



# PSW-D115

Powered Subwoofer

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## SERVICE MANUAL



JBL Consumer Products Inc.  
250 Crossways Park Drive  
Woodbury, N.Y. 11797  
1-800-336-4JBL in the USA

**H** A Harman International Company

Rev C 11/2000

## SAFETY INFORMATION

### Warning

Any person performing service of this unit will be exposed to hazardous voltages and the risk of electric shock. It is assumed that any person who removes the amplifier from this cabinet has been properly trained in protecting against avoidable injury and shock. Therefore, any service procedures are to be performed by qualified service personnel ONLY!

### Caution

Before the amplifier is plugged in, be sure its rated voltage corresponds to the voltage of the AC power source to be used. Incorrect voltage could cause damage to the amplifier when the AC power cord is plugged in. Do not exceed rated voltage by more than 10%: operation below 90% of rated voltage will cause poor performance or may shut the unit off.

### Leakage/Resistance Check

Before returning the unit to the customer, perform a leakage or resistance test as follows:

**Leakage Current.** Connect the unit to its rated power source. Using an ammeter, measure the current between the neutral side of the AC supply and chassis ground of the unit under test. If leakage current exceeds 0.5mA, the unit is defective. Reverse the polarity of the AC supply and repeat.

**Resistance.** Measure the resistance from either side of the line cord to chassis ground. If it is less than 500k ohms, the unit is defective.

**WARNING! DO NOT** return the unit to the customer if it fails one of these tests until the problem is located and corrected.

### Critical Components



All components identified with the IEC symbol in the parts list and the schematic diagram designate components in which safety can be of special significance when replacing a component identified with  $\triangle$ . Use only the replacement parts designated in the parts list or parts with the same rating of resistance, wattage or voltage.

### List of Safety Components Requiring Exact Replacements

(all parts POWER AMP PCB except TR2)

F1	Fuse SLO BLO 3.0A 250V T type. UL approved
PWRCORD	SPT-2 or better with polarized plug, UL approved wired with the hot side to fused side. Use with factory replacement panel strain relief only.
TRX1	Transformer. Use only factory replacement.
C1, 2	2200uF, 100V electrolytic filter caps. Be sure replacement part is at least the same working voltage and capacitance rating. Also the lead spacing is important. Incorrect spacing may cause premature failure due to internal cabinet pressure and vibration.
C5	100nF 50 20 mono-ceramic axial
C6	4.7uf 100V 80/-20% Electrolytic radial NP
TR2	MPS A13 30V NPN(Darl)
DBR	Bridge Rect 200V 4A
R1	10M 0.25W 5% carbon film
R4a/b/c	0.1 0.5W 5% metal film
R9	3.9k 5W 5% ceramic wirewound
R15	100k 0.5W 5% carbon film
R16, 17	2.4k 5W 5% ceramic wirewound
R33, 50	332 0.5W 5% carbon film
R52, 57	2.7k 5W 5% ceramic wirewound
R61	5.1k 2W 5% carbon film
S64AMI	Power output module. Use only factory replacement
Faceplate	Faceplate. Use only factory replacement
CMC1	Use only factory replacement
L1	Use only factory replacement
Fuse PCB	Use only factory replacement
Main PCB	Use only factory replacement

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**NOTE: CERTAIN DRAWINGS AND CONNECTIONS WERE DEPICTED INCORRECTLY IN SOME EARLY COPIES OF THE PSW-D112/115 OWNER'S MANUALS.**

THEY INCLUDE:

1. DRAWING OF RCA LINE LEVEL INPUT/OUTPUT JACKS ON PAGES 3, 4, & 5; ALL CHANNELS - RIGHT SIDE SHOULD BE "LINE OUT", LEFT SIDE SHOULD BE "LINE IN".
2. CONNECTION ON PAGE 4 OF OWNER'S MANUAL - SINGLE CABLE DIRECT INPUT (FOR DOLBY DIGITAL OR DTS SURROUND); SINGLE CABLE FROM YOUR RECEIVER/PROCESSOR SHOULD CONNECT TO THE "CENTER CHANNEL LINE IN" JACK ON YOUR SUBWOOFER.

**THOSE DRAWINGS ARE CORRECT IN THIS DOCUMENT, SEE PAGES 8 & 9.**

## GENERAL SPECIFICATIONS

Amplifier Power (RMS) . . . . .	350 watts
Driver 15" . . . . .	High-Polymer Laminate
Inputs . . . . .	Line Level and Speaker Level
Outputs . . . . .	Line Level and Speaker Level
Low-Pass Frequency . . . . .	Continuously variable from 60Hz – 180Hz
High-Pass Frequency . . . . .	Continuously variable from 60Hz – 180Hz when using line-level inputs 150Hz when using speaker-level inputs
Frequency Response . . . . .	25Hz – low-pass crossover setting
Dimensions (H x W x D) . . . . .	20 x 20 x 21-3/4" (508 x 508 x 552mm)
Weight . . . . .	53 lbs/24.1 kg

## PSW-D115 DETAILED SPECIFICATIONS

LINE VOLTAGE	Yes/No	Hi/Lo Line	Nom.	Test Limits	Unit	Notes
US 120vac/60Hz	Yes	108-132	108-132	120	Vrms	Normal Operation

Parameter	Specification	Unit	Nom.	Test Limits	Conditions	Notes
<b>Amp Section</b>						
Type (Class AB, D, other)	D		D	n/a		Class D Preferred...Sink required for Class AB
Load Impedance (speaker)	8	Ohms	8	n/a	Nominal	Z-curve required
Rated Output Power	350	Watts	202	190	1 input driven	RFQ Spec.
THD@ Rated Power	0.3	%	194	1	22k filter	200W (Power Bandwidth 30-100Hz) @ 120 VAC
THD @ 1 Watt	0.5	%	0.066	0.8	22k filter	
DC Offset	<20	mV-DC	0.5	10mV	@ Speaker Outputs	
Damping factor	>80	DF	80	>50		Measured across amplifier outputs
<b>Input Sensitivity</b>						
Input Frequency	35	Hz			Nominal Freq.	1 input driven
Line Input	200	mVrms	200	±2dB	To Rated Power/ Vol @ Max	1 input driven: AP source Z = 600 ohms
Speaker/Hi Level Input	7	Vrms	6.963	±2dB	To Rated Power/ Vol @ Max	1 input driven: AP source Z = 25 ohms
<b>Signal to Noise</b>						
SNR-A-Weighted	100	dBA	102	90	Relative to rated output	A-Weighting filter
SNR-unweighted	75	dBr	85	70	Relative to rated output	22k filter
SNR rel. 1W-unweighted (22k)	65	dBr	67	55	relative to 1W Output	22k filter
Residual Noise Floor	1.5	mVrms	<1	1.5	Volume @max, using Audio Precision) , BW =22KHz	
Residual Noise Floor	1.5	mVrms(max)	1	2	Volume @max, w/ A/P Swept Bandpass Measurement (Line freq.+ harmonics) , BW<20KHz	
<b>Input Impedance</b>						
Line Input	10K	ohms	46.8K	n/a	Nominal	
Speaker/Hi Level Input	5K	ohms	24.0K	n/a	Nominal	
<b>Filters</b>						
Low Pass (fixed or variable)	Variable					0dBr = 1w @ 50Hz
Low Pass filter (point or range)	60-180	Hz		±2dB	-3dB Point	
Slope	24	dB/Octave		n/a		
Q	1	Damping		n/a		
Subsonic filter (HPF)	25	Hz		±2dB	-3dB Point	
Slope	12	dB/Octave		n/a		
Q	1	Damping		n/a		
AV Boost	YES			—		

Amplitude/Frequency	TBD	Hz		±2dB		
<b>Limiters (yes/no)</b>	yes		YES			
THD at Max. Output Power	10	%		functional ck.	Maximum Output Power	Maximum THD as a result of limiting.
<b>Features</b>						
Phase Switch (yes/no)	YES	—	YES	functional ck.		
Volume pot Taper (lin/log)	LOG	—	LOG	functional ck.		LOG type rear panel control.
<b>Input Configuration</b>						
Line In (L,C,R,AC3,Mono)	L,C,R	—		functional ck..		
Line Outputs (L,C,R)	L,C,R	—		functional ck..		Buffered Output / Pre-Volume control
Line-Out Adj. X-over	130-240	Hz	125-250	functional ck..	Var-HPF (Pot CCW and CW positions)	Rear panel Variable xover
Spkr/Hi Level In (L,C,R,mono)	L,C,R	—		functional ck..	Enabled w/Line/Spkr Input Select Switch	
Spkr Out: Hi Pass Filter	100	Hz	100	functional ck..	8 ohm Satellite: 6dB/oct passive xover	Output configured as RCL
<b>Signal-Present LED</b>						
Signal-Present LED	Yes			n/a		Bi-Color LED (green=signal/ red=no signal)
Signal-Present Input Freq.	100	Hz		functional ck..	Nominal	200uF Series Cap on PCB
Signal-Present Level	60	mV	60	functional ck..	100Hz into Line Input w/ 1 ch. driven	2.2V Speaker in
Signal-Present Bandwidth	1k	Hz		functional ck..	Signal-Present-LPF for noise immunity	
Signal-Present Turn-on time	1	sec.	0.5	functional ck..	Amp connected and AC on, then input signal applied	
Auto Mute/ Turn-OFF Time	15	min.		functional ck..	T before muting, after signal is removed	
<b>Power on Delay time</b>						
Power on Delay time	0.1	sec.		5	AC Power Applied	
<b>Transients/Pops</b>						
Signal-Present Transient	5	mV-peak		n/a	@ Speaker Outputs	
Turn-on Transient	500	mV-peak		2v-pp	@ Speaker Outputs	AC Line cycled from OFF to ON
Turn-off Transient	500	mV-peak		4v-pp	@ Speaker Outputs	AC Line cycled from ON to OFF
<b>Efficiency</b>						
Stand-by Input Power	28	Watts	28	25	@ nom. line voltage	
Power Cons.@rated power	282	Watts	290	245	@ nom. line voltage	
Efficiency	124.11 %	%	70	65	Relative to rated output	
<b>Protection</b>						
Short Circuit Protection	yes		Non tested	N/A	Direct short at output	
Line Fuse Rating	3	Amps			Type-T or Slo Blo	Consumption @ 10 % THD is 3.6 Amps RMS

## PSW-D115 CONTROLS AND THEIR FUNCTION

**1. Power LED** - Will illuminate when the unit is turned on with the main power switch. This light will be RED when the unit is plugged in and not receiving a signal; when the PSW-D115 receives a signal, the light will cycle to GREEN. If no signal is received after 10 – 15 minutes the light will cycle back to RED (standby) until a signal is present again.

