PowerBass™ Series
PB12 Subwoofer

SERVICE MANUAL

JBL Incorporated
250 Crossways Park Dr.
Woodbury, New York 11797

REV2 10/2001

PB12

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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 personal ONLY!

Caution

This unit does not have a power switch. Hazardous voltages are present within the unit whenever it is plugged in.

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. Note there is no power switch on this unit. When the power plug is plugged in, the unit is live. 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 . Use only the replacement parts designated in the parts list or parts with the same rating of resistance, wattage or voltage.

List of SafetyComponents Requiring ExactReplacements

F1	Fuse SLO BLO 2.0A 250V 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.
TRX	Transformer. Use only factory replacement.
BR RECT	Bridge diode. 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.
C10	4.7uF , 100 volt NPE low df radial.
S64AMI	Power output module. Use only factory replacement
Faceplate	Faceplate. Use only factory replacement
Air leak cover	Use only factory replacement
CMC	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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BASIC SPECIFICATIONS PB12 Subwoofer

Output Power	250 watts RMS
Driver	12" Woofer
Frequency Response	25Hz – to Low Pass Frequency setting
Inputs	Line Level (option: LFE); Speaker Level
Outputs	Speaker level fixed frequency 150Hz
Low-Pass Frequency	Variable from 50Hz – 150Hz
High-Pass Frequency	150Hz when using Speaker Level Output
Dimensions (H x W x D)	15 1/2" x 15" x 16" 394mm x 381mm x 406mm (with feet) 17 1/2" x 15" x 16" 445mm x 381mm x 406mm
Weight	40 lb/18.2kg

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Refinements may be made on occasion to existing products without notice but will always meet or exceed original specifications unless otherwise stated.
PowerBass is a registered trademark of JBL Incorporated.

DETAILED SPECIFICATIONS PB12 Subwoofer

JBL PB 12 250W Powered Sub Amp

LINE VOLTAGE	Yes/No	Hi/Lo Line	Nom.	Unit	Notes
US 120vac/60Hz	Yes	108-132	120	Vrms	Normal Operation
EU 230vac/50-60Hz	Yes	207-264	230	Vrms	Normal operation, MOMS required

Parameter	Specification	Unit	QA Test Limits	Conditions	Notes
Amp Section					
Type (Class AB, D, other)	D	n/a	n/a		
Load Impedance (speaker)	5.6	Ohms	n/a	Nominal	
Rated Output Power	250	Watts	145	1 input driven	Peak
THD @ Rated Power	0.3	%	1	22k filter	145 Watts
THD @ 1 Watt	0.1	%	0.5	22k filter	
DC Offset	10	mV-DC	20	@ Speaker Outputs	
Damping factor	>50	DF	35	Measured at amplifier board	Measured at the speaker cable. 150 Watts @ THD < 0.1 % @ 50 Hz
Input Sensitivity					
Input Frequency	50	Hz	50	Nominal Freq.	
L&R	240	mVrms	±2dB	To 150 Watts	Single input driven
LFE input	240	mVrms	±2dB	To 150 Watts	Single input driven, LFE switch ON
Speaker/Hi Level Input	2.4	Vrms	±2dB	To 150 Watts	Single input driven
Signal to Noise					
SNR-A-Weighted	90	dBA	80	relative to rated power	A-Weighting filter
SNR-unweighted	85	dBr	80	relative to rated power	22k filter
SNR rel. 1W-unweighted	65	dBr	60	relative to 1W Output	22k filter
Residual Noise Floor	1	mVrms	2	Volume @max, using RMS reading DMM/VOM (or A/P) BW=20 Khz.	
Residual Noise Floor	1.5	mVrms(max)	2	Volume @max, w/ A/P Swept Bandpass Measurement (Line freq.+ harmonics) (BW=20 Khz)	
Input Impedance					
Line Input (L, R,LFE)	20K	ohms	n/a	Nominal	
Speaker/Hi Level Input	4.7K	ohms	n/a	Nominal	
Filters					
LP filter 4th order fixed	60-180	Hz	± 10		2nd order variable + 2nd order fix-24 db/Octave
Subsonic filter (HPF) 2nd Orde	Fixed				
LFE Low pass 2nd order	200>LP<1K	Hz		LFE input driven only	
HP speaker out connector	200	Hz	± 10	Speaker input driven - 4 Ohms	
	100	Hz	± 10	Speaker input driven - 8 Ohms	
Limiter					
THD at Max. Output Power	n/a	n/a	functional	Maximum Output Power	Maximum THD as a result of limiting.
Features	--				
Volume pot Taper (lin/log)	LOG	--	functional		A Taper
HP Speaker out	YES		functional		Refer to Filter section
Phase switch	0-180	deg	functional		
LP Filter defeat switch	YES		functional		Disables LP filter, intended for LFE
Input Configuration					
Line In (L,R) & LFE	YES	--	functional		Dual RCA jack
Spkr/Hi Level In	YES	--	functional		Binding post connector L&R
Signal Sensing (ATO)					
Auto-Turn-On (yes/no)	YES		functional		
ATO Input test frequency	50	Hz	functional	"	
ATO Level LFE Input	4	mV	functional	"	Maximum acceptable level.
ATO Level Speaker in	50	mV	functional	"	Maximum acceptable level.
ATO Turn-on time	5	ms	functional	Amp connected and AC on, then input signal applied	
Auto Mute/ Turn-OFF Time	15	minutes	15	T before muting, after signal	Auto turn of time (T) must be 5 > T < 15
Power on Delay time	3	sec.	4	AC Power Applied	
Transients/Pops					
ATO Transient	5	mV-peak	n/a	@ Speaker Outputs	
Turn-on Transient	50	mV-peak	2v-pp	@ Speaker Outputs	AC Line cycled from OFF to ON
Turn-off Transient	50	mV-peak	2v-pp	@ Speaker Outputs	AC Line cycled from ON to OFF
Efficiency					
Efficiency	65	%	64		Nominal Line voltage 120 VAC
Stand-by Input Power	24	Watts	26	@ nom. line voltage	
Power Cons. @ rated power	234	Watts	240	@ nom. line voltage	150 Watts @ 5.6 Ohms nominal line voltage
Short Circuit Protection	YES		functional	Direct short at output	Amplifier should resume operation after short
Thermal Protection	YES		functional		
DC Offset Protection	YES		-	DC present at Speaker Out leads	
Line Fuse Rating					
USA-Domestic (120v)	2	Amps		Type-T or Slo Blo-250 V	
EU (230v)	1	Amps		Type-T or Slo Blo-250 V	External fuse with UL/SEMKO rated holder

