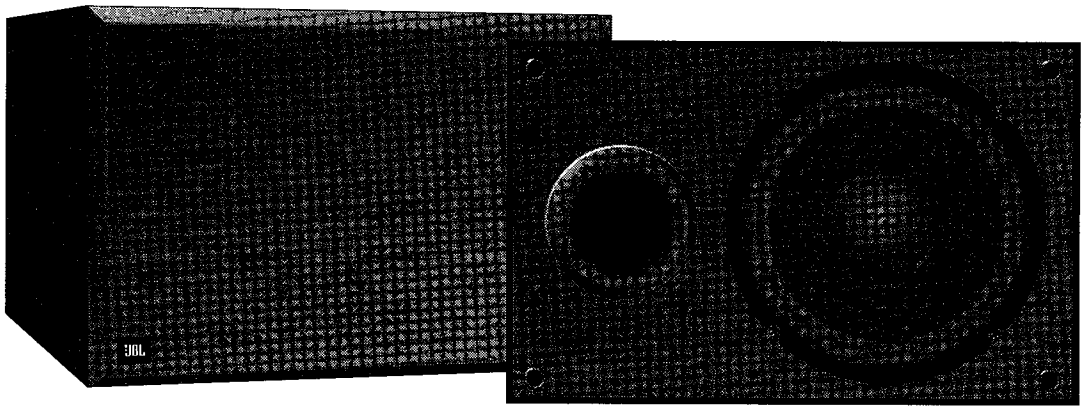
JBL

SERVICE MANUAL

PSW800

Powered Subwoofer



120V & 230V Versions

JBL Consumer Products Inc.
80 Crossways Park West
Woodbury, N.Y. 11797

8500 Balboa Blvd.
Northridge, CA 91329

H A Harman International Company

1112-PSW800 Rev A

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SPECIFICATIONS

Amplifier Power (RMS)* . . . . . 65 Watts
Low Frequency Woofer. . . . . 8"
Voice Coil Diameter . . . . . 1.5"
Cone Material . . . . . High Polymer Laminate
Inputs. . . . . Line Level & Speaker Level
Outputs. . . . . 6dB/octave High Pass Filtered
Crossover Frequency 50-150Hz
(Continuously Variable)
Frequency Response (-6dB) . . . . 45 to (50-150Hz)**

External Dimensions (Inches)
Height. . . . . 14"
Width . . . . . 9-1/4"
Depth . . . . . 12-1/2"

External Dimensions (mms)
Height. . . . . 356 mm
Width . . . . . 234 mm
Depth . . . . . 318 mm
Weight . . . . . 23 lbs (10.5 kg)

*ALC circuit defeated.
**Determined by crossover setting.

CONTROLS AND THEIR FUNCTIONS

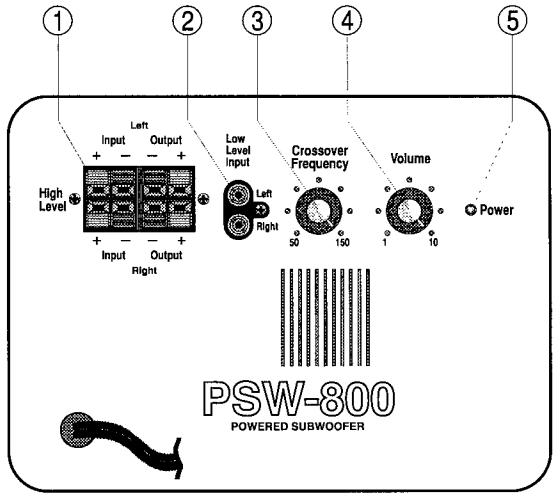
1. The **High Level Input/Output Push Terminals. -** The Speaker Level Output from the receiver connects to the High Level Input of PSW-800. The High Level Outputs are connected to the left and right speakers.

2. The **Low Level Input RCA** jacks **-** are connected to the Low Level Preamplifier Output or Subwoofer Output from the receiver

3. The **Crossover Frequency Knob** - determines the highest frequency the PSW-800 will reproduce.

4. The **Volume** Knob - determines the level of volume.

5. The **Power** Light - lights when unit is on and receiving signal.



JBL continually strives to improve its products. New materials, production methods and design refinements are introduced into existing models without notice as a routine expression of our design philosophy. For this reason, PSW800 Subwoofer may differ in some respect from its published specifications and descriptions, but will always equal or exceed the original specifications unless otherwise stated.

1. BASIC CIRCUIT OPERATION

Transformer (T1) steps down the AC mains voltage to 55VAC Center-tapped. The 55VAC is rectified by full wave bridge (D1) and filtered by C1 and C2 (Bulk Capacitors) producing +/-40VDC (+VC/-VE). Resistors R80, R1, R81, R2 and Zeners D2/D3 reduce +/-40VDC to +/-15VDC which is connected to U1 (+5V regulator) and U2 (-5V regulator) providing +/-5VDC for the low level signal processing circuit.

The left and right Low Level Inputs are mixed at U6:A together with attenuated High Level Inputs (Speaker Inputs). The Feedback Level Control (R36) is an audio taper control which provides a logarithmic gain control. The Low Level Signal is inverted by U6:B to provide correct phase at the woofer output. D8 and D9 provide signal clipping. Next the subsonic 34Hz High-Pass filter (U6:D and U6:C) removes the infrasonic components below 34Hz. The adjustable 50-150Hz Low-Pass filter is provided by U7 (Switched Capacitor Filter) and U8 (variable frequency clock 2.5Khz-7.5Khz for U7) providing the user with an adjustable High Frequency Limit. The signal is again High Frequency Limited by the 200Hz Low-Pass Filter (U9:C) resulting in ultimate -36dB/Octave slope (also providing reduction of clock frequency in O/P of U7). The boost circuit (U9:A/U9:B) provides Low Frequency correction for the woofer (+6DB @ 48Hz).

The Power Output is provided by U3 with the following functions: Thermal Shutdown, Current Limiting, SOA and Mute Input.

The Supply Referenced Limiter (R92-R97 and D14-D19) provides soft clipping to the signal which automatically tracks the +VC/-VE supply preventing hard clipping in the power amplifier (U3) with +/-20% variation of AC mains voltage.

Automatic Mute Circuit:

The Automatic Mute will activate in 150-250 seconds if the signal is below 25mv p-p (approx). At the input of U4:A (Processor Output) U4:A provides +40db of gain for the threshold comparator U4:B when the signal is >25mv p-p then the output of the threshold comparator is +5VDC holding Q1 "on" which in turn hold C24 to ground potential (0v). The output of timer U5 will be at +5Vdc keeping Q2, Q3 and Q4 conducting and LED2 will be "On" and U3 will be "On" (Muting Off). When the signal is <25mv p-p then the output of U4:B will be -5Vdc, Q1 will be "off" allowing C24 to charge via R19 to the required voltage (In>150-250 seconds) to trip U5 bringing the Output (Pin3) to 0v. Q2, Q3, Q4 and LED2 will turn "Off" and causing the power amp (U3) to turn "Off" (Mute).

2. TROUBLE SHOOTING BEFORE OPENING

Check connections, control settings, driver and other possible external problems. If there is Output, determine if all controls and Inputs function properly. Rotate Pots over full range while applying lateral and vertical oscillating forces to locate possible intermittent function. Left and right Low Level and High Level (speaker) Input should be tested individually. Speaker Outputs should also be tested. While a signal is present, corner drop the enclosure a few inches to expose possible intermittent problems. Check woofer for rubbing of voice coil or any damage to cone. Check cabinet for any loose objects.

3. REMOVING THE AMPLIFIER

WARNING

This amplifier has no power switch. Hazardous voltages are present within the unit whenever it is plugged in.

WARNING

There are voltages and hot components at many points in the amplifier which can, if contacted, cause personal injury. Be extremely careful. Any adjustments or service procedures that require operation of the amplifier out of its enclosure should be performed only by trained service personnel. refer to drawings for locations of hazards and familiarize yourself with their locations before starting.

WARNING

The bulk DC electrolytics contain a large amount of stored energy. Wear safety glasses, and remove rings and jewelry when operating the amplifier out of its enclosure. Fully disconnect the AC source and wait one minute for capacitors to discharge before touching the circuit. Do not bridge capacitors or bulk DC tracks, or components connected to them. Dangerous fragments of molten metal or shattered components may be ejected.

A.) Disconnect the amplifier AC plug.

B.) Remove 12 large screws within 0.5" of edge of panel; remove top three last while holding panel in place. (**DO NOT** remove any other screws).

C.) Carefully tip panel with PC boards partly out of cabinet, holding by edges of panel only. Disconnect 2 quick connects near the center of the power amp PC board.

CAUTION

DO NOT pick up or support assembly by PC board(s) or any components on PC assembly. Always support or handle by metal panel.

4. TROUBLE SHOOTING AFTER REMOVAL

Verify AC plug is disconnected See WARNINGS in section 3.

WARNING

To prevent loose hardware from reducing safety spacings, it is essential that all hardware be replaced in the same manner as it was removed, with lock washers under all nuts, proper torque on screws and thread locking sealer on the transformer nuts. It is important to replace any silicone sealant which has been removed.

WARNING

To reduce the risk or electric shock and/or fire, replace items as marked on schematic with the safety marking only with the exact replacements listed in the safety component list, section 6. If exact replacements are not available, order them from the factory or an authorized service center.

