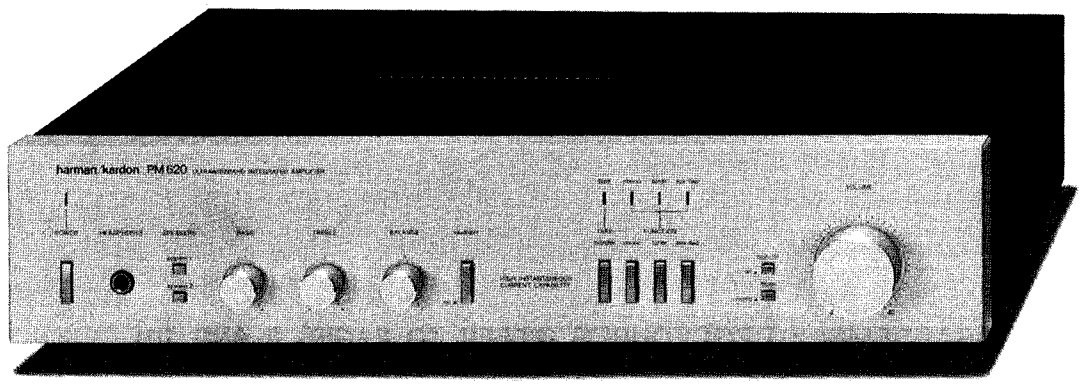
The Harman Kardon Model PM620

Manual No. 59A

ULTRAWIDEBAND INTEGRATED AMPLIFIER

Technical Manual



PM620

harman/kardon
240 CROSSWAYS PARK WEST, WOODBURY, N.Y. 11797
1112-H15259A6 P-08834 400 PRINTED IN JAPAN

SPECIFICATIONS

	Nominal Limit
RMS Output Power	
8Ω, 1kHz, THD 0.15%	25.5W ≧22W
4Ω, 1kHz, THD 0.15%	35.5W ≧30W
High Instantaneous Current Capability (HCC)	16A
Half Power Bandwith	10Hz ~ 80kHz
Frequency Response at −3dB	4Hz ~ 120kHz
Usable Sensitivity	
Aux/DAD	135mV ± 25mV
Phono	2.2mV ± 0.2mV
Signal to Noise Ratio.	
Aux/DAD	85dB ≧78dB
Phono	81dB ≧72dB
Channel Separation at 10 kHz	
Aux/DAD	60dB ≧45dB
Phono	65dB ≧60dB
IM Distortion Ratio	0.1% ≦0.25%
Damping Factor at 1kHz	86 ≧60
Tone Control Characteristics	
Bass at 50 Hz	
Boost	10dB ± 2dB
Cut	−10dB ± 2dB
Treble at 10kHz	
Boost	10dB ± 2dB
Cut	−10dB ± 2dB

	Nominal Limit
Loudness Control (with Volume control at −40dB)	
at 10kHz	3dB± 1dB
at 50Hz	10dB± 2dB
DC Output Voltage	
L channel	0mV ± 60mV
R channel	0mV ± 60mV
RIAA Equalization at Tape Out (20Hz/20kHz) (No load)	0.8dB ≦ 1.5dB/0.2dB ≦ 1.5dB
Phono Overload (No load)	140mV ≧ 100mV
Dimensions (W x H x D)	443 x 103 x 353 mm
Weight	5.8 kg
Power Supply	AC220/240V, 50/60Hz
Power Consumption	120W

This specification is the target of servicing. But, there is a case that the specification is not applicable to the measurement condition and instrument.

Specifications and components subject to change without notice. Overall performance will be maintained or improved.

DISASSEMBLY PROCEDURES (REFER TO PAGES 3 AND 10)

1 CABINET TOP REMOVAL

Remove 6 screws Ⓐ and then remove the cabinet top.

2 FRONT PANEL ASSEMBLY REMOVAL

1. Remove the cabinet top (refer to step 1).
2. Pull off Volume, Bass, Treble and Balance knobs (103 and 104).
3. Open the lid of connector (J551) on the tape monitor & function switches P.C. board (PCB-3) and then disconnect P551 from J551.
4. Remove 6 screw Ⓑ mounting the front panel assembly with function & tape monitor indicators and power indicator P.C. boards (PCB-9 and PCB-10), and pull the them toward you to remove.

3 TAPE MONITOR & FUNCTION SWITCHES P.C. BOARD (PCB-3) REMOVAL

1. Remove the front panel assembly (refer to step 2).
2. Remove 2 screws Ⓒ and then remove the tape monitor & function switches P.C. board (PCB-3). If necessary, unsolder the leads.

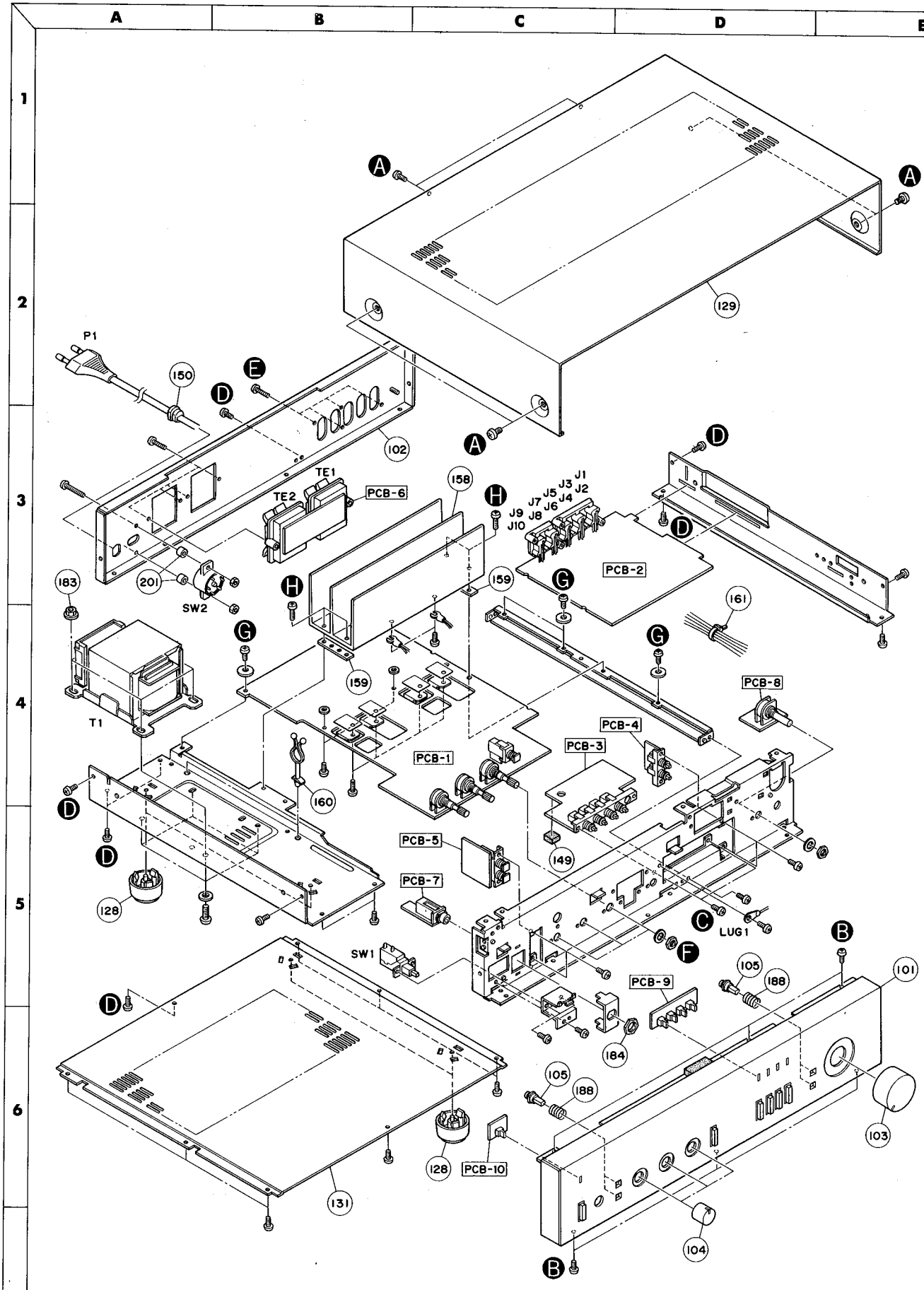
4 MAIN P.C. BOARD (PCB-1) REMOVAL

1. Remove the tape monitor & function switches P.C. board (PCB-3) (refer to step 3).
2. Disconnect J501 from P501 on the volume control P.C. board (PCB-8).
3. Remove 7 screws Ⓓ and 4 screws Ⓔ , and remove cabinet back assembly (102) with speaker terminals P.C. board (PCB-6) and rotary switch (SW2). If necessary, unsolder the leads.
4. Remove 3 hexagonal nuts Ⓕ .
5. Remove 4 screws Ⓖ and 4 screws Ⓗ , and remove the main P.C. board (PCB-1) backward.

5 EQUALIZER P.C. BOARD (PCB-2) REMOVAL

1. Remove the cabinet top (refer to step 1).
2. Remove 4 screws Ⓔ and 2 screws Ⓖ mounting the equalizer P.C. board (PCB-2) and remove it.

GENERAL UNIT EXPLODED VIEW



ALIGNMENT PROCEDURES

IDLING ADJUSTMENT

Conditions:
- Press the aux/DAD switch.
- Set the volume to minimum.
- Set the speaker system switches 1 and 2 to OFF.
- Make the adjustment at a room temperature of 25°C.