**2. Power Switch** - Main Power Switch to the PSW-D115; turn ON to energize the subwoofer. Under normal operation, Power Switch may be left ON to utilize the Auto ON/OFF feature. For extended periods of non-use, or vacations, it is recommended that the PSW-D115's Power Switch be turned OFF.

**3. Level Control** - The subwoofer Level Control, adjusts the volume of the subwoofer relative to the rest of the system.

**4. Video Contour** - The subwoofer Video Contour Control, optimizes the subwoofer's performance for movie listening. When the video-contour switch is "on" the subwoofer's performance is tailored to deliver the impact and excitement of today's movies. The green LED will illuminate when the video-contour switch is on.

**5. Speaker In Jacks** - Main Input connection to subwoofer when line level, subwoofer, or pre-amp output connectors are not available, or when a high pass filter (set at 150Hz) to main loudspeakers is desired through the Speaker Output Jacks.

**6. Speaker Out Jacks** - Connected to main loudspeakers when the Speaker Input Jacks are used.

**7. Phase Switch** - Changes the subwoofer's output to be in phase or 180 degrees out of phase with the program material.

**8. Line Input** - Main Input connection to subwoofer (preferred).

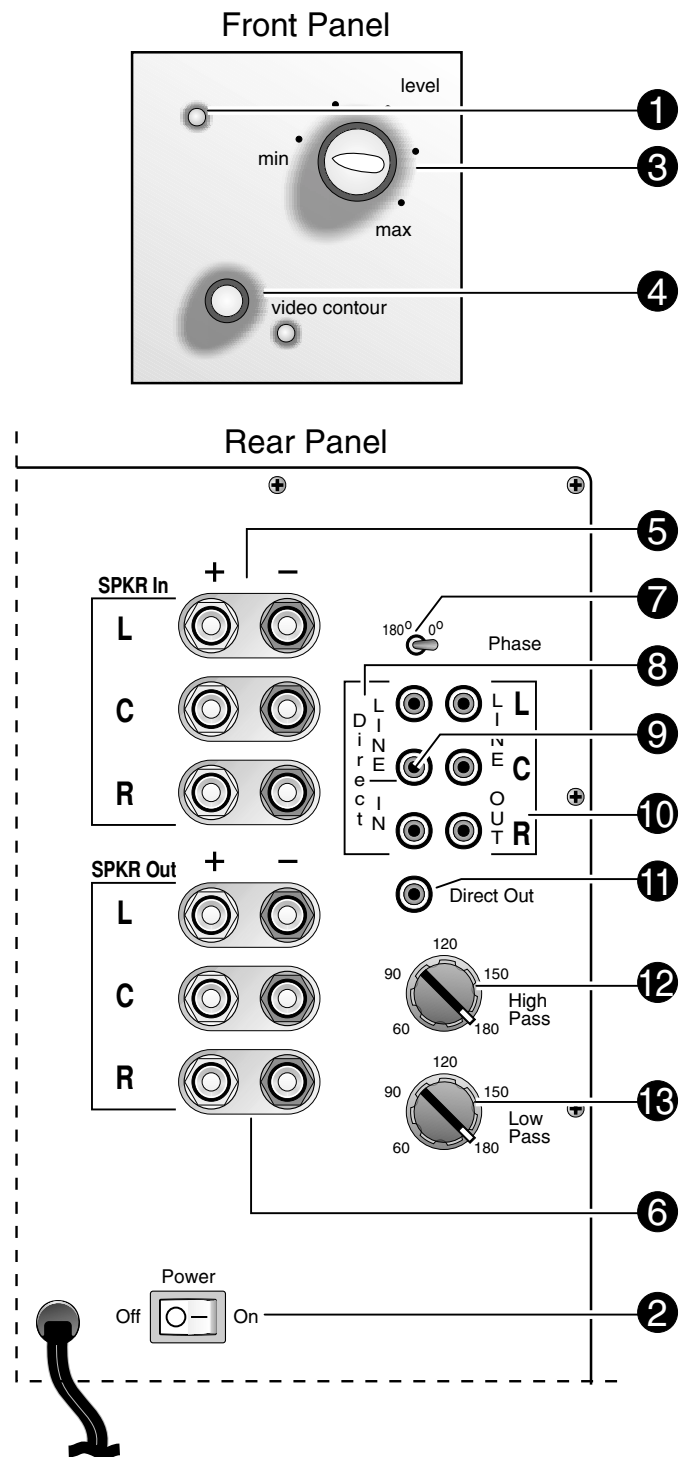
**9. Direct In** - If you will be connecting the PSW-D115 to a receiver/processor containing a Dolby Digital or DTS surround technology, use this single RCA connection. See the owner's manual for complete instructions.

**10. Line Output** - When using the Line-Level Input jacks, these are connected to an external power amplifier or receiver to power the main loudspeakers with a high pass filter if desired.

**11. Direct Out** - This allows you to connect more than one PSW-D115 together; connect this output jack to the Direct input jack on the second subwoofer.

**12. High Pass Control** - Controls the roll-off point of the lowest frequency produced at the High Pass Output Jacks.

**13. Low Pass Control** - Controls the roll-off point of the highest frequency the subwoofer will produce.



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## OPERATION

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### ***Crossover Adjustments***

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#### **High-Pass Control**

If you hooked up your subwoofer as shown in Speaker Connection 4 on page 9, you also have the capability of adjusting the high-pass frequency. The High-Pass control determines the frequency at which the main speaker will start reproducing sounds. If your main speakers can comfortably reproduce some low-frequency sounds, also set this control to a lower frequency setting, between 50Hz – 100Hz. This will concentrate the subwoofer's efforts to the ultradeep bass sounds, while your main speakers continue to reproduce the mid-bass information. If you are using smaller bookshelf speakers that do not extend to the lower bass frequencies, set the high-pass crossover control to a higher setting, between 125Hz – 180Hz. With this setting, your main speakers will not have the burden of reproducing any low-frequency sounds.

If you hooked up your subwoofer as shown in Speaker Connection 1 on page 8, the high-pass frequency is fixed at 150Hz.

If you hooked up your subwoofer as shown in Speaker Connection 2 or 3 on page 8 and 9, no high-pass control adjustment can be made from the subwoofer. Unless your receiver/amplifier incorporates a high-pass crossover, your main speakers will continue to get a full-range signal.

Final adjustment and blending of the low-pass and high-pass controls may evolve over several listening sessions. A good starting point would be to set both the low- and high-pass controls to the same frequency and adjust from that point.

#### **Low-Pass Control**

The Low-Pass control determines the highest frequency at which the subwoofer reproduces sounds. If your main speakers can comfortably reproduce some low-frequency sounds, set this control to a lower frequency setting, between 50Hz – 100Hz. This will concentrate the subwoofer's efforts on the ultradeep bass sounds required by today's films and music. If you are using smaller bookshelf speakers that do not extend to the lower bass frequencies, set the low-pass crossover control to a higher setting, between 120Hz – 180Hz.

### ***Phase***

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#### **Phase Control**

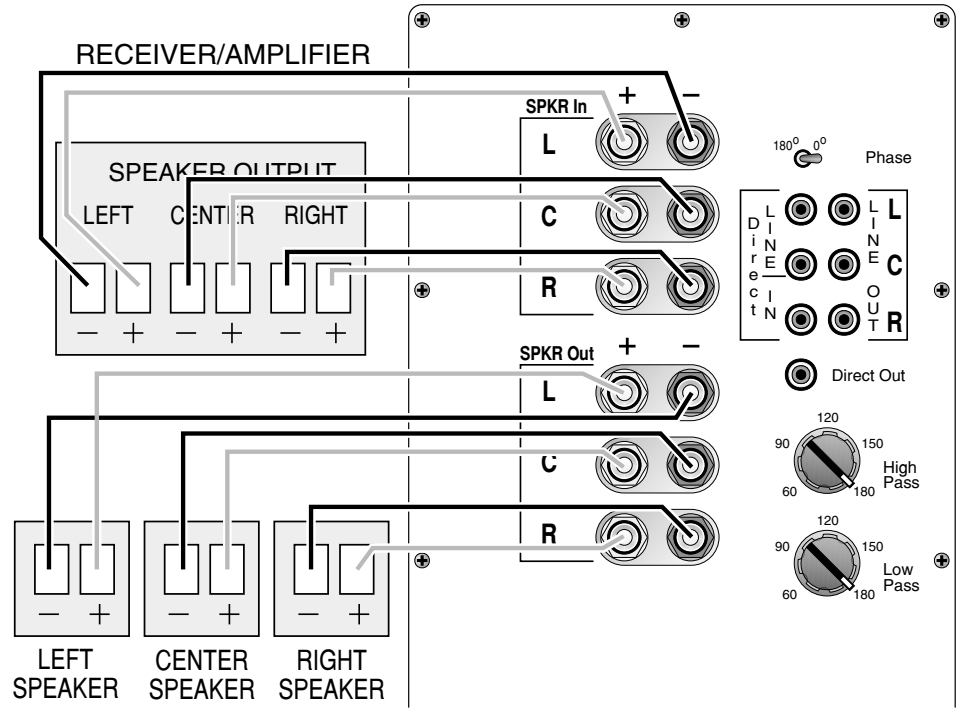
The Phase Control determines whether the subwoofer speaker's piston-like action moves in and out with the main speakers, 0°, or opposite the main speakers, 180°. There is no correct or incorrect setting. Proper phase adjustment depends on several variables such as room size, subwoofer placement and listener position. Adjust the phase switch to maximize bass output at the listening position.

Remember, every system, room and listener is different. There are no right or wrong settings; any setting you choose will result in excellent performance. Should you decide to fine-tune your system for optimum performance, be patient and trust your ears. It will be worth the effort involved to fully "tweak" your system.