A. Check fuse F1. If blown visually check transformer for discoloration, and large capacitors (C1-C2) for bulges or venting. Check for shorts with an Ohmmeter, across C1 and C2.

B. Check Insulation of power amp I.C.

I) Temporarily remove QC3* (ground lead on Power Amp Board).

II) Check Insulation resistance with Ohmmeter from metal tab on U3 to ground (panel).

III) If shorted then follow steps I, II, V, VI, VII (replacement of U3) and re-check insulation.

IV) Replace QC3* (ground connection).

*QC100 for 230VAC 3-wire unit

CAUTION

Integrated circuits U5, U7 and U8 are CMOS and susceptible to static discharges. Use good ESD control procedures when handling, testing or replacing, or components connected to them.

C. With Ohmmeter, verify voice coil of woofer is about 5 to 6 Ohms (model dependent) and windings of transformer are continuous.

D. Examine boards and wiring for obvious damage, broken or poorly soldered connections, or discoloration.

E. Repair or replace items identified above.

CAUTION

Use low power, grounded temperature regulated iron with small tip and ESD control. Use SN63/37 solder 0.032" diameter with "**NO CLEAN**" flux core.

To Gain Access to Solder Side of Power Amp Board or Preamp Board:

Remove Power Amp Board See I) and II) below.

Preamp Board Removal:

(*avoid removal of preamp board if possible.*)

Remove:

Plastic cover (3 screws top on front panel).
Control knobs, nuts and washers.
Phono jack screw (center of jack and speaker jack screws (two).

Replacement of U3 Power Amplifier I.C.:

Note: electrically insulated U3's (plastic tab) do not use mica and shoulder washers.

I) Remove U3 mounting screw, nylon shoulder washer, and Power Amp Board bracket mounting screw from front of panel.

II) Lift board out carefully (do not stress ribbon cable) and support using a suitable PCB holder.

III) Desolder U3 using solder braid 0.05" or equal and remove.

IV) Place new U3 in PCB and position carefully (check for correct position by temporarily replacing PCB to check alignment of mounting holes). Solder U3 in place.

V) Clean insulator seating area on back of panel.

VI) Coat both sides of NEW mica insulator with white thermal compound and position it on panel (for insulated U3's coat seating area with white thermal compound on U3 only).

VII) Replace Power Amp Board, mounting bracket screw, U3's NEW nylon shoulder washer and mounting screw.

VIII)a) Temporarily remove QC3* (ground lead on Power Amp Board).

b) Check insulation resistance with Ohmmeter from metal tab on U3 to ground (panel). (If U3 is electrically insulated (plastic tab) then measure from-VE to ground (panel).

c) If shorted then repeat Steps **I**, **II**, **V**, **VI**, **VII** & **VIII**.

d) Replace QC3* (ground connection).

*QC100 for 230VAC 3-wire unit

CAUTION

Never operate amplifier with U3 not attached to panel.

F. If fuse is not blown, and no obvious faults are identified above, proceed cautiously. Make sure you have read and understood the instructions as well as warnings and identifying hazardous line voltage areas on assembly from component locator drawings (if you are unsure, consult the manufacturer before energizing).

I) Connect 6 Ohm 100Watt resistor across speaker terminals and monitor with scope (make certain that scope polarity is correct).

II) Connect lab audio oscillator with floating output (output level at zero) to Left Signal Input. Set amplifier "Level" control fully clockwise, "Frequency" (Crossover) control to 150Hz. Place unit with panel and knobs down on a clean, convenient area of bench so that it is not necessary to reach across amplifier to access test equipment. Use foam blocks to hold securely and prevent rocking or damage to panel.

III) Connect negative lead of DVM to speaker "Black" tab. Use an insulated, shrouded probe for positive lead. Refer to component locator for test point locations to follow, and take care not to short adjacent points with probe tip.

IV) Position a switched "Power Bar" with the switch in a convenient location near the edge of the bench well away from unit so that it can be reached safely to turn AC power ON and OFF to unit without risk of accidental contact with exposed areas of assembly. See safety warnings in preface.

V) With "Power Bar" switch OFF, plug amplifier cord into this controlled "Power Bar".

VI) Observing appropriate safety procedures, turn "Power Bar" ON.

With DVM probe, test the following voltages:

+VC	+40VDC+/-10%
-VE	-40VDC+/-10%
+VZ	+15VDC+/-20%
-VZ	-15VDC+/-20%
+5	+5VDC+/-10%
-5	-5VDC+/-10%

If any of these is incorrect switch OFF and investigate power supply. (Use a variable AC transformer to trouble shoot power supply by increasing the AC voltage from 0 to 120VAC in steps and monitoring the above D.C. voltages).

VII) If DC is OK, check output DC offset: Speaker "Red" tab 0VDC +/-0.03VDC Trouble shoot power amplifier if not correct. (replacement of U3 maybe required)

G. Audio Signal Trouble Shooting/Testing:

I) Adjust audio oscillator for 0.2 VRMS signal @ 48Hz.

II) Scope should indicate 56V P-P with approx. 10% THD. This will be 60-65 Watts RMS into the 6 Ohm load (no hard clipping should be visible).

III) Turn input down, there should be no instability or ringing on the output waveform (if unstable or ringing occurs then check components C11 to C14, C16 to C18 and R6 to R9 and replace if faulty).

IV) Adjust audio oscillator to 0.2V RMS @200Hz signal will be attenuated (compared to 48Hz). Further attenuation will occur when "Frequency" crossover control is decreased to 50Hz (min).

V) If problem is found then trace signal stage by stage (refer to circuit operation in Section 1.).

5. FINAL CHECKS

After repair, inspect for possible safety hazards, including loose hardware, missing lock washers, correct fuse and lead dress of primary wires (positioned away from secondary components). With an Ohmmeter, check that panel in connected to signal ground (0 Ohm for 120VAC two wire and 100K Ohms for 230VAC three wire unit).

Attach speaker wires with black stripe to "BLK" tab and other wire to "RED" tab on Power Amp Board. Re-install amplifier in cabinet using reverse procedure in Section 3.

WARNING

It is essential that the following safety insulation test be performed prior to returning the Power Sub-woofer to the customer, using one of the following methods:

a) Insulation Resistance Test:

With a 500VDC insulation tester, check insulation from the outer shell of the RCA jack (chassis) to the line and neutral of the AC cord. Resistance should be >100M Ohms.

b) HiPot Test:

If a UL/CSA approved Hi-Pot tester is available, test line and neutral of AC cord to outer shell or RCA Jack (chassis) at 1100VAC for 2 seconds. Observe all of instrument manufacturer's instructions and safety warning in performing this test.

Listening Test:

Connect Sub-Woofer system to a music source. Play at high level while checking for air leaks around driver, and voice coil problem such as rubbing or loose turns. With the crossover "Frequency" set to 50Hz, very little of the voice content should be heard.

6. LIST OF SAFETY COMPONENTS REQUIRING EXACT REPLACEMENTS

F1 120VAC Input Units: Fuse, 1.25A/250V (3AG Type) slow blow, UL and CSA approved.

230VAC Input Units: Fuse, 0.8A/250V (2AG Type) slow blow, UL and CSA approved

T1 Power Transformer Order from factory quoting model number, serial and rated voltage.

Line Cord (120VAC Units Only):

SPT-2 or better with polarized plug, UL and CSA marked and approved. Connect "HOT" side (line) to fused side (on fuse PCB), and neutral (Wider Pin) to neutral on fuse PCB (See Primary drawing).

A UL/CSA strain relief, Heyco 4K-1 or equal is required.

Line Cord/AC Receptacle/Power Switch (230VAC Units):

Follow electrical code requirement for country of installation.

7. DRIVER TEST PROCEDURE

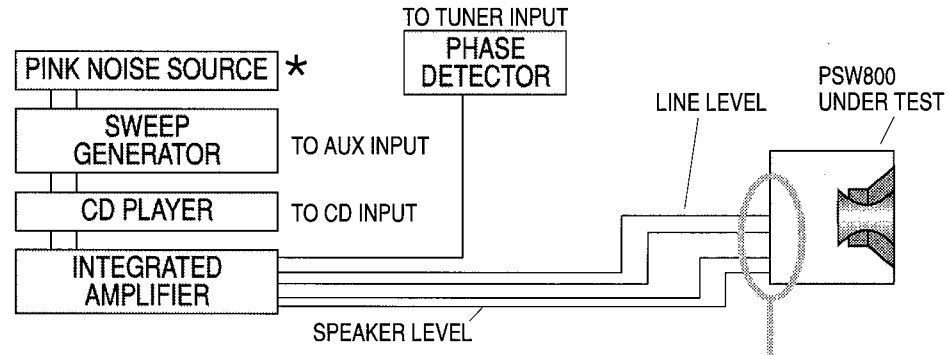
A. Using a sinewave generator, voltmeter and amplifier, the driver should be swept through the range of 25-100Hz using a voltage of 11 volts applied to the High Level (speaker) Input terminal. Listen for any abnormal sounds (ticks, buzzes, rattles etc.) that would indicate a defective driver.