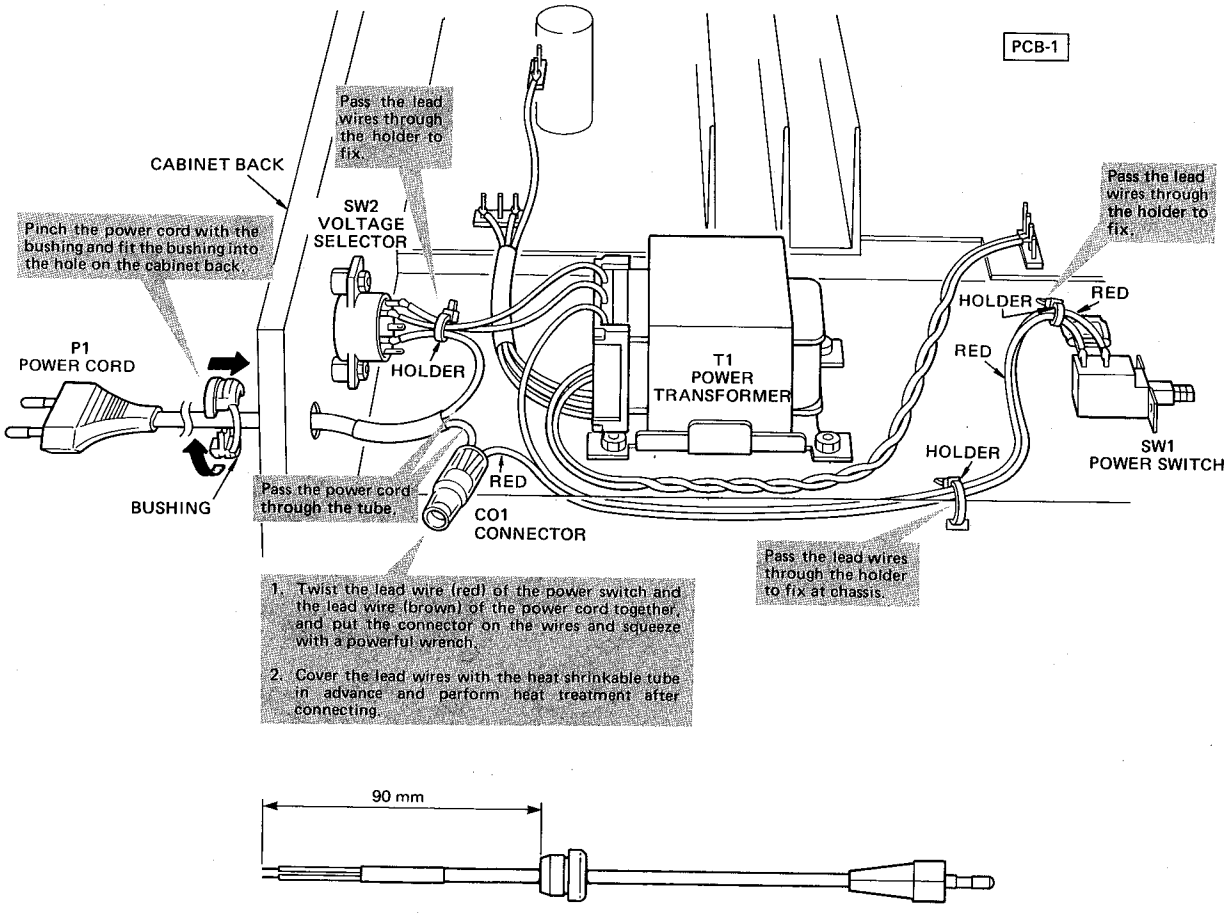
Step	Connections required	Adjustment location	Adjustment value
1	Connect the digital voltmeter to TP1 and TP2.	VR401(L channel)	22mV
2	Connect the digital voltmeter to TP3 and TP4.	VR402(R channel)	22mV
3	Repeat steps 1 and 2 after aging for 15 minutes.	VR401/VR402	22mV/22mV

DC BALANCE CONFIRMATION

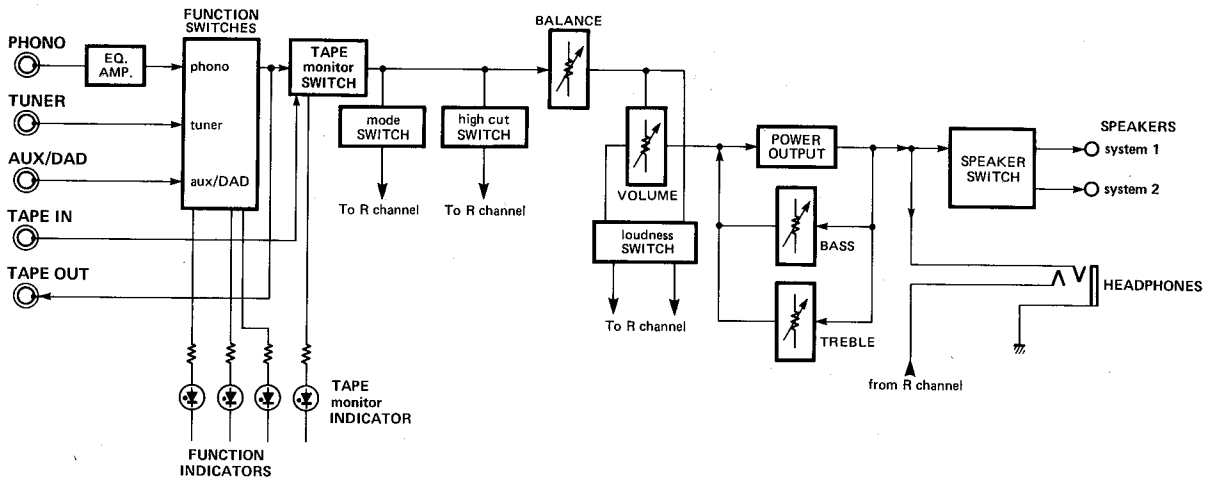
Step	Connections required	Correct value
1	Connect the digital voltmeter between TP5 and ground.	0 ± 60mV
2	Connect the digital voltmeter between TP6 and ground.	0 ± 60mV

POWER CORD REPLACEMENT

In order to prevent fire or shock hazard when replacing the power cord, follow the procedure below to replace the parts with the standard supply parts.



BLOCK DIAGRAM



CIRCUIT DESCRIPTION

- **OVERLOAD PROTECTION Lch (Rch)**

As soon as the carrent over rated power flows, the voltage between TP1 (TP3) and TP2 (TP4) rises and Q3 (Q4), Q5 and Q13 are turned ON. So Q7 (Schmit trigger circuit) is turned ON. The base of Q1 becomes 0V and Q1 is turned OFF. The operation of power amp. circuit stops and the circuit is protected.

GENERAL UNIT PARTS LIST

Ref. No.	Part No.	Description
101	A443-PM620A	Front Panel Assembly (Includes: Push Buttons)
102	A424-PM620C	Cabinet Back Assembly
"	A424-PM620D	Cabinet Back Assembly (for German model)
103	A630-PM620A	Knob Assembly, Volume
104	A630-PM620B	Knob Assembly, Bass, Treble, Balance
105	A662-PM620A	Push Button Assembly, Speakers, High Cut, Mode
128	1319-0139	Foot
129	1414-03401	Cabinet Top
131	1424-08701	Cabinet Bottom
149	2112-11187	Sponge
150	2114-415027	Bushing
158	2222-7143	Heat Sink
159	2224-7069	Insulator
160	2240-7050	Holder
161	2240-7120	Holder
183	2440-60	Special Nut
184	2440-61	Special Nut
188	2651-210187	Spring
201	2132-01406	Spacer
	2211-7249	Chassis, Front
	2211-7243	Chassis, T1
	2211-7234	Chassis, Right
	2219-7782	Bracket, SW1
	2219-7879	Bracket, PCB-7
	2219-7880	Bracket, Center
	1111-J30144	Owner's Guide
	1222-7216	Cushion (2 Used)
	1221-777144	Carton Box

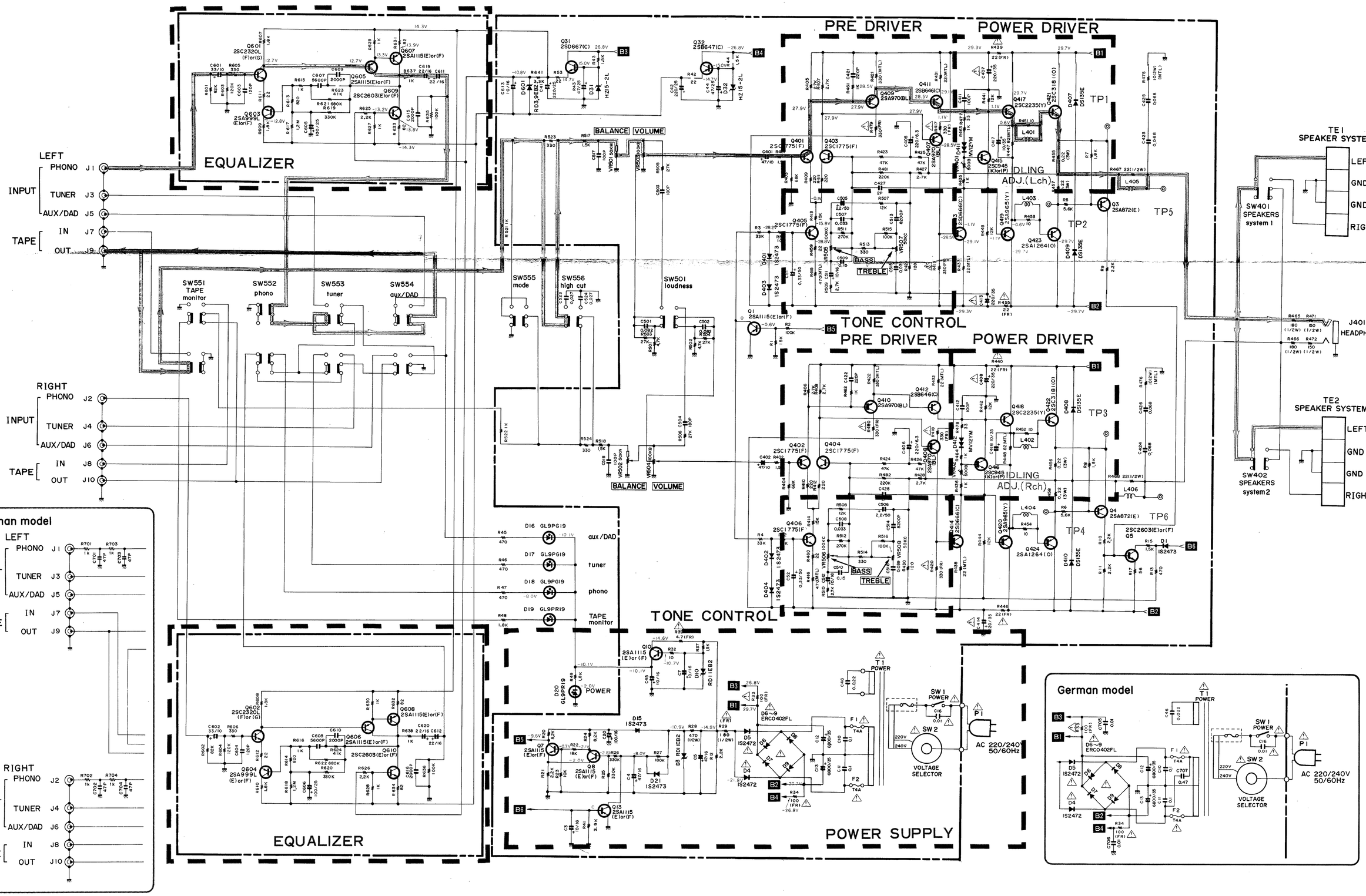
ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
	CHASSIS MISCELLANEOUS	
P1	4161-7256	Power Cord
T1	5584-701419	Power Transformer
CO1	4443-712	Connector, Power Cord
SW1	4431-A01056	Push Switch, Power
SW2	4411-102719	Rotary Switch, Voltage Selector
C16	5352-1030958	Capacitor, 0.01μF, ±20%, AC250V, Metalized Polyester
LUG1	4211-4	Lug Terminal
	PCB-1 MAIN P.C. BOARD	
	RESISTORS	
R29	5102-1815114	180Ω, ±5%, 1/2W, Fuse
R33, 34	5102-1014713	100Ω, ±2%, 1/4W, Fuse
R39	5102-4R74713	4.7Ω, ±2%, 1/4W, Fuse
R415, 416	5174-471381	470Ω, ±1%, 1/4W, Metal
R417, 418, 479, 480	5102-3314715	330Ω, ±2%, 1/4W, Fuse
R419, 420	5102-3314713	330Ω, ±2%, 1/4W, Fuse
R421, 422	5174-331381	330Ω, ±1%, 1/4W, Metal
R431, 432, 437, 438	5174-220381	22Ω, ±1%, 1/4W, Metal
R439, 440, 445, 446	5102-2204715	22Ω, ±2%, 1/4W, Fuse
R447, 448	5174-820381	82Ω, ±1%, 1/4W, Metal
R455/457, 456/458	5273-R22672	0.22Ω, ±10%, 3Wx2, Cement
R475, 476	5173-100571	10Ω, ±5%, 2W, Metal
	CONTROLS	
VR401, 402	5101-50171920	500ΩB
VR501/502	5113-50385122	50kΩM/N, Balance
VR505/506	5113-10486122	100kΩC, Bass
VR507/508	5113-50387122	50kΩC, Treble
	CAPACITORS	
C3, 7	5345-106C041	10μF, ±20%, 16V, Electrolytic
C4, 5	5345-476C041	47μF, ±20%, 16V, Electrolytic
C12, 13	5341-688E0955	6800μF, ±20%, 35V, Electrolytic
C20	5345-107C041	100μF, ±20%, 16V, Electrolytic
C51, 52	5345-334F0951	0.33μF, ±20%, 50V, Electrolytic
C401, 402	5345-476B0951	47μF, ±20%, 10V, Electrolytic
C405, 406	5345-227A041	220μF, ±20%, 6.3V, Electrolytic
C407, 408, 413, 414	5345-227E041	220μF, ±20%, 35V, Electrolytic
C411, 412	5359-1015851	100pF, ±5%, 100V, Polypropylene
C417, 418	5345-106E041	10μF, ±20%, 35V, Electrolytic
C421, 422	5359-2215851	220pF, ±5%, 100V, Polypropylene
C427, 428	5353-020934	2pF, ±0.5pF, 500V, Mica
C503, 504	5359-1815851	180pF, ±5%, 100V, Polypropylene
C505, 508	5345-225F0951	2.2μF, ±20%, 50V, Electrolytic
C511, 512	5345-106C0951	10μF, ±20%, 16V, Electrolytic
C517, 518	5359-1015851	100pF, ±5%, 100V, Polypropylene
C707	5352-4741957	0.47μF, ±10%, 250V, Metalized Polyester (German model only)
	TRANSISTORS	
Q1, 7, 8, 10, 13	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q3, 4	5611-872(E)	2SA872(E)
Q5	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q401, 402, 403, 404, 405, 406	5613-1775(F)	2SC1755(F)