**SPEAKER CONNECTIONS**

**Figure 1**

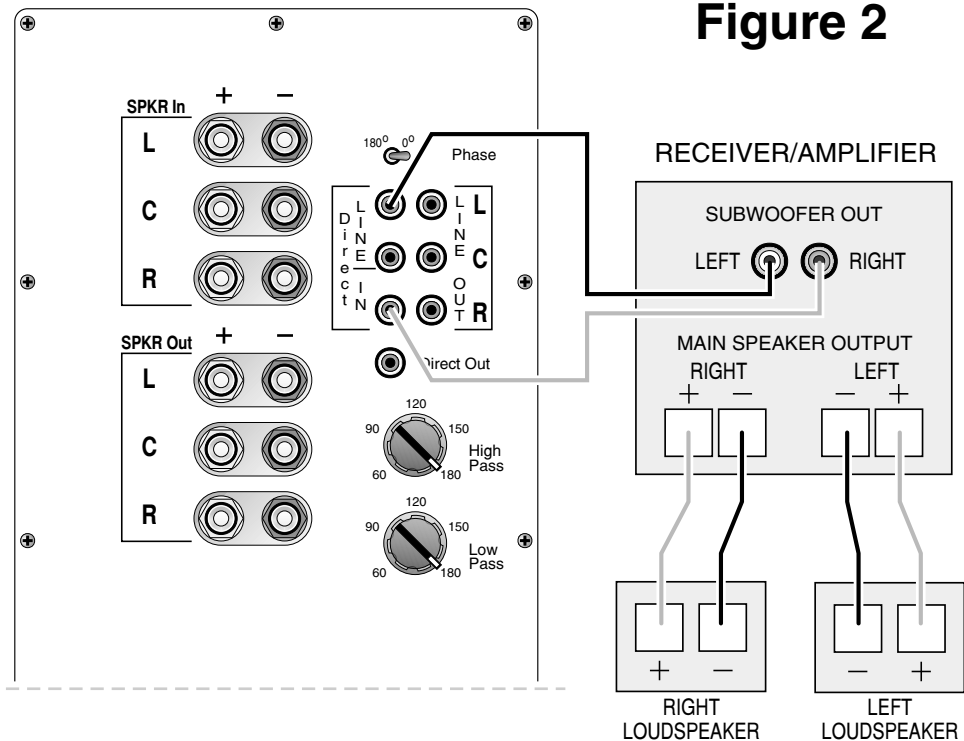
1) If your receiver/amplifier has no subwoofer outputs or preamp outputs for the left, center and right channels. See Figure 1.



2) If your receiver/amplifier has subwoofer outputs or preamp output jacks for the left, center and right channels, or left and right only. See Figure 2.

If your receiver/amplifier has a single (mono) subwoofer output or LFE output, you may connect the output to either the Left or Right line-level input on the subwoofer. However, to maximize the subwoofer's performance, we recommend that you use a "Y"-connector (not included). Plug the single male end of the "Y"-connector into the receiver/amplifier, and connect each of the 2 female connectors to an RCA-type interconnect cable. Then connect the 2 interconnect cables to the Left and Right line-level inputs on the PSW-D115.

**Figure 2**





3) If your receiver/processor contains Dolby® Digital or DTS® surround processing technology, then connect the subwoofer or LFE output from your receiver/processor to the Center line-level input as shown. Set the “Low-Pass” control to the 180Hz position.

When hooked up using this method, all of the crossover and level adjustments are controlled through the receiver/processor.

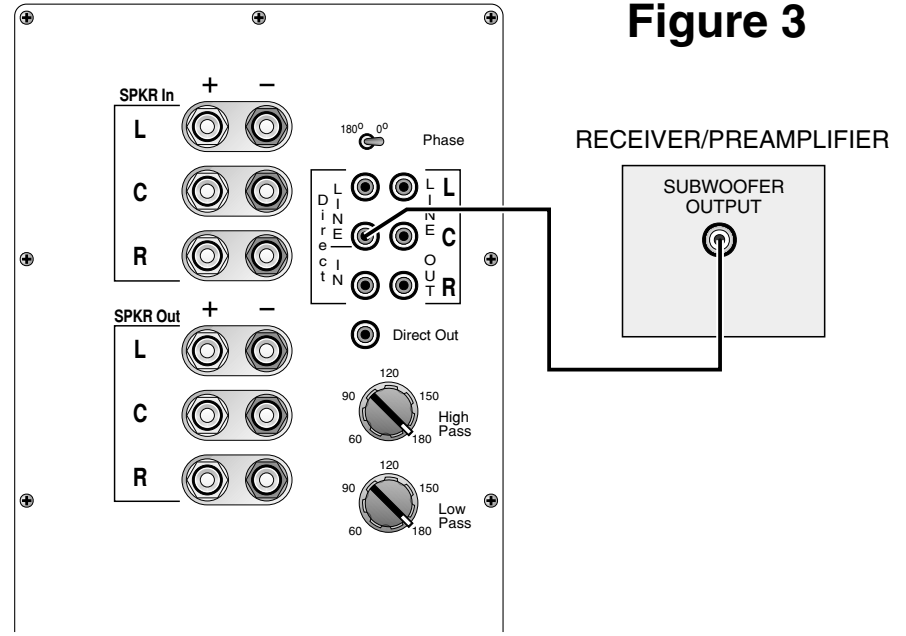


Figure 3

4) If your receiver/amplifier has preamp output jacks and main input jacks for the left and right channels or you have a separate pre-amp/ processor and power amplifier. See Figure 4.

This method of hookup can offer the highest level of performance for your complete loudspeaker system. The PSW-D115 incorporates a variable high-pass crossover *in addition* to a variable low-pass crossover. When hooked up as shown, the subwoofer will limit the low-frequency information that is returned to your receiver/amplifier. Your receiver/ amplifier does not need to waste valuable power reproducing the low frequencies. In addition, since no low-frequency information is being sent to your main loudspeakers, they are able to reproduce mid and high frequencies with greater clarity

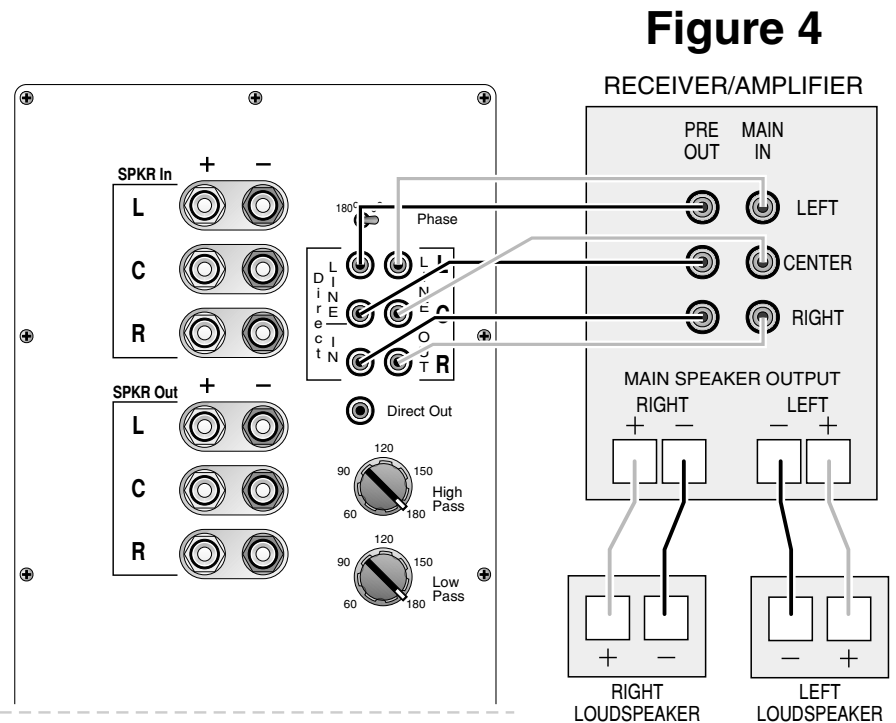


Figure 4

## TROUBLESHOOTING

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**If you used the high-level (speaker) inputs and there is no sound from any of the speakers, check the following:**

- Receiver/amplifier is on and a source is playing.
- Powered subwoofer is plugged in.
- Check all wires and connections between receiver/amplifier and speakers. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured.
- Review proper operation of your receiver/amplifier.

**If there is low (or no) bass output, check the following:**

- Make sure the connections to the left and right “Speaker Inputs” have the correct polarity (+ and –).
- Make sure that the subwoofer is plugged into an active electrical outlet.
- Adjust the crossover point.
- Flip the Phase Control Switch to the opposite position.
- If you are using a Dolby\* Digital/DTS® receiver or processor, make sure that the subwoofer adjustments on the receiver/processor are set up correctly.
- Slowly turn the level Control clockwise until you begin to hear the desired amount of bass.

**If you used the line-level inputs and there is no sound from the subwoofer, check the following:**

- Receiver/amplifier is on and a source is playing.
- Powered subwoofer is plugged in.
- Check all wires and connections between receiver/amplifier and subwoofer. Make sure all wires are connected. Make sure none of the wires are frayed, cut or punctured.
- Review proper operation of your receiver/amplifier.
- Slowly turn the level Control clockwise until you begin to hear the desired amount of bass.
- Make sure that you have configured your receiver/processor so that the subwoofer/LFE output is on.

