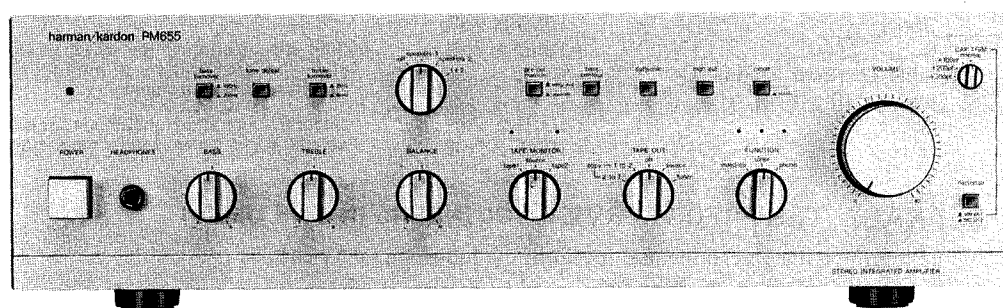


The Harman Kardon Model PM655

Manual No. 80A

STEREO INTEGRATED AMPLIFIER

Technical Manual



PM655

harman/kardon

240 Crossways Park West, Woodbury,
New York 11797

1112-H15280A4 P-088410 Printed in Japan

SPECIFICATIONS

	Nominal	Limit		Nominal	Limit
RMS Output Power			Filters		
8Ω, 1kHz, THD 0.08%	67W	≥ 60W	Subsonic	15Hz, 6dB/Octave	
4Ω, 1kHz, THD 1.0%	112W	≥ 100W	High Cut	6kHz, 6dB/Octave	
High Instantaneous Current Capability (HCC)	45A		Bass Contour		
Half Power Bandwidth	10Hz ~ 100kHz		Boost at 50Hz	+10dB	
Frequency Response at -3dB	0.15Hz ~ 180kHz		DC Output Voltage		
Input Sensitivity			L channel	0mV ± 60mV	
Video/CD, Tuner	135mV ± 25mV		R channel	0mV ± 60mV	
Phono (MM)	2.2mV ± 0.2mV*		RIAA Equalization at Tape Out		
Phono (MC)	120μV ± 0.2μV*		(20Hz/20kHz) (No load)	0.2dB ≤ 0.5dB/0.2dB ≤ 0	
Signal to Noise Ratio			Phono Overload (No load)		
Video/CD, Tuner	79.5dB ≥ 78dB		Phono (MM)	220mV ≥ 190mV	
Phono (MM)	79.5dB ≥ 77dB		Phono (MC)	13mV ≥ 8mV	
Phono (MC)	77dB ≥ 74dB		Dimensions (W x H x D)	17-1/2"x5-5/16"x15-11/16"	(443 x 134 x 398 mm)
Channel Separation at 10kHz			Weight	22 lbs.11 oz. (10.3 kg)	
Video/CD, Tuner	50dB ≥ 45dB		Power Supplies		
Phono (MM)	56dB ≥ 45dB		U.S.A. and Canada models	AC 120V, 60Hz	
Phono (MC)	50dB ≥ 45dB		General and German models	AC 220/240V, 50/60Hz	
IM Distortion Ratio	0.06% ≤ 0.1%		Power Consumption		
Damping Factor at 1kHz	66 ≥ 50		U.S.A. and Canada models	400W (440VA)	
Tone Control Characteristics			General and German models	290W	
Bass Turnover Frequency	200Hz/400Hz				
Bass at 50Hz					
Boost	10dB ± 2dB				
Cut	-10dB ± 2dB				
Treble Turnover Frequency	2kHz/6kHz				
Treble at 10kHz					
Boost	10dB ± 2dB				
Cut	-10dB ± 2dB				

PM655

* Input Sensitivity (Phono MM and MC) for German model are 2.4mV ± 0.2mV (MM) and 145μV ± 20μV (MC).

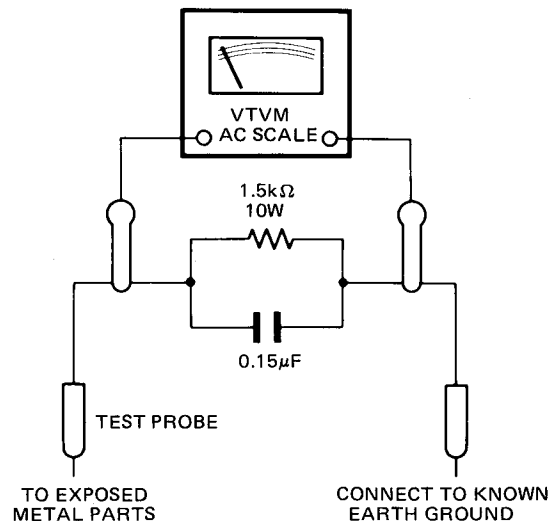
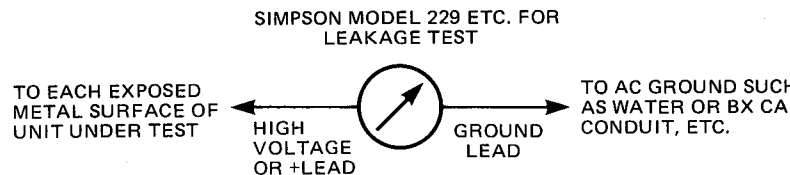
This specification is the target of servicing. But, there is a case that the specification is not applicable to the measurement condition and instrument.

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

LEAKAGE TEST (FOR SERVICE ENGINEERS IN THE U.S.A.)

Before returning the unit to the user, perform the following safety checks:

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the unit.
2. Be sure that any protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc. which were removed for servicing are properly reinstalled.
3. Be sure that no shock hazard exists; check for leakage current using Simpson Model 229 Leakage Tester, standard equipment item No. 21641, RCA Model WT540A or use alternate method as follows:
 Plug the power cord directly into a 120-volt AC receptacle (do not use an Isolation Transformer for this test). Using two clip leads, connect a 1500 Ohm, 10-watt resistor paralleled by a 0.15μF capacitor, in series with all exposed metal cabinet parts and a known earth ground, such as a water pipe or conduit. Use a VTVM or VOM with 1000 Ohms per volt, or higher, sensitivity to measure the AC voltage drop across the resistor. (See Diagram.) Move the resistor connection to each exposed metal part having a return path to the chassis (antenna, metal, cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor. (This test should be performed with the power switch in both the On and Off positions.)



A reading of 0.35 volt RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the unit to the owner.

ALIGNMENT PROCEDURES (REFER TO PAGES 11 AND 12)

- **Conditions:**
 - Set the Function selector to the "video/CD" position.
 - Set the Volume control to minimum.
 - Set the Speaker selector to "off" position.
 - Make the adjustment at a room temperature of 77°F (25°C).

■ DC BALANCE ADJUSTMENT

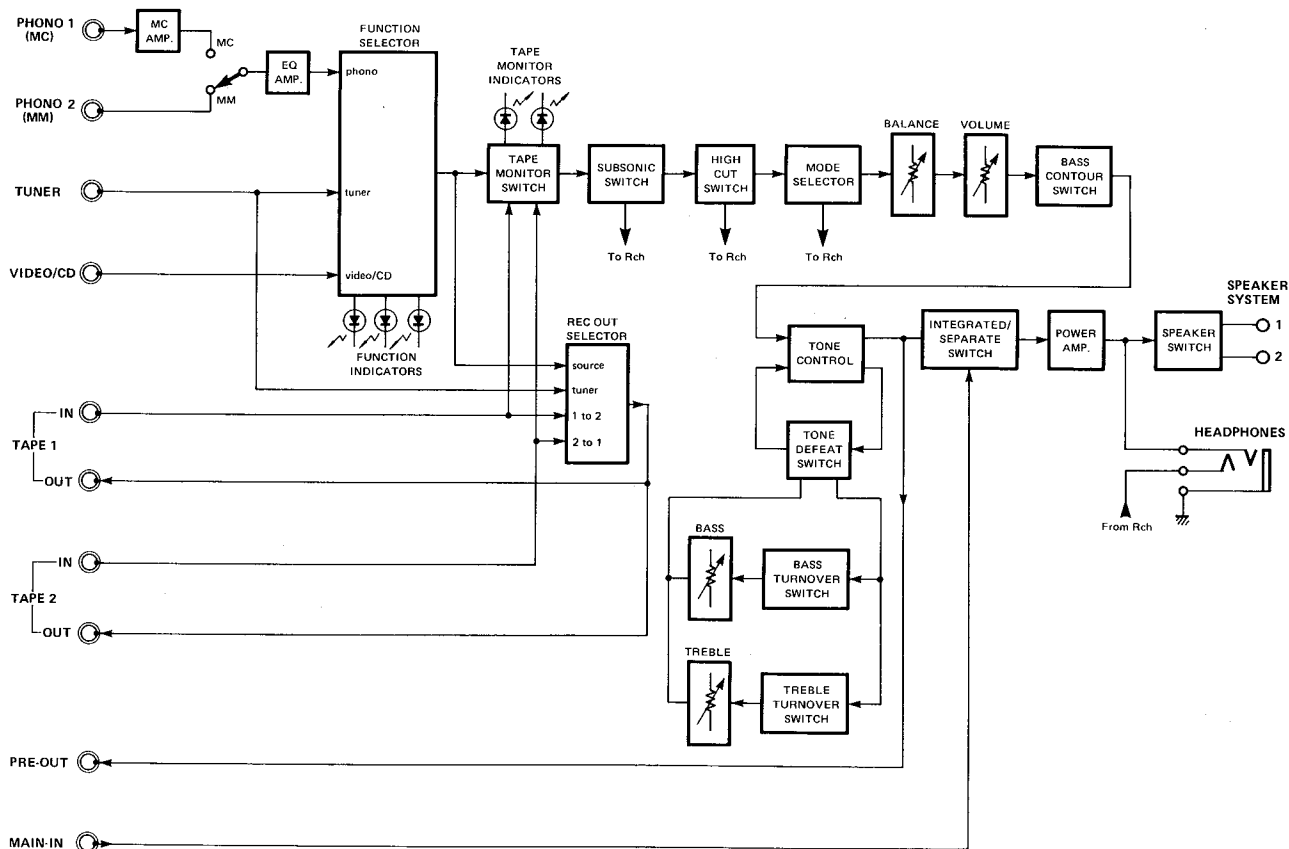
Step	Connection Equipments	Adjustment	For
1	Connect the Digital Volt Meter to TP1 and TP2.	VR401	0 ± 10mV
2	Connect the Digital Volt Meter to TP3 and TP2.	VR402	0 ± 10mV

■ IDLING CURRENT ADJUSTMENT

Step	Connection Equipments	Adjustment	For
1	Connect the Digital Volt Meter to TP4 and TP5.	VR403	30mV
2	Connect the Digital Volt Meter to TP6 and TP7.	VR404	30mV

- After the above adjustment, leave the unit with its power on for longer than 15 minutes and then repeat the same adjustments.

BLOCK DIAGRAM



DISASSEMBLY PROCEDURES (REFER TO PAGES 4 AND 12)

1 CABINET TOP (132) REMOVAL

Remove 8 screws **A** and remove the Cabinet Top (132).

2 FRONT PANEL ASSEMBLY (101) REMOVAL

1. Remove the Cabinet Top (132). (Refer to step **1**.)
2. Remove 5 screws **B** and remove the Front Panel Assembly (101).

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

1. Remove 10 screws **C** and remove the Cabinet Bottom (133).
2. Remove the Front Panel Assembly (101). (Refer to step **2**.)
3. Loosen 2 screws **D** and pull out the Shaft (196) with the Speaker Selector Knob Assembly (102).
4. Remove 24 screws **E** and fastener **F**, then remove the Cabinet Back (134). If necessary, unsolder the lead wires from the Power Transformer (T1).
5. Remove 7 screws **G** and remove the Main P.C. Board (PCB-1) with Heat Sink (180). At this time, unsolder the lead wires connected to the Main P.C. Board (PCB-1).

4 POWER SUPPLY P.C. BOARD (PCB-5) REMOVAL

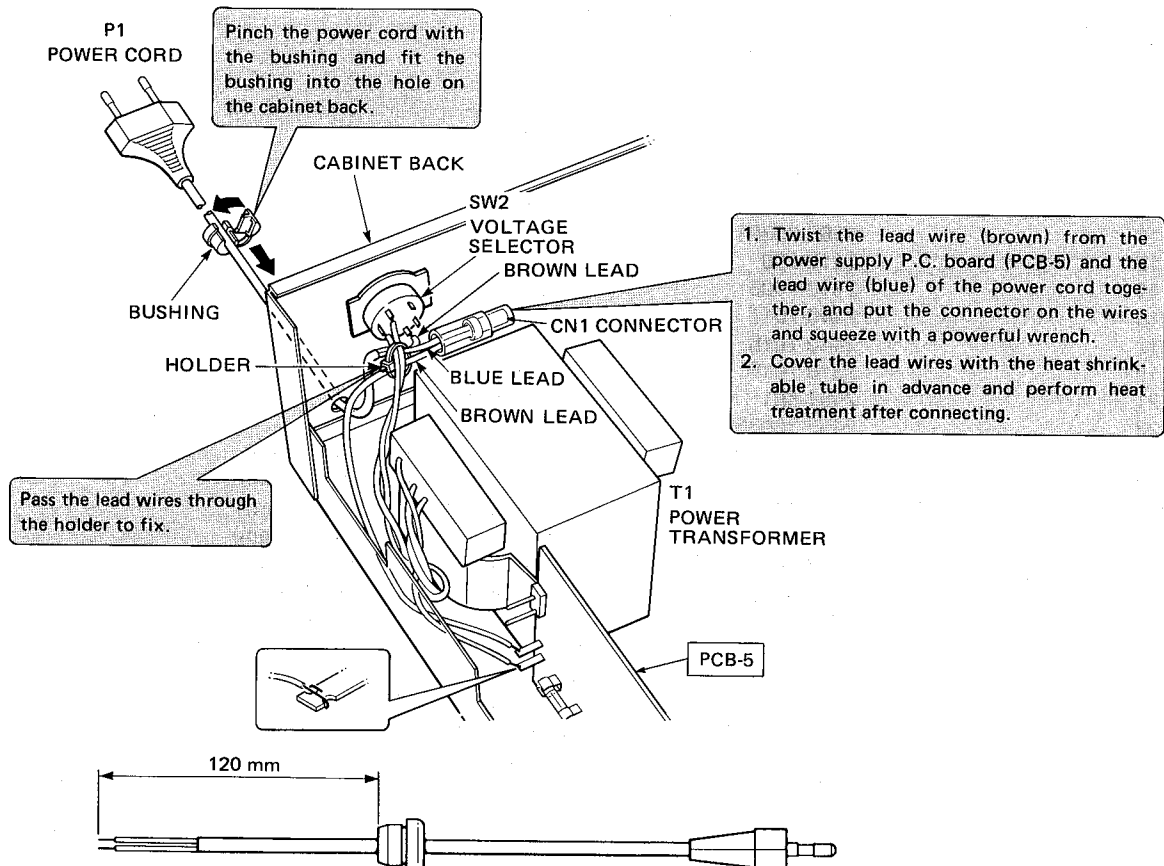
1. Remove the Front Panel Assembly (101). (Refer to step **2**.)
2. Pull out the Power Push Button (143) and Levers (192).
3. Remove 3 screws **H** and remove the Power Supply P.C. Board (PCB-5). If necessary, unsolder the lead wires.

5 TONE CONTROL AND PUSH SWITCHES P.C. BOARDS (PCB-2 and PCB-3) REMOVAL

1. Remove the Front Panel Assembly (101). (Refer to step **2**.)
2. Pull out the Shaft (196) with the Speaker Selector Knob Assembly (102). (Refer to step **3**-3.)
3. Pull out the 7 Knob Assemblies (102 and 103), Cap. Trim Knob (148), Power Push Button (143) and Levers (192).
4. Remove hexagon nut **I** and remove the Capacitance Trim P.C. Board (PCB-6).
5. Remove screw **J**, 2 fasteners **K** and **L**, 2 screws **M** and screw **N** mounting the Bracket (165), then remove the Bracket (165) with the Phono Equalizer P.C. Board (PCB-4).
6. Straighten the catches fixing the Power Indicator P.C. Board (PCB-9) and remove the Power Indicator P.C. Board (PCB-9).
7. Remove the metal fixture **O** fixing the Headphones P.C. Board (PCB-11) and remove the Headphones P.C. Board (PCB-11).
8. Remove 7 hexagon nuts **P** and remove 4 screws **Q**.
9. Remove 6 screws **R** and the Chassis (161), then the Tone Control P.C. Board (PCB-2), Push Switches P.C. Board (PCB-3) and Volume Control P.C. Board (PCB-7) can be removed. Unsolder the lead wires if necessary when removing each P.C. Board.

POWER CORD REPLACEMENT (FOR SERVICE ENGINEERS OTHER THAN NORTH AMERICA)

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.