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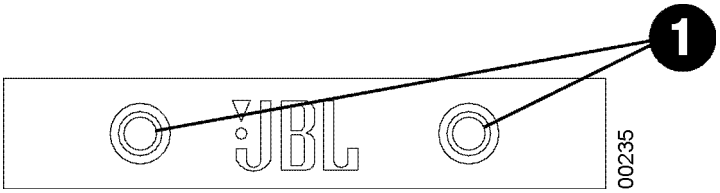
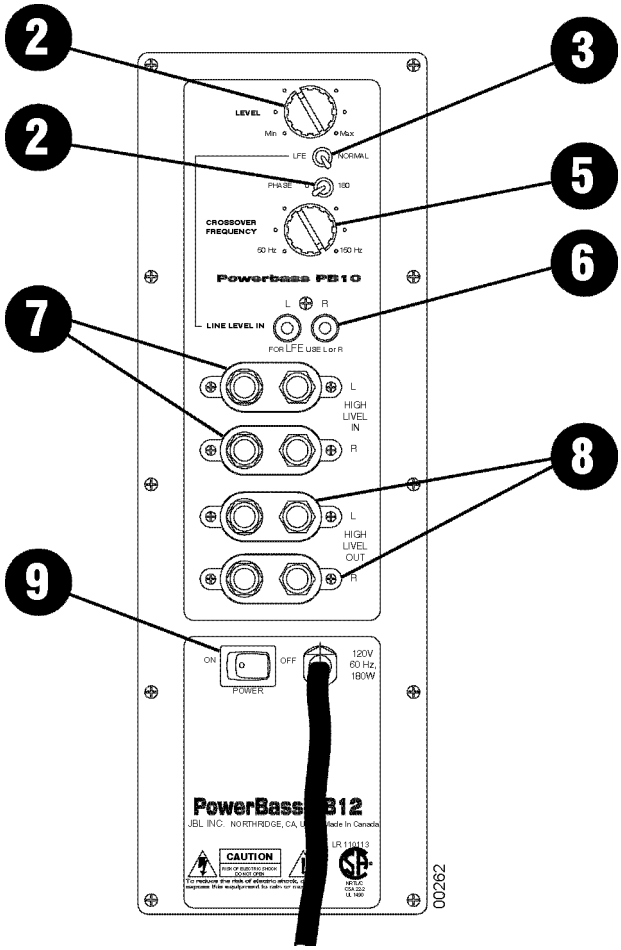
PB12 Subwoofer Controls and their Function

1. **Power -** These lights will be red when the unit is plugged in and not receiving a signal; when the PB12 receives a signal, the lights will cycle to GREEN. If no signal is received after 10-15 minutes the lights will cycle back to RED (standby) until a signal is present again.
2. **Level Control -** The subwoofer Level Control, PB12, (located on the rear panel) adjusts the volume of the subwoofer relative to the rest of the system.
3. **LFE/Normal Switch -** Ordinarily placed in the Normal position - but switch to LFE when playing Dolby DigitaL, DTS or other digital surround modes - see page 9.
4. **Phase Switch -** Changes the subwoofer's output to be in phase or 180 degrees out of phase with the program material.
5. **Crossover Frequency -** Sets the highest frequency the subwoofer will reproduce.
6. **Line Input -** Main Input connection to subwoofer (preferred).
7. **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.
8. **Speaker Out Jacks -** Connected to main loudspeakers when the Speaker Input Jacks are used.
9. **Power Switch -** Turns the PB12 on or off.

