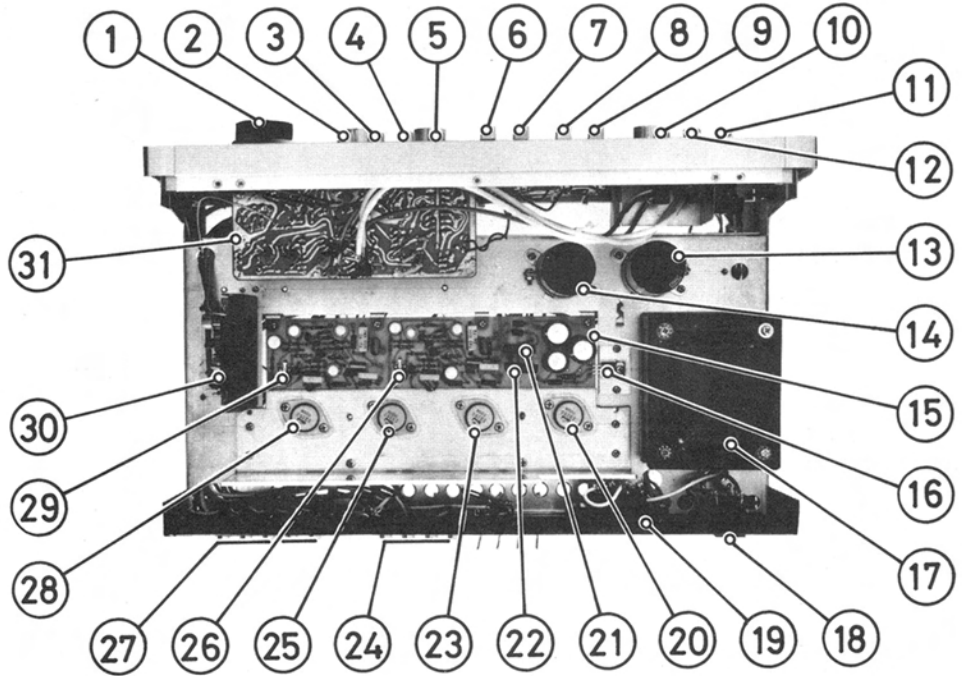
## technical manual

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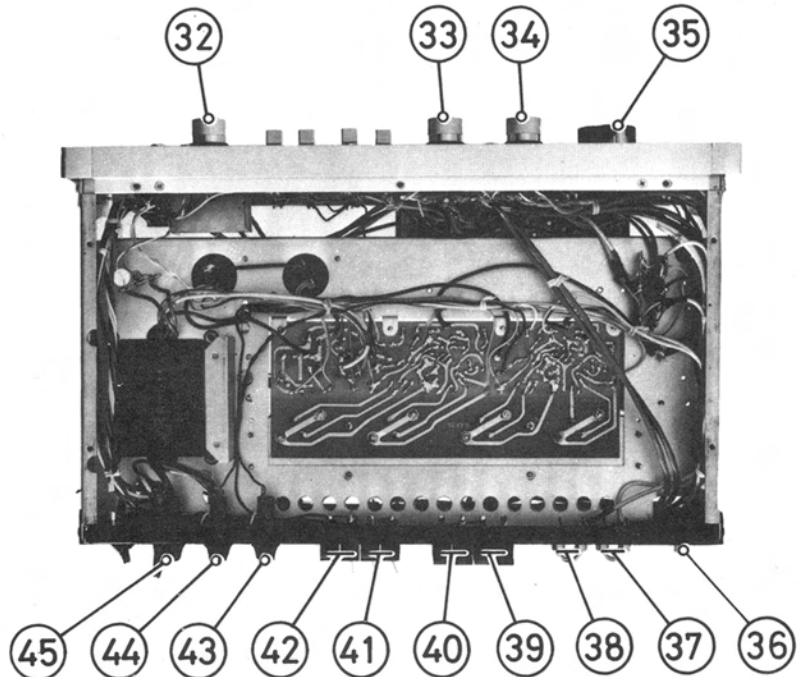
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# CHASSIS LAYOUT