GENERAL UNIT PARTS LIST

Ref. No.	Part No.	Description
101	A443-PM655A	Front Panel Assembly
102	A630-PM655A	Knob Assembly, Bass, Treble, Balance, Tape Monitor, Tape Out, Function, Speaker System Selector
103	A630-PM655B	Knob Assembly, Volume
104	A662-PM655A	Push Button Assembly, Bass Turnover, Tone Defeat, Treble Turnover, Pre-out Main-in, Bass Contour, Subsonic, High Cut, Mode, Cartridge
132	1414-05301	Cabinet Top
133	1423-02201	Cabinet Bottom
134	1424-14301	Cabinet Back (for U.S.A. and Canada models)
"	1424-14401	Cabinet Back (for General and German models)
143	1660-00401	Push Button, Power
148	1634-04501	Knob, Cap. Trim
151	1319-0139	Foot
161	2211-7260	Chassis
163	2219-8007	Bracket
164	2219-8008	Bracket
165	2219-8009	Bracket
166	2219-8010	Bracket
167	2219-8011	Bracket
168	2219-8012	Bracket
169	2219-8013	Bracket
170	2219-8014	Bracket
171	2219-8015	Bracket
172	2219-8016	Bracket
173	2219-8019	Bracket
174	2219-7879	Bracket
175	2219-8022	Bracket
180	2222-7173	Heat Sink (for U.S.A. and Canada models)
"	2222-7171	Heat Sink (for General and German models)
181	2222-7170	Heat Sink
182	2222-7179	Heat Sink
185	2240-7183	Protector
186	2240-7050	Holder
188	2240-7176	Protector
189	2240-7120	Holder
192	2672-7018	Lever
195	2601-7069	Shaft
196	2601-7131	Shaft
199	2651-210189	Spring
201	2132-7126	Spacer
203	2224-7069	Insulator
205	2114-415027	Bushing
210	1568-00301	Frame
213	2410-100	Special Washer
214	2410-7005	Special Washer
216	2440-7011	Special Nut
217	2440-7016	Special Nut
219	2310-7015	Special Screw
221	2461-501	E-Stop Ring
222	2459-3003511	Snap-in-fastener
224	2347-300627	Self-tapping Screw (+) (3 x 6 mm)
230	2347-301027	Self-tapping Screw (+) (3 x 10 mm)
232	2347-400647	Self-tapping Screw (+) (4 x 6 mm)
233	2347-301041	Self-tapping Screw (+) (3 x 10 mm)
234	2347-300647	Self-tapping Screw (+) (3 x 6 mm)
235	2347-300827	Self-tapping Screw (+) (3 x 8 mm)
240	2396-300549	Hexagon-socket-head Screw (3 x 5 mm)
301	2132-7116	Spacer (only General and German models)
302	2440-7017	Special Nut (only General and German models)
	1111-J30173	Owner Guide (for U.S.A. model)
	1111-J30174	Owner Guide (for Canada, General and German models)
	1221-777143	Packing Box
	1222-7225	Packing Cushion, Right
	1222-7226	Packing Cushion, Left

ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
CHASSIS MISCELLANEOUS		
△ P1	4161-71151	Power Cord (for U.S.A. and Canada models)
△ "	4161-7256	Power Cord (for General and German models)
△ T1	5584-701487	Power Transformer (for U.S.A. & Canada models)
△ "	5584-701488	Power Transformer (for General and German models)
△ SW2	4411-102729	Rotary Switch, Voltage Selector (only General and German models)
△ SO1/2/3	4474-156	AC Outlet, Unswitched, Switched (only U.S.A. and Canada models)
△ CN1	4443-712	Connector, Power Cord (only General and German models)
△ F1	5732-632029	Fuse, 6.3A, 125V (for U.S.A. and Canada models)
△ "	5732-312030	Fuse, T3.15A, 250V (for General and German models)
△ F2, 3, 4, 5	5732-502029	Fuse, 5A, 125V (only Canada model)
LUG1, 2, 3, 4	4211-4	Lug Terminal (only German model)
	4442-14	Pin Plug (for Phono Input Jacks) (Accessory)
PCB-1 MAIN P.C. BOARD		
RESISTORS		
R423, 424	5174-621381	620Ω, ±1%, 1/4W, Metal
R425, 426	5174-330381	33Ω, ±1%, 1/4W, Metal
△ R427, 428, 429, 430	5102-5614713	560Ω, ±2%, 1/4W, Fuse
R433, 434	5174-243381	24kΩ, ±1%, 1/4W, Metal
△ R443, 444, 445, 446, 451, 452, 453, 454	5102-1514713	150Ω, ±2%, 1/4W, Fuse
R447, 448, 449, 450	5174-123381	12kΩ, ±1%, 1/4W, Metal
△ R461, 462, 463, 464	5102-2205711	22Ω, ±5%, 1W, Fuse
△ R465, 466, 467, 468	5102-1014713	100Ω, ±2%, 1/4W, Fuse
△ R469, 470, 471, 472	5102-2R2579	2.2Ω, ±5%, 1/4W, Fuse
△ R481, 482	5102-6804713	68Ω, ±2%, 1/4W, Fuse
R483/485, 484/486	5275-R22671	0.22Ω, ±10%, 5W x 2, Cement (Special Dual)
R487, 488	5175-150571	15Ω, ±5%, 3W, Metal
R489, 490	5171-220572	22Ω, ±5%, 1W, Metal
R491, 492	5171-1R5572	1.5Ω, ±5%, 1W, Metal
CONTROLS		
VR401, 402	5101-50371920	50kΩ
VR403, 404	5101-20171920	200Ω
CAPACITORS		
C2, 3, 4, 5	5352-1041957	0.1μF, ±10%, 250V, Metalized Polyester
△ C6, 7, 8, 9	5341-478F0955	4700μF, ±20%, 50V, Electrolytic
C10	5345-475F0952	4.7μF, ±20%, 50V, Electrolytic
C11	5345-336B0952	33μF, ±20%, 10V, Electrolytic
C15	5353-330534	33pF, ±5%, 500V, Mica
C60	5352-1040962	0.1μF, ±20%, 400V, Metalized Polyester (only German model)
C401, 402	5345-107B0951	100μF, ±20%, 10V, Electrolytic
C403, 404	5359-4715851	470pF, ±5%, 100V, Polypropylene
C405, 406	5345-476D041	47μF, ±20%, 25V, Electrolytic
C407, 408	5353-020934	2pF, ±0.5pF, 500V, Mica
C409, 410	5353-680534	68pF, ±5%, 500V, Mica
C411, 412, 417, 418	5345-106C041	10μF, ±20%, 16V, Electrolytic
△ C413, 414, 415, 416	5345-337F041	330μF, ±20%, 50V, Electrolytic
TRANSISTORS		
Q1, 3	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q2, 4, 7	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q8	5613-1845(E)	2SC1845(E) or 2SC1845(F)
Q9, 10, 415, 416	5611-970(BL)	2SA970(BL)
Q401, 402	5616-2SK364(V)	F.E.T., 2SK364(V) or 2SK364(BL)
Q403, 404, 405, 406, 413, 414, 419, 420	5613-2240(BL)	2SC2240(BL)
Q407, 408, 409, 410	5613-2603(F)	2SC2603(F) or 2SC2603(E)
Q411, 412, 421, 422, 425, 426	5612-646A(C)	2SB646A(C)