Ref. No.	Part No.	Description
Q407, 408, 409, 410	5611-970(BL)	2SA970(BL)
Q411, 412	5612-646(C)	2SB646(C)
Q413, 414	5614-666(C)	2SD666(C)
Q415, 416	5613-945(K)	2SC945(K) or 2SC945(P)
Q417, 418	5613-2235(Y)	2SC2235(Y)
Q419, 420	5611-965(Y)	2SA965(Y)
Q421, 422	5613-3181(O)	2SC3181(O) (w/Insulator)
Q423, 424	5611-1264(O)	2SA1264(O) (w/Insulator)
	DIODES	
D1, 15, 21, 401, 402, 403, 404	5631-1S2473	1S2473
D3, 10	5635-RD11EB2	Zener, RD11EB2
D4, 5	5636-1S2472	1S2472
D6, 7, 8, 9	5632-ERC402FL	ERC402FL
D407, 408, 409, 410	5632-DS135E	DS135E
D411, 412	5641-MV12YM	Varistor, MV12YM
	COILS	
L401, 402, 403, 404	5597-35502	Ferrite Bead
L405, 406	5991-7165	
	MISCELLANEOUS	
F1, 2	5732-402030	Fuse, T4A, 250V
SW501	4431-A027210	Push Switch, Loudness
J501	4163-71165	Connector with Lead Wires, 11 Pos.
	4472-0131	Fuse Holder
	2132-7049	Spacer, R29
	PCB-2 EQUALIZER P.C. BOARD	
	RESISTORS	
R623, 624	5174-Z412228	41.2kΩ, ±0.5%, 1/4W, Metal
	CAPACITORS	
C41, 42	5345-227-25	220μF, +50%—10%, 25V, Electrolytic
C43, 44	5345-476-25	47μF, +50%—10%, 25V, Electrolytic
C601, 602	5345-336B0951	33μF, ±20%, 10V, Electrolytic
C603, 604	5359-1215851	120pF, ±5%, 100V, Polypropylene
C605, 606	5345-107D0952	100μF, ±20%, 25V, Electrolytic
C609, 610, 615, 616	5359-2025851	2000pF, ±5%, 100V, Polypropylene
C611, 612, 619, 620	5345-226C0226	22μF, ±20%, 16V, Electrolytic
C613	5345-106-16	10μF, +50%—10%, 16V, Electrolytic
C701, 702, 703, 704	5353-470534	47pF, ±5%, 500V, Mica (German model only)
	TRANSISTORS	
Q31	5614-667(C)	2SD667(C)
Q32	5612-647(C)	2SB647(C)
Q601, 602	5613-2320L(F)	2SC2320L(F) or 2SC2320L(G)
Q603, 604	5611-999L(F)	2SA999L(F) or 2SA999L(E)
Q605, 606, 607, 608	5611-1115(E)	2SA1115(E) or 2SA115(F)
Q609, 610	5613-2603(E)	2SC2603(E) or 2SC2603(F)
	DIODES	
D31, 32	5635-HZ15-2L	Zener, HZ15-2L
D601	5635-RD3R9EB2	Zener, RD3.9EB2
	MISCELLANEOUS	
J1, 2, 3, 4, 5, 6	4486-9	6-Pin Jack, Phono, Tuner, Aux/DAD
J7, 8, 9, 10	4484-31	4-Pin Jack, Tape In, Tape Out
	2132-7049	Spacer, D31 & D32

Ref. No.	Part No.	Description
	PCB-3 TAPE MONITOR & FUNCTION SWITCHES P.C. BOARD	
	CAPACITORS	
C45	5345-106C041	10μF, ±20%, 16V, Electrolytic
	MISCELLANEOUS	
SW551/552/553/554	4431-04167166	Push Switch, Tape Monitor, Phono, Tuner, Aux/DAD
J551	4443-060185	Connector, 6 Pos.
	PCB-4 MODE & HIGH CUT SWITCHES P.C. BOARD	
SW555/556	4431-02047363	Push Switch, Mode, High Cut
	PCB-5 SPEAKER SYSTEM SELECTORS P.C. BOARD	
SW401/402	4431-02047164	Push Switch, Speaker System 1, Speaker System 2
	PCB-6 SPEAKER TERMINALS P.C. BOARD	
TE1, 2	4214-133	Terminal, Speaker System 1, Speaker System 2
	PCB-7 HEADPHONE JACK P.C. BOARD	
J401	4451-00139	Jack, Headphones
	PCB-8 VOLUME CONTROL P.C. BOARD	
	CONTROLS	
VR503/504	5113-10476122	100kΩB, Volume
	MISCELLANEOUS	
P501	4443-117114	Connector, 11 Pos.
	PCB-9 FUNCTION & TAPE MONITOR INDICATORS P.C. BOARD	
D16, 17, 18	5637-GL9PG19	L.E.D., GL9PG19, Green, Aux/DAD, Tuner, Phono
D19	5637-GL9PR19	L.E.D., GL9PR19, Red, Tape Monitor
P551	4242-061307	Jumper Lead, 6 Pos.
	PCB-10 POWER INDICATOR P.C. BOARD	
D20	5637-GL9PR19	L.E.D., GL9PR19, Red, Power