Front Panel



Rear Panel



Speaker Connection

When we designed the PB10 and PB12 powered subwoofers, our goal was to offer the user the best possible performance combined with the most flexible and complete installation options. Please look over the following three examples to determine which description best matches your system and follow the corresponding hookup instructions.

To use the binding-post speaker terminals with bare wire, unscrew the collar until the hole through the centerpost is visible under the collar.

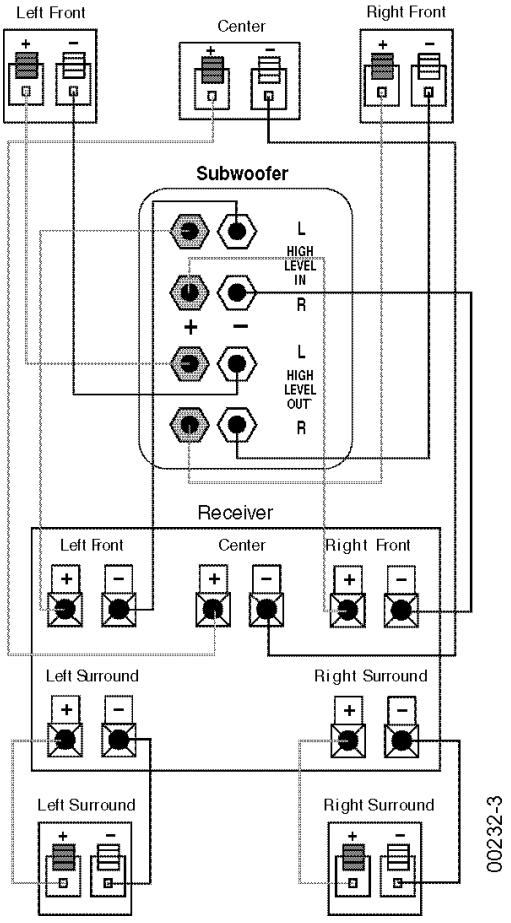
Insert the bare end of the wire through the hole in the post, then screw the collar back down until the connection is tight. The holes in the center of the collars are intended for banana-type connectors.

Dolby Pro Logic (Non-Digital)-Speaker Level

Use this installation method for Dolby Pro Logic applications (not Dolby Digital, DTS® or other digital processing), where the receiver/processor does not have a subwoofer output or a volume-controlled preamp (line-) level output:

Connect your receiver or amplifier's front left and right speaker terminals to the left and right terminals on the subwoofer that are marked "High Level In." Connect the left and right terminals on the subwoofer that are marked "High Level Out" to the corresponding terminals on the back of your front left and right speakers.

Connect your receiver or amplifier's center, left and right surround-speaker terminals to the corresponding terminals on the back of your center, left and right surround speakers.



Dolby Pro Logic (Non-Digital)-Line Level

Use this installation method for Dolby Pro Logic applications (not Dolby Digital, DTS or other digital processing), where the receiver/processor is equipped with a subwoofer output or a volume-controlled preamp (line-) level output:

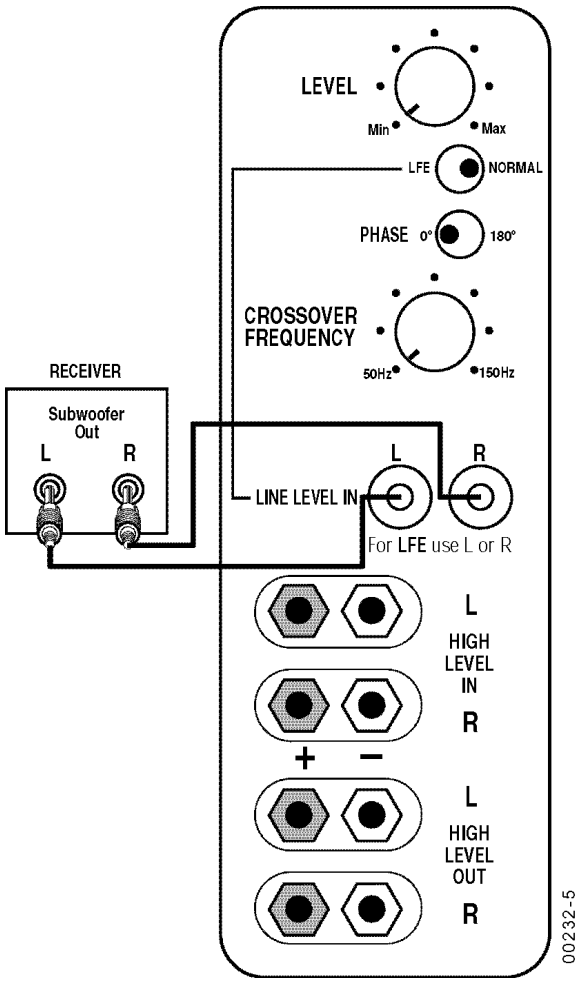
Use RCA-type patch cords to connect the line-level subwoofer outputs on your receiver or amplifier to the line-level inputs on the subwoofer. IMPORTANT: Make sure that the LFE toggle switch on the subwoofer is in the “Normal” position. Do not use the “LFE” position with Dolby Pro Logic-only processors.