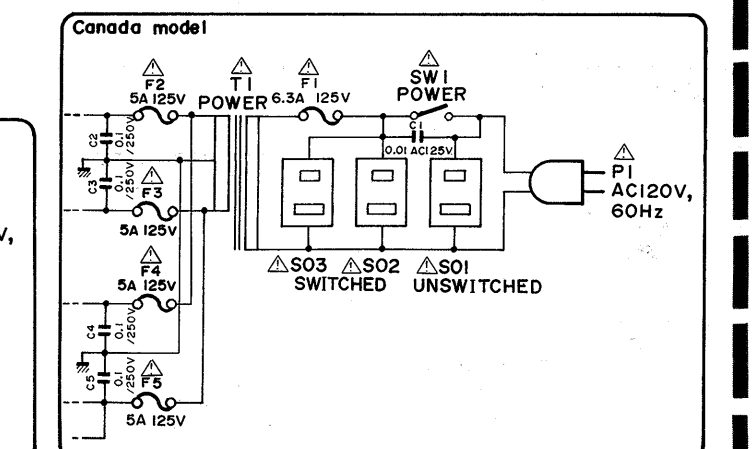
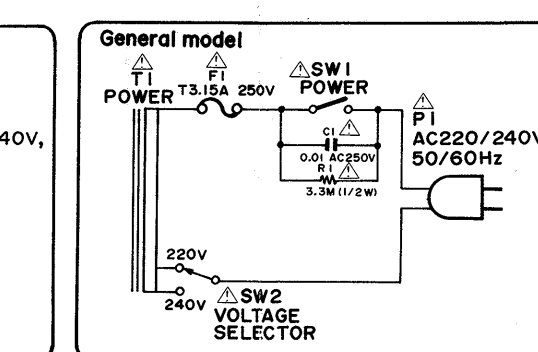
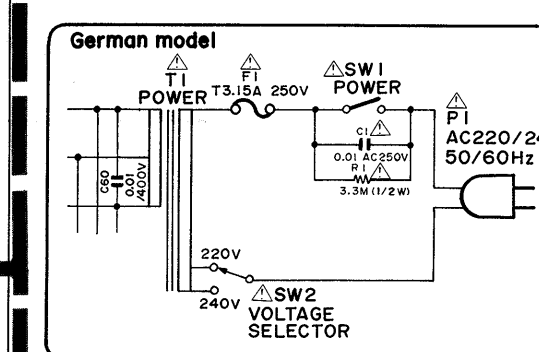
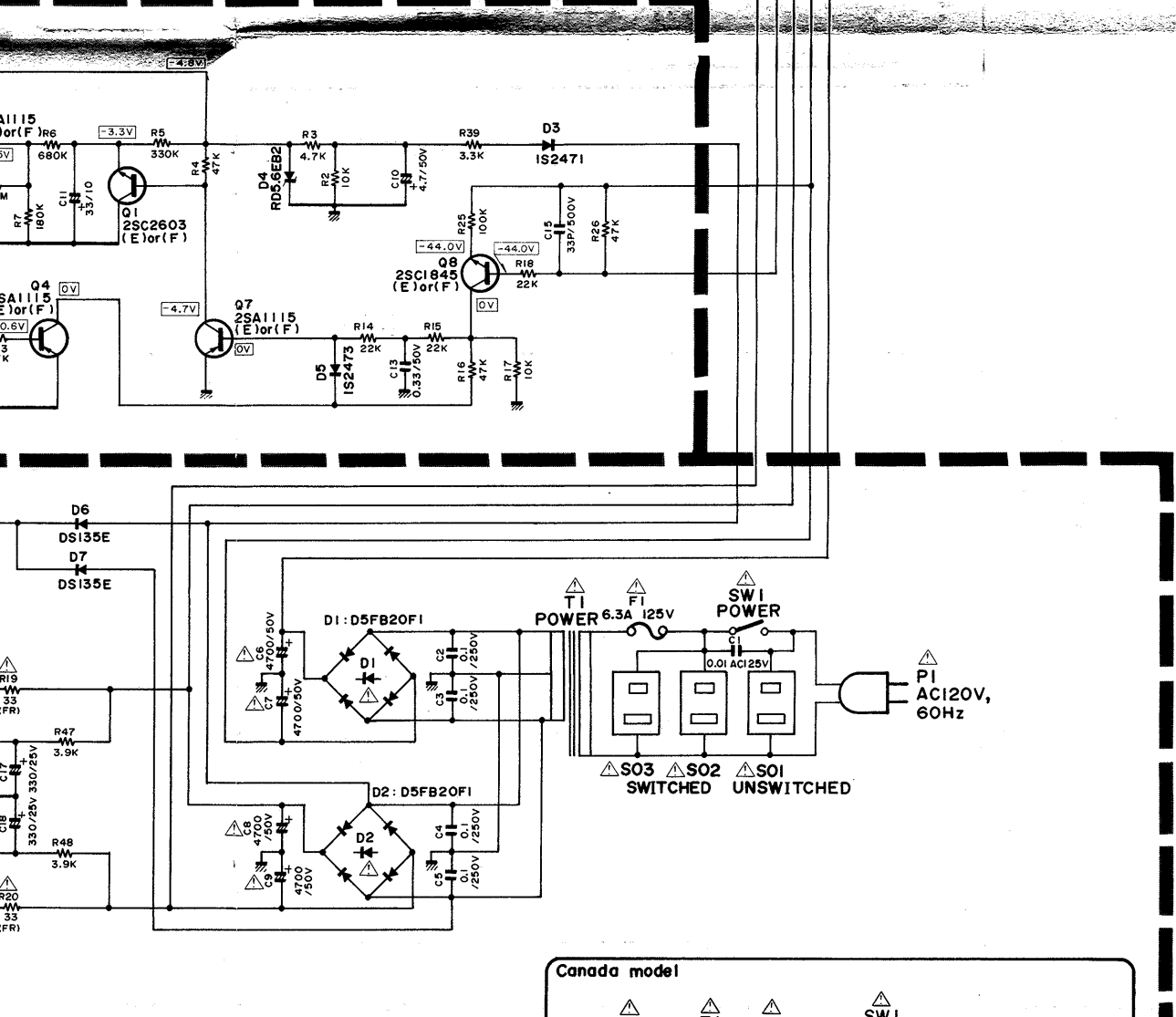
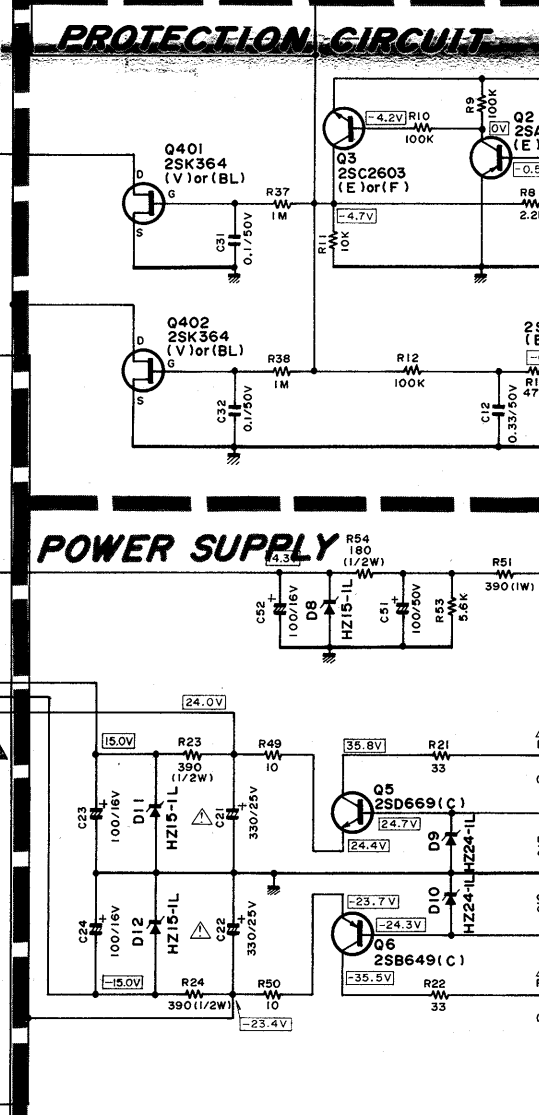
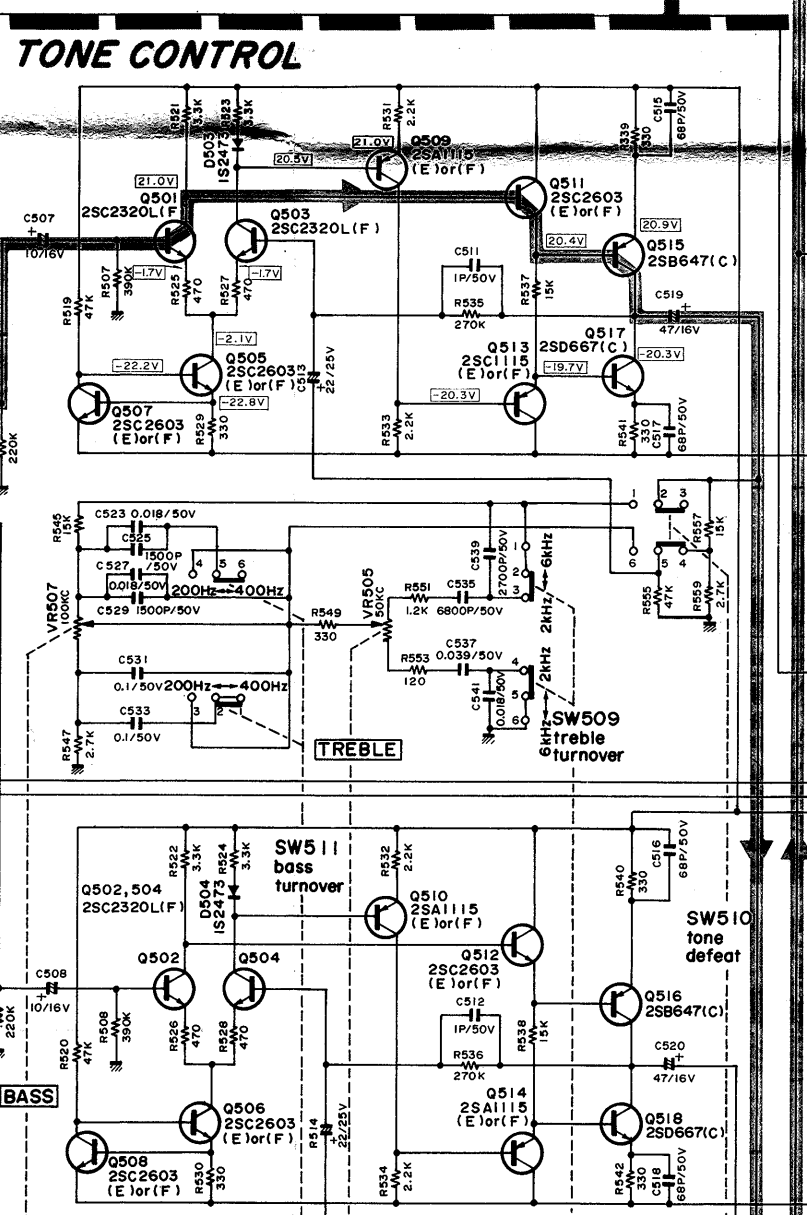
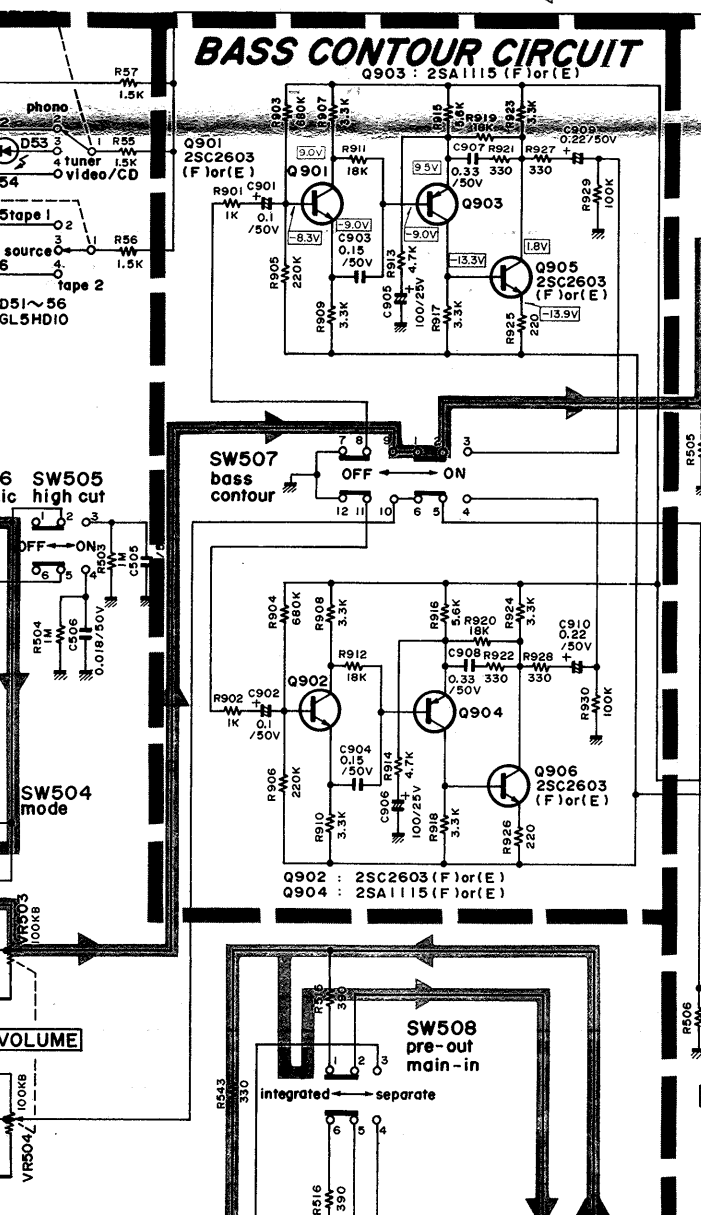
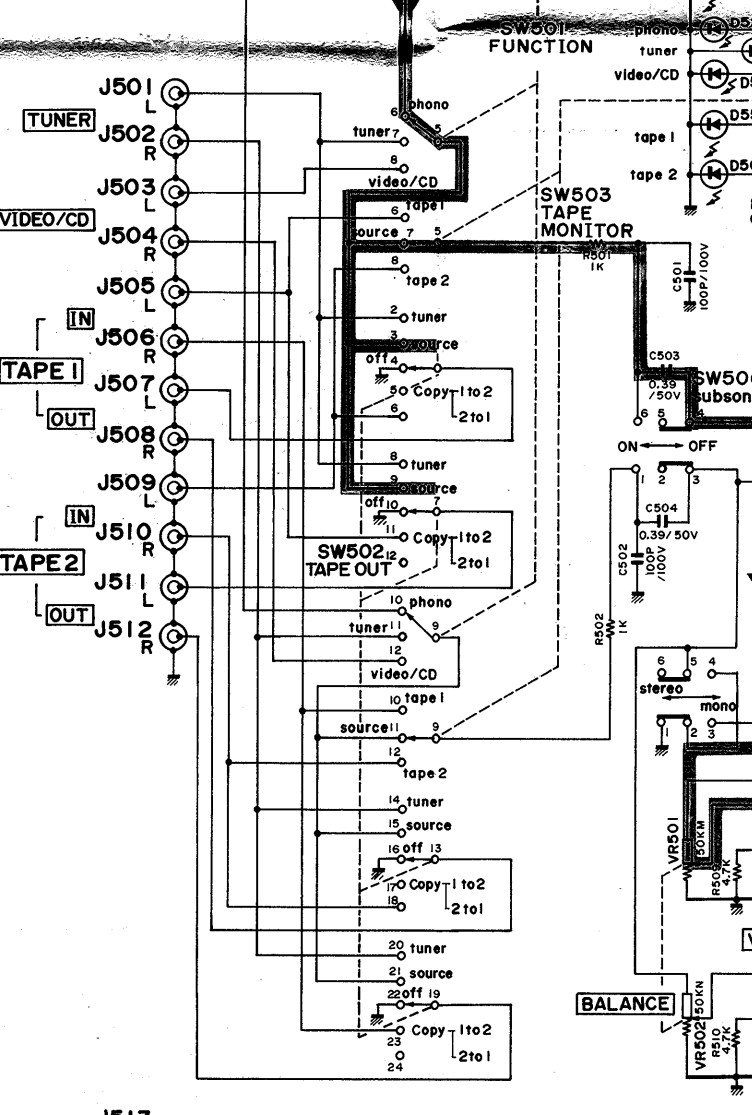
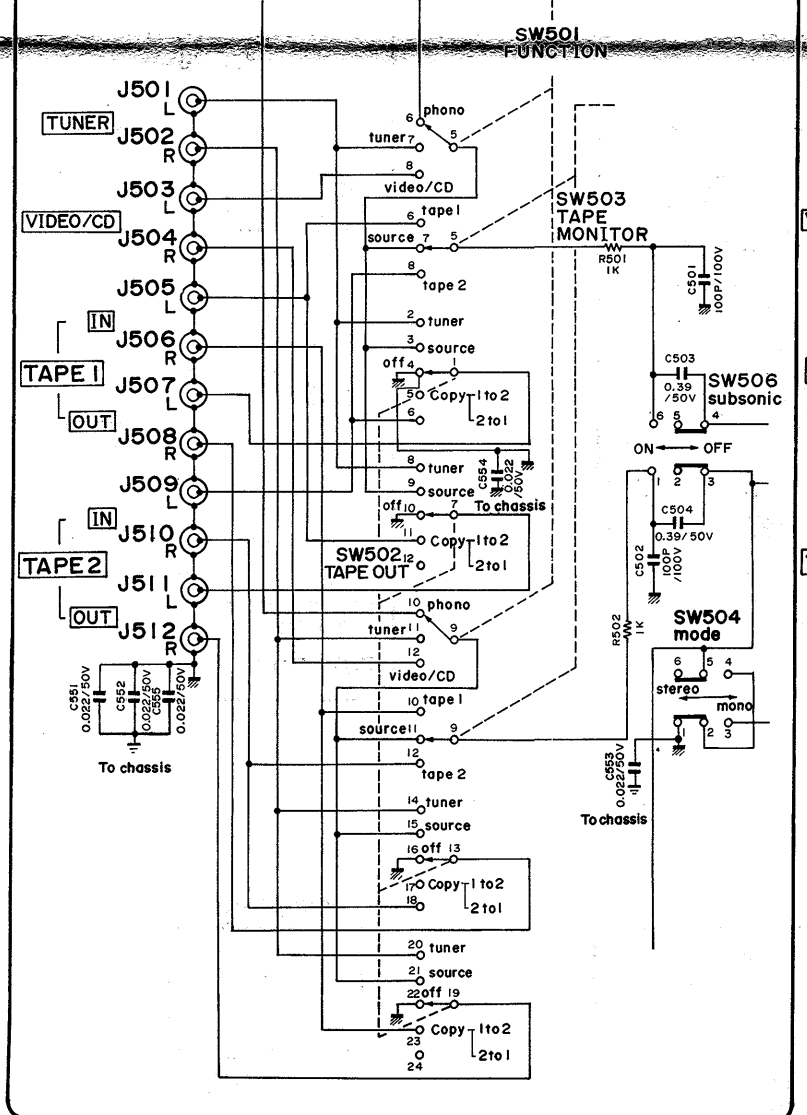
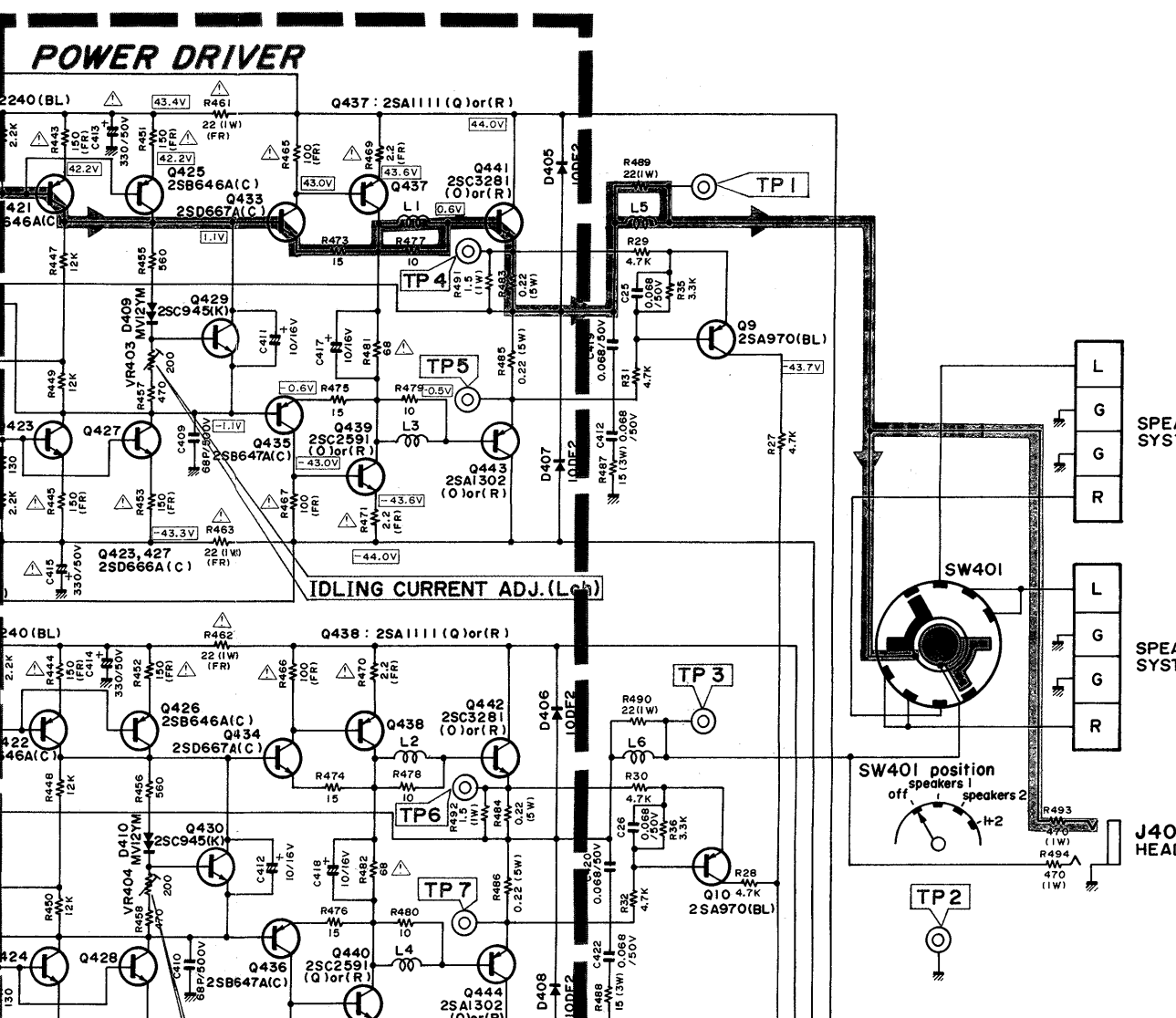
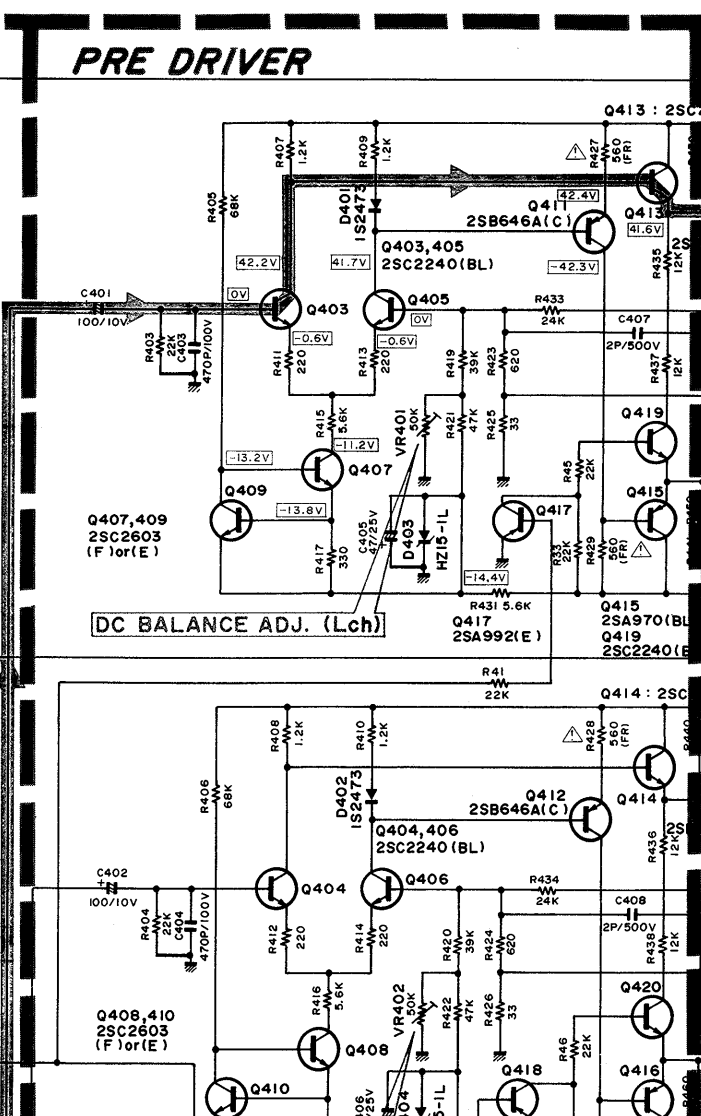
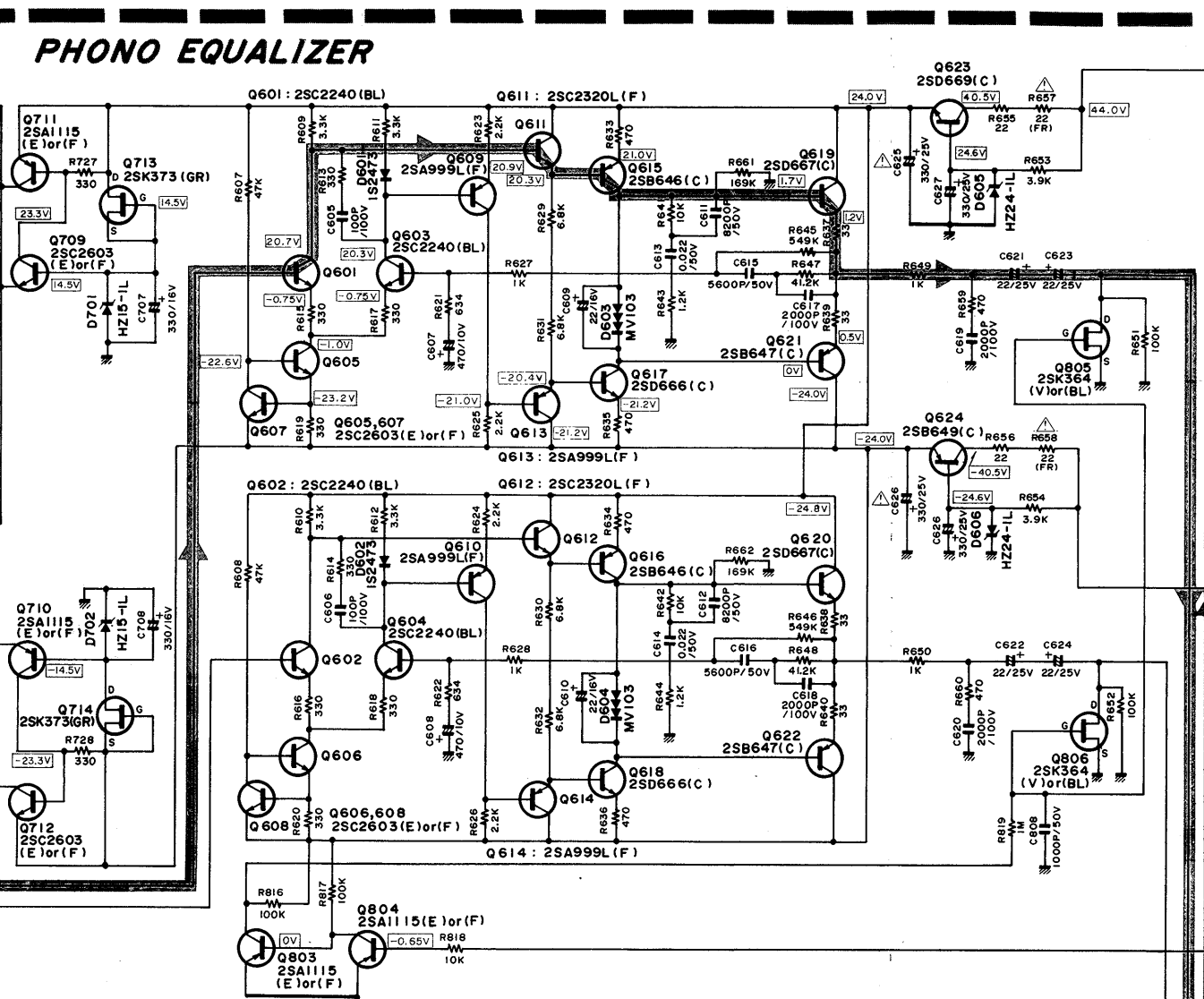
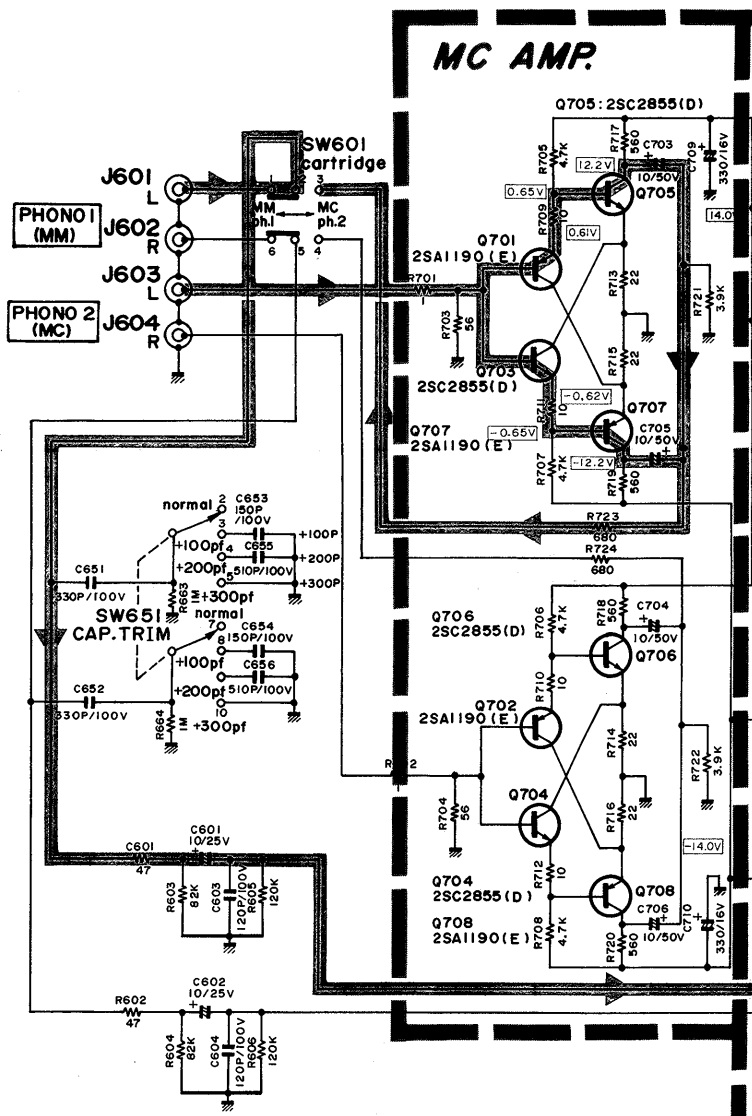
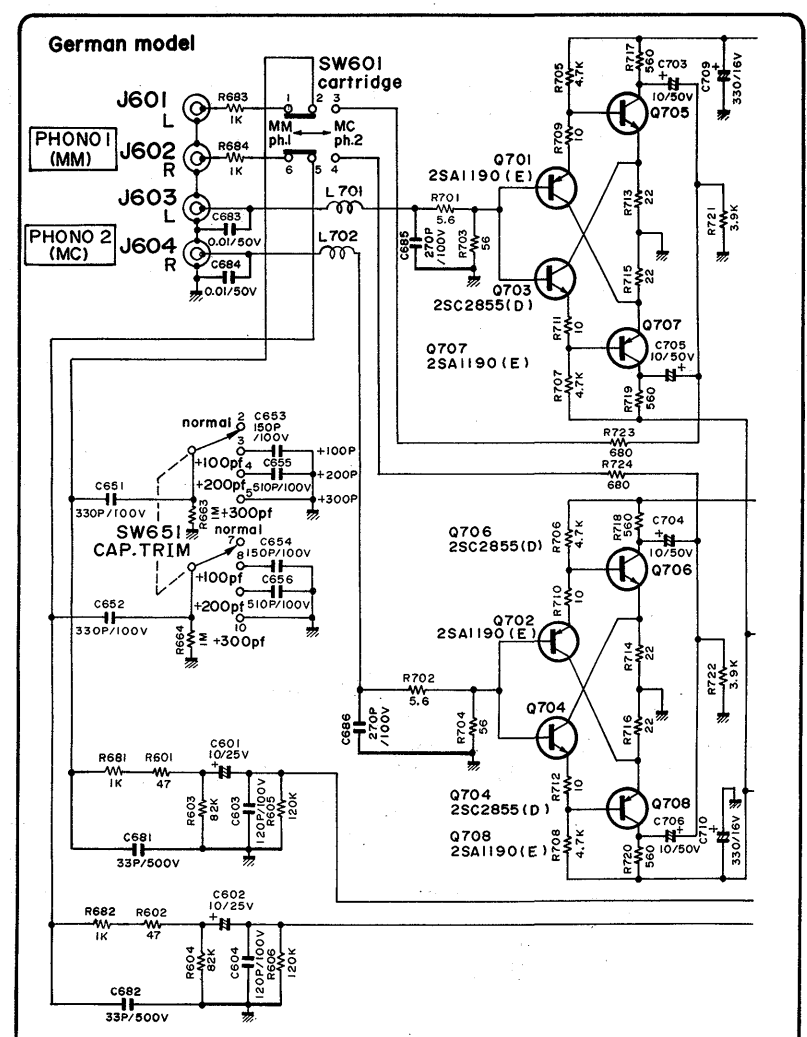
Ref. No.	Part No.	Description
Q417, 418	5611-992(E)	2SA992(E)
Q423, 424, 427, 428	5614-666A(C)	2SD666A(C)
Q429, 430	5613-945(K)	2SC945(K)
Q433, 434	5614-667A(C)	2SD667A(C)
Q435, 436	5612-647A(C)	2SB647A(C)
Q437, 438	5611-1111(Q)	2SA1111(Q) or 2SA1111(R) (w/Insulator and Bushing)
Q439, 440	5613-2591(Q)	2SC2591(Q) or 2SC2591 (R) (w/Insulator and Bushing)
Q441, 442	5613-3281(O)	2SC3281(O) or 2SC3281(R) (w/Insulator)
Q443, 444	5611-1302(O)	2SA1302(O) or 2SA1302(R) (w/Insulator)
DIODES		
△ D1, 2	5685-D5FB20F1	Bridge Silicon, D5FB20F1
D3	5636-1S2471	1S2471
D4	5635-RD5R6EB2	Zener, RD5.6EB2
D5, 401, 402	5631-1S2473	1S2473
D403, 404	5635-HZ15-1L	Zener, HZ15-1L
D405, 406, 407, 408	5632-10DF2	10DF2
D409, 410	5641-MV12YM	Varistor, MV12YM
COILS		
L1, 2, 3, 4	5597-35502	Ferrite Bead
L5, 6	5991-7165	
MISCELLANEOUS		
CN401	4443-040185	Connector, 4 Pos.
PCB-2 TONE CONTROL P.C. BOARD		
RESISTORS		
△ R19, 20	5102-3304713	33Ω, ±2%, 1/4W, Fuse
CONTROLS		
VR501, 502	5113-50396122	50kΩMN, Balance (w/Hexagon Nut)
VR505, 506	5113-50373148	50kΩC, Treble (w/Hexagon Nut)
VR507, 508	5113-10474148	100kΩC, Bass (w/Hexagon Nut)
CAPACITORS		
C17, 18, 21, 22	5345-337D041	330μF, ±20%, 25V, Electrolytic
C23, 24	5345-107C041	100μF, ±20%, 16V, Electrolytic
C501, 502	5359-1015851	100pF, ±5%, 100V, Polypropylene
C507, 508	5345-106C0951	10μF, ±20%, 16V, Electrolytic
C511, 512	5353-010934	1pF, ±0.5pF, 500V, Mica
C513, 514	5345-226D0951	22μF, ±20%, 25V, Electrolytic
C515, 516, 517, 518	5353-680534	68pF, ±5%, 500V, Mica
C519, 520	5345-476C0951	47μF, ±20%, 16V, Electrolytic
C901, 902	5345-104F0951	0.1μF, ±20%, 50V, Electrolytic
C905, 906	5345-107D041	100μF, ±20%, 25V, Electrolytic
C909, 910	5345-224F0951	0.22μF, ±20%, 50V, Electrolytic
TRANSISTORS		
Q5	5614-669(C)	2SD669(C) (w/Insulator)
Q6	5612-649(C)	2SB649(C) (w/Insulator)
Q501, 502, 503, 504	5613-2320L(F)	2SC2320L(F)
Q505, 506, 507, 508, 511, 512	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q509, 510, 513, 514	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q515, 516	5612-647(C)	2SB647(C)
Q517, 518	5614-667(C)	2SD667(C)
Q901, 902, 905, 906	5613-2603(F)	2SC2603(F) or 2SC2603(E)
Q903, 904	5611-1115(F)	2SA1115(F) or 2SA1115(E)
DIODES		
D9, 10	5635-HZ24-1L	Zener, HZ24-1L
D11, 12	5635-HZ15-1L	Zener, HZ15-1L
D503, 504	5631-1S2473	1S2473
MISCELLANEOUS		
SW501, 503	4412-043742	Rotary Slide Switch, Function, Tape Monitor (w/Hexagon Nut)
SW502	4412-045752	Rotary Slide Switch, Tape Out (w/Hexagon Nut)