1. VR202, Volume Control
2. S8, Muting Switch
3. S7, Loudness Switch
4. S6, Mode Switch
5. S5, Tone Defeat Switch
6. VR205, Treble Control (R-ch.)
7. VR203, Treble Control (L-ch.)
8. VR206, Bass Control (R-ch.)
9. VR204, Bass Control (L-ch.)
10. S3, Hi-Fil. Switch
11. S1, Power Switch
12. S2, Low Fil. Switch
13. C002, Ripple Filter Capacitor
14. C001, Ripple Filter Capacitor
15. Main Amp. & Power Supply pcb
16. Q701, Stabilizer Transistor
17. T001, Power Transformer
18. J002, 003, 004, AC Outlet
19. Line Voltage Selector
20. Q307, Power Amp. Transistor (L-ch.)
21. D701, Rectifier
22. D702, Rectifier
23. Q306, Power Amp. Transistor (L-ch.)
24. Tape Monitor Jacks
25. Q314, Power Amp. Transistor (R-ch.)
26. VR301, Idling Current Adj. (L-ch.)
27. Input Jacks
28. Q313, Power Amp. Transistor (R-ch.)
29. VR302, Idling Current Adj. (R-ch.)
30. Equalizer Amp. Circuit Board
31. Tone Control Amp. Circuit Board



32. S4, Speakers Switch
33. S9, Monitor Switch
34. S10, Selector Switch
35. VR201, Balance Control
36. GND. Terminal
37. PRE/MAIN Jacks (R-ch.)
38. PRE/MAIN Jacks (L-ch.)
39. Speakers-1 Terminals (R-ch.)
40. Speakers-1 Terminals (L-ch.)
41. Speakers-2 Terminals (R-ch.)
42. Speakers-2 Terminals (L-ch.)
43. F003, Speaker Fuse (R-ch.)
44. F002, Speaker Fuse (L-ch.)
45. F001, AC Fuse



## 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 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.

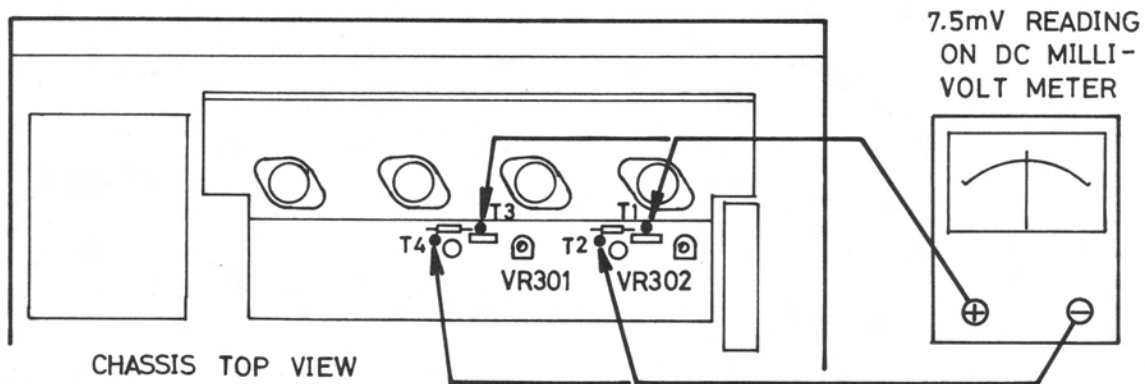
## BIAS (IDLING CURRENT) ADJUSTMENT

Set Speakers switch to OFF position.

Set Volume Control to minimum position.

Connect the plus lead of a DC milli-volt meter to test point T1 (on main amp. pcb) and the minus lead to test point T2 (for Left

channel, connect the plus lead to test point T3 and the minus lead to T4), and rotate the potentiometer VR302 (for Left channel, VR301) to obtain a 7.5mV reading on the DC milli-volt meter (see Figure 1).



# TROUBLE SHOOTING

## I. Completely Inoperative.

A. If the pilot lamp does not light, check to see if the AC Fuse, F001, is OK.

1. And if the AC Fuse is OK,
  - a. Power Switch connection may be faulty, or
  - b. Power Transformer may be faulty, or
  - c. AC Fuse connection may be faulty.
2. And if the AC Fuse is blown,
  - a. Rectifier, D701, 702, 703 or 704, may be faulty, or
  - b. Transistor, Q701, may be shorted out, or
  - c. Power Transformer (Sec. winding) may be shorted out.