SCHEMATIC DIAGRAM



German model

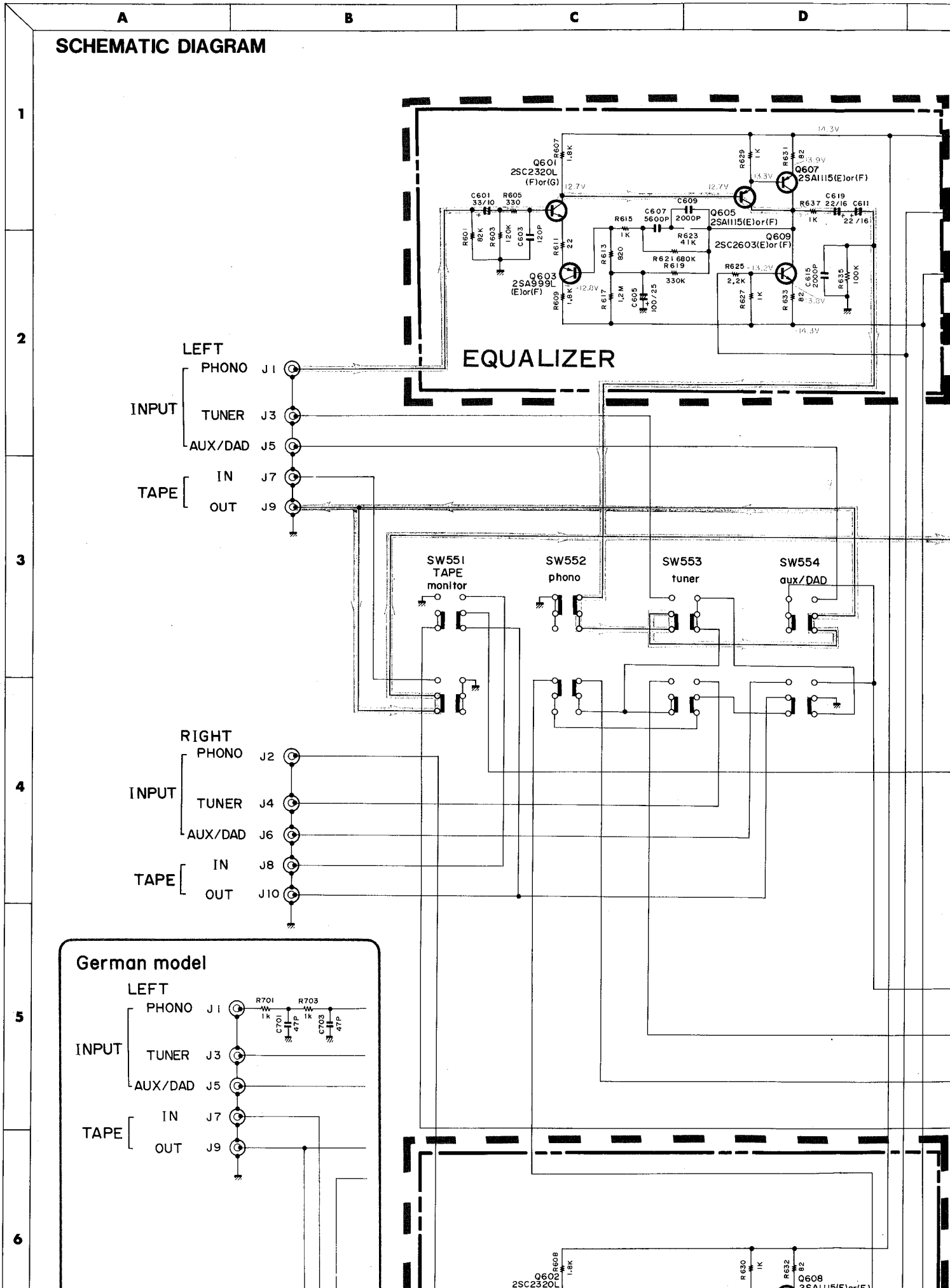
LEFT
INPUT
PHONO J1
TUNER J3
AUX/DAD J5
TAPE
IN J7
OUT J9

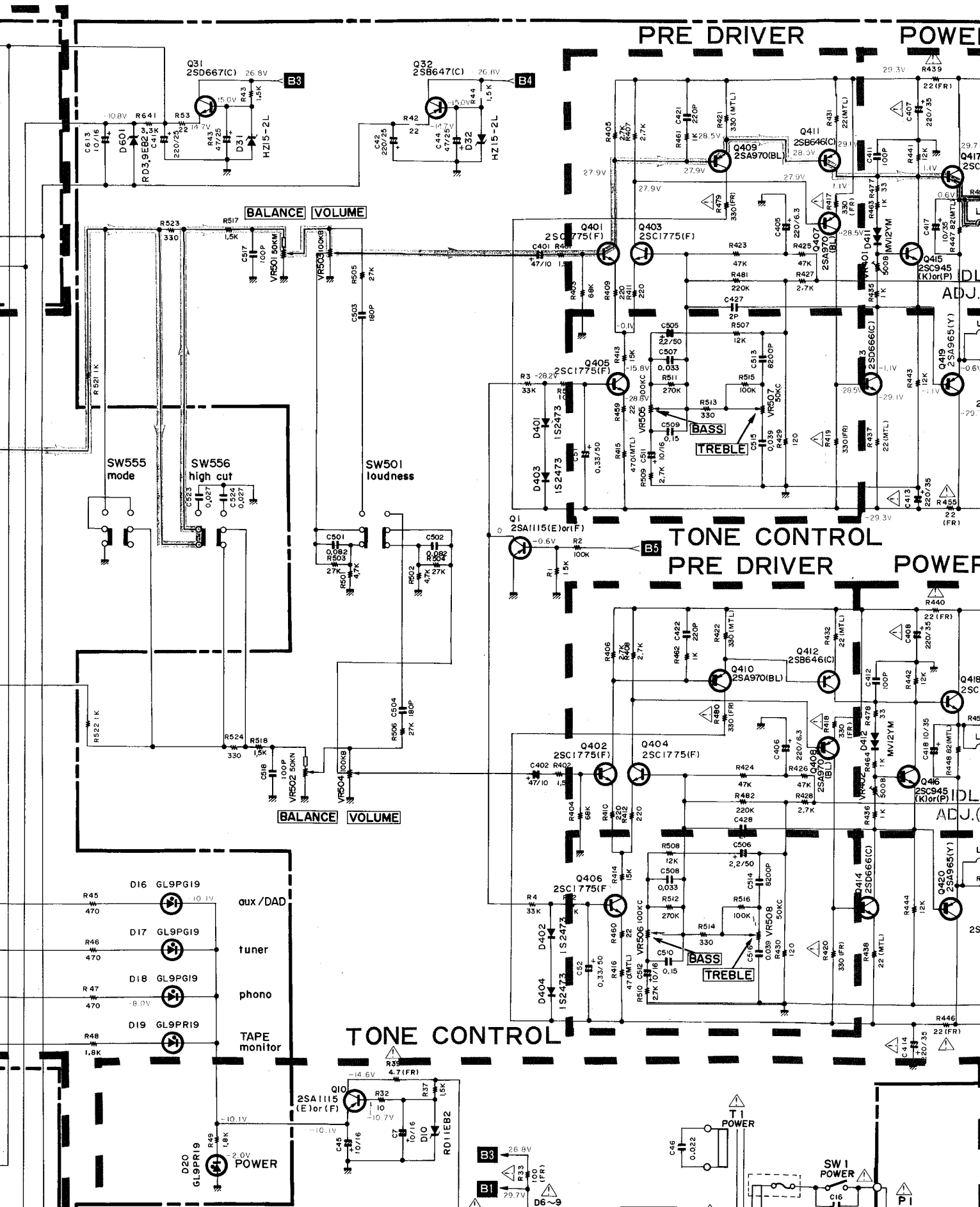
RIGHT
INPUT
PHONO J2
TUNER J4
AUX/DAD J6
TAPE
IN J8
OUT J10

..... PHONO SIGNAL

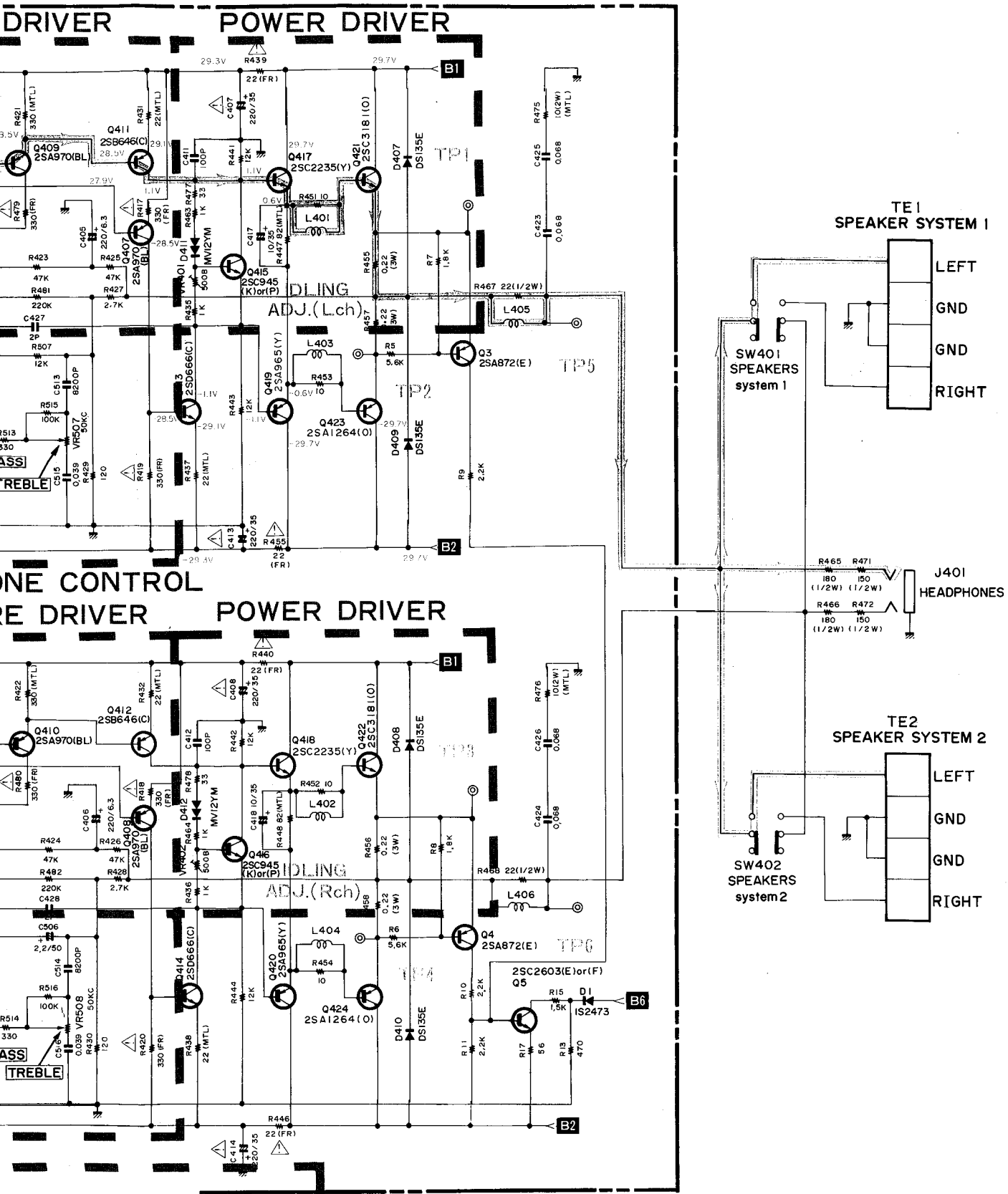
1. ALL RESISTANCES VALUES ARE IN Ω.
   KΩ=1000Ω, MΩ=1000KΩ.
2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
3. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=μμF
4. V: DC VOLTAGE AT NO SIGNAL
5. ⚠ SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS. THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