B. Using an Ohmmeter, make sure that the driver's D.C. resistance measures between 5 and 6 Ohms.

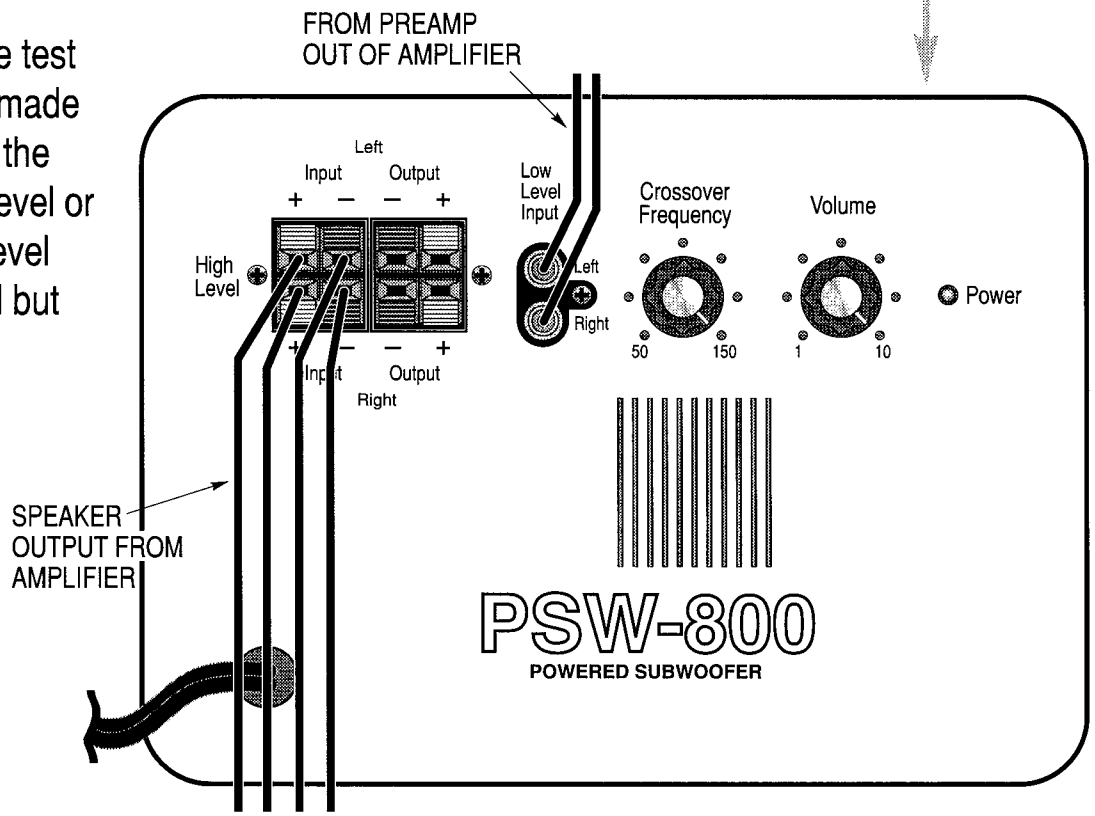
POWERED SUB WOOFER TEST SETUP

EQUIPMENT	Qty
Integrated Amp	1
Sweep Generator	1
RMS DMM	1
Phase Detector	1
* Pink Noise Source (CD or RTA)	1

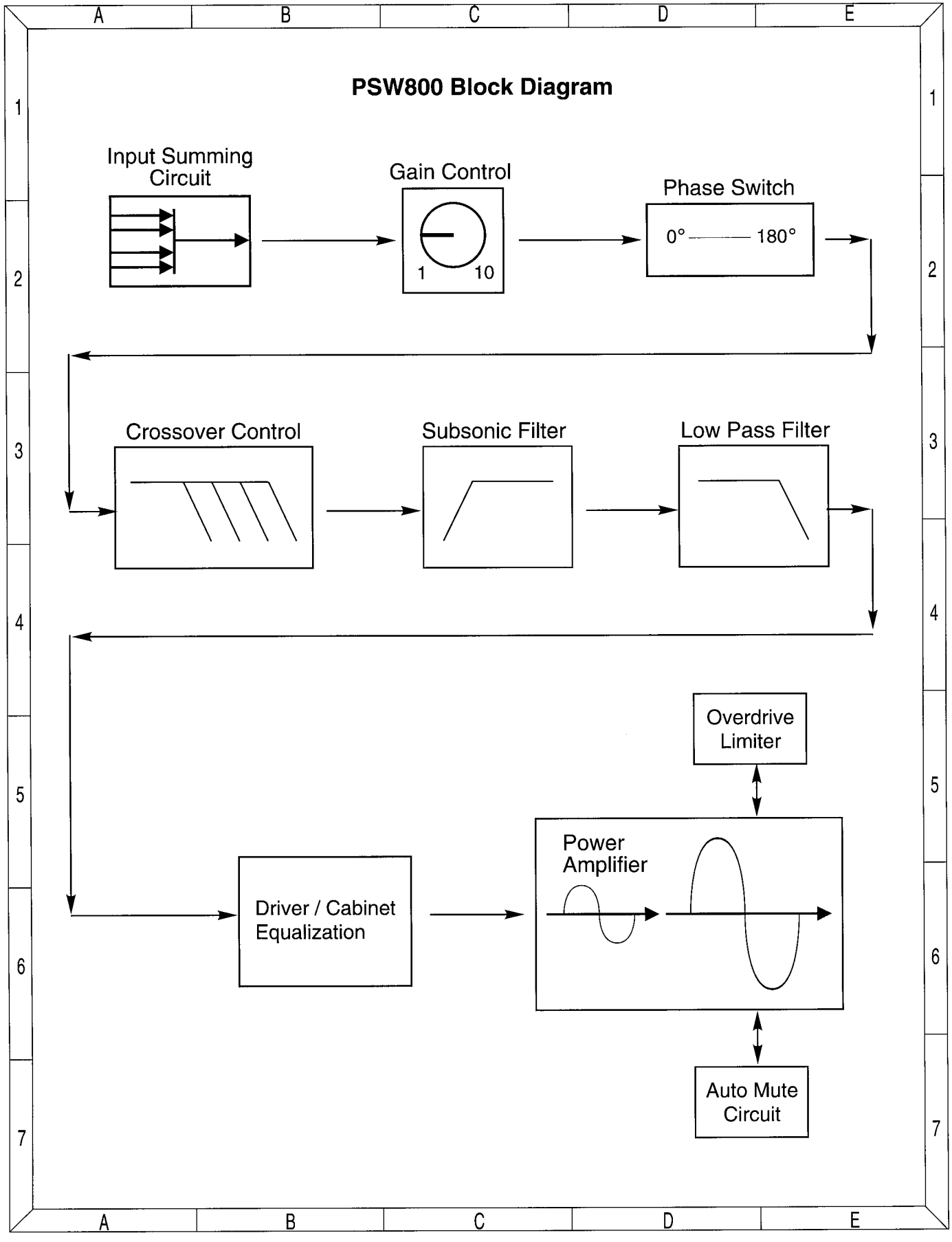
* i.e. Track 7 IASCA disc, RTA or any other test disc



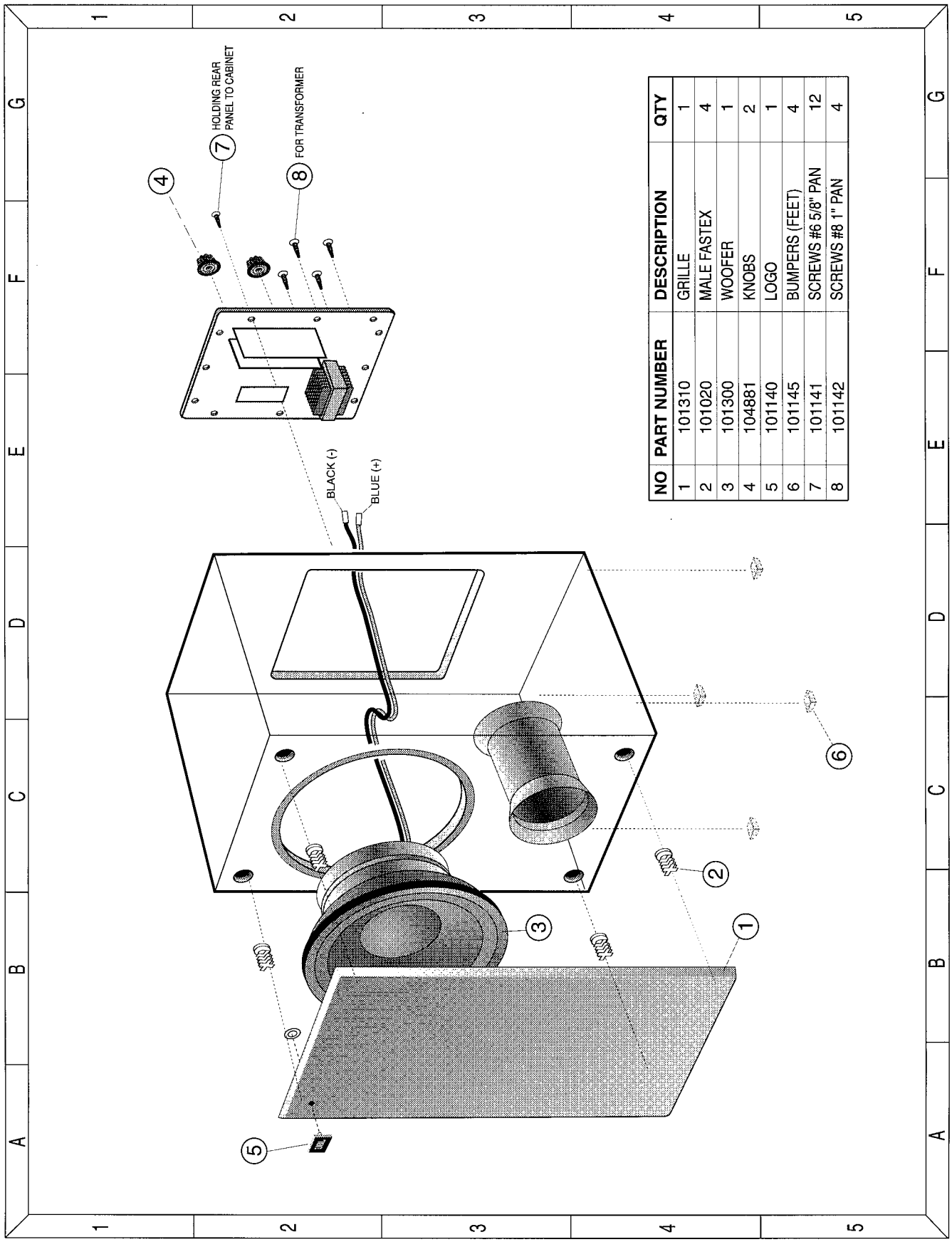
NOTE: The test should be made with either the Speaker Level or the Line Level Connected but not both.