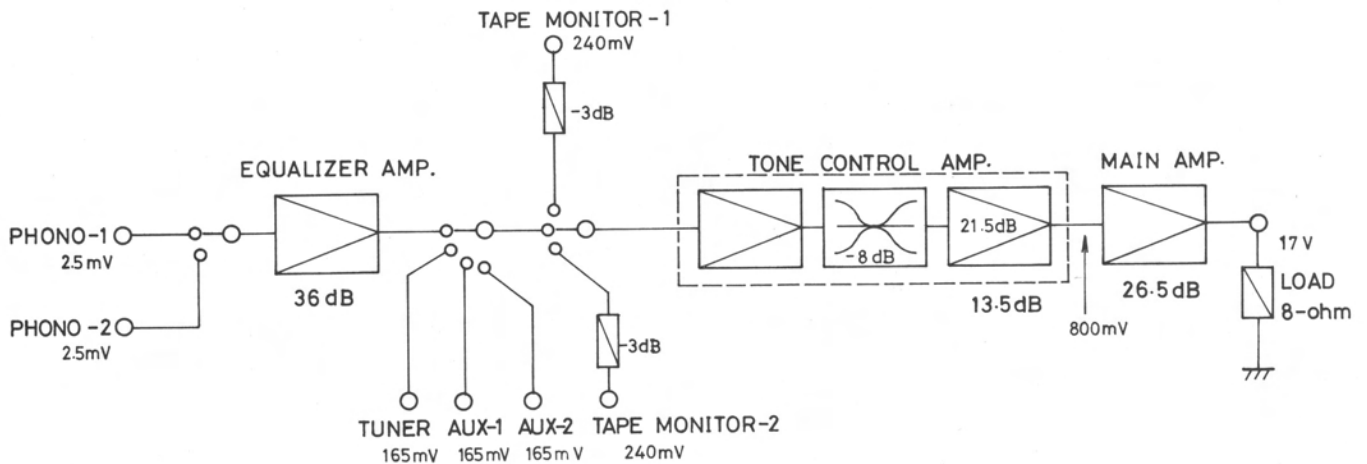
B. If the pilot lamp does light, check to see if the speaker fuse is OK.

1. And if the speaker fuse is OK, check to see if there is a signal at PRE OUT jack.
  - a. And if there is a signal at PRE OUT jack,
    - 1) Transistor, Q301, 302, 303, 304, 305, 306 or 307 (Q308, 309, 310, 311, 312, 313 or 314 for Right channel) may be faulty, or
    - 2) Capacitor, C301 (C308 for Right channel) may be faulty.
  - b. And if there is no signal,
    - 1) Capacitor, C203, 204, 208, 209, 214 or 218 (C221, 222, 226, 227, 232 or 236 for Right channel) may be faulty, or
    - 2) Transistor, Q201, 202, 203 or 204 (Q205, 206, 207 or 208 for Right channel) may be faulty.
2. If the speaker fuse is blown,
  - a. The speaker circuit (including speaker system) may be shorted out.

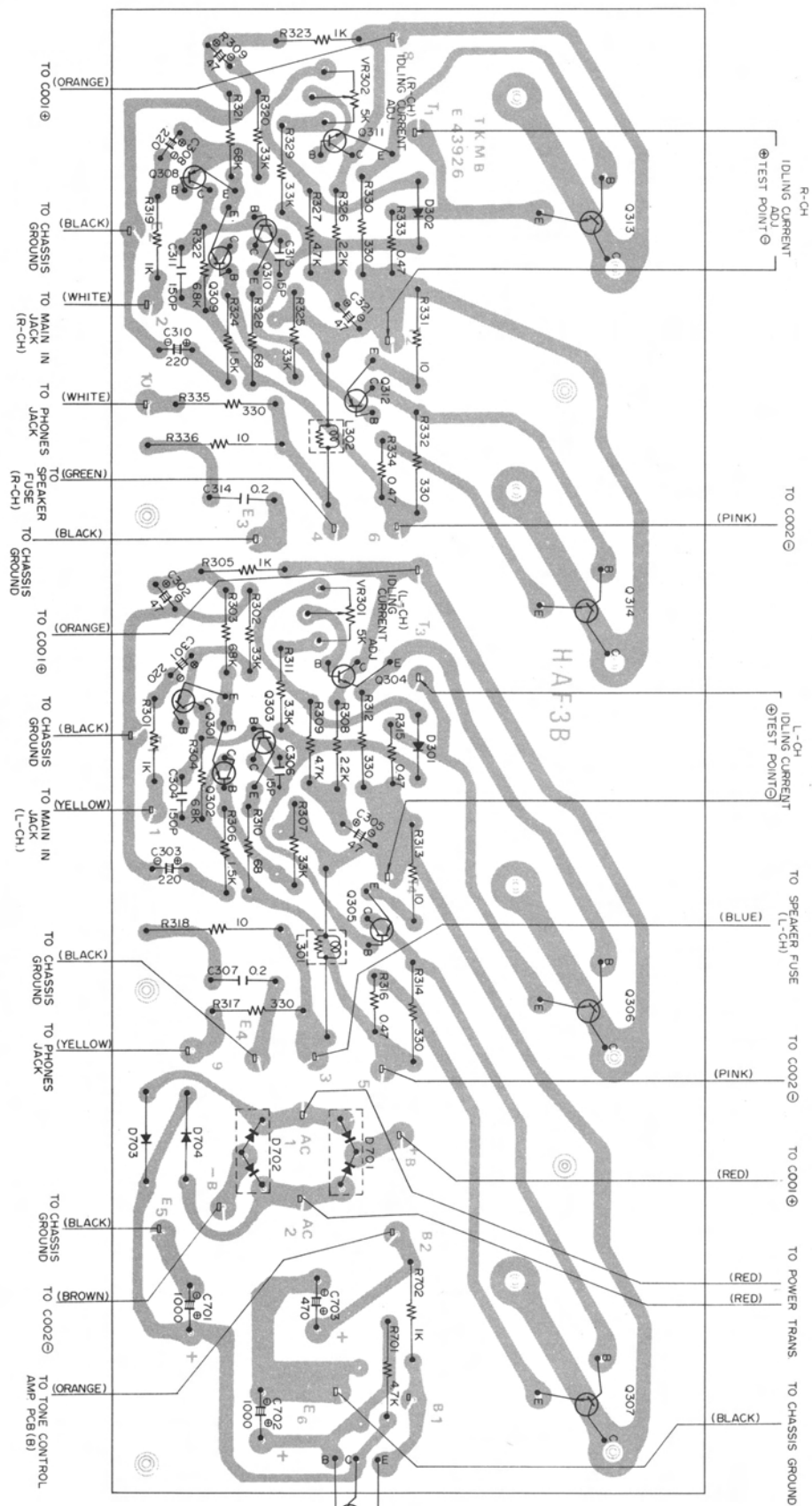
## II. Only Phono section inoperative.