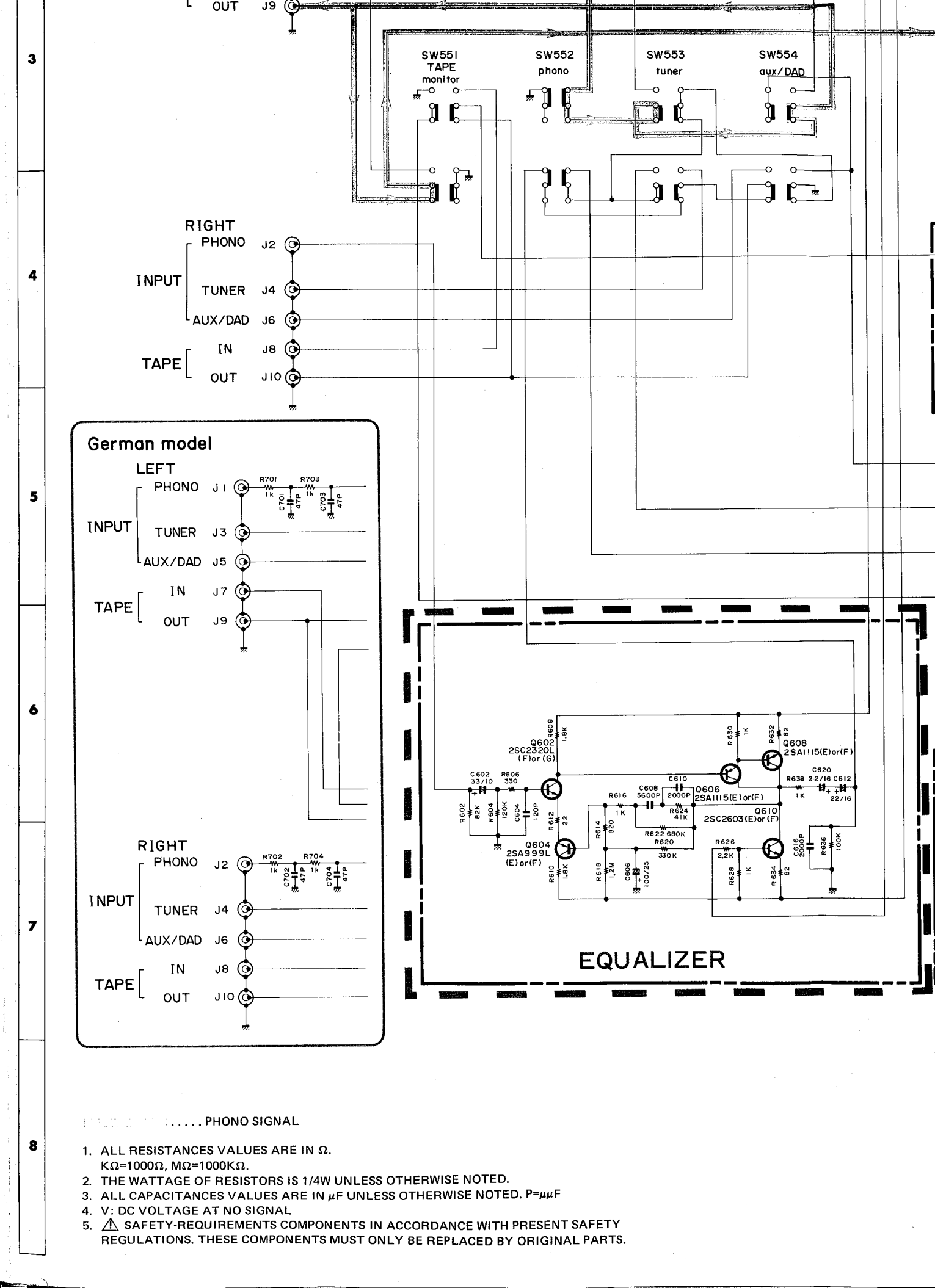
SCHEMATIC DIAGRAM




PRE DRIVER
POWE
TONE CONTROL
PRE DRIVER
POWER
TONE CONTROL
BALANCE
VOLUME
SW555
mode
SW556
high cut
SW501
loudness
BASS
TREBLE
aux/DAD
tuner
phono
TAPE
monitor
POWER
T1
POWER
SW1
POWER
Q31
2SD667(C)
Q32
2SB647(C)
Q401
2SC1775(F)
Q403
2SC1775(F)
Q405
2SC1775(F)
Q409
2SA970(BL)
Q411
2SB646(C)
Q415
2SC945
(K)or(P)
Q419
2SA965(Y)
Q1
2SA1115(E)or(F)
Q402
2SC1775(F)
Q404
2SC1775(F)
Q406
2SC1775(F)
Q410
2SA970(BL)
Q412
2SB646(C)
Q416
2SC945
(K)or(P)
Q420
2SA965(Y)
Q10
2SA1115
(E)or(F)
D401
1S2473
D403
1S2473
D402
1S2473
D404
1S2473
D601
RD3.9EB2
D31
HZ15-2L
D32
HZ15-2L
D10
RD11EB2
D16 GL9PG19
D17 GL9PG19
D18 GL9PG19
D19 GL9PR19
D20
GL9PR19
B3
B4
B5
B1
D6~9

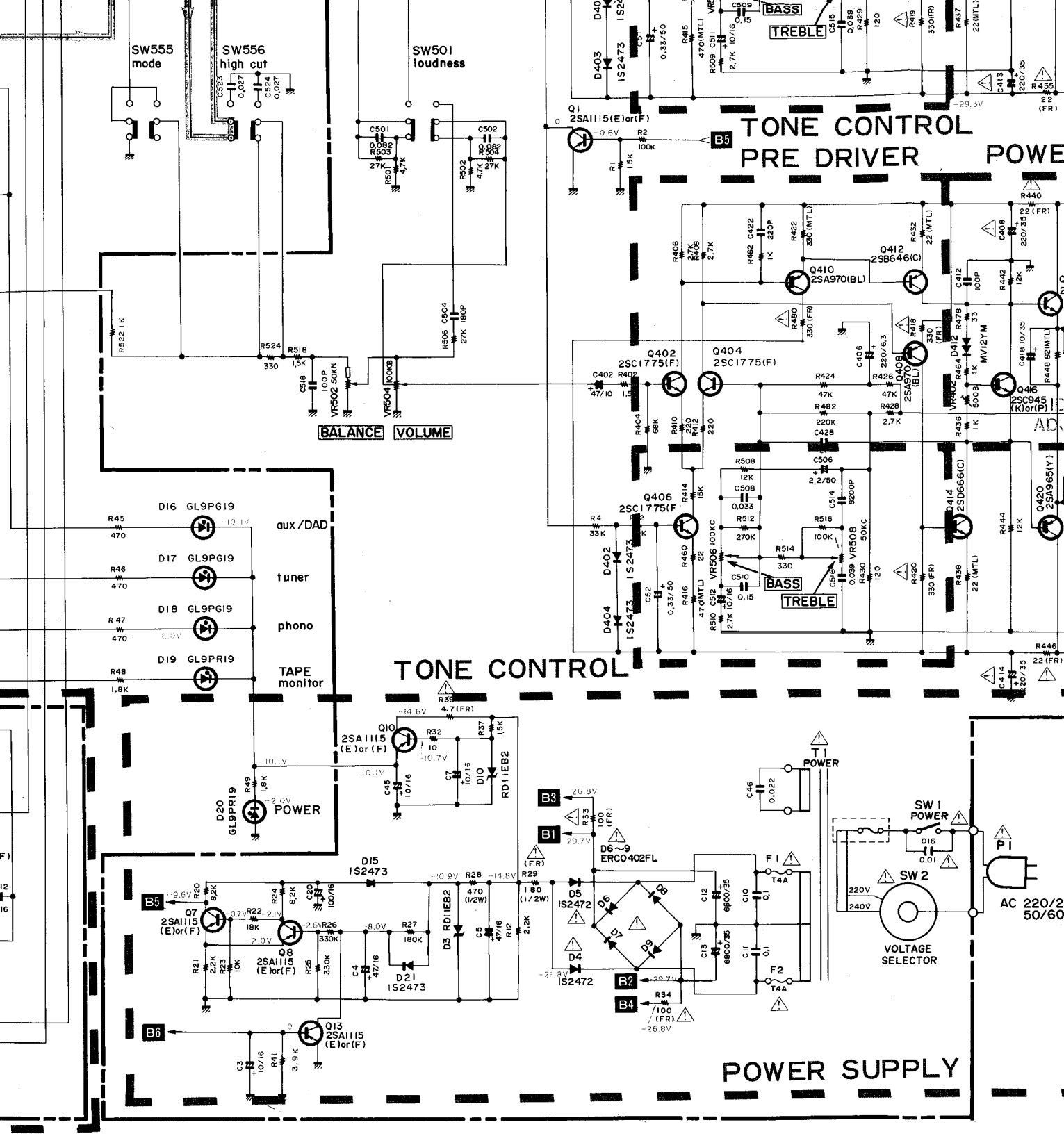
H	I	J	K

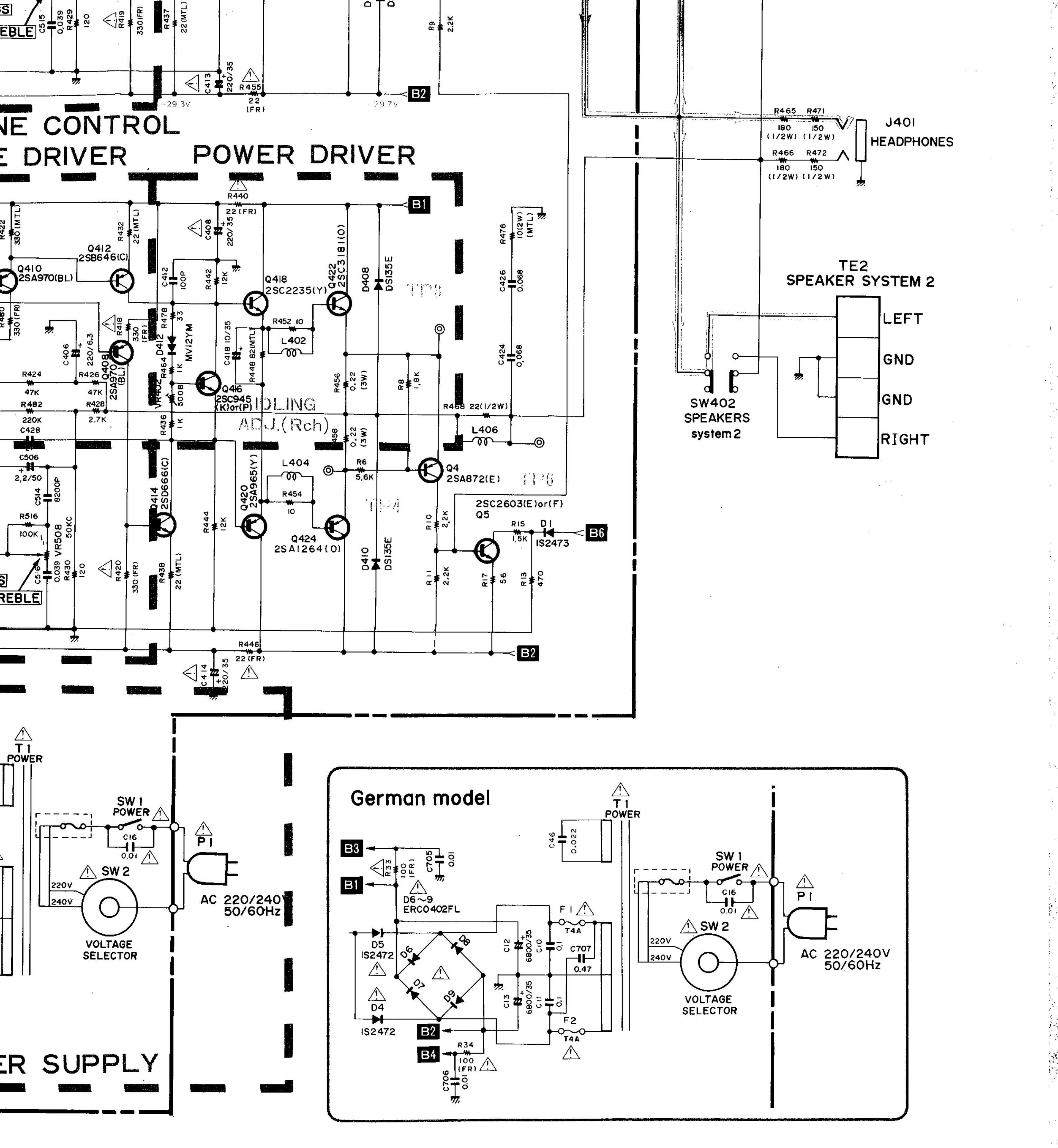

DRIVER
POWER DRIVER
ONE CONTROL
RE DRIVER
POWER DRIVER
TREBLE
TREBLE
IDLING ADJ.(Lch)
IDLING ADJ.(Rch)
TP1
TP2
TP3
TP4
TP5
TP6
B1
B2
B6
Q411 2SB646(C)
Q409 2SA970(BL)
Q407 2SA970(BL)
Q415 2SC945 (K)or(P)
Q417 2SC2235(Y)
Q421 2SC3181(O)
Q423 2SA1264(O)
Q419 2SA965(Y)
Q3 2SA872(E)
Q412 2SB646(C)
Q410 2SA970(BL)
Q408 2SA970(BL)
Q416 2SC945 (K)or(P)
Q418 2SC2235(Y)
Q422 2SC3181(O)
Q424 2SA1264(O)
Q420 2SA965(Y)
Q4 2SA872(E)
Q5 2SC2603(E)or(F)
D1 IS2473
L401
L402
L403
L404
L405
L406
TE1 SPEAKER SYSTEM 1
LEFT
GND
GND
RIGHT
SW401 SPEAKERS system 1
TE2 SPEAKER SYSTEM 2
LEFT
GND
GND
RIGHT
SW402 SPEAKERS system2
J401 HEADPHONES
T1 POWER
SW1 POWER
German model