BLOCK DIAGRAM

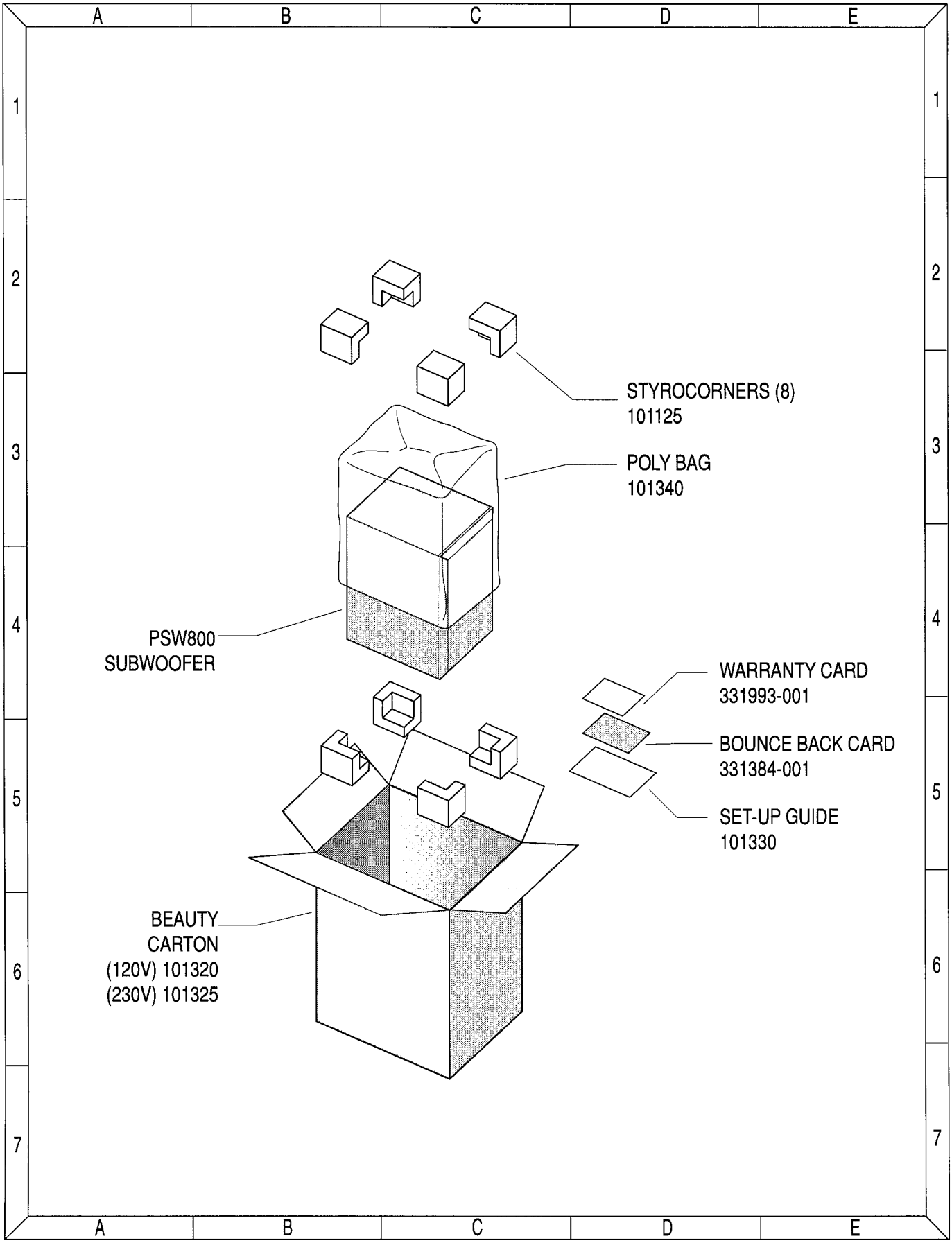


CABINET ASSEMBLY EXPLODED VIEW



NO	PART NUMBER	DESCRIPTION	QTY
1	101310	GRILLE	1
2	101020	MALE FASTEX	4
3	101300	WOOFER	1
4	104881	KNOBS	2
5	101140	LOGO	1
6	101145	BUMPERS (FEET)	4
7	101141	SCREWS #6 5/8" PAN	12
8	101142	SCREWS #8 1" PAN	4

PACKAGING ASSEMBLY EXPLODED VIEW



PSW800 PARTS LIST

ELECTRICAL PARTS LIST

Ref. Number	Part Number	Description	Quantity
Capacitors			
C1, 2	108405	4700uF/63 20%	2
C3, 4	108325	47uF/25 20%	2
C5, 6, 12, 13 18, 21, 22	108460	0.1uF/100 20%	7
C7, 8	108710	33uF/16 20%	2
C9	108645	10uF/25 NP 20%	1
C10	108370	220PF/50 20%	1
C11, 14	108335	47uF/63 20%	2
C15	108350	100uF/25 20%	1
C16	108645	10uF/25 NP 20%	1
C17, 23	108500	0.047uF/100 20%	2
C19	108505	1uF/50 20%	1
C20	108400	1000PF/100 20%	1
C24	108350	100uF/10 20%	1
C25, 26	108085	1uF/50 20%	2
C27	108035	0.01uF/100V 20%	1
C28, 30, 33, 34 40, 41	108005	0.1uF/100V 20%	6
C29, 31, 32, 50	108065	0.047uF/100 10%	4
C35	108000	0.0022uF/100V 20%	1
C36	108035	0.01uF/100V 20%	1
C37	108055	0.022uF/100 10%	1
C38, 39	108045	0.1uF/100 10% FILM	2
C51, 52	108280	1000PF/100 20%	2
C53	108060	0.047uF/100 20%	1
C55	108495	0.01uF/100 20%	1
C401, 402	108250	200uF/50 NP 20%	2
Bridge			
D1	108450	RS604, BRIDGE	1
Diodes			
D2, 3	108590	1N4744A	2
D4, 16, 17, 18 19	108565	1N914	5
D7	108600	1N5243B	1
D8, 9	108100	1N5221B	2
D14, 15	108605	1N5245B	2
Miscellaneous			
F1	108825	1.25A SLOW BLOW (3AG) FUSE **(120V UNIT)**	1
F1	108826	0.5AMP SLOW BLOW (2AG) FUSE **(230V UNIT)**	1
J1	108320	DUAL RCA INPUT JACK CONNECTOR	1
J2	108115	SPEAKER JACK, CONNECTOR	1
LED2	108455	T1-3/4 RED LED, DIODE	1
P1	108760	POWER CORD 120V	1
P1	108761	POWER CORD 230V	1
PCB1	108835	PRE AMP PCB	1
PCB2	108840	POWER AMP PCB	1
PCB3	108845	FUSE PCB	1
Transistors			
Q1, 2	108620	2N4401	2
Q3	108445	MPS8598	1
Q4	0108440	MPS8098	1
Connectors			
QC1, 2, 3, 4, 9, 10, 11, 12, 13, 14	108770	0.187TAB	10
Resistors			
R1, 2	108375	240Ω 2W ±5%	2
R4	108655	10.0KΩ 1/4W ±5%	1
R5	108515	1.0KΩ 1/4W ±5%	1
R6	108525	1.0KΩ 1/4W ±1%	1
R7	108700	22.1KΩ 1/4W ±1%	1
R8	108685	22.0KΩ 1/4W ±5%	1
R9	108630	2.2Ω 2W ±5%	1
R10	108705	27.0KΩ 1/4W ±5%	1
R11	108655	10.0KΩ 1/4W ±5%	1
R12, 13, 21, 22	108550	1.0MΩ 1/4W ±5%	4
R14	108395	390.0KΩ 1/4W ±5%	1
R15	108360	100.0KΩ 1/4W ±5%	1
R16	108360	100.0KΩ 1/4W ±5%	1
R17	108615	2.2KΩ 1/4W ±5%	1
R18	108345	47Ω 1/4W ±5%	1
R19	108550	1.0MΩ 1/4W ±5%	1
R20	108685	22.0KΩ 1/4W ±5%	1
R23	108685	22.0KΩ 1/4W ±5%	1
R25	108515	1.0KΩ 1/4W ±5%	1
R26, 27	108210	100Ω 2W ±5%	2
R28, 29	108270	510Ω 2W ±5%	2
R30, 31	108165	100.0KΩ 1/4W ±5%	2
R32, 33	108120	10.0KΩ 1/4W ±5%	2
R36	108290	A100KΩ 1/4W ±5%	1
R37, 38, 39	108165	100.0KΩ 1/4W ±5%	3
R40	108235	140.0KΩ 1/4W ±1%	1
R42	108140	47.0KΩ 1/4W ±5%	1
R43	108235	140.0KΩ 1/4W ±5%	1
R45	108155	71.5KΩ 1/4W ±1%	1