Ref. No.	Part No.	Description
PCB-3 PUSH SWITCHES P.C. BOARD		
D52, 53, 54, 55, 56	5637-GL5HD10	L.E.D., GL5HD10, Red, Function and Tape Monitor Indicators
SW504/505/506/507/508	4431-05127159	Push Switch, Mode, High Cut, Subsonic, Bass Contour, Pre-out/Main-in
SW509/510/511	4431-03127158	Push Switch, Treble Turnover, Tone Defeat, Bass Turnover
PCB-4 PHONO EQUALIZER P.C. BOARD		
RESISTORS		
R621, 622	5174-Z634038	634 Ω , \pm 1%, 1/4W, Metal
R627, 628	5174-102381	1k Ω , \pm 1%, 1/4W, Metal
R645, 646	5174-Z549338	549k Ω , \pm 1%, 1/4W, Metal
R647, 648	5174-Z412238	41.2k Ω , \pm 1%, 1/4W, Metal
△ R657, 658	5102-2204713	22 Ω , \pm 2%, 1/4W, Fuse
R661, 662	5174-Z169338	169k Ω , \pm 1%, 1/4W, Metal
R717, 718, 719, 720	5174-561381	560 Ω , \pm 1%, 1/4W, Metal
CAPACITORS		
C601, 602	5345-106D0951	10 μ F, \pm 20%, 25V, Electrolytic
C603, 604	5359-1215851	120pF, \pm 5%, 100V, Polypropylene
C605, 606	5359-1015851	100pF, \pm 5%, 100V, Polypropylene
C607, 608	5345-477B0952	470 μ F, \pm 20%, 10V, Electrolytic
C609, 610	5345-226C041	22 μ F, \pm 20%, 16V, Electrolytic
C617, 618, 619, 620	5359-2025851	2000pF, \pm 5%, 100V, Polypropylene
C621, 622, 623, 624	5345-226D0226	22 μ F, \pm 20%, 25V, Electrolytic
C625, 626, 627, 628	5345-337D041	330 μ F, \pm 20%, 25V, Electrolytic
C651, 652	5359-3315851	330pF, \pm 5%, 100V, Polypropylene
C681, 682	5353-330534	33pF, \pm 5%, 500V, Mica (only German model)
C685, 686	5359-2715851	270pF, \pm 5%, 100V, Polypropylene (only German model)
C703, 704, 705, 706	5345-106F0226	10 μ F, \pm 20%, 50V, Electrolytic
C707, 708, 709, 710	5345-337C041	330 μ F, \pm 20%, 16V, Electrolytic
TRANSISTORS		
Q601, 602, 603, 604	5613-2240(BL)	2SC2240(BL)
Q605, 606, 607, 608, 709, 712	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q609, 610, 613, 614	5611-999L(F)	2SA999L(F)
Q611, 612	5613-2320L(F)	2SC2320L(F)
Q615, 616	5612-646(C)	2SB646(C)
Q617, 618	5614-666(C)	2SD666(C)
Q619, 620	5614-667(C)	2SD667(C)
Q621, 622	5612-647(C)	2SB647(C)
Q623	5614-669(C)	2SD669(C) (w/Insulator)
Q624	5612-649(C)	2SB649(C) (w/Insulator)
Q701, 702, 707, 708	5611-1190(E)	2SA1190(E)
Q703, 704, 705, 706	5613-2855(D)	2SC2855(D)
Q710, 711, 803, 804	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q713, 714	5616-2SK373GR	F.E.T., 2SK373 (GR)
Q805, 806	5616-2SK364(V)	F.E.T., 2SK364(V) or 2SK364(BL)
DIODES		
D601, 602	5631-1S2473	1S2473
D603, 604	5641-MV103	Varistor, MV103
D605, 606	5635-HZ24-1L	Zener, HZ24-1L
D701, 702	5635-HZ15-1L	Zener, HZ15-1L
COILS		
L701, 702	5597-3	Ferrite Bead (only German model)
MISCELLANEOUS		
SW601	4422-70211	Remote Switch, Cartridge
J501/502/503/504, 601/602/603/604	4484-31	4-Pin Jack, Tuner, Video/CD, Phono 1 (MM), Phono 2 (MC)
CN601, 603, 604	4443-030185	Connector, 3 Pos.
CN602	4443-070185	Connector, 7 Pos.