..... PHONO SIGNAL

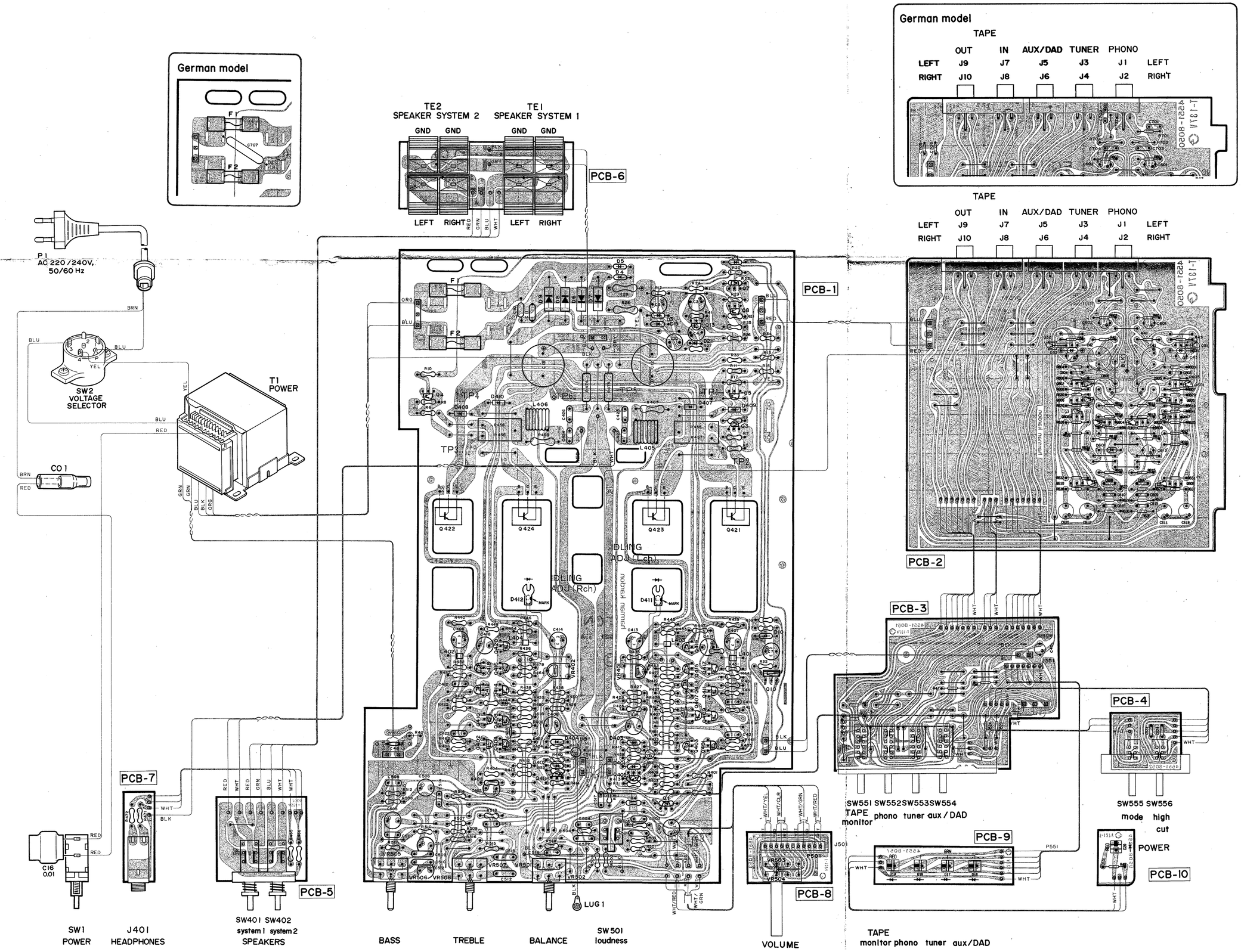
1. ALL RESISTANCES VALUES ARE IN Ω.
   KΩ=1000Ω, MΩ=1000KΩ.
2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
3. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=μμF
4. V: DC VOLTAGE AT NO SIGNAL
5. ⚠ SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS. THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.


SW555
mode
SW556
high cut
SW501
loudness
TONE CONTROL
PRE DRIVER
POWE
BALANCE
VOLUME
TONE CONTROL
aux /DAD
tuner
phono
TAPE
monitor
POWER
BASS
TREBLE
POWER SUPPLY
T1
POWER
SW1
POWER
SW2
VOLTAGE
SELECTOR
AC 220/2
50/60



NE CONTROL
E DRIVER
POWER DRIVER
J401
HEADPHONES
R465 180 (1/2W)
R471 150 (1/2W)
R466 180 (1/2W)
R472 150 (1/2W)
TE2
SPEAKER SYSTEM 2
LEFT
GND
GND
RIGHT
SW402
SPEAKERS
system 2
Q410 2SA970(BL)
Q412 2SB646(C)
Q418 2SC2235(Y)
Q422 2SC3181(O)
Q408 2SA970(BL)
Q416 2SC945 (K)or(P)
Q414 2SD666(C)
Q420 2SA965(Y)
Q424 2SA1264(O)
Q4 2SA872(E)
2SC2603(E)or(F) Q5
D408 DS135E
D410 DS135E
D412 MV12YM
D1 1S2473
VR402 500B
VR508 50KC
IDLING
ADJ.(Rch)
L402
L404
L406
B1
B2
B6
T1 POWER
SW1 POWER
SW2
P1
AC 220/240V 50/60Hz
VOLTAGE SELECTOR
ER SUPPLY
German model
B3
B1
B2
B4
D6~9 ERC0402FL
D5 1S2472
D4 1S2472
F1 T4A
F2 T4A
C12 6800/35
C13 6800/35
C707 0.47
R33 100 (FR)
R34 100 (FR)
C705 0.01
C706 0.01
C46 0.022
220V
240V

WIRING DIAGRAM



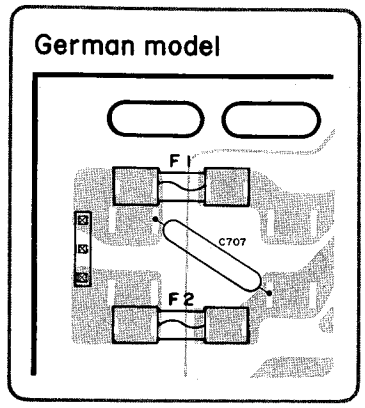
PIN-CONNECTION DIAGRAM OF TRANSISTORS AND DIODES

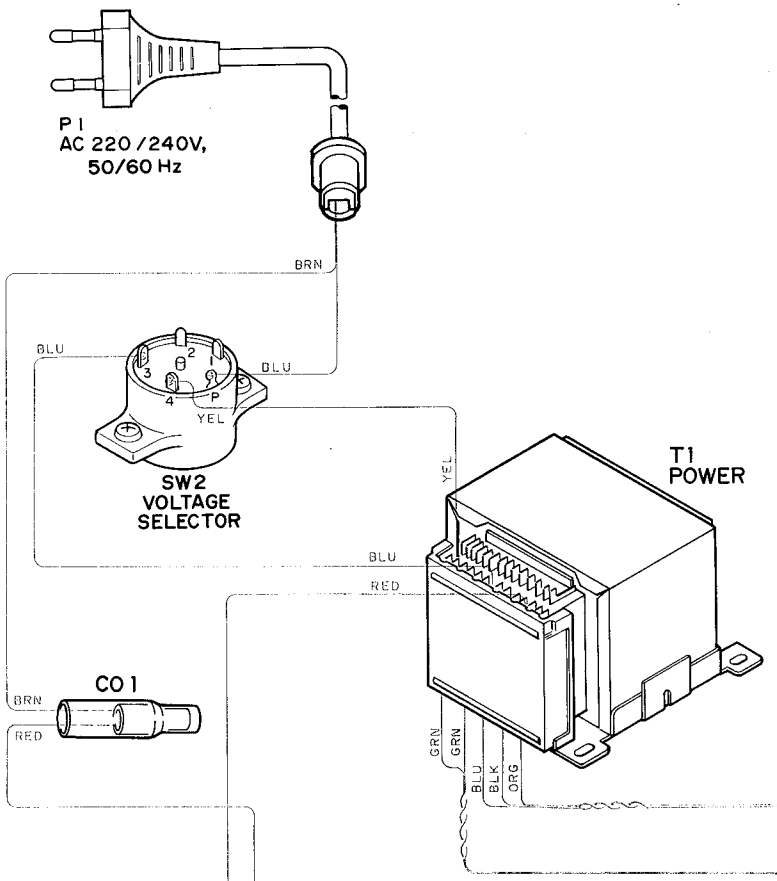
2SA1115 (E) or (F) : Q1, 7, 8, 10, 13, 605 ~ 608 2SC2603 (E) or (F) : Q5, 609, 610	2SA872(E): Q3, 4 2SD667(C): Q31 2SA970(BL): Q407 ~ 410 2SC945(K) or (P) : Q415, 416 2SC2320L(F) or (G) : Q601, 602 2SA999L(F) or (E) : Q603, 604	2SB647(C): Q32 2SC1755(F): Q401 ~ 406 2SB646(C): Q411, 412 2SD666(C): Q413, 414 2SC2235(Y): Q417, 418 2SA965(Y): Q419, 420	2SC3181(O): Q421, 422 2SA1264(O): Q423, 424	1S2473 : D1, 15, 21, 401 ~ 404 RD11EB2 : D3, 10 1S2472 : D4, 5 HZ15-2L : D31, 32 RD3.9EB2 : D601	ERC0402FL: D6 ~ 9	DS135E : D407 ~ 410	MV12YM : D411, 412	GL9PG19 : D16 ~ 18 GL9PR19 : D19, 20