**SERVICE BULLETIN JBL9903 - APRIL 1999**

To: All JBL Service Centers  
Models: PSW-D115

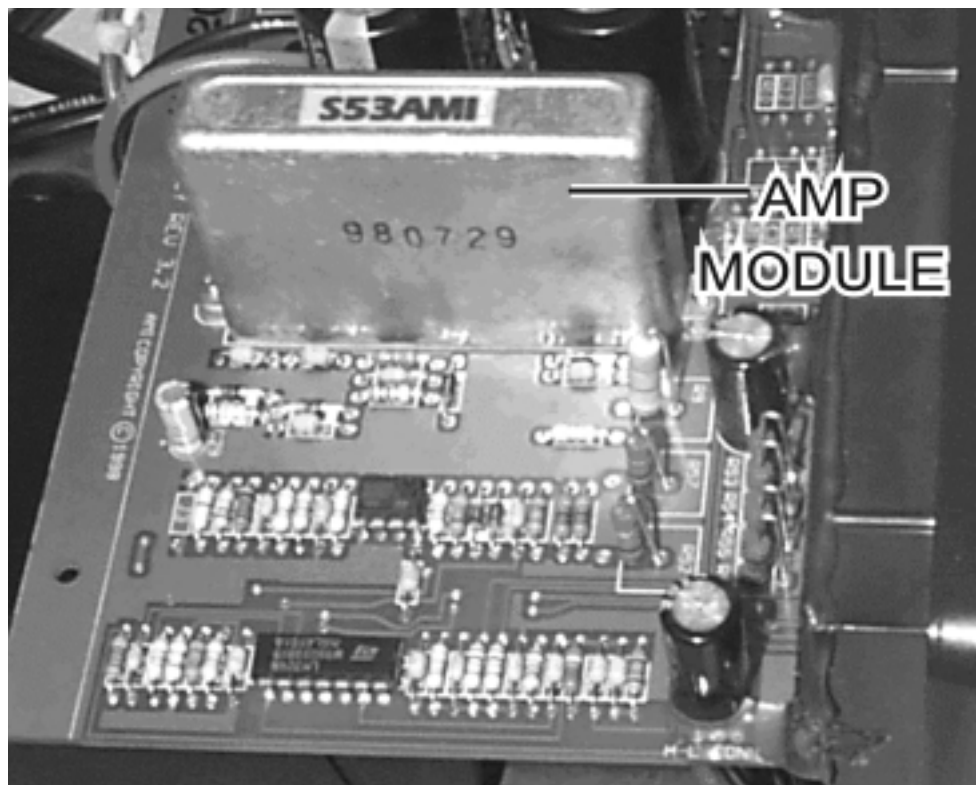
This is considered a Minor repair

***Subject: Check Solder Joints in Event of Failure***

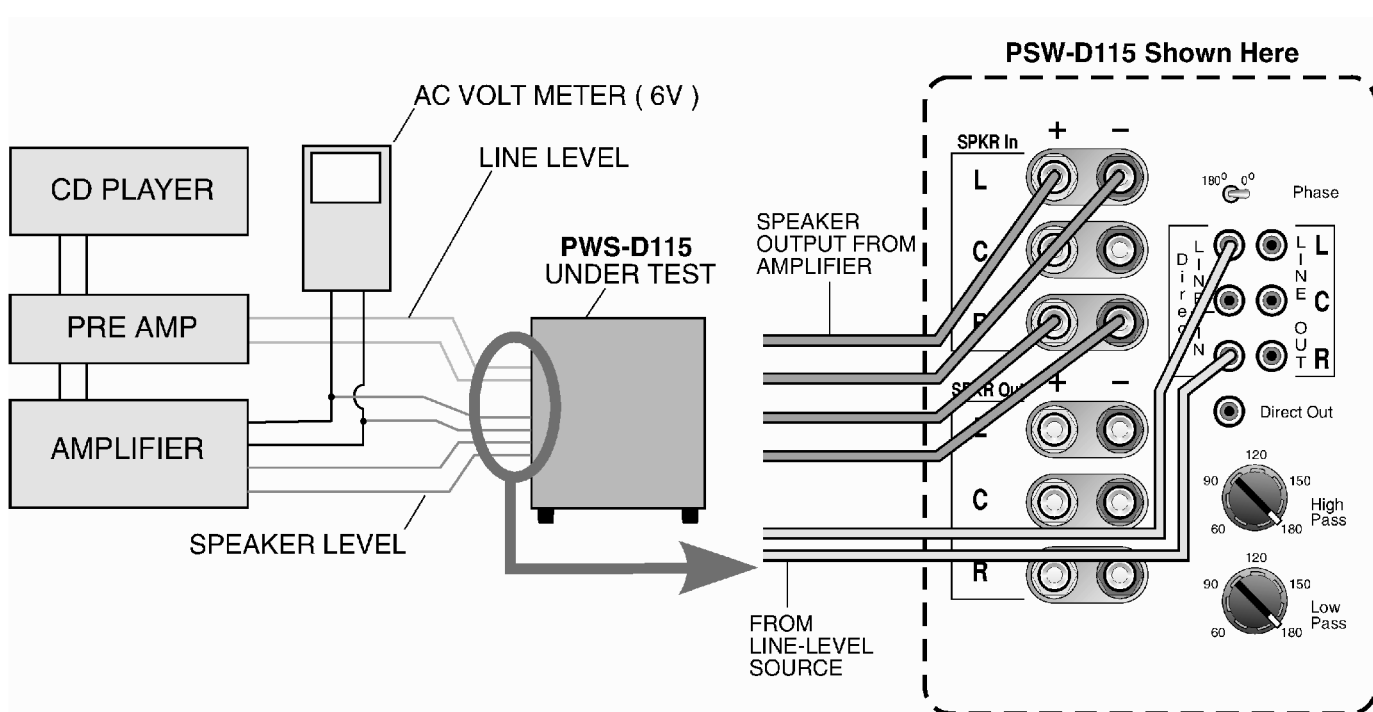
Some performance related complaints in the PSW-D115 powered Subwoofers may be caused by cold solder connections between the 28 pins of the Power Amp Module and the main circuit board. When troubleshooting, failure to check these joints can result in erroneous conclusions or wasted time.

**In the event you receive a PSW-D115 Subwoofer with the complaints “Dead, or No Output, or Motorboating (Oscillation)”, perform the steps listed below first before any further troubleshooting takes place:**

- 1) Unplug all cables, lay the subwoofer on a padded surface.
- 2) Remove all Philips screws around the outer perimeter of the amplifier faceplate.
- 3) Remove amplifier assembly; you should be able to remove the amplifier far enough out of the cabinet to service it without removing the woofer wires.
- 4) Locate the Power Amp Module; it is the large gray component with a metal case. On the solder side of the circuit board are the 28 soldered connections to the Module.
- 5) Regardless of whether you can visibly see breaks in any of the connections or not, carefully re-solder all 28 pin connections, adding 60/40 rosin core solder. Take care not “bridge” any connections on the board with solder.
- 6) Inspect the solder joints to the main filter capacitors C1 and C2 on the main PCB and re-solder if needed.
- 7) Replace the amplifier assembly back into the cabinet; replace the screws.
- 8) Test the unit by applying a signal from a music source, adjust the volume to a moderate level and confirm the original problem has been corrected.



## PSW-D115 TEST SET UP AND PROCEDURE



### General Function

#### UUT = Unit Under Test

1. Connect both right and left line level inputs (RCA) to signal generator and UUT. Use Y-cable if necessary from mono source. VOLUME control should be full counterclockwise.
2. Turn on generator, adjust to **50mV, 50 Hz**.
3. Plug in UUT; red LED should be ON. Turn VOLUME control full clockwise. Low Pass control should be set fully clockwise (180).
4. LED should turn Green; immediate bass response should be heard and felt from port tube opening.
5. Turn off generator, turn VOLUME control fully counterclockwise, disconnect RCA cables.
6. Connect one pair of speaker cables to the Right & Left High Level Input terminals on UUT. Cables should be connected to an integrated amplifier fed by the signal generator.
7. Turn on generator and adjust so that speaker level output is **2.0V, 50 Hz**. Turn VOLUME control full clockwise.
8. Green LED should light, immediate bass response should be heard and felt from the port tube opening.

### Sweep Function

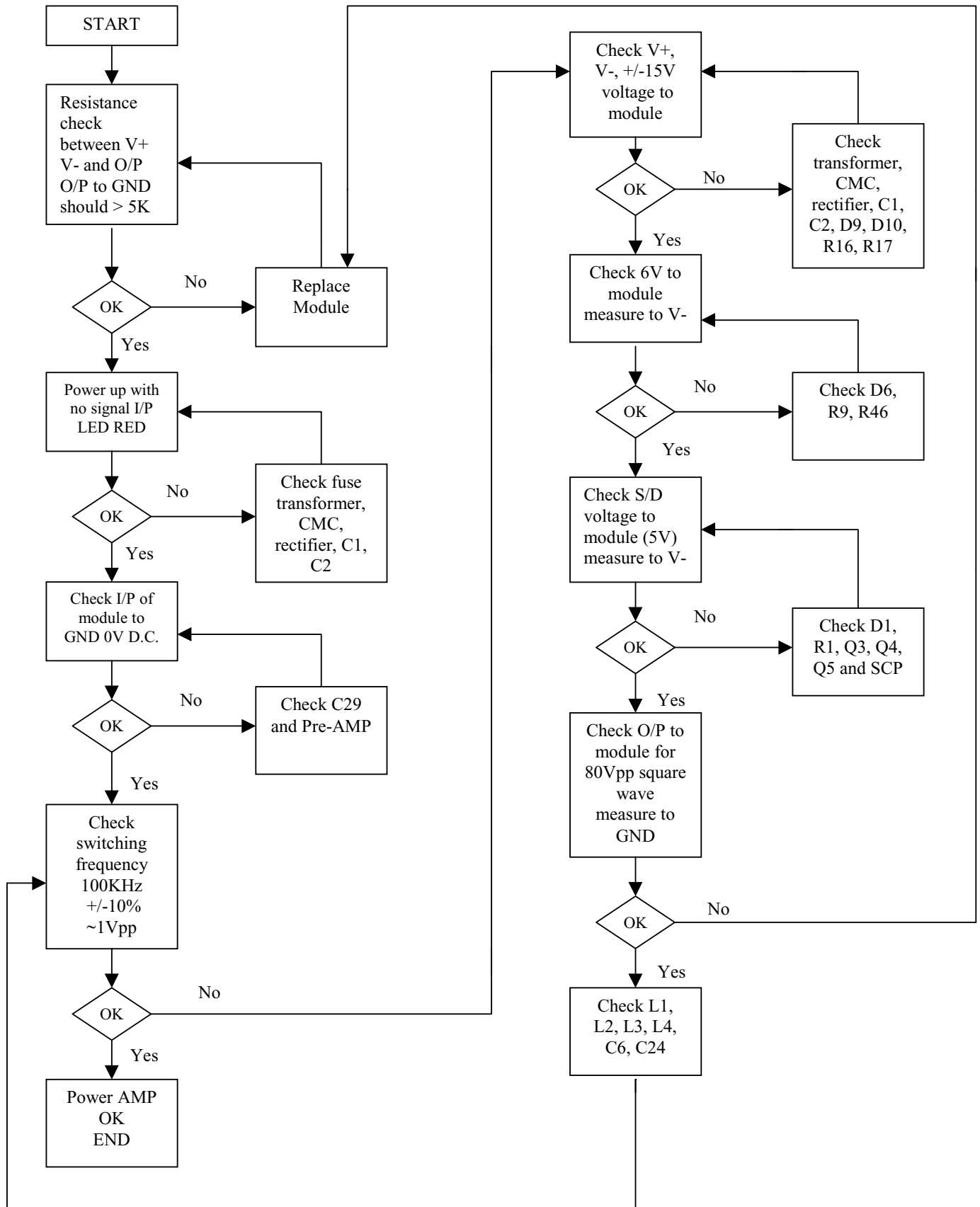
1. Follow steps 1-4 above, using a sweep generator as a signal source.
2. Sweep generator from 20Hz to 300Hz. Listen to the cabinet and drivers for any rattles, clicks, buzzes or any other noises. If any unusual noises are heard, remove driver and test.

### Driver Function

1. Remove driver from cabinet; detach + and - wire clips.
2. Check DC resistance of driver; it should be **7.0 ohms**.
3. Connect a pair of speaker cables to driver terminals. Cables should be connected to an integrated amplifier fed by a signal generator and adjust so that speaker level output is **5.0V**.
4. Sweep generator from 20Hz to 1kHz. Listen to driver for any rubbing, buzzing, or other unusual noises.