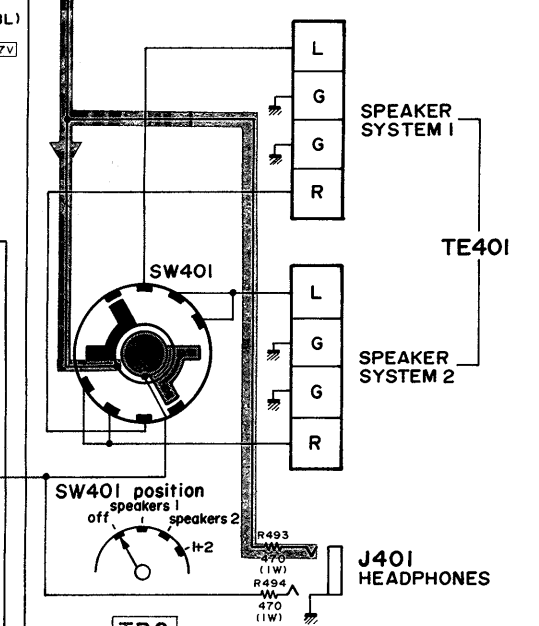
Ref. No.	Part No.	Description
PCB-5 POWER SUPPLY P.C. BOARD		
RESISTORS		
△ R1	5135-335J50P	3.3M Ω , \pm 5%, 1/2W, Carbon (only General and German models)
R51	5171-391572	390 Ω , \pm 5%, 1W, Metal
CAPACITORS		
△ C1	5352-1030959	0.01 μ F, \pm 20%, AC125V, Metalized Polyester (for U.S.A. and Canada models)
△ "	5352-1030958	0.01 μ F, \pm 20%, AC250V, Metalized Polyester (for General and German models)
C51	5345-107F041	100 μ F, \pm 20%, 50V, Electrolytic
C52	5345-107C041	100 μ F, \pm 20%, 16V, Electrolytic
DIODES		
D6, 7	5632-DS135E	DS135E
D8	5635-HZ15-1L	Zener, HZ15-1L
MISCELLANEOUS		
△ SW1	4431-01018158	Push Switch, Power
CN51	4443-030185	Connector, 3 Pos.
	4472-7113	Fuse Holder (for U.S.A. and Canada models)
	4472-7122	Fuse Holder (for General and German models)
PCB-6 CAPACITANCE TRIM P.C. BOARD		
CAPACITORS		
C653, 654	5359-1515851	150pF, \pm 5%, 100V, Polypropylene
C655, 656	5359-5115851	510pF, \pm 5%, 100V, Polypropylene
MISCELLANEOUS		
SW651	4411-204714	Rotary Switch, Cap. Trim (w/Hexagon Nut)
PCB-7 VOLUME CONTROL P.C. BOARD		
VR503, 504	5113-10472147	Control, 100k Ω B, Volume (w/Hexagon Nut)
PCB-8 SPEAKERS P.C. BOARD		
R493, 494	5171-471572	Resistor, 470 Ω , \pm 5%, 1W, Metal
SW401	4411-1047110	Rotary Switch, Speaker System Selector (w/Hexagon Nut)
TE401	4214-156	Terminal, Speaker System 1/2
PCB-9 POWER INDICATOR P.C. BOARD		
D51	5637-GL5HD10	L.E.D., GL5HD10, Red, Power Indicator
PCB-10 INPUT/OUTPUT JACKS P.C. BOARD		
J505/506/507/508, 509/510/511/512, 513/514/515/516	4484-27	4-Pin Jack, Tape 1 In/Out, Tape 2 In/Out, Pre-out, Main-in
PCB-11 HEADPHONES P.C. BOARD		
J401	4451-00159	Jack, Headphones

△ SAFETY RELATED COMPONENT. USE ONLY EXACT REPLACEMENT PART AS SPECIFIED.

SCHEMATIC DIAGRAM

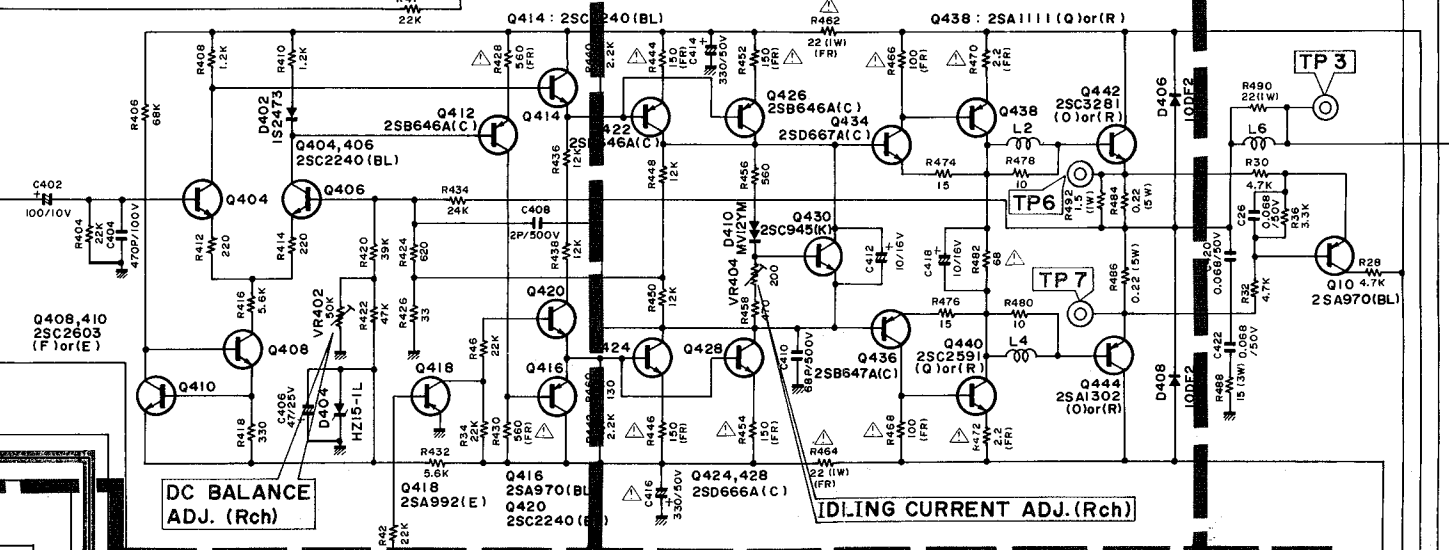
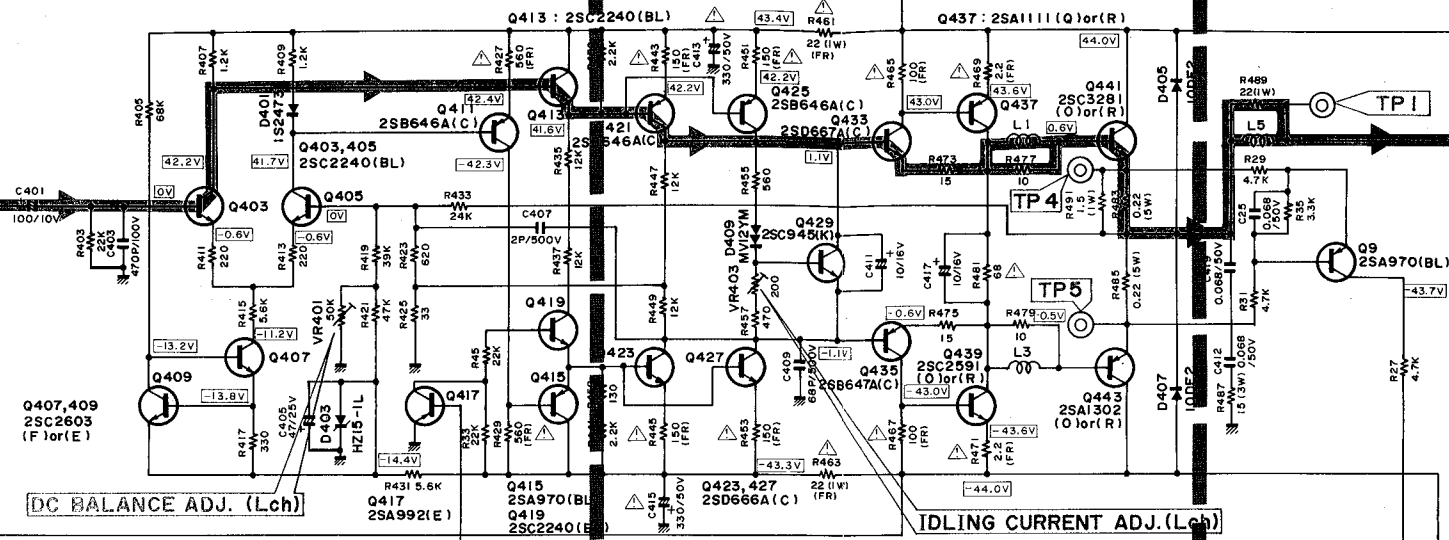


1. ALL RESISTANCES VALUES ARE IN Ω .
K Ω =1000 Ω , M Ω =1000K Ω .
2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
3. ALL CAPACITANCES VALUES ARE IN μ F UNLESS OTHERWISE NOTED. P= μ F.
4. \square : DC VOLTAGE AT NO SIGNAL.
5. SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY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



PRE DRIVER

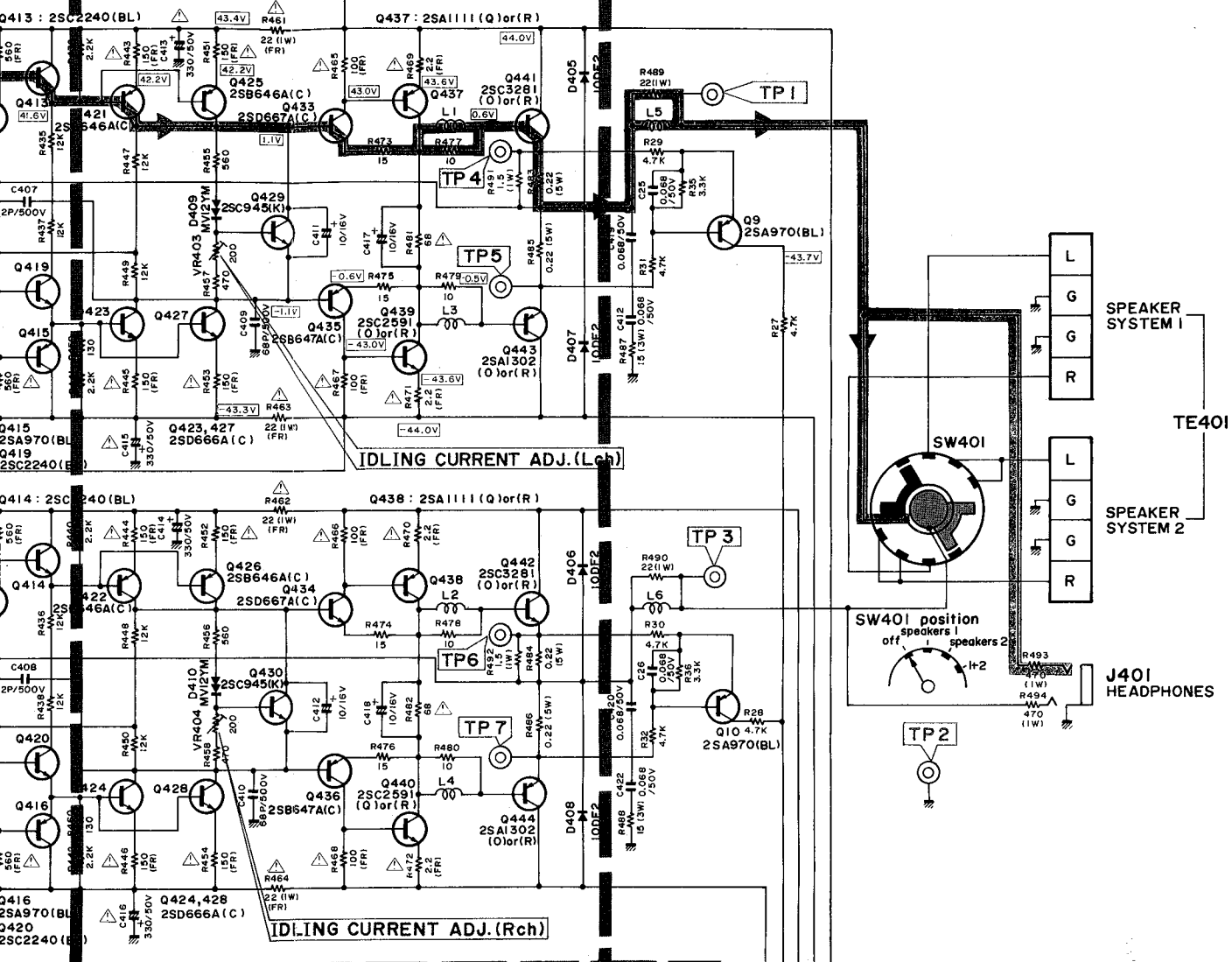
POWER DRIVER



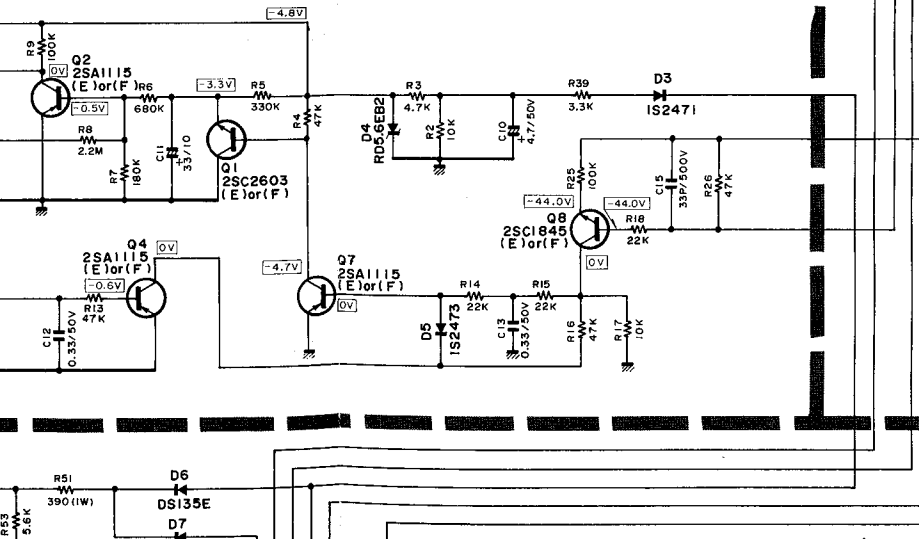
PROTECTION CIRCUIT

POWER SUPPLY

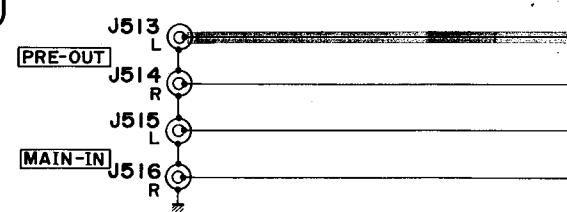
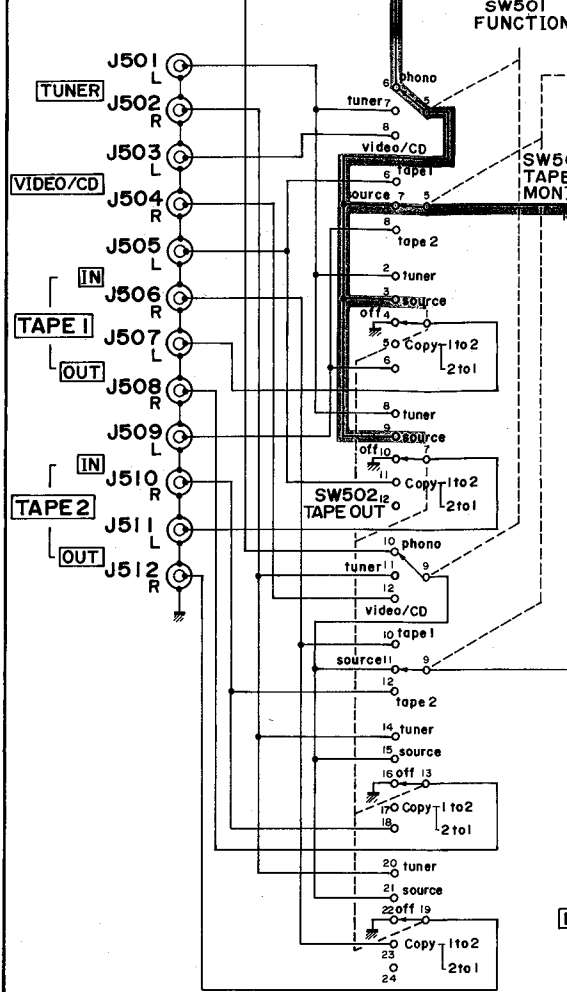
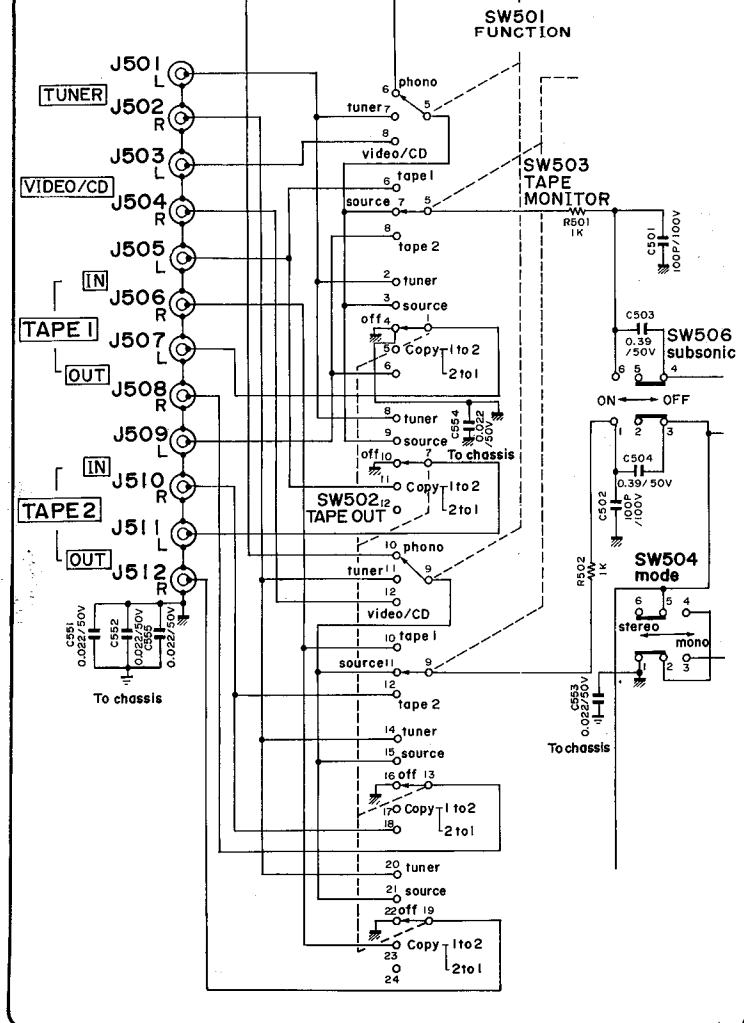
POWER DRIVER