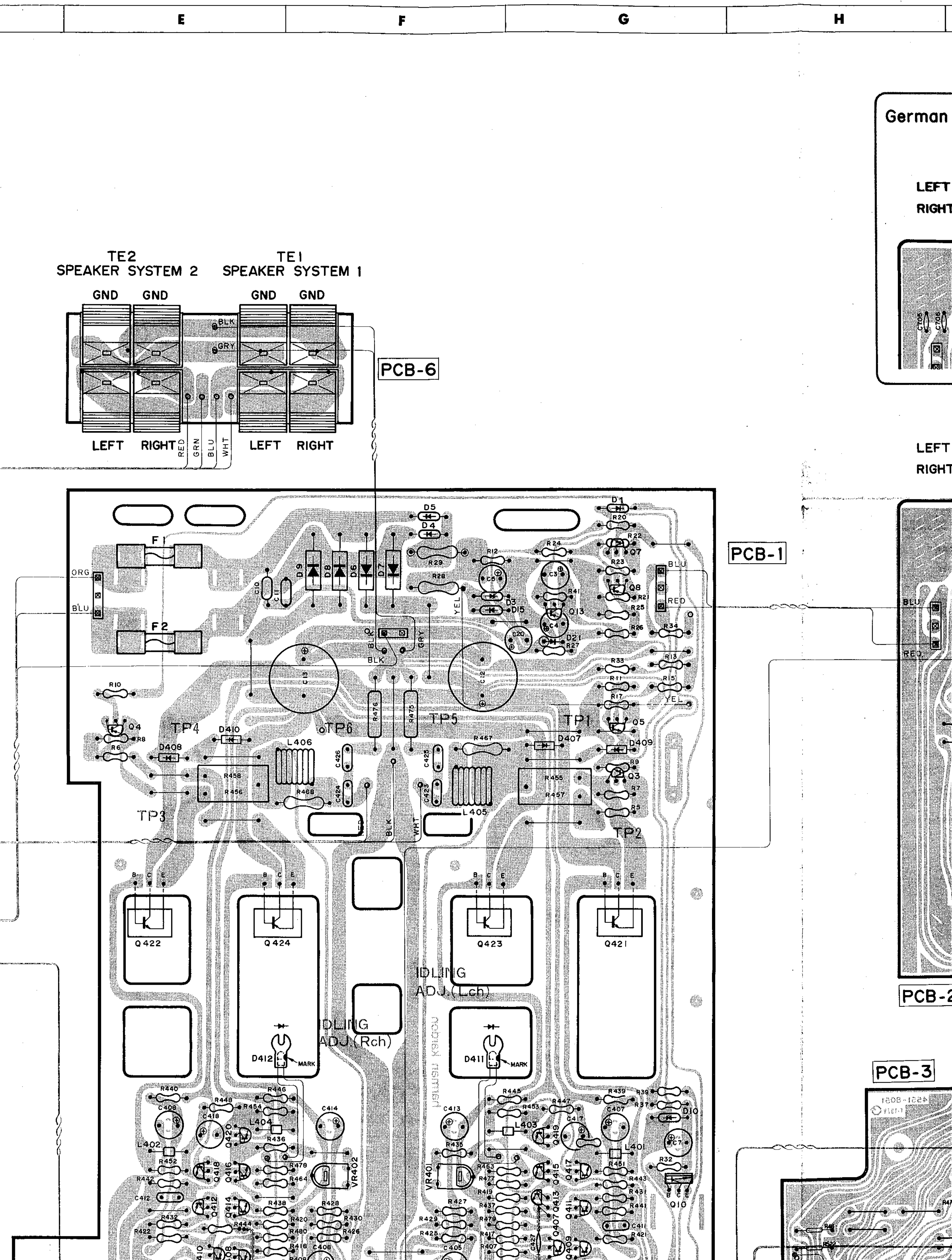
WIRE COLOR ABBREVIATIONS

RED: Red	GRN: Green
WHT: White	ORG: Orange
BLK: Black	YEL: Yellow
GRY: Gray	BRN: Brown
BLU: Blue	CLR: Clear

WIRING DIAGRAM





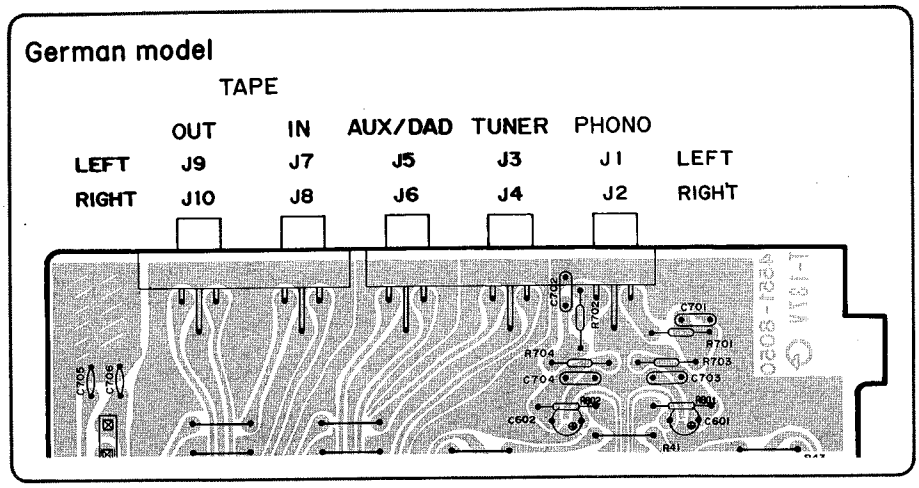


E
F
G
H
German
LEFT
RIGHT
TE2
SPEAKER SYSTEM 2
TE1
SPEAKER SYSTEM 1
GND
GND
GND
GND
LEFT
RIGHT
LEFT
RIGHT
RED
GRN
BLU
WHT
BLK
GRY
PCB-6
PCB-1
PCB-2
PCB-3
F1
F2
ORG
BLU
RED
YEL
TP1
TP2
TP3
TP4
TP5
TP6
L406
L405
Q422
Q424
Q423
Q421
IDLING
ADJ.(Lch)
IDLING
ADJ.(Rch)
D412
D411
MARK
VR401
VR402
L401
L402
L403
L404

German model

TAPE

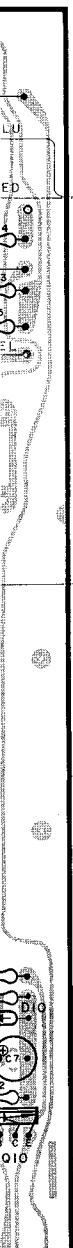
	OUT	IN	AUX/DAD	TUNER	PHONO	
LEFT	J9	J7	J5	J3	J1	LEFT
RIGHT	J10	J8	J6	J4	J2	RIGHT