1. Capacitor, C401, 405 or 408 (C409, 414 or 417 for Right channel) may be faulty, or
2. Transistor, Q401 or 402 (Q403 or 404 for Right channel) may be faulty.

# GAIN DIAGRAM



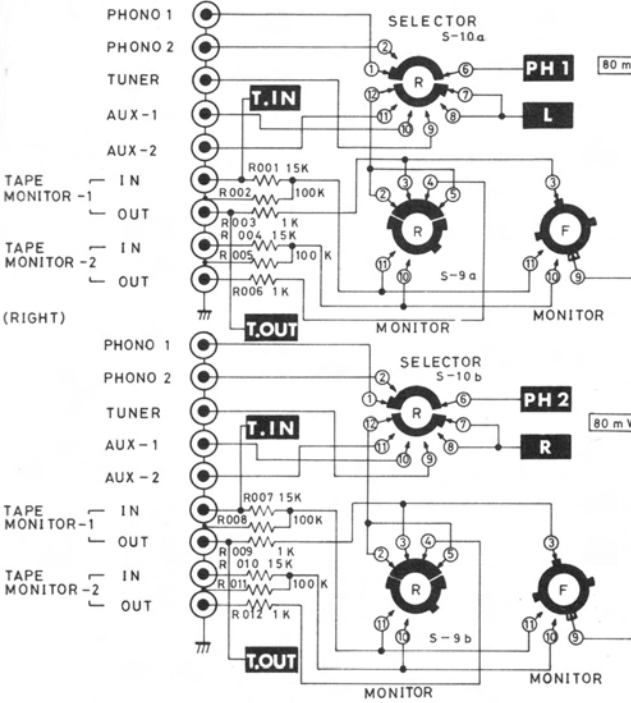
# MAIN AMP & POWER SUPPLY CIRCUIT BOARD DIAGRAM



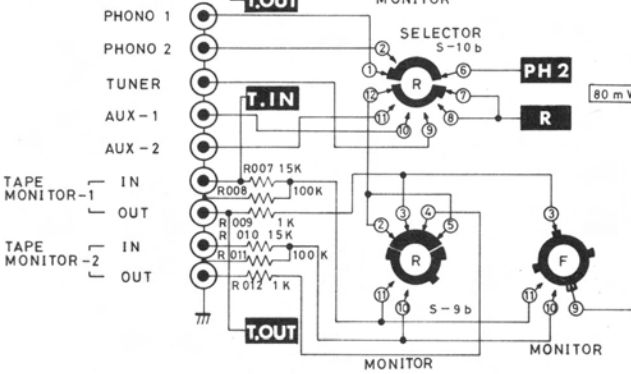


# SCHEMATIC DIAGRAM

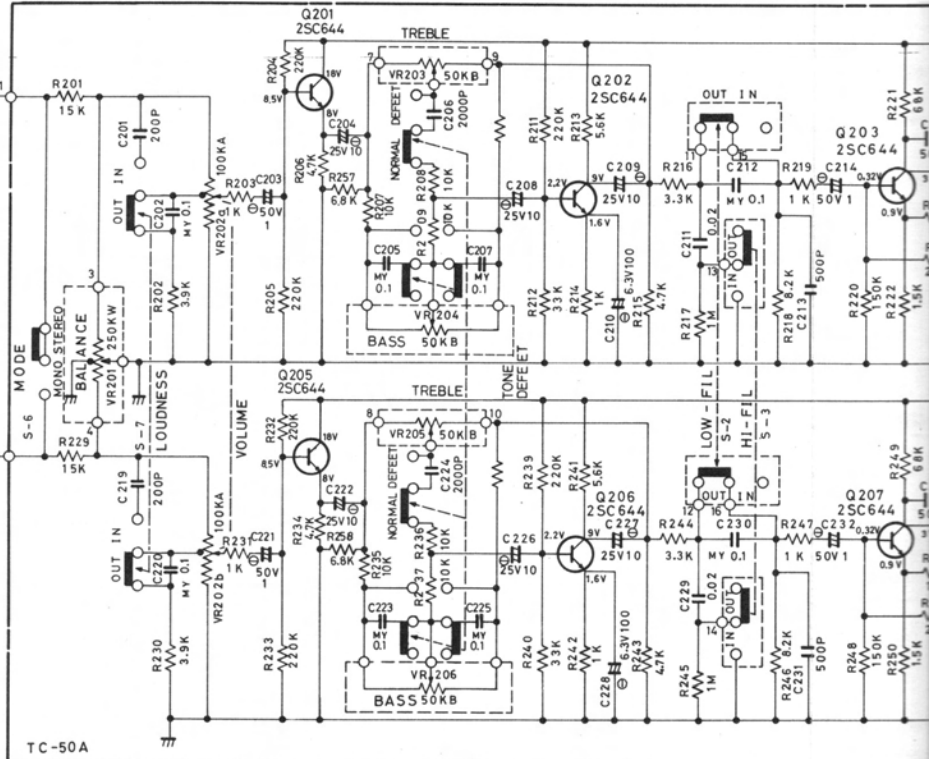
(LEFT)



(RIGHT)