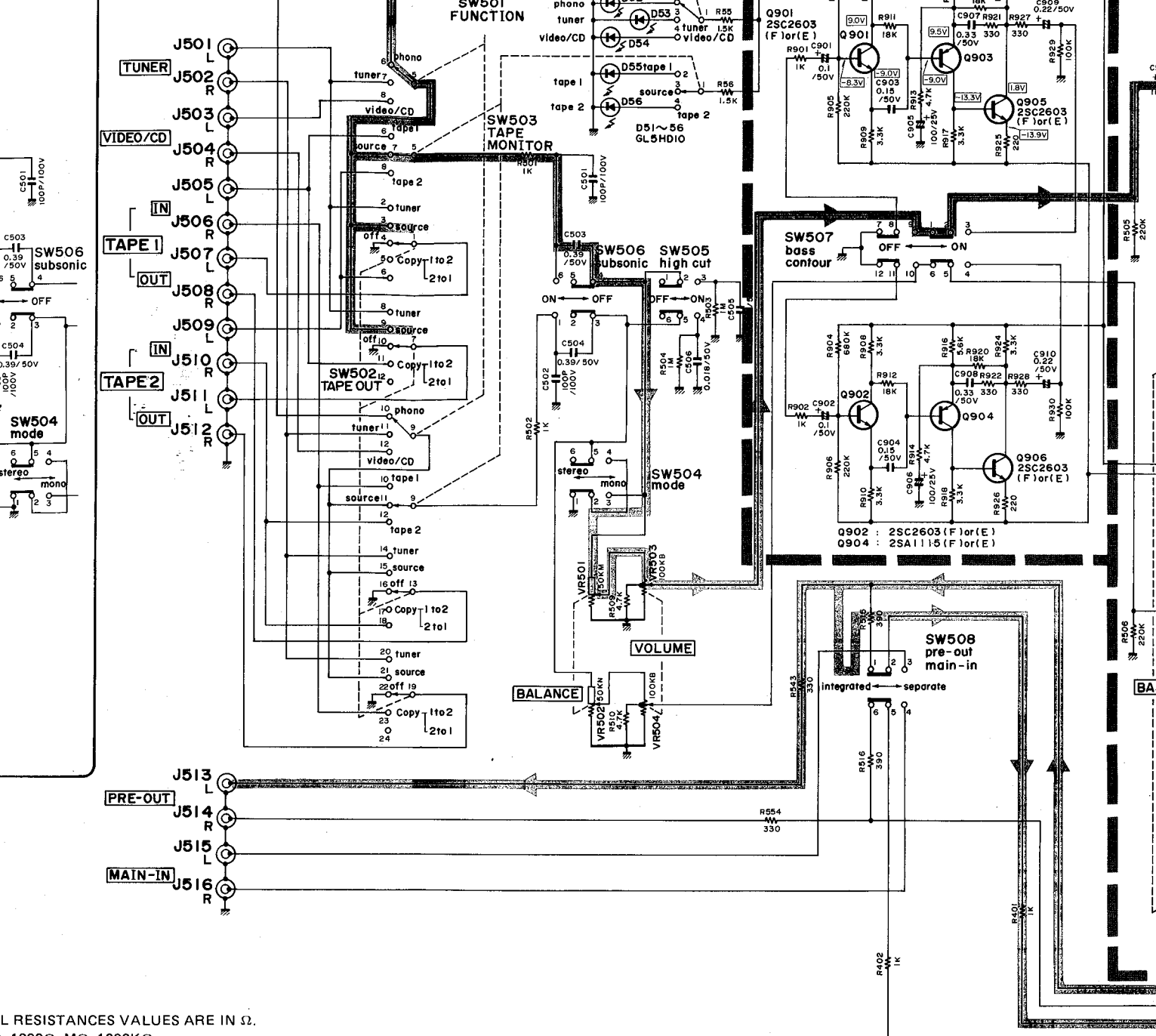
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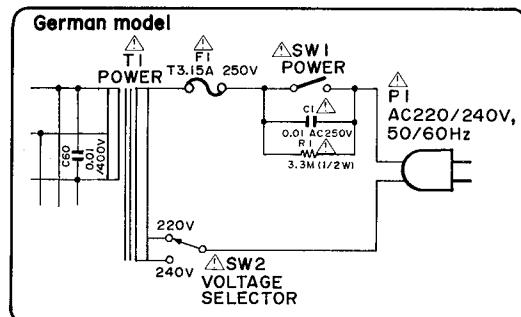
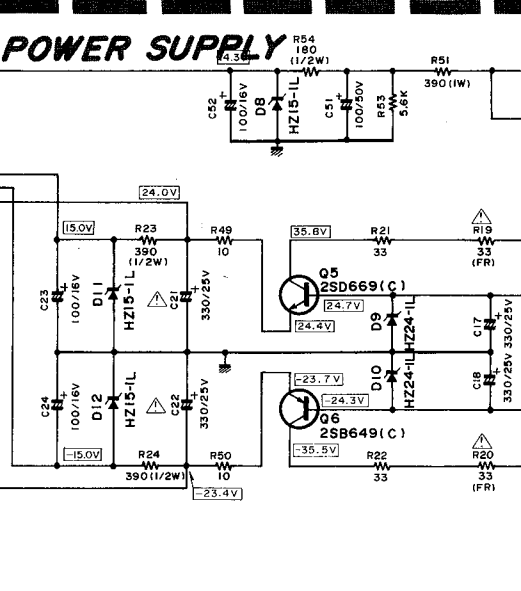
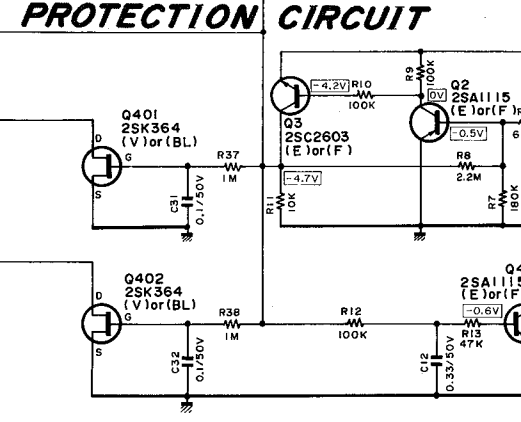
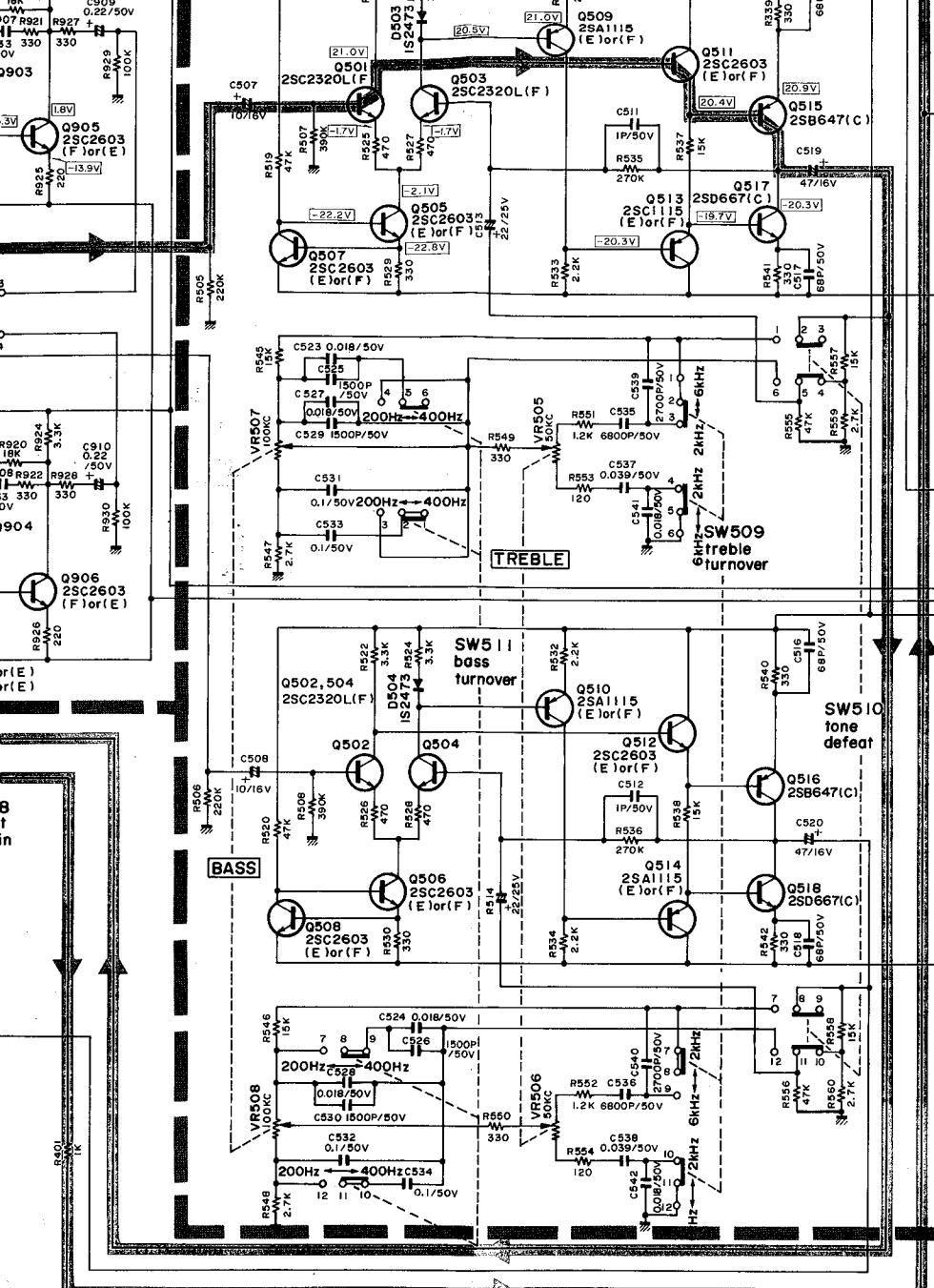
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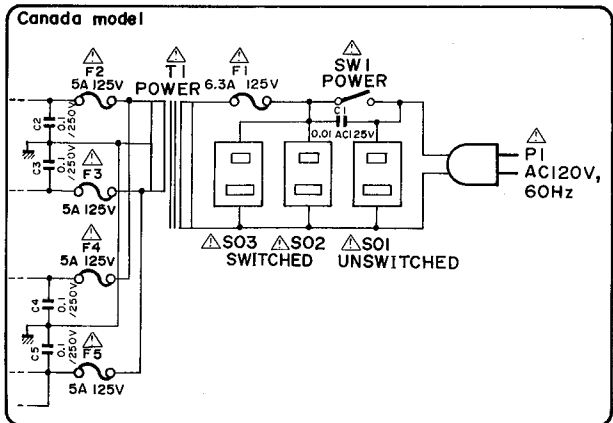
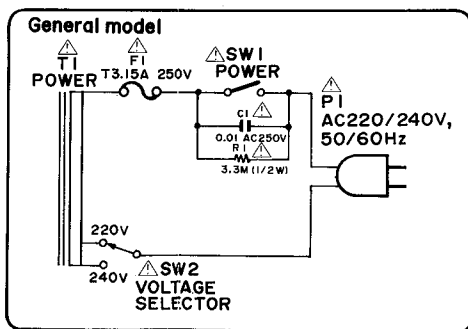
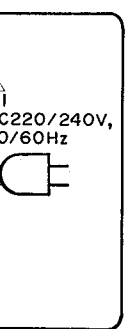
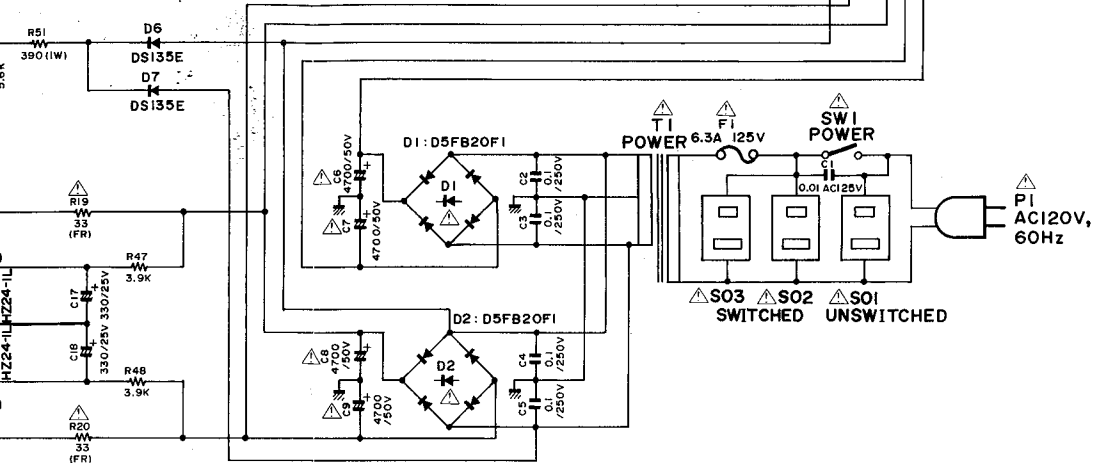
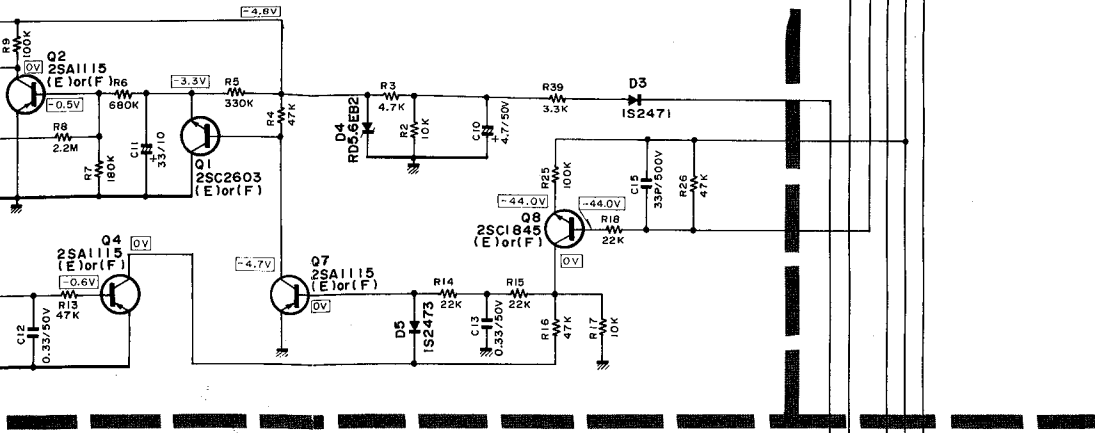


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3. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P= μ
4. $\square \dots V$: DC VOLTAGE AT NO SIGNAL
5. SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRES... REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY C...