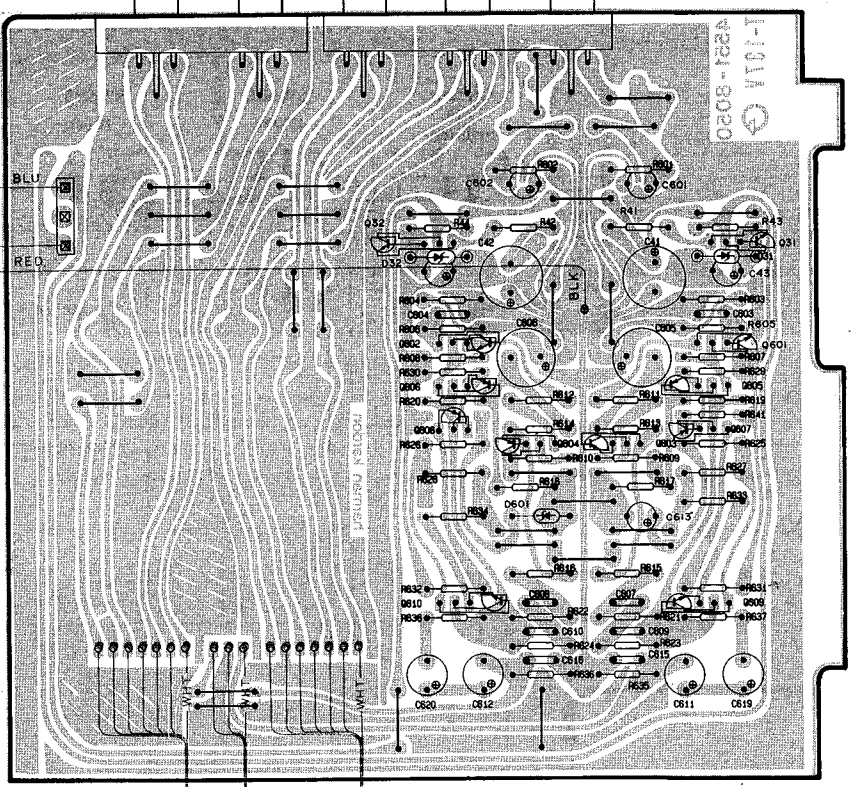


TAPE

	OUT	IN	AUX/DAD	TUNER	PHONO	
LEFT	J9	J7	J5	J3	J1	LEFT
RIGHT	J10	J8	J6	J4	J2	RIGHT

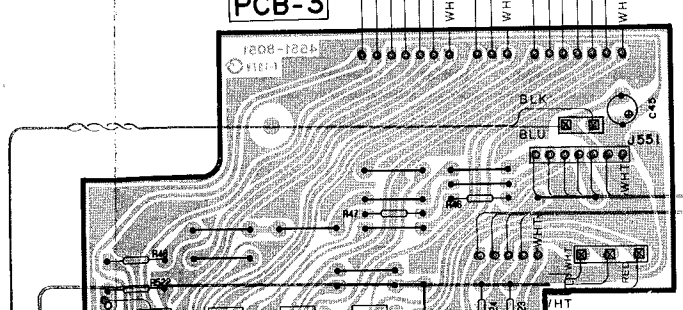
PCB-1



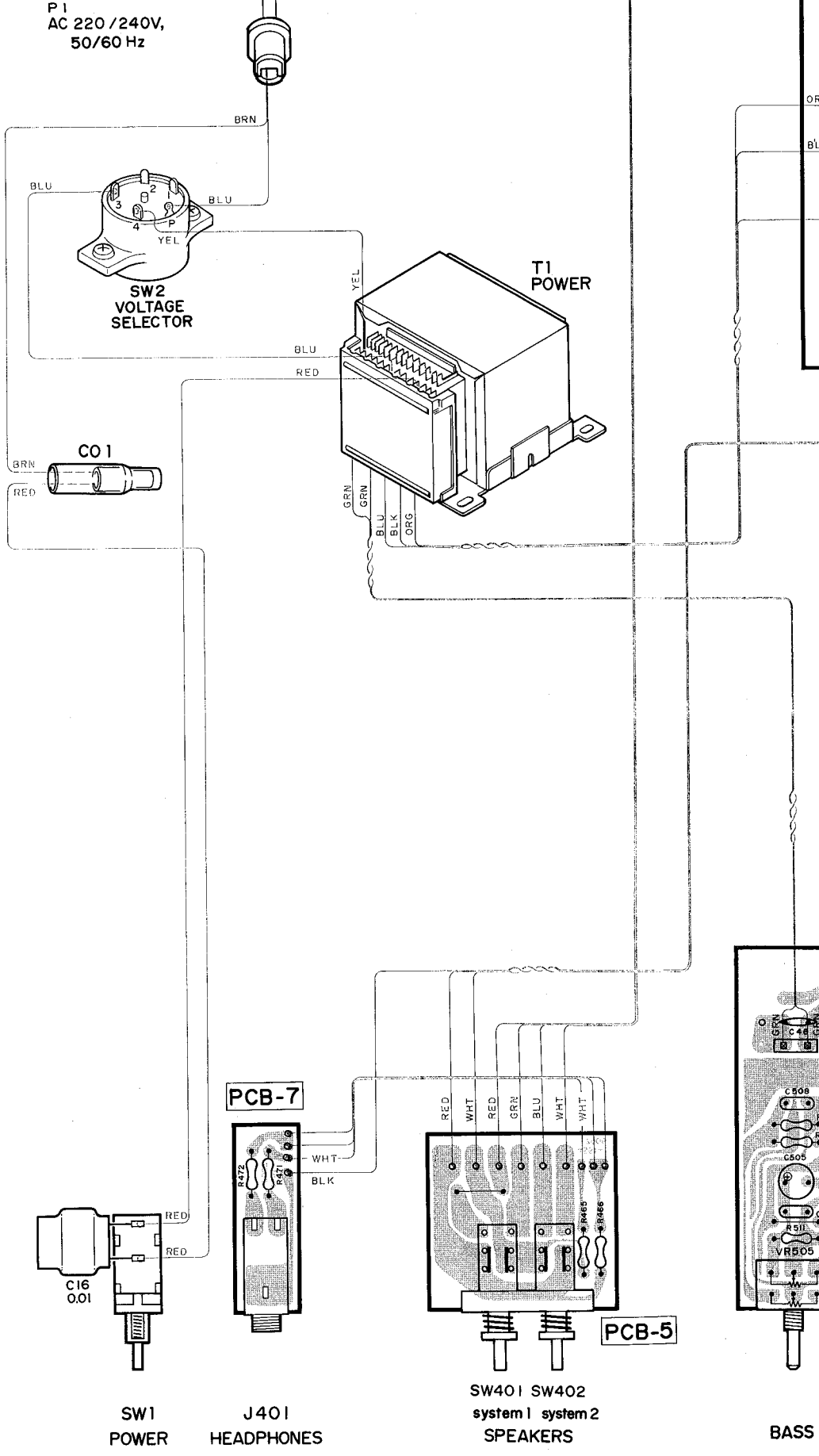


PCB-2

PCB-3



PCB-4



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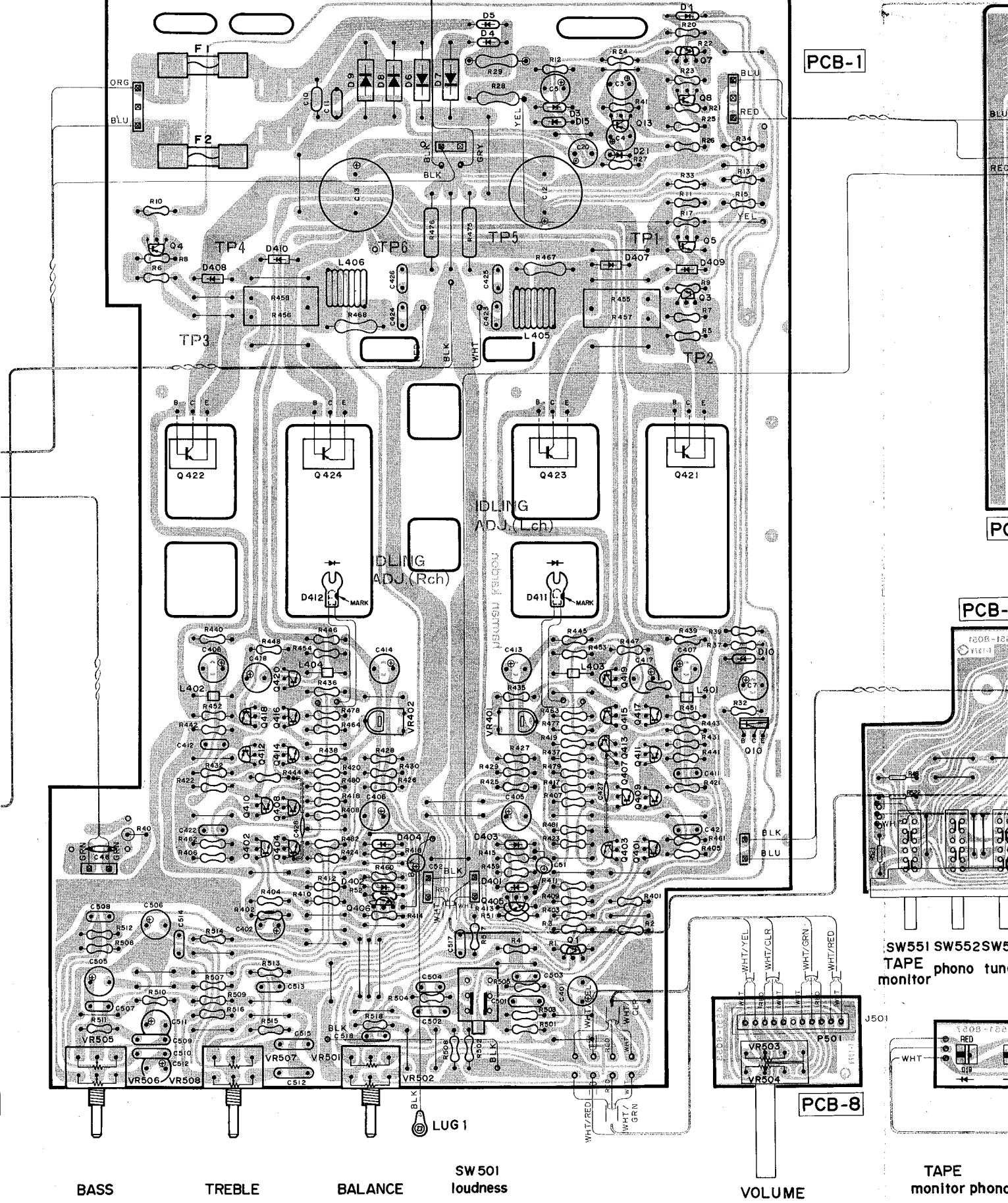
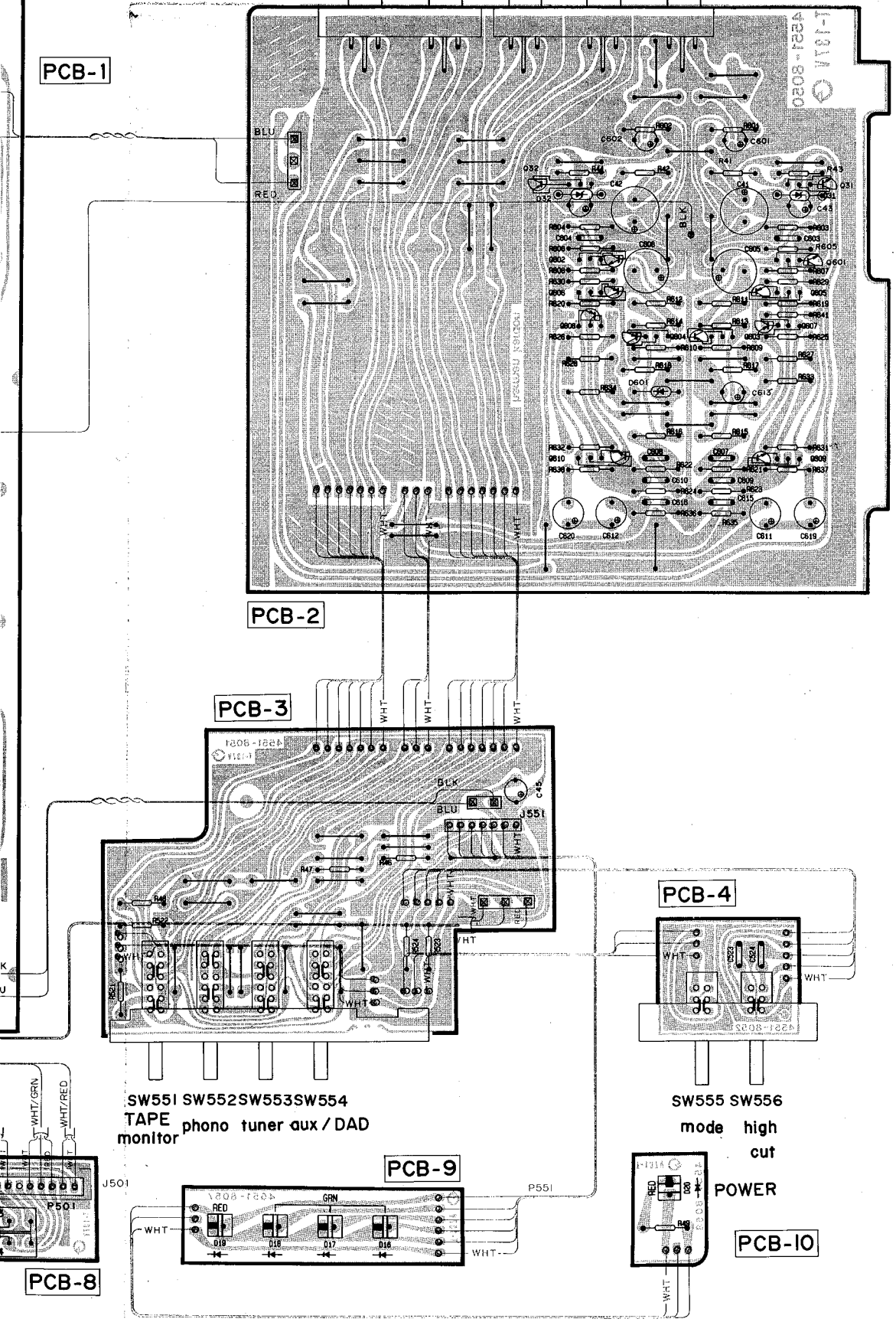


02FL : D6～9	DS135E : D407～410	MV12YM : D411, 412	GL9PG19 : D16～18 GL9PR19 : D19, 20
Anode Cathode	Anode Cathode	MARK	



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