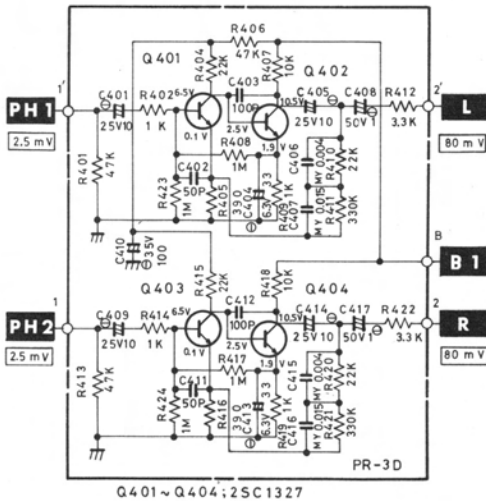


## TONE CONTROL CIRCUIT



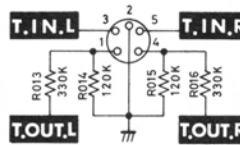
TC-50A

## EQUALIZER AMP CIRCUIT

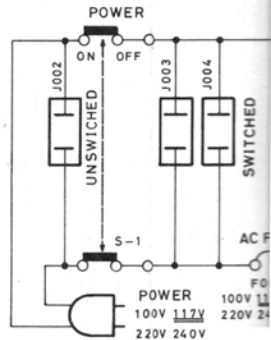


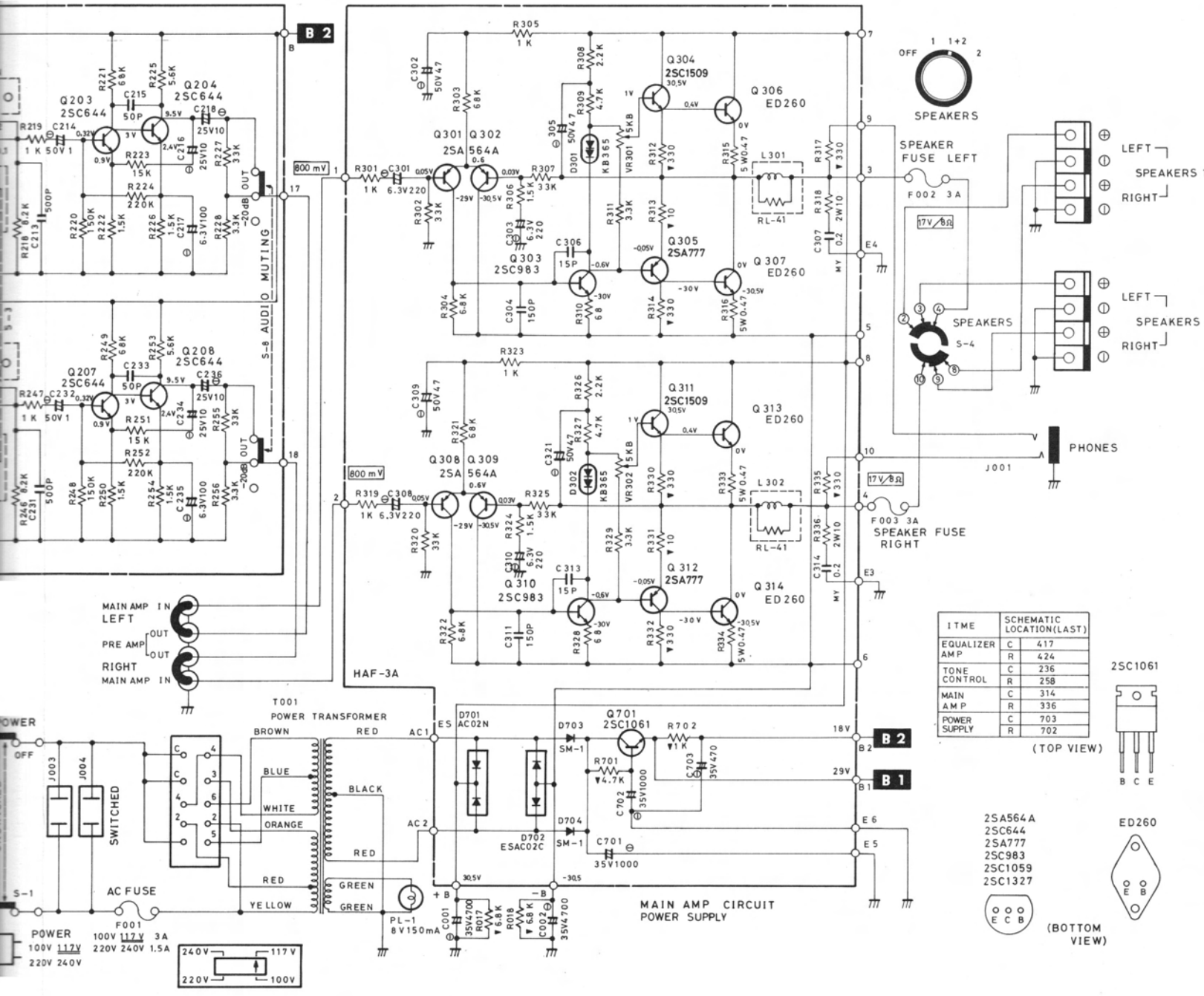
Q401-Q404; 2SC1327

## RED/PB

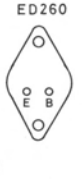
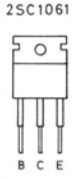


(RESISTORS)  
5% TOLERANCE UNLESS OTHERWISE NOTED.  
K---KILO OHM.  
M---MEGA OHM.  
\*---COMPOSITION RESISTORS 1/2 WATT.  
NON MARK---LOW NOISE TYPE CARBON RESISTORS 1/4 WATT.  
(CAPACITORS)  
MY---MYLAR FILM CAPACITORS.  
E---ELECTROLYTIC CAPACITORS.  
NON MARK---CERAMIC CAPACITORS.  
YE---CERAMIC 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 117 VOLT)  
VOLTAGE READING MAY VARY ±20%.





ITEM	SCHEMATIC LOCATION(LAST)
EQUALIZER	C 417
AMP	R 424
tone CONTROL	C 236
	R 258