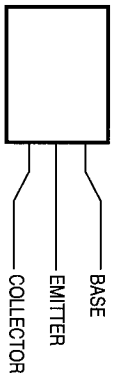
Ref. Number	Part Number	Description	Quantity
R46	108220	100Ω 1/4W ±5%	1
R52	108135	30.0KΩ 1/4W ±5%	1
R53	108295	B100KΩ 1/4W ±5%	1
R57, 58	108145	54.9KΩ 1/4W ±1%	2
R60	108235	140.0KΩ 1/4W ±1%	1
R61	108110	4.32KΩ 1/4W ±1%	1
R62, 63	108260	267.0KΩ 1/4W ±1%	2
R64, 65, 66, 67	108165	100.0KΩ 1/4W ±5%	4
R76	108655	10.0KΩ 1/4W ±5%	1
R80, 81	108375	240Ω 2W ±5%	2
R82	108155	71.5KΩ 1/4W ±1%	1
R83	108130	15.0KΩ 1/4W ±5%	1
R84	108095	1.5KΩ 1/4W ±5%	1
R85, 86	108220	100Ω 1/4W ±5%	2
R92, 93	108635	6.81KΩ 1/4W ±1%	2
R94, 95, 96, 97	108525	1.0KΩ 1/4W ±1%	4
R200	108655	10.0KΩ 1/4W ±5%	1
Transformers			
T1	108755	TRANSFORMER 120V	1
T1	108756	TRANSFORMER 230V	1
Integrated Circuits			
U1	108430	MC78L05CP REGULATOR	1
U2	108435	MC79L05CP REGULATOR	1
U3	108420	LM3886 AUDIO AMP	1
U4	108415	LM358 DUAL OP-AMP	1
U5	108425	LMC555CN TIMER	1
U6	108305	MC3403 QUAD OP-AMP	1
U7	108315	MF4CN-50 SWITCHED CAPACITOR FILTER	1
U8	108300	LMC555CN TIMER	1
U9	108305	MC3403 QUAD OP-AMP	1

MECHANICAL PARTS LIST

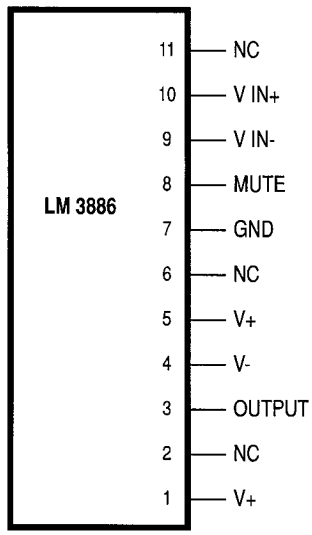
Ref. Number	Part Number	Description	Quantity
	104881	KNOBS	2
	108720	RIBBON CABLE	1
	108725	PLASTIC COVER	1
	108730	STANDOFFS BETWEEN PCB	2
	108735	HEATSINK FOR U3	1
	108740	SHOULDER WASHER FOR U3	1
	108745	MICA WASHER FOR U3	1
	108750	BRACKET FOR AMP PCB	1
	108765	POWER CORD STRAIN RELIEF 120V	1
	108766	POWER CORD STRAIN RELIEF 230V	1
	108820	#4X1/2" SPACER	2
	108830	FUSE CLIPS (3AG TYPE)	2
	101300	8" WOOFER	1
	101310	GRILLE WITH PEGS	1
	101020	GRILLE PEGS (4/GRILLE)	4
	101320	CARTON 120V Version	1
	101325	CARTON 230V Version	1
	101125	STYRO CORNERS	8
	101330	OWNER'S MANUAL 120V	1
	101335	OWNER'S MANUAL 230V	1
	101140	LOGO WITH RETAINING CLIP	1
	101145	RUBBER BUMPERS (FEET)	4

INTEGRATED CIRCUIT DIAGRAMS

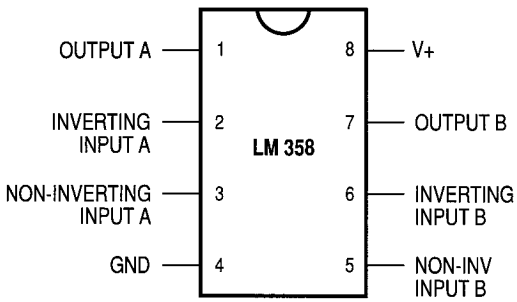
U1 - #108430, MC78L05CP
U2 - #108435, MC79L05CP
REGULATORS



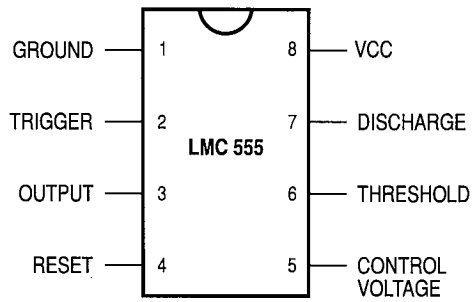
U3 - #108420
LM3886 AUDIO AMP



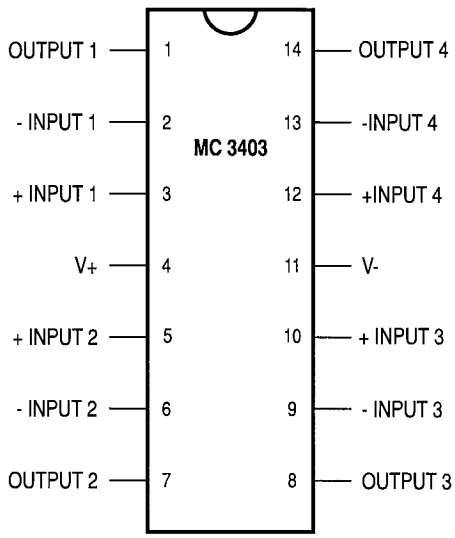
U4 - #108415
LM358 DUAL OP-AMP



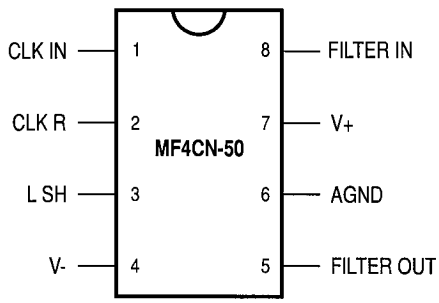
U5 - #108425 & **U8** - #108300
LMC555CN TIMERS



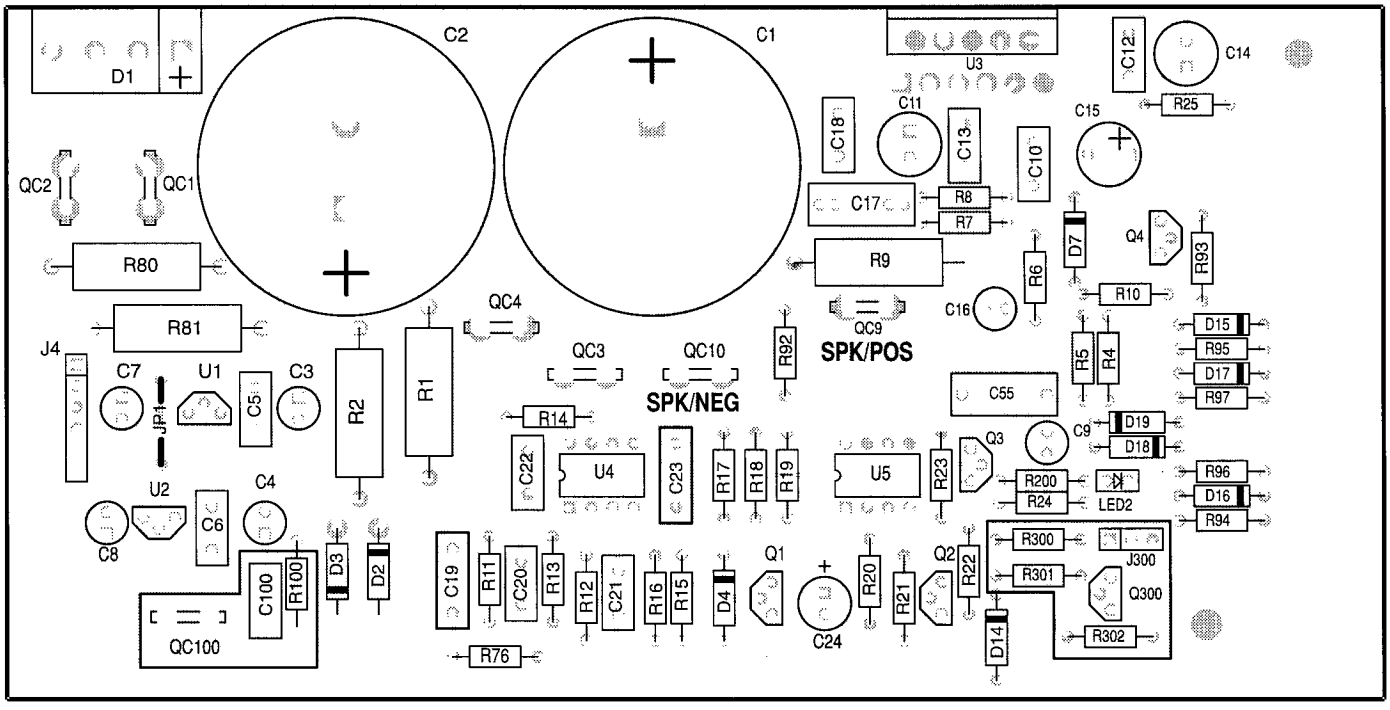
U6 - #108305 & **U9** - #108305
MC3403 QUAD OP-AMP