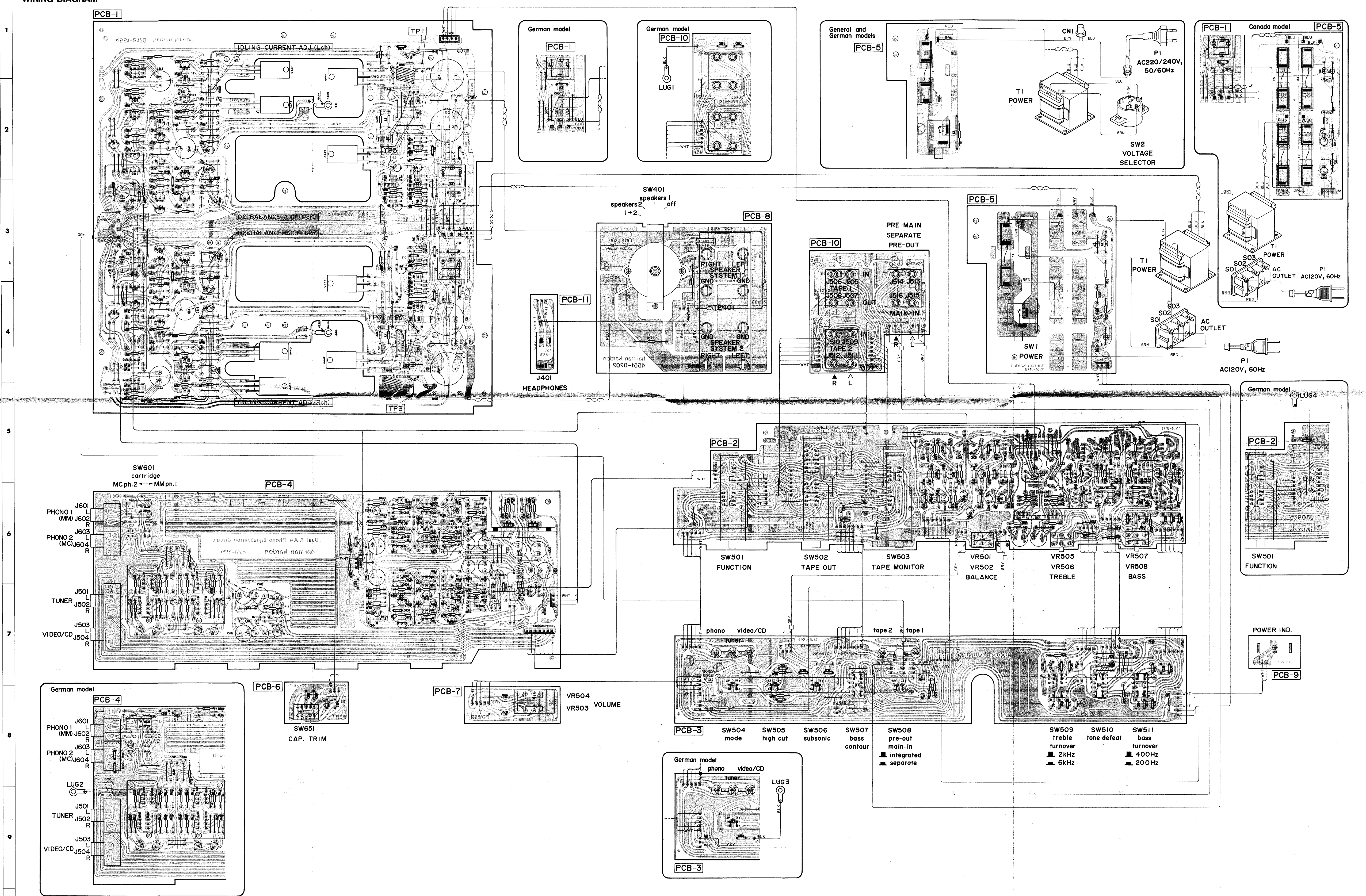


L RESISTANCES VALUES ARE IN Ω .
 M=1000 Ω , K=1000K Ω .
 W WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
 L CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P= $\mu\mu F$
 V : DC VOLTAGE AT NO SIGNAL
 SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY
 REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.





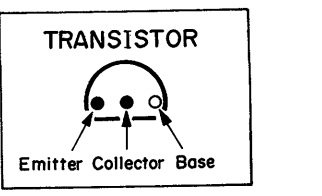
WIRING DIAGRAM



PIN CONNECTION DIAGRAM OF TRANSISTORS AND DIODES

<p>28C1845 28A970 28C2240 28A992 28C945 28C2320L 28A999L 28A1190 28C2855</p>	<p>28C2603 28A1115</p>	<p>28B646A 28D666A 28D667A 28B647A 28B647 28D667 28B646 28D666</p>	<p>28A1111 28C2591</p>	<p>28C3281 28A1302</p>	<p>28D669 28B649</p>	<p>28K373</p>	<p>28K364</p>	<p>DS135E</p>	<p>1S2471 RD5.6EB2 1S2473 HZ15-1L 10DF2 HZ24-1L</p>	<p>MV12YM</p>	<p>GL5HD10</p>	<p>D5FB20F1</p>	<p>MV103</p>
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- WIRE COLOR ABBREVIATIONS
- RED : Red
 - ORG : Orange
 - BLU : Blue
 - WHT : White
 - GRN : Green
 - BLK : Black
 - YEL : Yellow
 - PUR : Purple
 - PIK : Pink

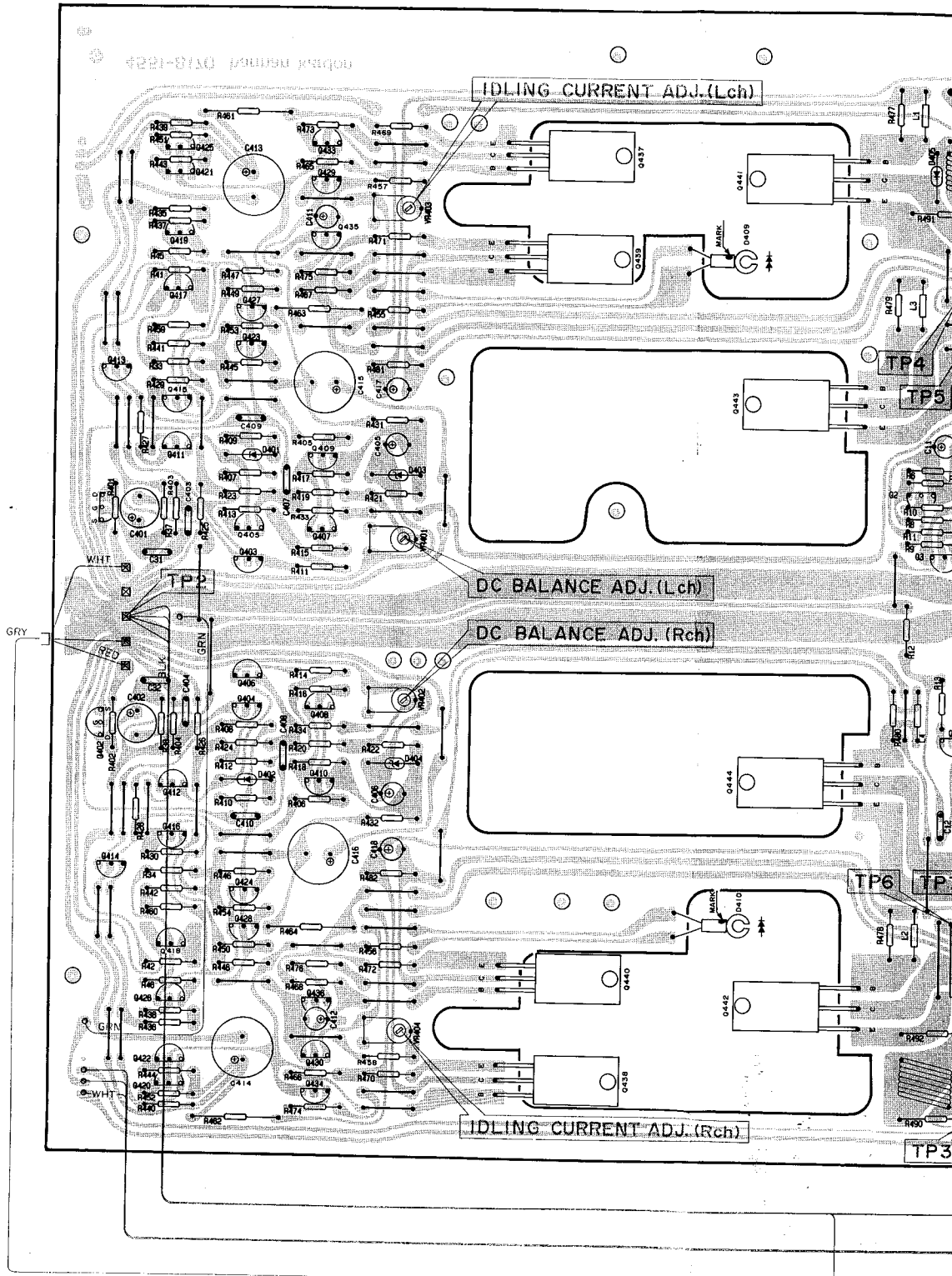


WIRING DIAGRAM

A B C D

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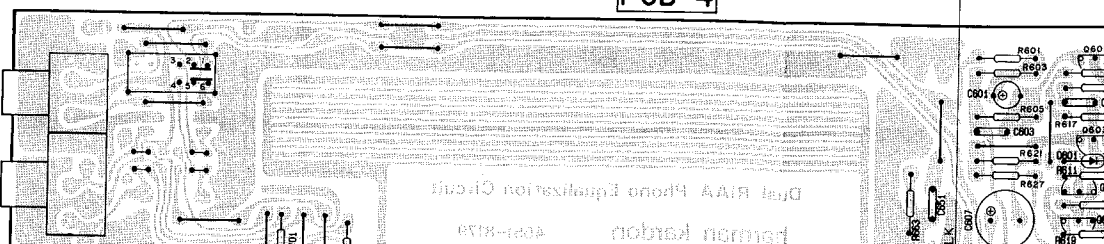
PCB-1

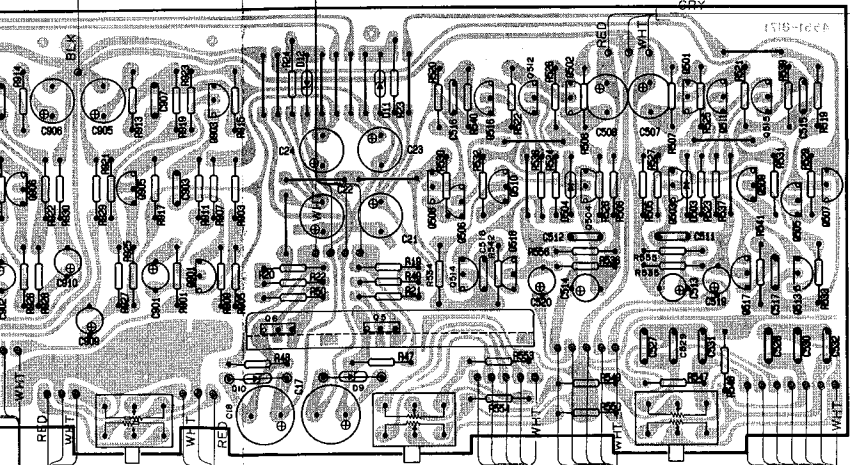
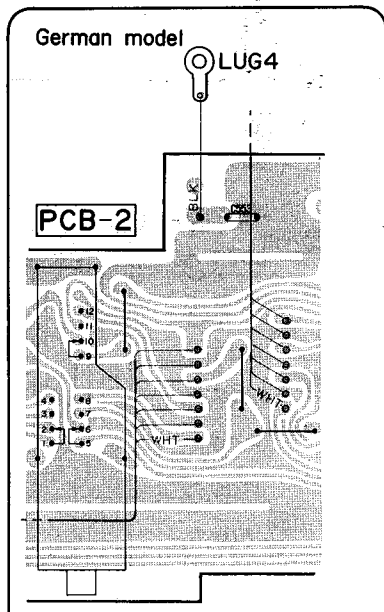
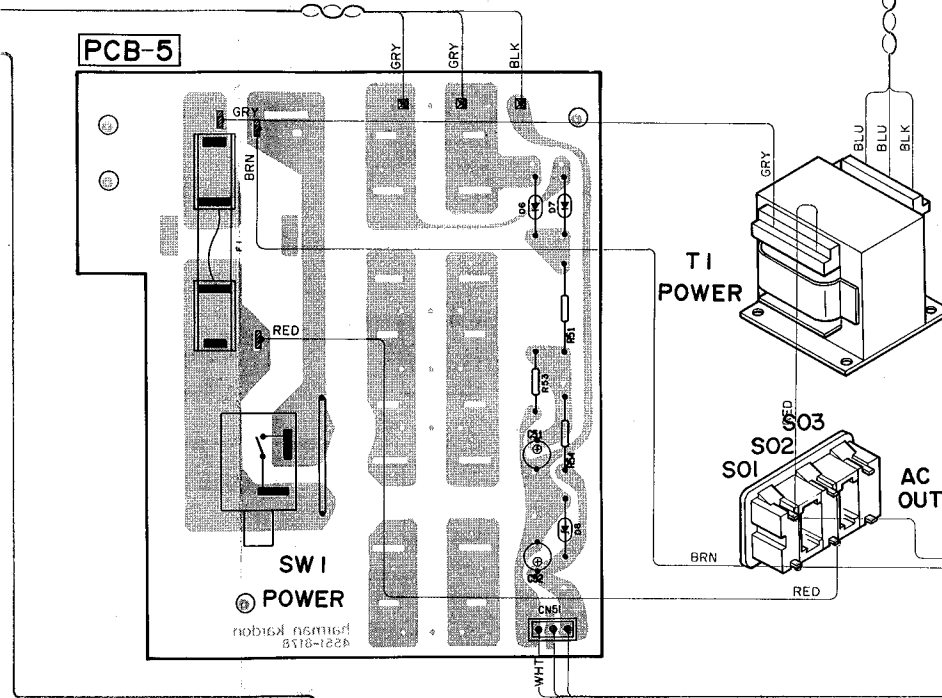
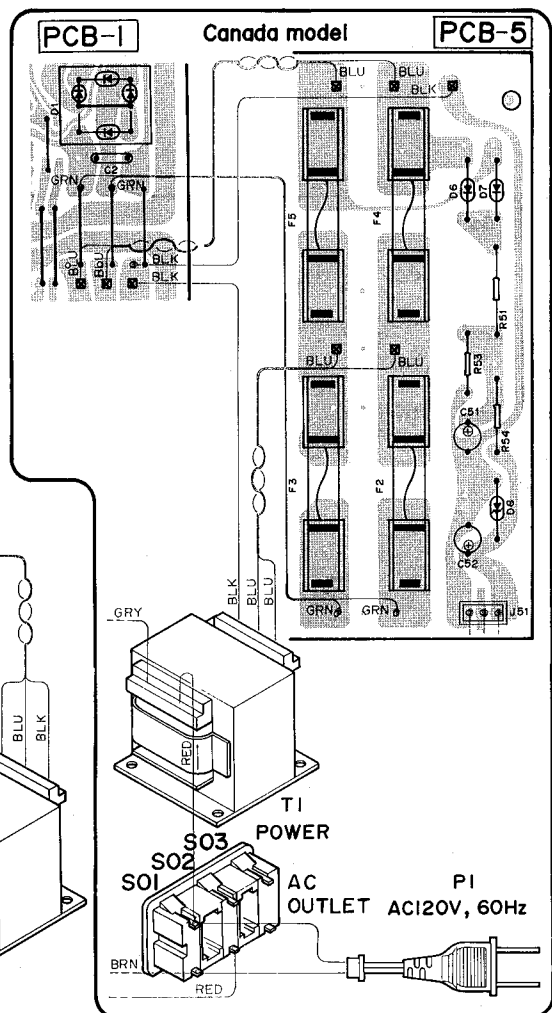
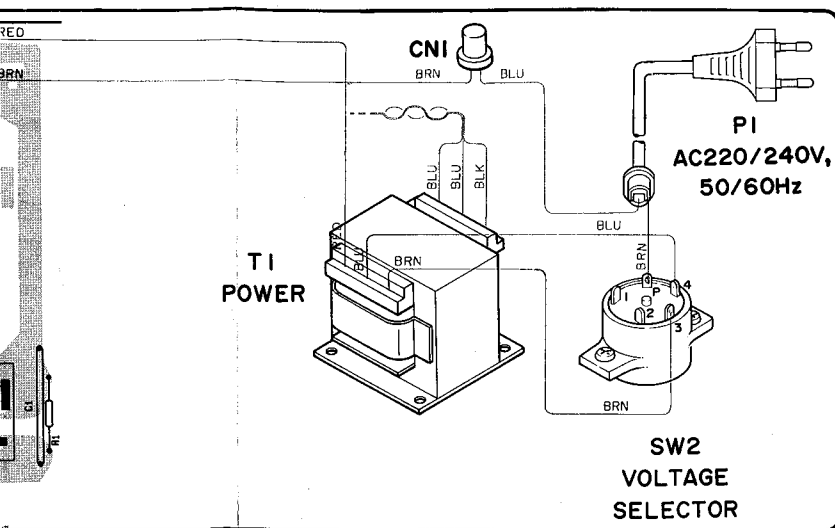