MAIN AMP	C 314
	R 336
POWER SUPPLY	C 703
	R 702



- 2SA564A
- 2SC644
- 2SA777
- 2SC983
- 2SC1059
- 2SC1327



# PARTS LIST

## CHASSIS PARTS

Schematic Location	Part No.	Description
<b>RESISTORS</b>		
R001, 004, } R007, 010 }	552015322	Carbon Film, 15K ±5%, 1/4W
R002, 005, } R008, 011 }	552010422	Carbon Film, 100K ±5%, 1/4W
R003, 006, } R009, 012 }	552010222	Carbon Film, 1K ±5%, 1/4W
R013, 016	552033422	Carbon Film, 330K ±5%, 1/4W
R014, 015	552012422	Carbon Film, 120K ±5%, 1/4W
R017, 018	551068233	Composition, 6.8K ±10%, 1/2W
VR201	581005033	Variable, 250KW, Balance Control
VR203, 204, } VR205, 206 }	581005036	Variable, 50KB, Bass & Treble Control
<b>CAPACITOR</b>		
C001, 002	400470439	Electrolytic, 4700mfd, 35V
<b>TRANSISTORS</b>		
Q306, 307, } Q313, 314 }	301901126	ED260, Power Amp.
Q701	301201125	2SC1061, Stabilizer