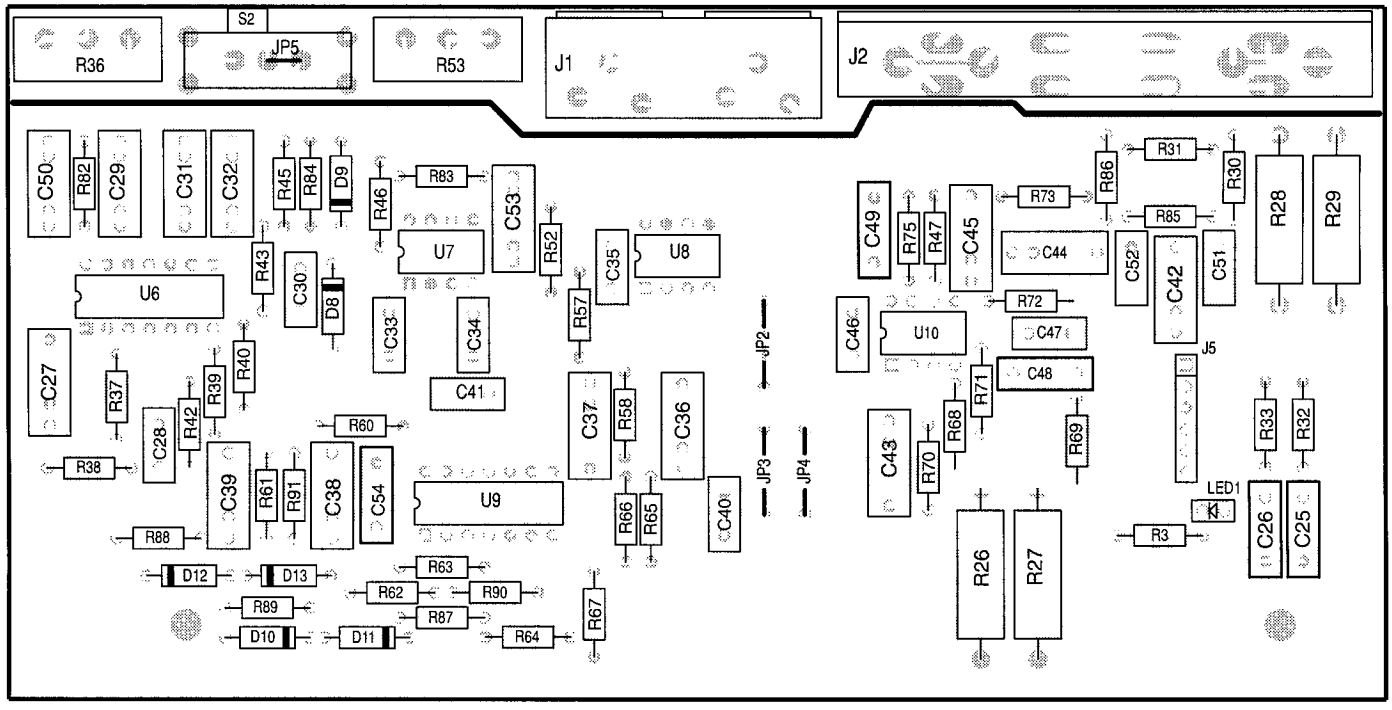
U7 - #108315, MF4CN-50
SWITCHED CAPACITOR FILTER



PRINTED CIRCUIT BOARDS (TOP VIEW)