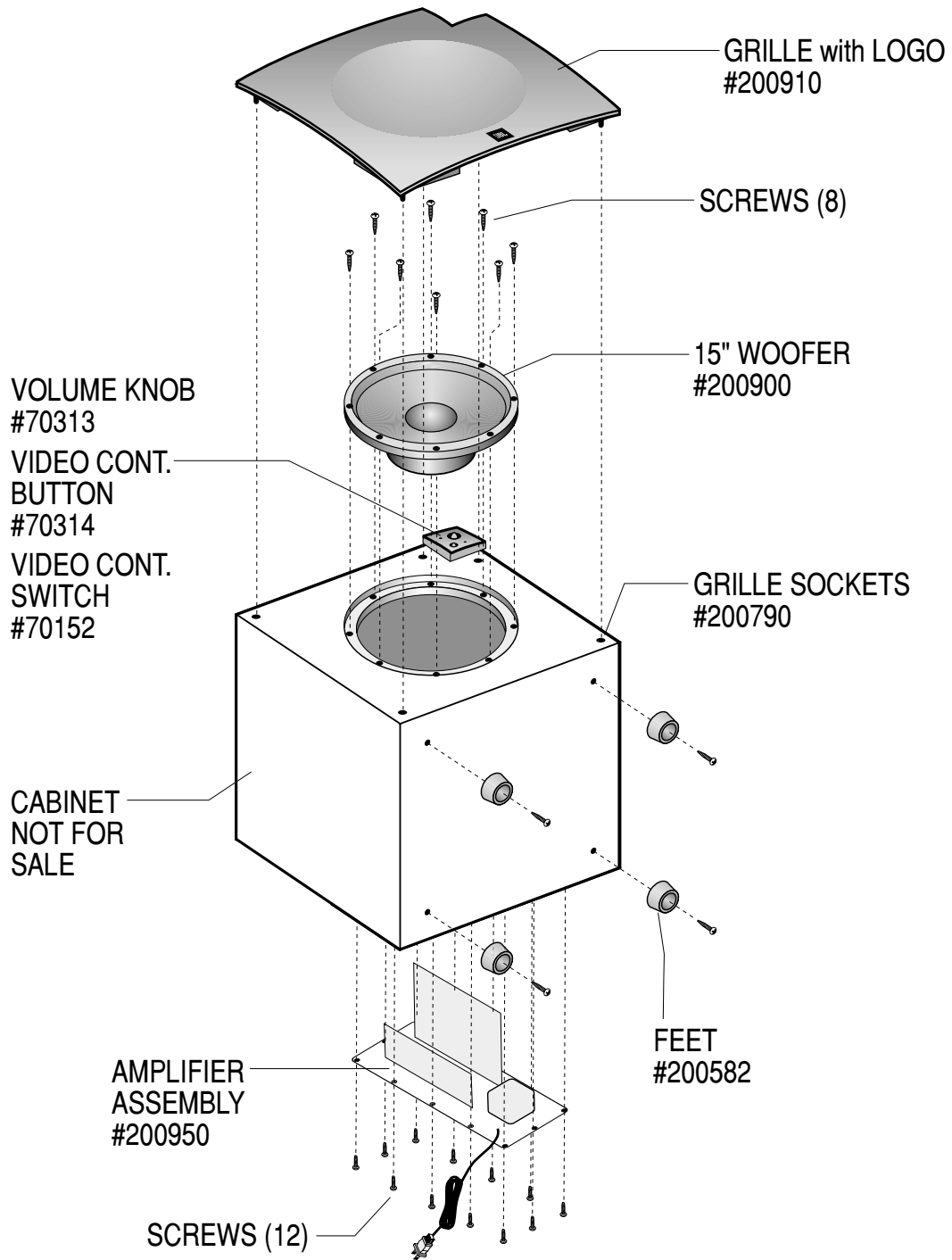
**NOTE: When testing the PSW-D115 amplifier, a load must always be connected to the output terminals, whether the woofer, or a 4 to 8 ohm resistive load.**

PSW-D115 POWER AMP MODULE TESTING FLOW CHART

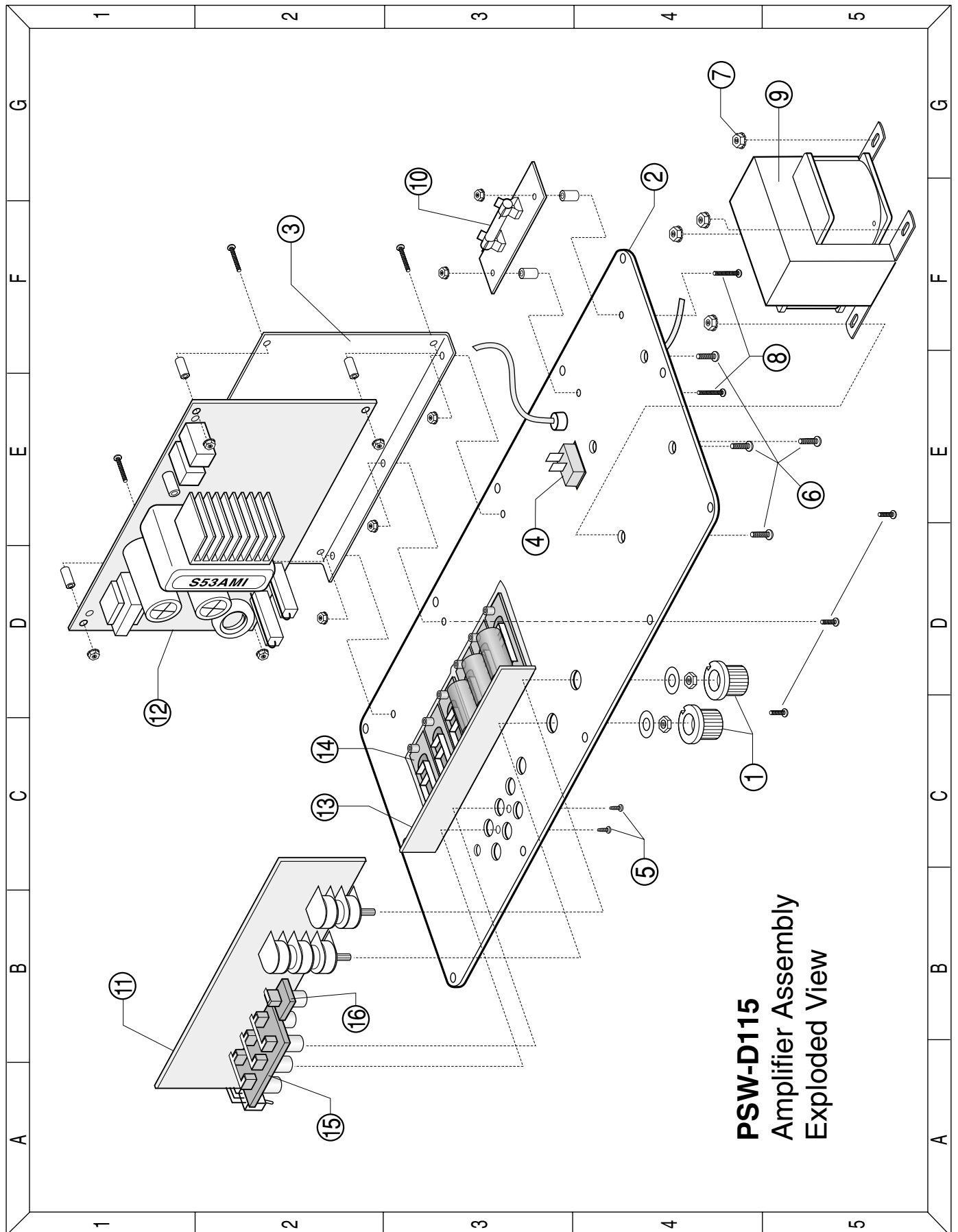


CABINET EXPLODED VIEWS

# PSW-D115 CABINET ASSEMBLY









### AMPLIFIER EXPLODED VIEW



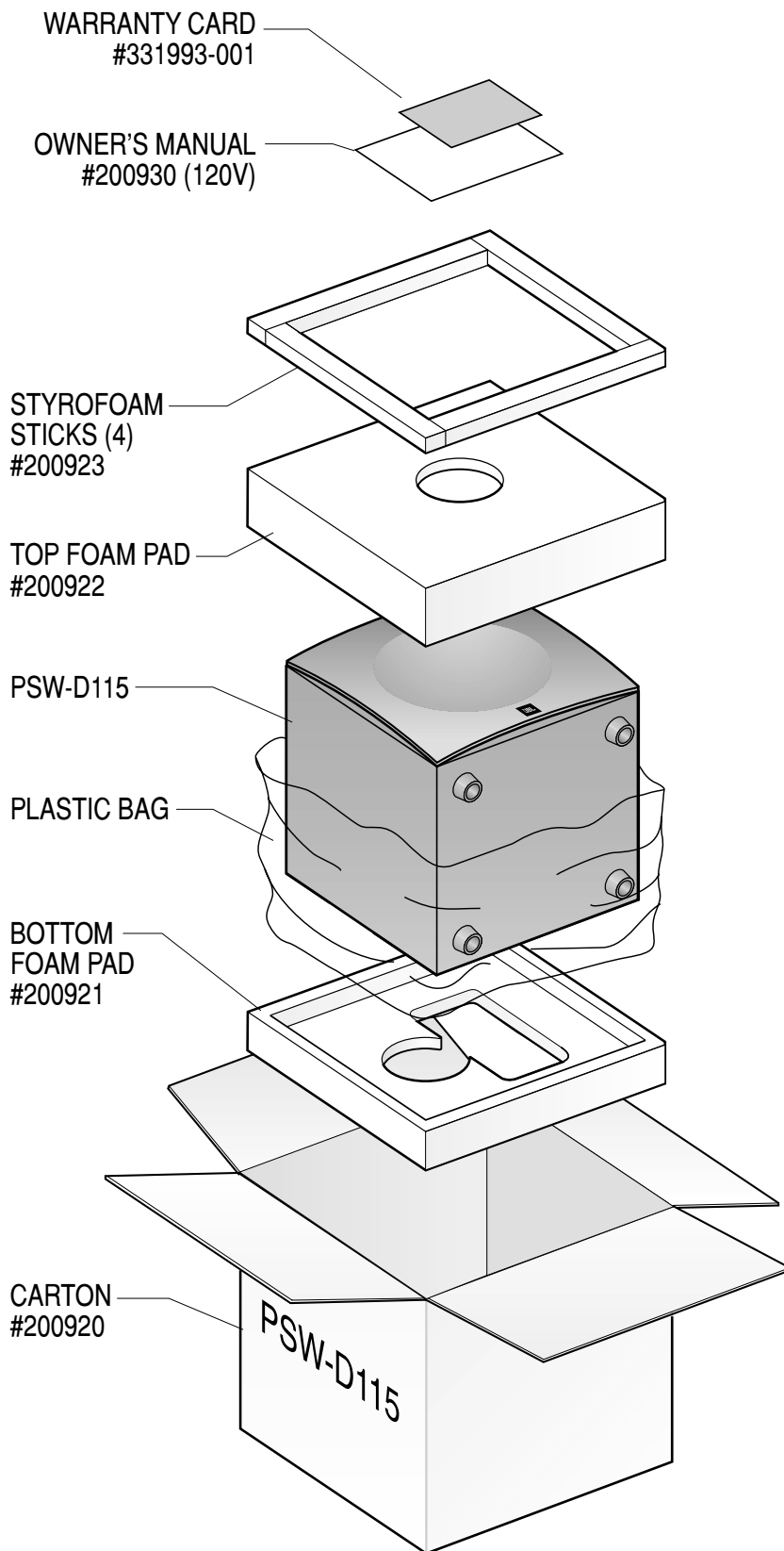
**PSW-D115**  
Amplifier Assembly  
Exploded View