Schematic Location	Part No.	Description
<b>MISCELLANEOUS</b>		
T001	205001347	Power Transformer (100, 117, 220, 240V)
S1, 2, 3, } (1 set) }	614030808	Switch, Push 3-keys, Hi-Fil., Low Fil., Power
S4	601011225	Switch, Speakers Selector
S9	601011227	Switch, Monitor
S10	601011239	Switch, Input Selector
J001	626110023	Headphones Jack
J002, 003, } J004 }	648211126	AC Outlet
PL1	351080015	Lamp, 8V, 0.15A, Pilot
F001	341220030	Fuse, 3A-3AG, AC
	341220015	Fuse, 1.5A-3AG, AC (for 220V or 240V area)
F002, 003	341220030	Fuse, 3A-3AG, Speaker Protector
	624100210	Pin Jack, 10P
	624100208	Pin Jack, 8P
	624100104	Pin Jack, 4P
	642400104	Speakers Terminal, 4P
	625001112	Din Jack, 5P, Tape Monitor
	648211127	Bracket, Fuse

## EQUALIZER AMP. CIRCUIT BOARD

Schematic Location	Part No.	Description
<b>RESISTORS</b>		
R401, 406, } R413 }	552047322	Carbon Film, 47K ±5%, 1/4W
R402, 409, } R414, 419 }	552010222	Carbon Film, 1K ±5%, 1/4W
R404, 410, } R415, 420 }	552022322	Carbon Film, 22K ±5%, 1/4W
R405, 416	552039122	Carbon Film, 390 ±5%, 1/4W
R407, 418	552010322	Carbon Film, 10K ±5%, 1/4W
R408, 417, } R423, 424 }	552010522	Carbon Film, 1M ±5%, 1/4W
R411, 421	552033422	Carbon Film, 330K ±5%, 1/4W
R412, 422	552033222	Carbon Film, 3.3K ±5%, 1/4W
<b>CAPACITORS</b>		
C401, 405, } C409, 414 }	402100629	Electrolytic, 10mfd, 25V

Schematic Location	Part No.	Description
C402, 411	440501283	Ceramic, 50pF ±10%, 250V
C403, 412	440101183	Ceramic, 100pF ±10%, 250V
C404, 413	402330609	Electrolytic, 33mfd, 6.3V
C406, 415	450401033	Mylar Film, 0.004 mfd ±10%, 50V
C407, 416	450150933	Mylar Film, 0.015mfd ±10%, 50V
C408, 417	402100749	Electrolytic, 1mfd, 50V
C410	402100539	Electrolytic, 100mfd, 35V
<b>TRANSISTORS</b>		
Q401, 402, } Q403, 404 }	301201134	2SC1327, Phono Amp.
	770101224	Pin, Terminal
	140500524	Printed Circuit Board "PR-3D"
	141510134	Equalizer Amp. Circuit Assembly

## TONE CONTROL AMPLIFIER CIRCUIT BOARD

Schematic Location	Part No.	Description
<b>RESISTORS</b>		
R201, 223, R229, 251	552015322	Carbon Film, 15K ±5%, 1/4W
R202, 230	552039222	Carbon Film, 3.9K ±5%, 1/4W
R203, 214, R219, 231, R242, 247	552010222	Carbon Film, 1K ±5%, 1/4W
R204, 205, R211, 224, R232, 233, R239, 252	552022422	Carbon Film, 220K ±5%, 1/4W
R206, 215, R234, 243	552047222	Carbon Film, 4.7K ±5%, 1/4W
R207, 208, R209, 210, R235, 236, R237, 238	552010322	Carbon Film, 10K ±5%, 1/4W
R212, 227, R240, 255	552033322	Carbon Film, 33K ±5%, 1/4W
R213, 225, R241, 253	552056222	Carbon Film, 5.6K ±5%, 1/4W
R216, 228, R244, 256	552033222	Carbon Film, 3.3K ±5%, 1/4W
R217, 245	552010522	Carbon Film, 1M ±5%, 1/4W
R218, 246	552082222	Carbon Film, 8.2K ±5%, 1/4W
R220, 248	552015422	Carbon Film, 150K ±5%, 1/4W
R221, 249	552068322	Carbon Film, 68K ±5%, 1/4W
R222, 226, R250, 254	552015222	Carbon Film, 1.5K ±5%, 1/4W
R257, 258	552068222	Carbon Film, 6.8K ±5%, 1/4W
VR202	525121113	Variable, 100Kx2, Volume Control