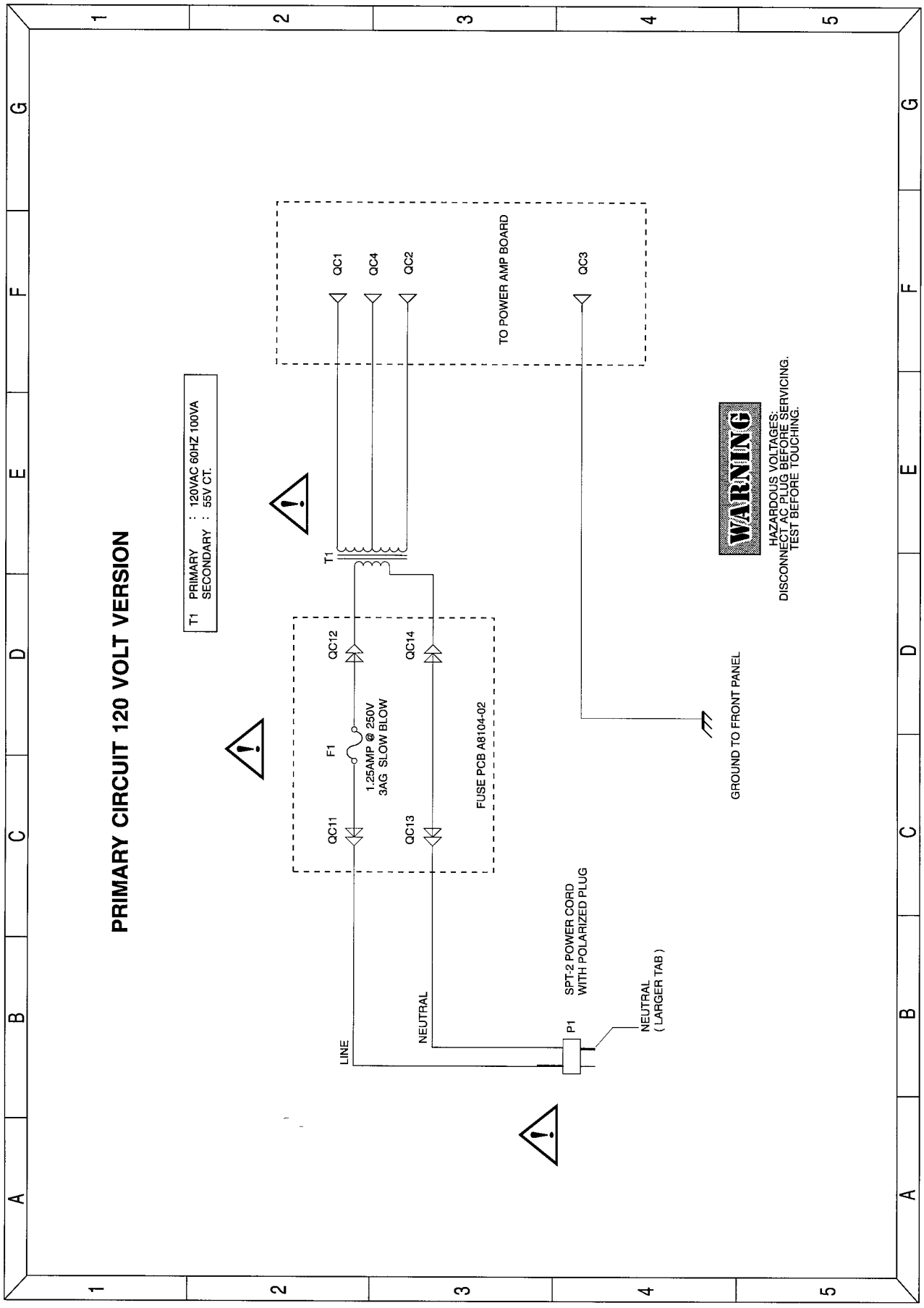


POWER AMP

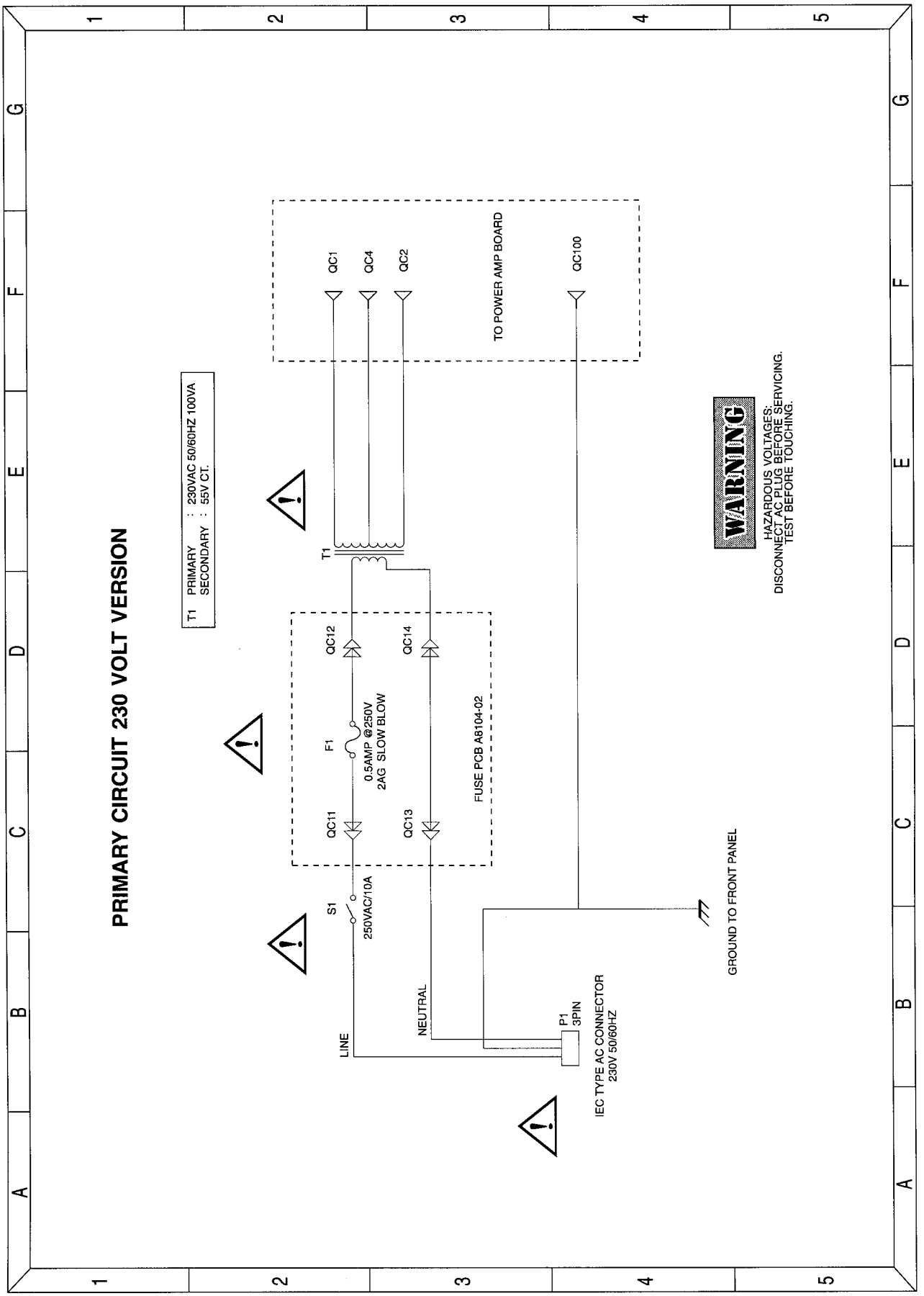


PREAMP

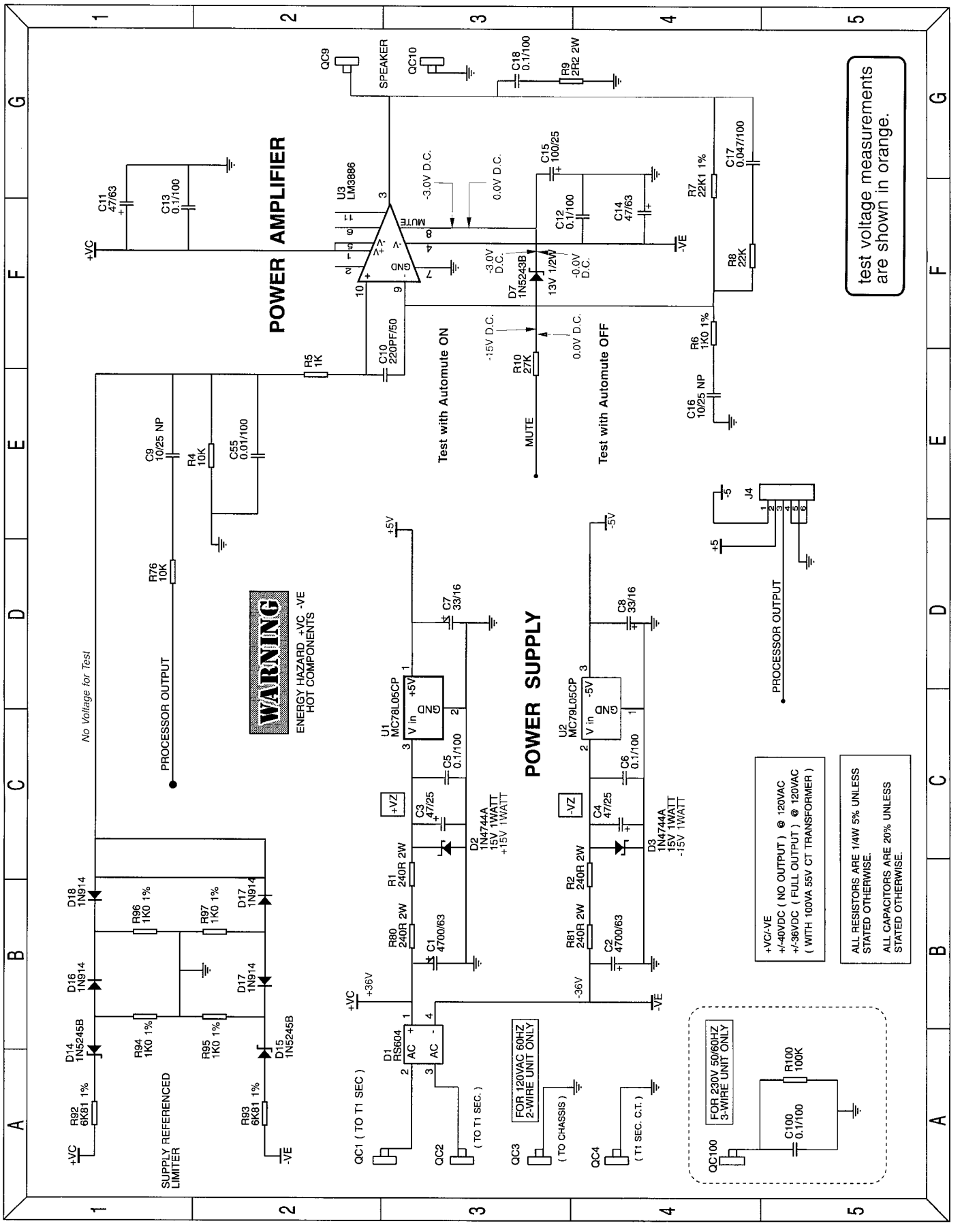
PRIMARY CIRCUIT 120 VOLT



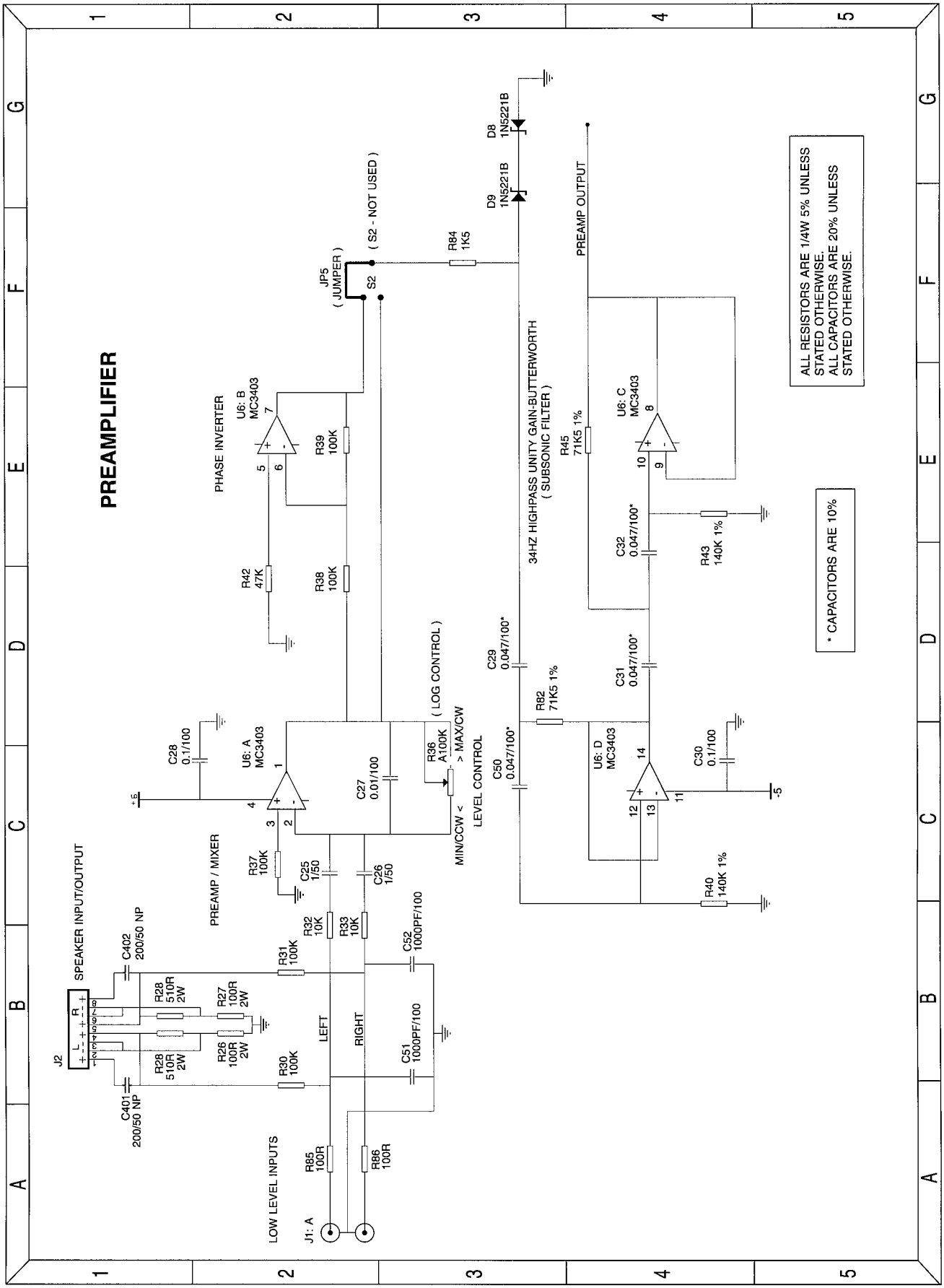
PRIMARY CIRCUIT 230 VOLT