## PSW-D115 MECHANICAL PARTS LIST

Ref. #	Part Number	Description	Qty
<b>PSW-D115</b>			
1	70302	Knob on PSW-D115	2
2	70319	PSW-D115 faceplate	
	70313	Volume Knob for PSW-D115	
	70314	Video contour button for PSW-D115	
3	70316	Amp PCB support	
4	70151 	Power switch PSW-D115 Safety part	
	70152	Video contour switch PSW-D115	
5	70170	#4x0.5" Screws to secure input jacks	
6	70171	#10 x 1" Machine screw Bolts for trans.	4
7	70172	#10 keps Nuts for transformer	4
8	70173	#6 x 0.5"Screws for fuse PCB	2
9	80125 	Transformer #4688 Safety part	
10	80126 	250V, 3.0A, T type SLO BLO fuse Safety part	
11	80118 	Preamp board, PSW-D115 Safety part	
12	80119 	Power amp board PSW-D115 Safety part	
13	80120 	High level input PCB PSW-D115 Safety part	
14	108116	High level 5way binding post(pr)	
15	108322	Six line RCA input jack	
16	108323	Single RCA input jack	

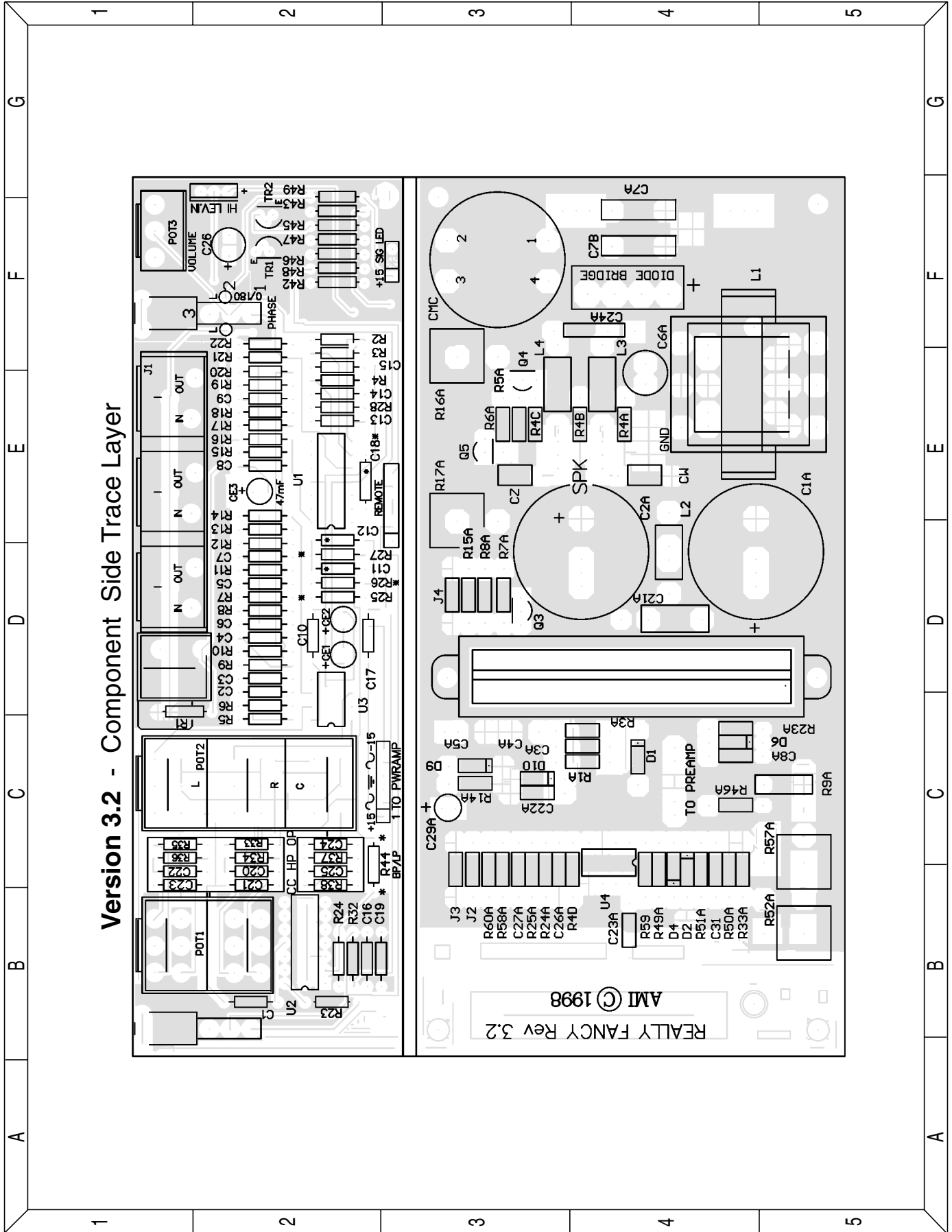


### PACKING EXPLODED VIEWS



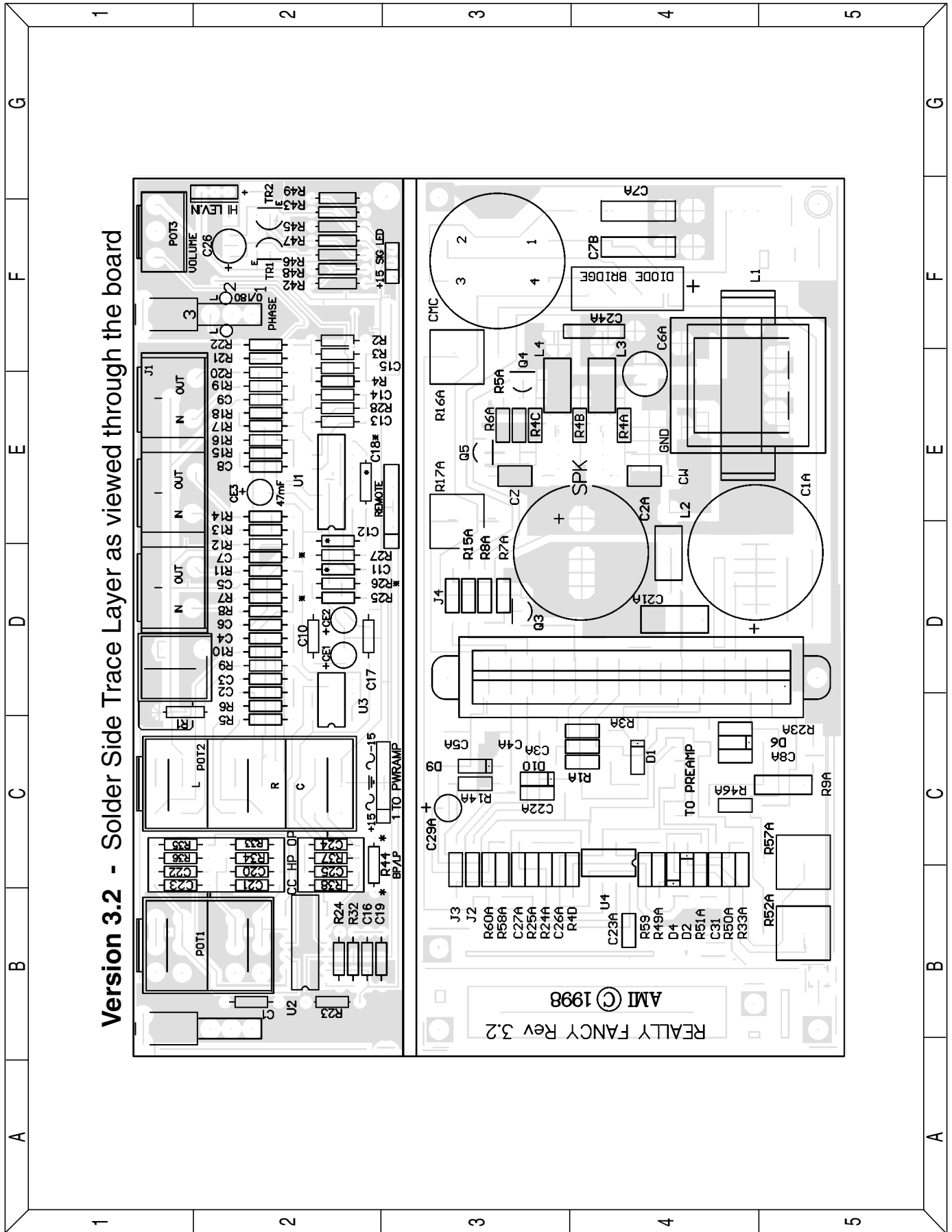
PSW-D115 Version 3.21 PCB (Component Side)

Version 3.2 - Component Side Trace Layer



PSW-D115 Version 3.21 PCB (Solder Side)