Schematic Location	Part No.	Description
<b>CAPACITORS</b>		
C201, 219	440201183	Ceramic, 200pF ±10%, 250V
C202, 205, C207, 212, C220, 223, C225, 230	450100833	Mylar Film, 0.1mfd ±10%, 50V
C203, 214, C221, 232	402100749	Electrolytic, 1mfd, 50V
C204, 208, C209, 216, C218, 222, C226, 227, C234, 236	402100629	Electrolytic, 10mfd, 25V
C206, 224	442201033	Ceramic, 0.002mfd ±10%, 50V
C210, 217, C228, 235	402100509	Electrolytic, 100mfd, 6.3V
C211, 229	450200933	Mylar Film, 0.02mfd ±10%, 50V
C213, 231	440501183	Ceramic, 500pF ±10%, 250V
C215, 233	440501283	Ceramic, 50pF ±10%, 250V
<b>TRANSISTORS</b>		
Q201, 202, Q203, 204, Q205, 206, Q207, 208	301201114	2SC644, Tone Amp.
S5, 6, 7, 8 (1 set)	614040811	Switch, Push 4-keys, Mode, Loudness etc.
	770101225	Pin, Terminal
	140700743	Printed Circuit Board "TC-50"
	141710240	Tone Control Amp. Circuit Assembly

## MAIN AMP. & POWER SUPPLY CIRCUIT BOARD

Schematic Location	Part No.	Description
<b>RESISTORS</b>		
R301, 305, R319, 323	552010222	Carbon Film, 1K ±5%, 1/4W
R302, 307, R320, 325	552033322	Carbon Film, 33K ±5%, 1/4W
R303, 321	552068322	Carbon Film, 68K ±5%, 1/4W
R304, 322	552068222	Carbon Film, 6.8K ±5%, 1/4W
R306, 324	552015222	Carbon Film, 1.5K ±5%, 1/4W
R308, 326	552022222	Carbon Film, 2.2K ±5%, 1/4W
R309, 327	552047222	Carbon Film, 4.7K ±5%, 1/4W
R310, 328	552068022	Carbon Film, 68 ±5%, 1/4W
R311, 329	552033222	Carbon Film, 3.3K ±5%, 1/4W

Schematic Location	Part No.	Description
R312, 314, R317, 330, R332, 335	551033133	Composition, 330 ±10%, 1/2W
R313, 331	551010033	Composition, 10 ±10%, 1/2W
R315, 316, R333, 334	554147973	MPC, 0.47 ±10%, 5W
R318, 336	554010053	Bath-tub, 10 ±10%, 2W
VR301, 302	510502128	Potentiometer, 5KB, Idling Current Adj.
R701	551047233	Composition, 4.7K ±10%, 1/2W
R702	551010233	Composition, 1K ±10%, 1/2W

Schematic		
Location	Part No.	Description
<b>CAPACITORS</b>		
C301, 303, } C308, 310 }	402220509	Electrolytic, 220mfd, 6.3V
C302, 305, } C309, 321 }	402470649	Electrolytic, 47mfd, 50V
C304, 311	440151183	Ceramic, 150pF ±10%, 250V
C306, 313	440151283	Ceramic, 15pF ±10%, 250V
C307, 314	450200833	Mylar Film, 0.2mfd ±10%, 50V
C701, 702	402100439	Electrolytic, 1000mfd, 35V
C703	402470539	Electrolytic, 470mfd, 35V
<b>TRANSISTORS AND DIODES</b>		
Q301, 302, } Q308, 309 }	301001115	2SA564, Differential Amp.

Schematic		
Location	Part No.	Description
Q303, 310	301201137	2SC983, Pre-driver
Q304, 311	301201143	2SC1095, Driver
Q305, 312	301001128	2SA777, Driver
D301, 302	300212007	KB-365. Varister
D701	300919010	ESAC02N, Rectifier
D702	300919009	ESAC02-C, Rectifier
D703, 704	300919008	SM-1-02, Rectifier
L301, 302	220401120	Coil, Anti-parasitic
	127012128	Heat Sink for Pre-driver
	770101224	Pin, Terminal
	140600661	Printed Circuit Board "H-AF-3"
	141610246	Main Amp. & Power Supply Circuit Assembly