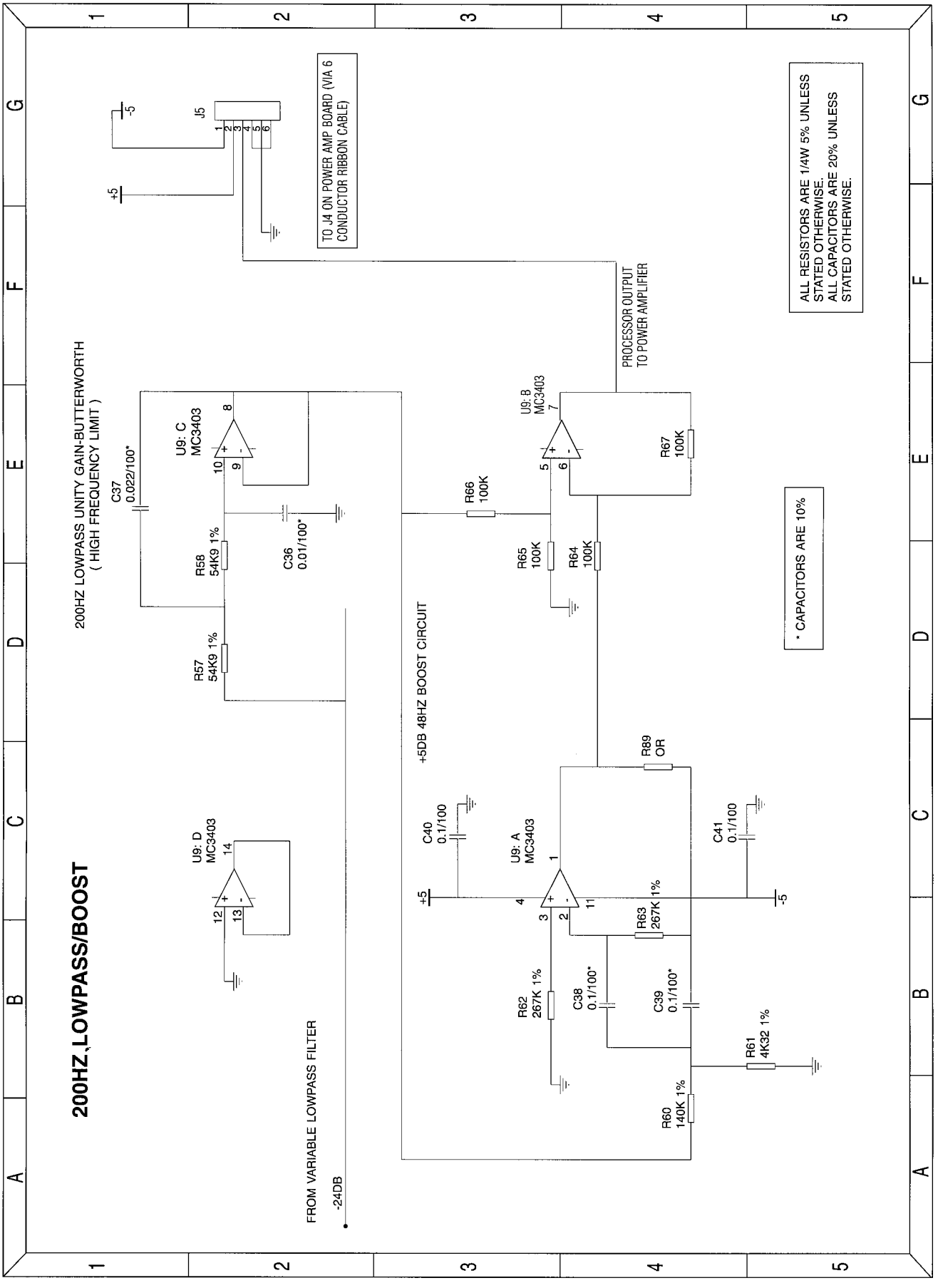
POWER SUPPLY SCHEMATIC



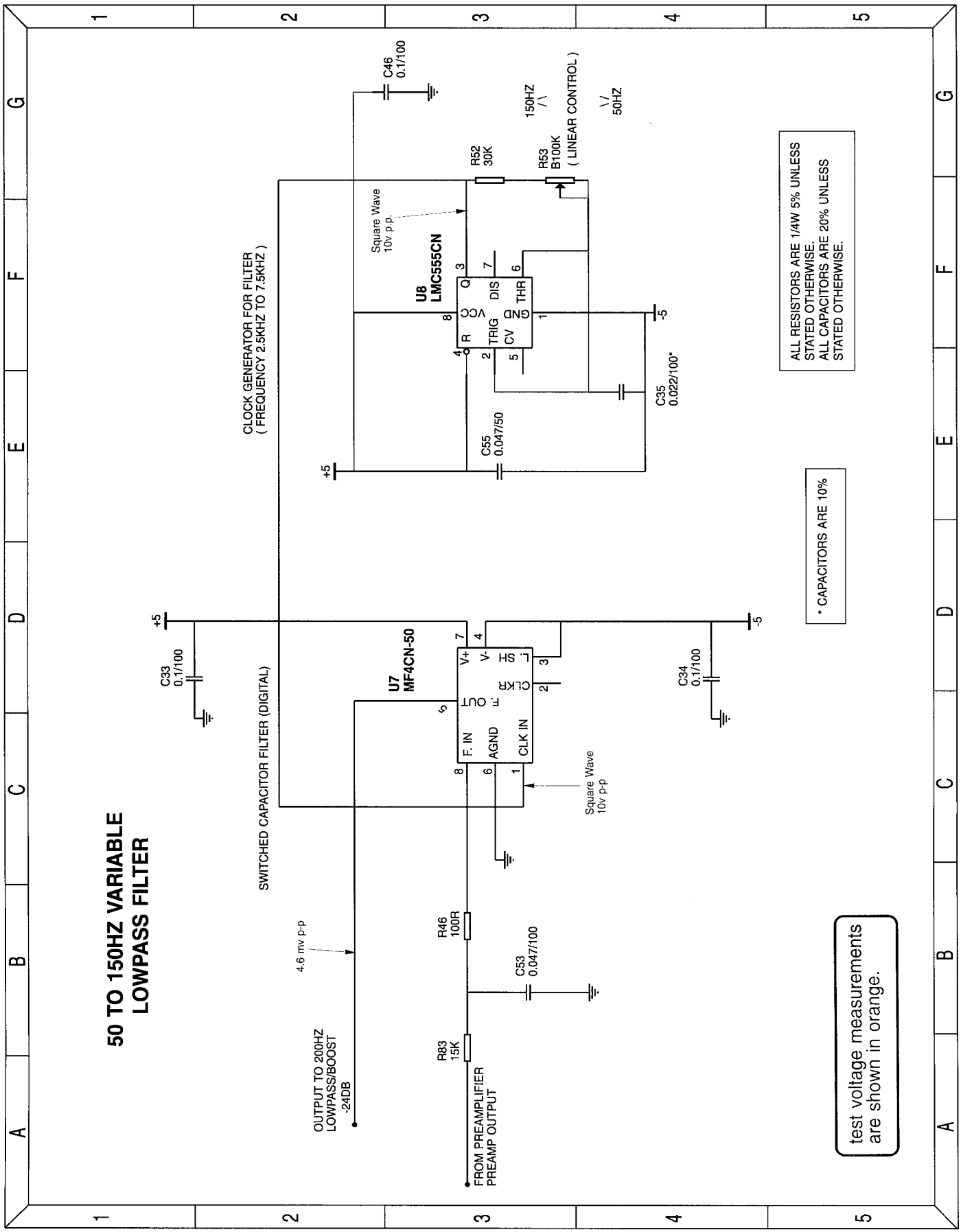
PREAMPLIFIER SCHEMATIC



LOWPASS / BOOST SCHEMATIC



VARIABLE LOWPASS FILTER



AUTOMATIC MUTE CIRCUIT SCHEMATIC