Version 3.2 - Solder Side Trace Layer as viewed through the board



## PSW-D115 ELECTRICAL PARTS LIST

Ref. #	Part Number	Description	Qty	Ref. #	Part Number	Description	Qty
<b>Preamp Board Rev 8</b>				C18		Jumper	
Safety Crossover	40436	20k 0.25W 10% Quad Lin Pot	1	C19	30508	10nF 50V 10% Mono-ceramic axial	1
Level	40402	5k 0.25W 10% Single Linear Pot	1	C20, 21, 22, 23	30504	100nF 50V 10% Mono-ceramic axial	4
HP out	40450	20k 0.25W 10% 3-gang Tandem Lin Pot	1	C24, C25	30501	47nF 50V 20% Mono-ceramic axial	1
<b>Resistors</b>				C26	30719	220uF 35V +80/-20% Electrolytic Radial	
R1	40405	4.7k 0.25W 5% carbon film	1	<b>Diodes</b>			
R2	40431	68k 0.25W 1% metal film	1	Signal LED	50109	Bi-colour $\triangle$	1
R3	40451	137k 0.25W 1% metal film	1	Video LED	50110	Green	1
R4	40452	2.7k 0.25W 5% carbon film	1	<b>Transistors</b>			
R5, 6	40438	20k 0.25W 1% metal film	2	TR2	60151	MPS A13 30V NPN(Darl) $\triangle$	1
R7, 11, 12, 14, 19, 20	40108	620 0.25W 5% carbon film	6	TR1	60154	MPS A56 80V PNP	1
R8	40453	20k 0.25W 5% carbon film	1	<b>Integrated Circuits</b>			
R9, R10, 13	40438	20k 0.25W 1% metal film	3	U1, U2	60100	LM324 Quad OpAmp +/-15% $\triangle$	2
R15	40434	56.2k 0.25W 1% metal film	1	U3	60101	TLO 82 Dual OpAmp +/-15%	1
R16	40405	7.5k 0.25W 5% carbon film	1	<b>PSW-D115 Poweramp Board</b>			
R17, 18	40453	20k 0.25W 5% carbon film	2	<b>Resistors</b>			
R21	40412	33.2k 0.25W 1% metal film	1	R1	40706	10M 0.25W 5% carbon film $\triangle$	1
R22	40454	45.3k 0.25W 1% metal film	1	R3	40458	43.2k 0.25W 1% metal film	1
R23	40405	4.7k 0.25W 1% metal film	1	R4, 8, 25, 51	40417	47k 0.25W 5% carbon film	4
R24	40408	8.66k 0.25W 1% metal film	1	R4a/b/c	40105	0.1 0.5W 5% metal film	1
R25	40455	133k 0.25W 1% metal film	1	R5 $\triangle$ , R6	40420	1k 0.25W 5% carbon film	2
R27	40434	20k 0.25W 1% metal film	1	R7	40449	3.3k 0.25W 5% carbon film	1
R28	40456	2.7k 0.25W 5% carbon film	1	R9	40421	3.9k 5W 5% ceramic wirewound	1
R32	40403	10k 0.25W 1% metal film	1	R14	40409	10k 0.25W 5% carbon film $\triangle$	1
R33, 34, 35, 36	40440	6.8k 0.25W 5% carbon film	4	R15	40459	100k 0.5W 5% carbon film	1
R37, 38	40438	20k 0.25W 1% metal film	2	R16, R17	40460	2.4k 5W 5% ceramic wirewound $\triangle$	2
R42	40457	196k 0.25W 1% metal film	1	R23	40747	20k 1W 5% carbon film $\triangle$	1
R43		Jumper		R24	40427	23.7k 0.25W 1% metal film	1
R45	40449	3.3k 0.25W 5% carbon film	1	R33	40100	332 0.5W 5% carbon film	1
R46, R47	40415	470k 0.25W 5% carbon film	2	R46	40104	4.7 0.25W 5% carbon film $\triangle$	1
R48	40405	4.99k 0.25W 1% metal film	1	R49	40746	316k 0.25W 1% metal film	1
R49	40440	6.8k 0.25W 5% carbon film	1	R50	40100	332 0.5W 5% carbon film	1
<b>Capacitors</b>				R52, R57 $\triangle$	40462	2.7k 5W 5% ceramic wirewound	2
C1	30502	100nF 50V 20% Mono-ceramic axial $\triangle$	1	R58 $\triangle$ , R59	40405	4.7k 0.25W 5% carbon film	2
C2	30501	47nF 50V 20% Mono-ceramic axial	1	R60	40431	68k 0.25W 5% carbon film	1
C3, 4	30501	47nF 50V 20% Mono-ceramic axial	2	R61	40463	5.1k 2W 5% carbon film $\triangle$	1
CE3	30708	47uF 16V 20% Electrolytic Radial	1	<b>Capacitors</b>			
C5, 7, 9	30100	330pF 50V 20% Mono-ceramic axial	3	C1, C2	30710	2200uF 100V 80/-20% Electrolytic radial $\triangle$	2
C6	30709	47nF 50V 20% Mono-ceramic axial	1	C3	30505	100nF 50V 20% mono-ceramic axial $\triangle$	1
C8, 13, 14, 15	30101	220pF 50V 20% Mono-ceramic axial	4	C4, C5	30505	100nF 50V 20% mono-ceramic axial	2
C10, 11, 12, 17	30502	100nF 50V 20% Mono-ceramic axial	4	C6	30709	4.7uF 100V 80/-20% Electrolytic radial NP	1
C16	30504	100nF 50V 10% Mono-ceramic axial	1				

Ref. #	Part Number	Description	Qty
C7a/b	30521	100nF 250V 20% Metal Polyester Rad $\Delta$	1
C8	30502	100nF 50V 20% mono-ceramic axial	1
C21	30522	100nF 250V 20% mono-ceramic axial	1
C24	30523	330nF 100V 80/-20% mono-ceramic axial	1
C26	30508	10nF 50V 10% mono-ceramic axial	1
C27	30513	3.3nF 50V 10% mono-ceramic axial	1
C29	30711	22uF 35V 80/-20% Electrolytic radial	1
C31	30511	330nF 50V 20% mono-ceramic axial	1
CW, CZ	30505	100nF 100V 20% mono-ceramic axial	1
<b>Diodes</b>			
D1	50108	1N5270B 90V 5% .5W	1
D2, 4	50104	1N4148 100V .1A	2
D6	50103	1N5234B 6.2V 5% .5W	1
D9, 10	50105	1N4744A 15V 5% 1W	2
DBR	50100	Bridge Rect 200V 4A $\Delta$	1
<b>Transistors</b>			
Q3	60153	2N3904 40V NPN	1
Q4, 5	60155	2N5401 PNP	2
<b>Integrated Circuits</b>			
U4	60101	TL082 Dual Op Amp	1
	60302	S64AMI Power Amp module $\Delta$	1
<b>Safety Inductors</b>			
CMC1	80100	mc4438 Safety part $\Delta$	1
L1	80121	mc4642 Safety part $\Delta$	1
L2, L3, L4	80122	Ferrite Bead	3

## PSW-D115 High Level Input/Output Board

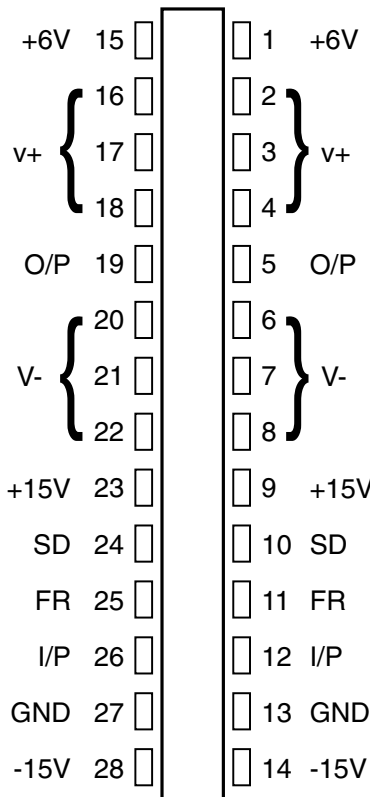
R1 L, R1 C R1 R, R3 L, R3 C, R3 R	40406	100k 0.25W 5% carbon film	6
R2 L, R2 C, R2 R	40405	4.7k 0.25W 5% carbon film	3
C1, 2, 3	30704	220uF 50V 20% Electrolytic Radial	3

## Revisions

date	issue	details
1/5/1999	2	R58A(4.64k ) to 4.53k
1/20/1999	4	"R20(1%MF) to 5% CF, R15A(.5W) to .25W, R4a,b,c (1W) to .5W"
2/22/1999	6	"R42 to 194k , R46(1000k ) to 470k, C21/CW/CZ to poly film caps"
1/6/1999	7	"R1(4.7k ) to 7.5k , CE1/CE2 removed,C21(20%) to 10%. " "Power amp. R1(8.2m) to 10M,C3(47n) to 100n. D1(1N4763A) to 1N5270B" High level board. C1/2/3 renamed CE4/5/6
7/15/1999	8	"R1 (7.5k ) to 4.7k , R16(4.7k ) to 7.5k ."

PSW-D115 INTEGRATED CIRCUITS

S53AMI/S64AMI - Power Amp module SAFETY PART

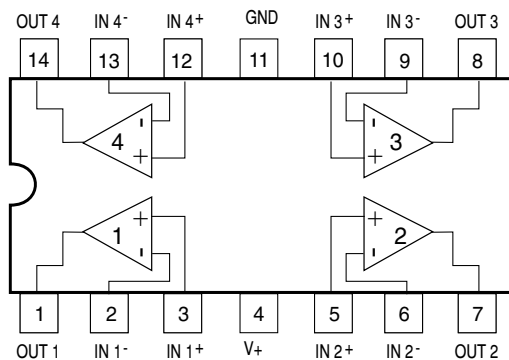


**NOTE:** THE FOLLOWING PROCEDURES MUST BE FOLLOWED WHEN INSTALLING NEW S53AMI/S64AMI AMP MODULES: FAILURE TO FOLLOW ONE OR MORE OF THESE STEPS MAY RESULT IN THE INSTANT DESTRUCTION OF THE MODULE WHEN POWERED UP.

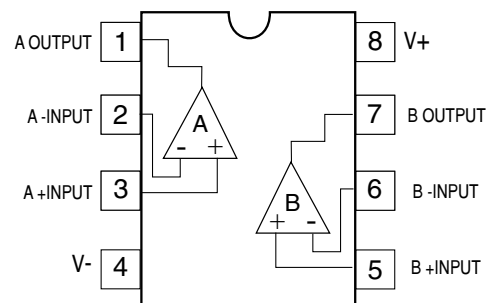
- 1) Align white indent marker on Amp Module with indent marker on main PCB; alternately observe position of label on the top of the module; incorrectly replacing the Module 180 in the PCB slot will result in its destruction.
- 2) All AC powered test instruments (meters, oscilloscopes, etc.) must have a floating ground, i.e. be connected to an isolation transformer.
- 3) Align and position the Amp Module before soldering.
- 4) Attach the amp Module with the mounting screws before soldering or powering up.
- 5) Use only rosin-core or non-acid core solder; thoroughly de-flux the surfaces after soldering.