SW601
cartridge
MC ph.2 ↔ MM ph.1

PCB-4

J601 L
PHONO 1 (MM) J602 R
J603 L
PHONO 2 (MC) J604 R



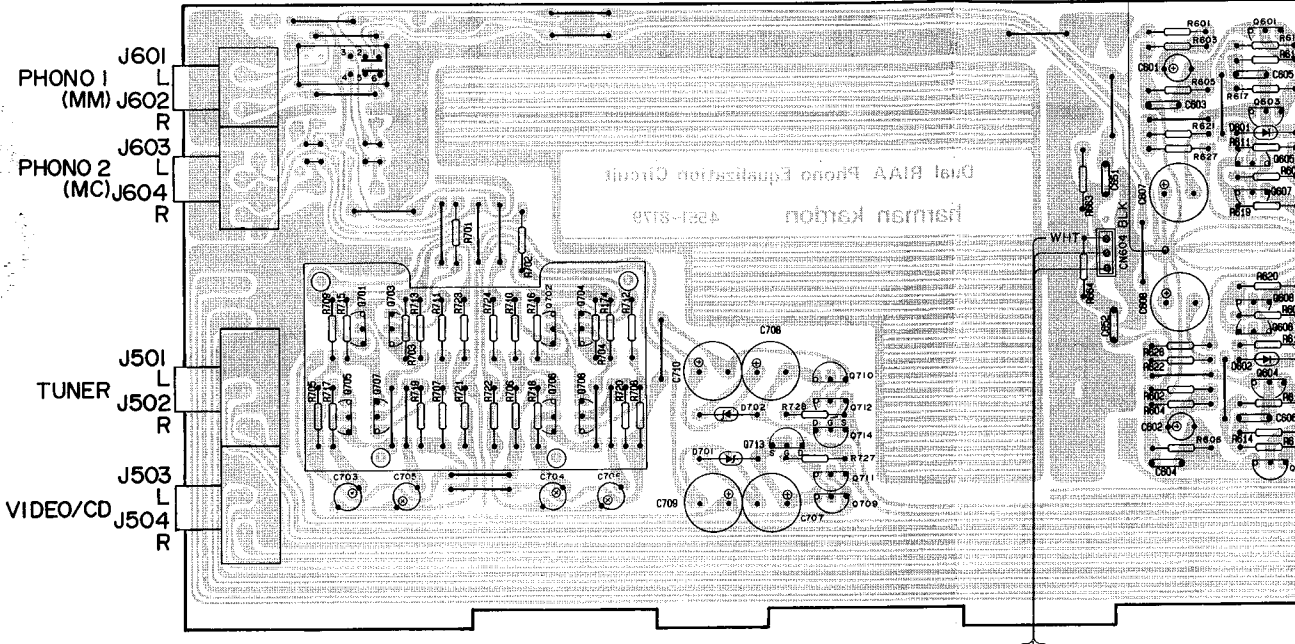


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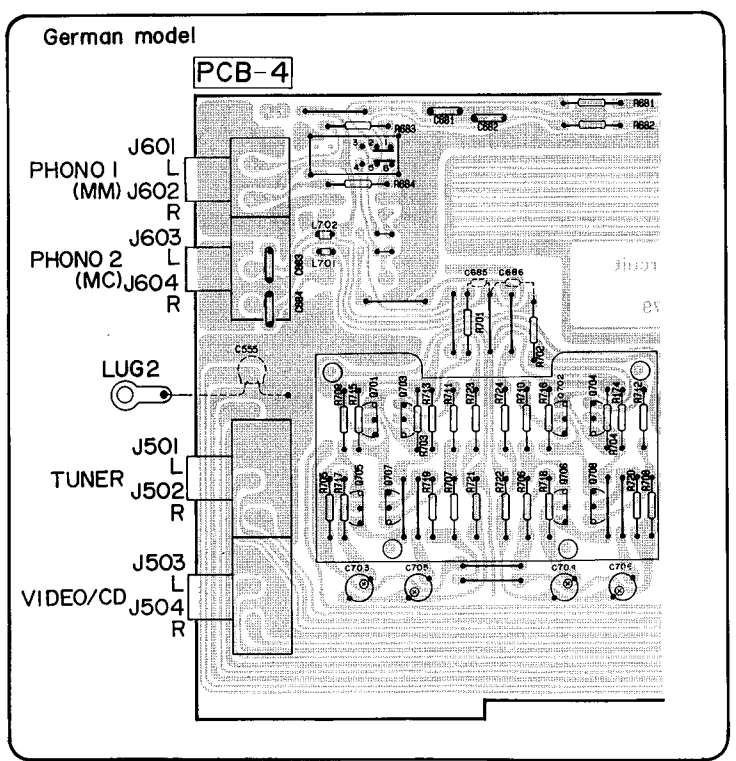
SW601
cartridge
MC ph.2 ← MM ph.1

PCB-4

6

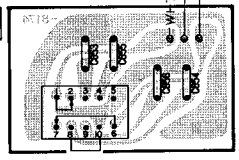


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PCB-6



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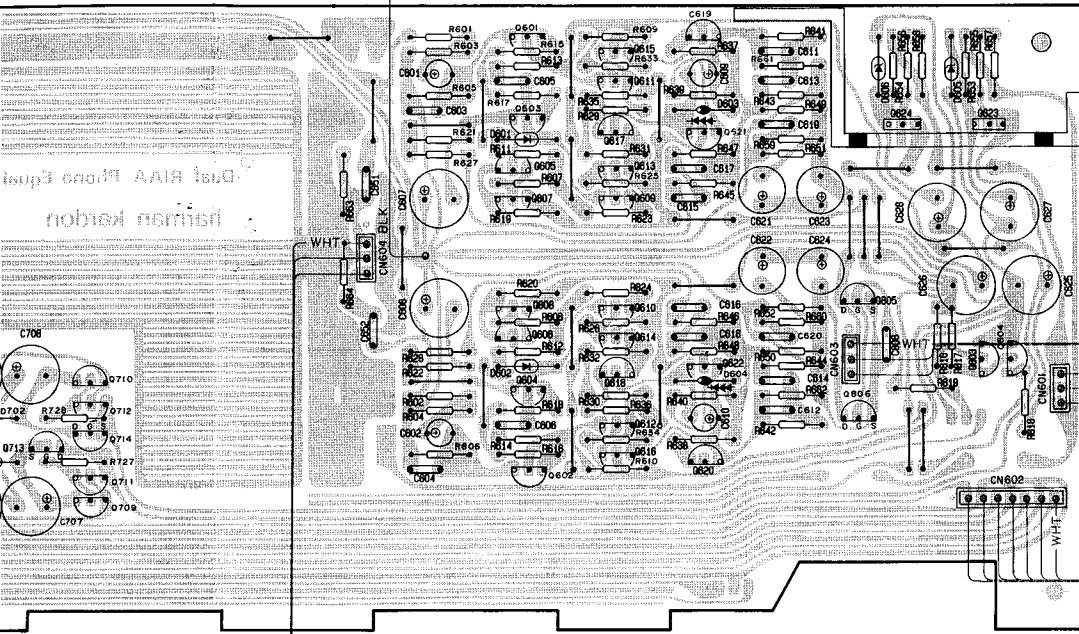
PIN CONNECT

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- 2SA970
- 2SC2240
- 2SA992
- 2SC945
- 2SC2320L
- 2SA999L
- 2SA1190
- 2SC2855

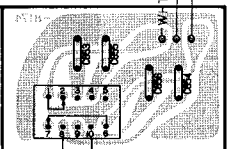
NG CURRENT ADJ. (Rch)

TP3

PCB-4

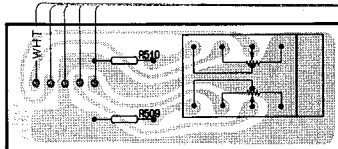


PCB-6



SW651
CAP. TRIM

PCB-7



VR504
VR503 VOLUME

PIN CONNECTION DIAGRAM OF TRANSISTORS AND DIODES

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2SA970
2SC2240
2SA992
2SC945
2SC2320L
2SA999L
2SA1190
2SC2855

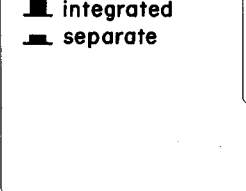
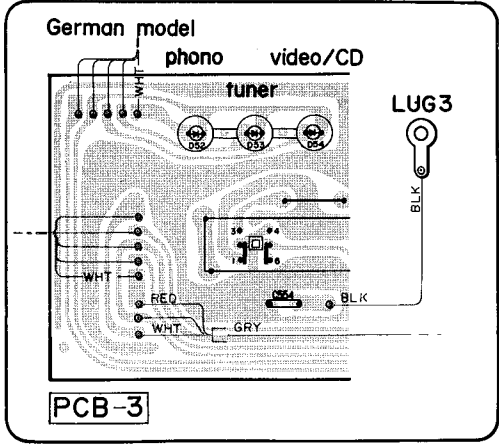
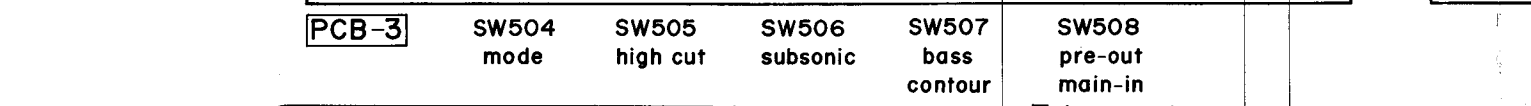
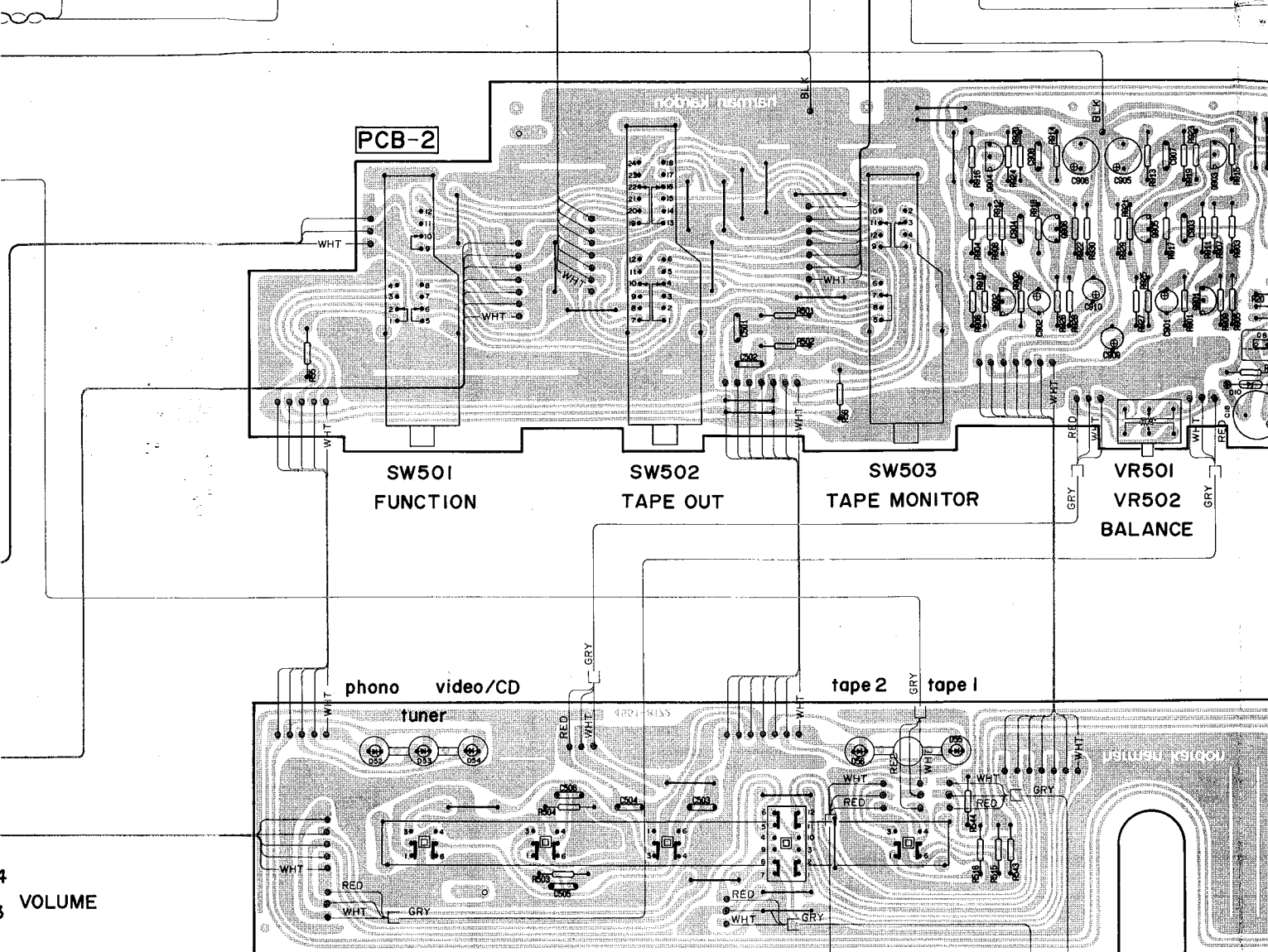
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2SA1115

2SB646A
2SD666A
2SD667A
2SB647A
2SB647
2SD667
2SB646
2SD666

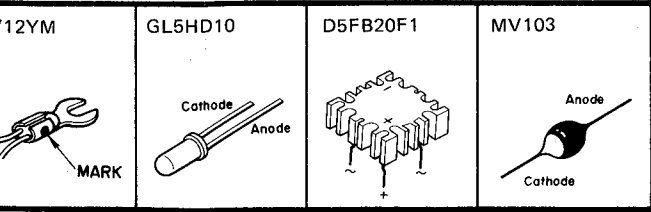
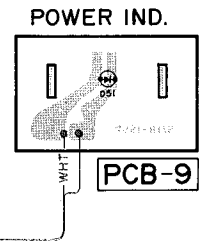
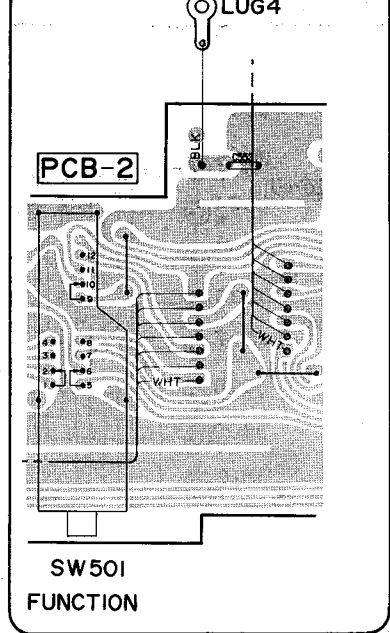
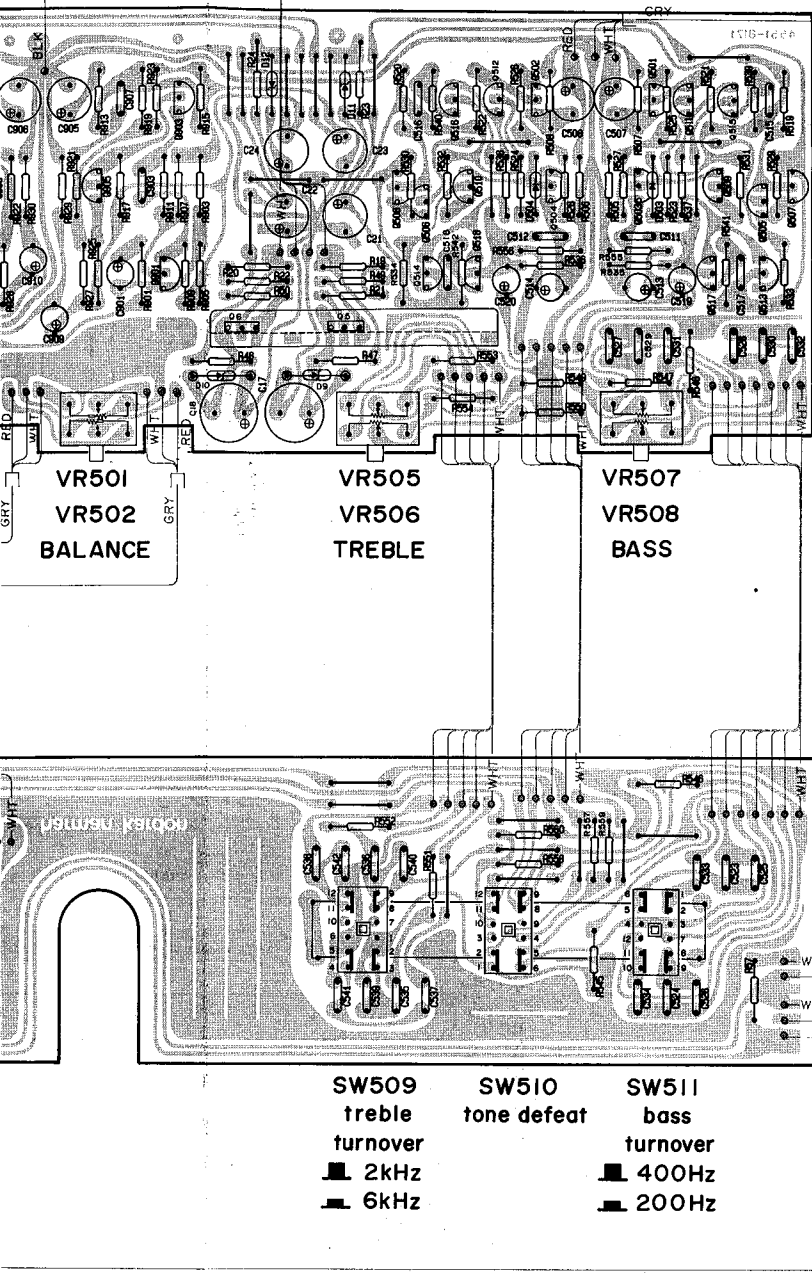
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2SC2591

2SC3281
2SA1302

2SD...
2SB...



1111 2591 	2SC3281 2SA1302 	2SD669 2SB649 	2SK373 	2SK364 	DS135E 	1S2471 RD5.6EB2 1S2473 HZ15-1L 10DF2 HZ24-1L 	MV12YM 	GL5HD10
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