If the new S53AMI/S64AMI Amp Module has larger mounting hole(s) in the case, and the stock screws no longer will fit, and screws of the proper type cannot be obtained locally order:  
 (2) part# 60301S (screws)  
 (2) part# 60301N (nuts)

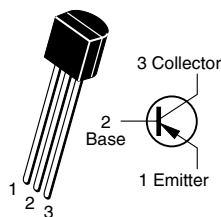
U1 - (LM324) Quad Op Amp



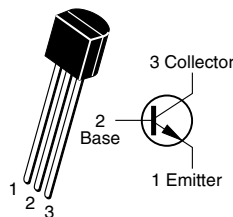
U2, U3, U4 - (TLO 82) Dual Op Amp



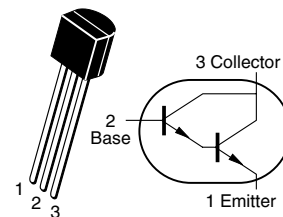
Q4, Q5, TR1 - (MPS A56)  
 (2N5401)  
 80V PNP Transistor



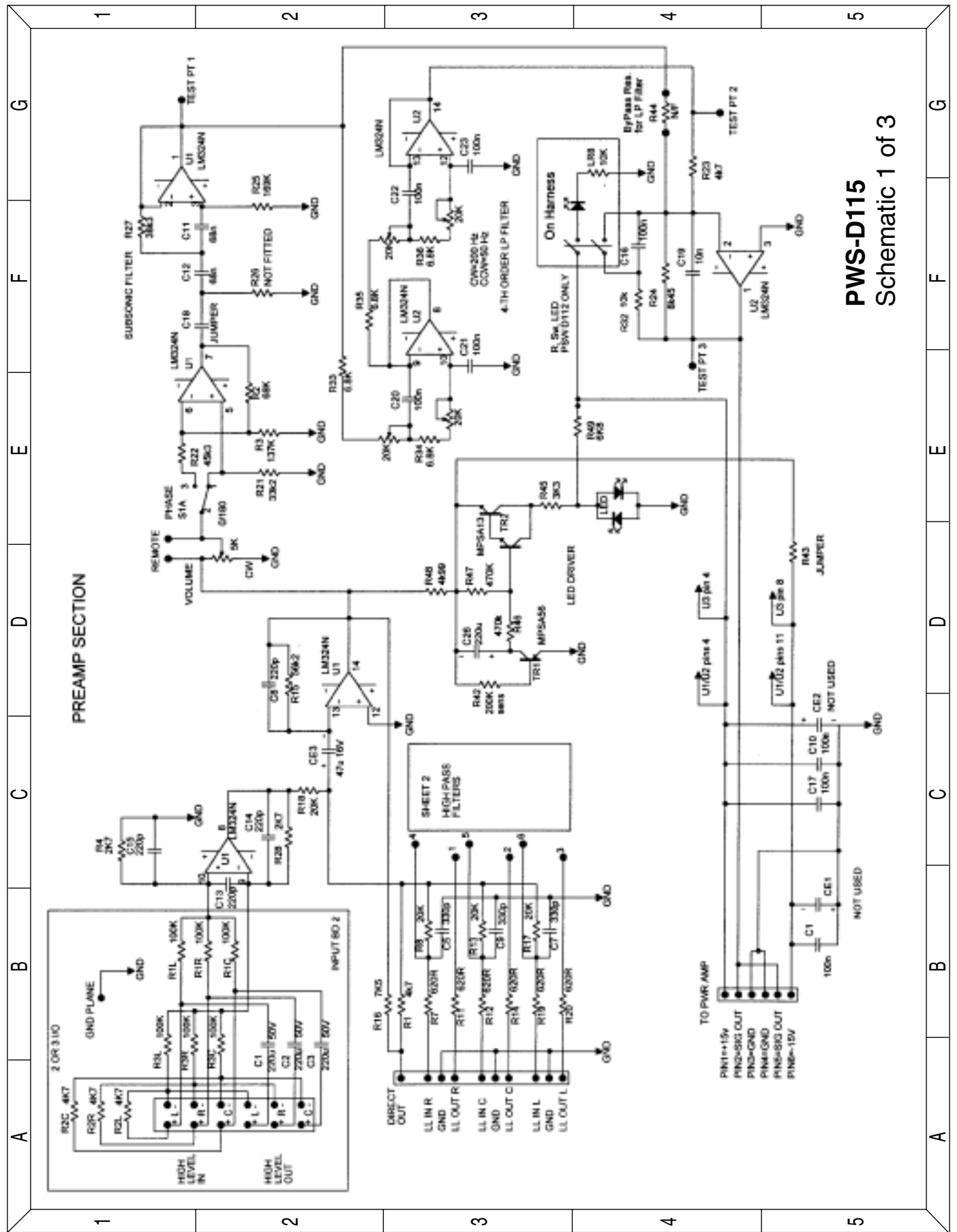
Q3 - (2N3904)  
 40V NPN Transistor



Q1, TR2 - (MPS A13)  
 30V NPN(Darl) Transistor



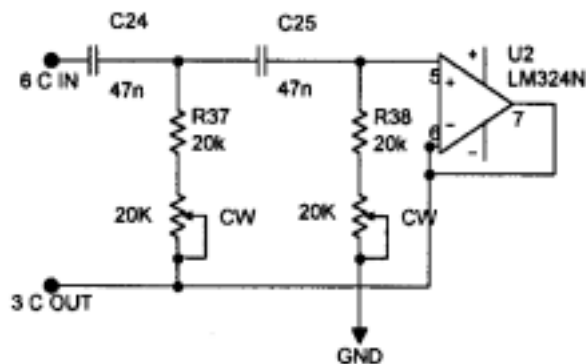
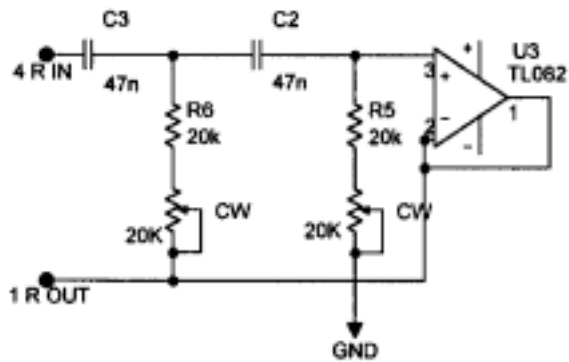
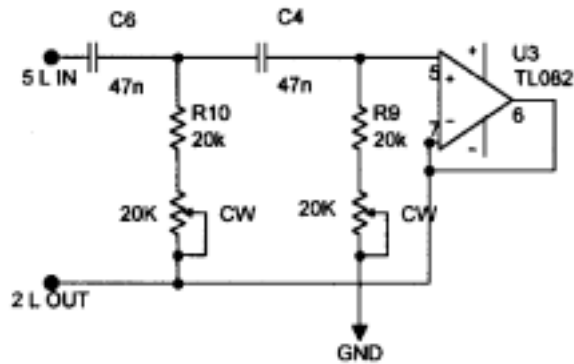
PSW-D115 SCHEMATIC 1 of 3



PWS-D115 Schematic 1 of 3

PSW-D115 SCHEMATIC 2 of 3

HIGH PASS FILTERS

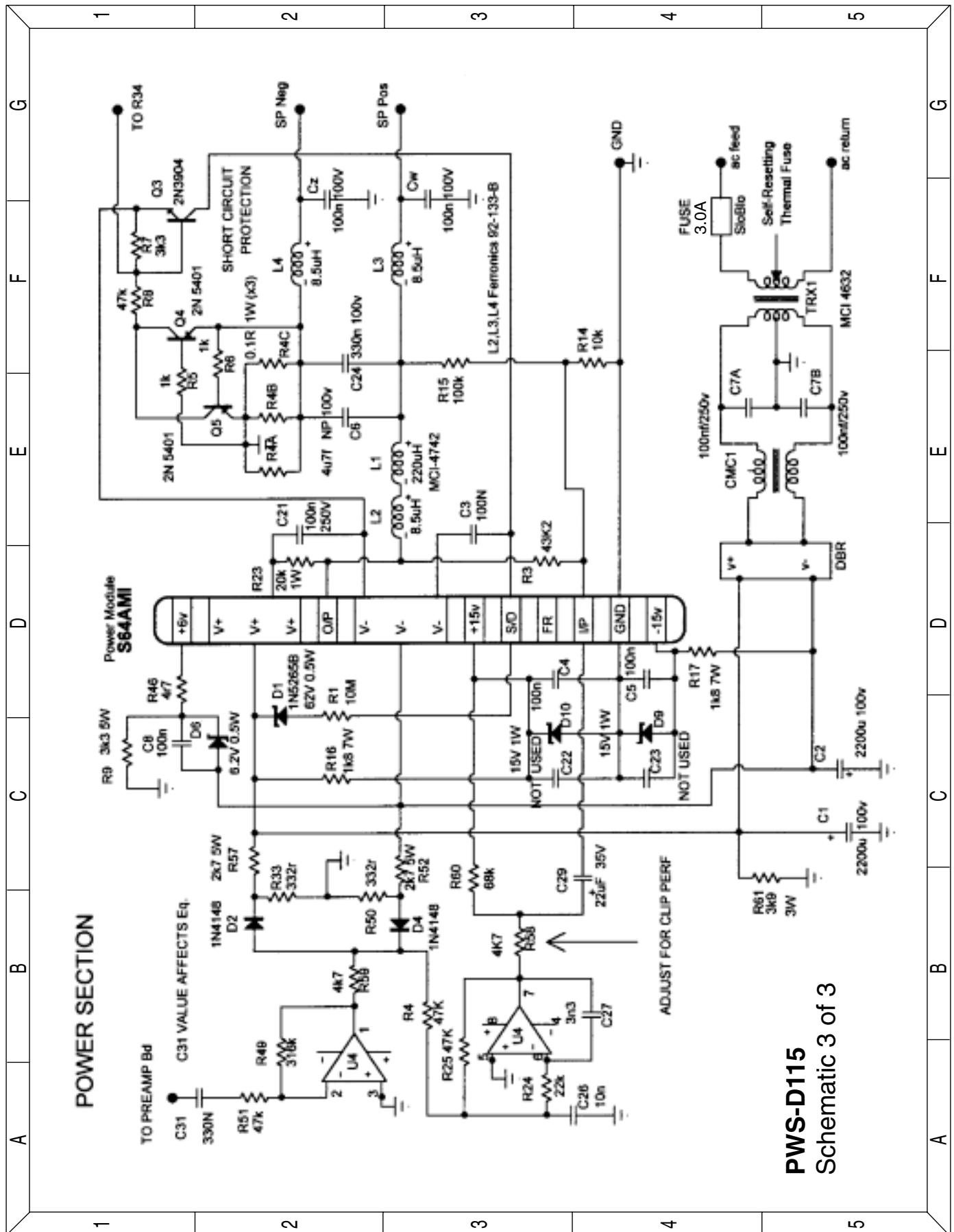


POT. 20K B

PWS-D115  
Schematic 2 of 3



PSW-D115 SCHEMATIC 3 of 3



PWS-D115 Schematic 3 of 3