Note: If your receiver or amplifier only has one subwoofer output jack, then you may connect the subwoofer output on your receiver/preamplifier to either the left or right line-level input on the subwoofer. It makes no difference which jack you choose.

Connect each speaker to the corresponding speaker terminals on your receiver or amplifier.

Make sure your receiver or processor is configured correctly; Make sure that the subwoofer is configured as “On.”

Note for advanced users: If your receiver/processor has a built-in low-pass crossover filter for the subwoofer output, then the LFE switch should be set to the “LFE” position to bypass the subwoofer’s internal crossover.



Dolby Digital or DTS (or Other Digital Surround Mode) Connection

Use this installation method for Dolby Digital, DTS or other digital surround processors:

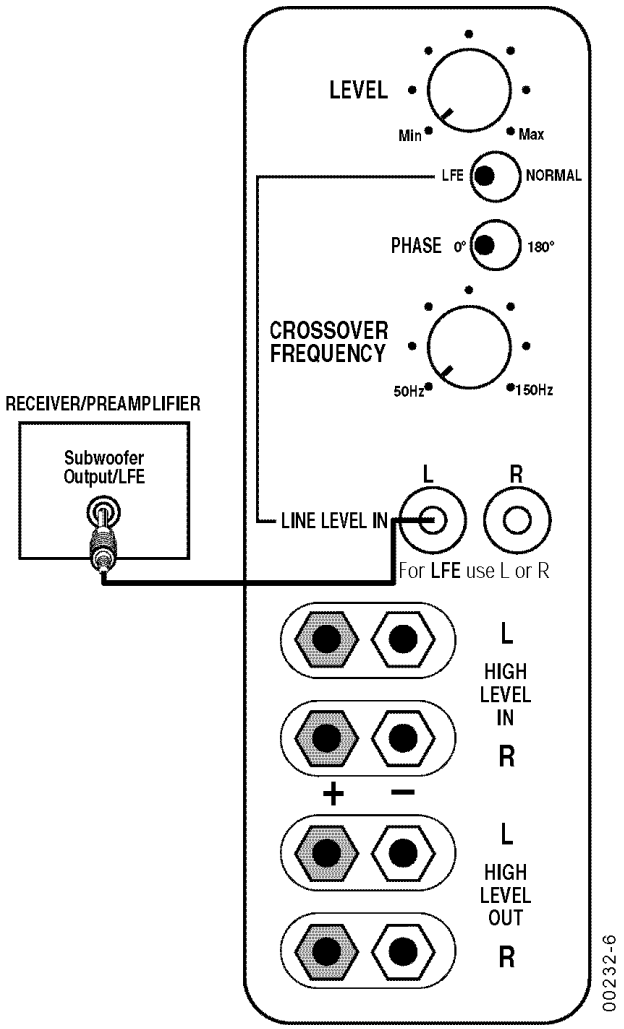
IMPORTANT: Make sure that the LFE toggle switch on the subwoofer is in the “LFE” position. Use the line-level input jacks for the low-Frequency Effects channel. Connect these jacks to the LFE output or subwoofer output on your receiver or amplifier.

Note: If your receiver or amplifier only has one subwoofer output jack, then you may connect the subwoofer output on your receiver/preamplifier to either the left or right line-level input on the subwoofer. It makes no difference which jack you choose.

Connect each speaker to the corresponding speaker terminals on your receiver or amplifier.

Make sure that you have configured your surround-sound processor for “Subwoofer On”or “LFE On.”

The front left, front right, center and rear speakers should be set to “Small” or “Large” depending on their size and frequency response. Consult your receiver’s or processor’s owner’s manual.



OPERATION

Power

When the unit is plugged in and the power switch is on and no signal is received, the LEDs on the front of the unit will turn red. When a signal is present, the LEDs will turn green.

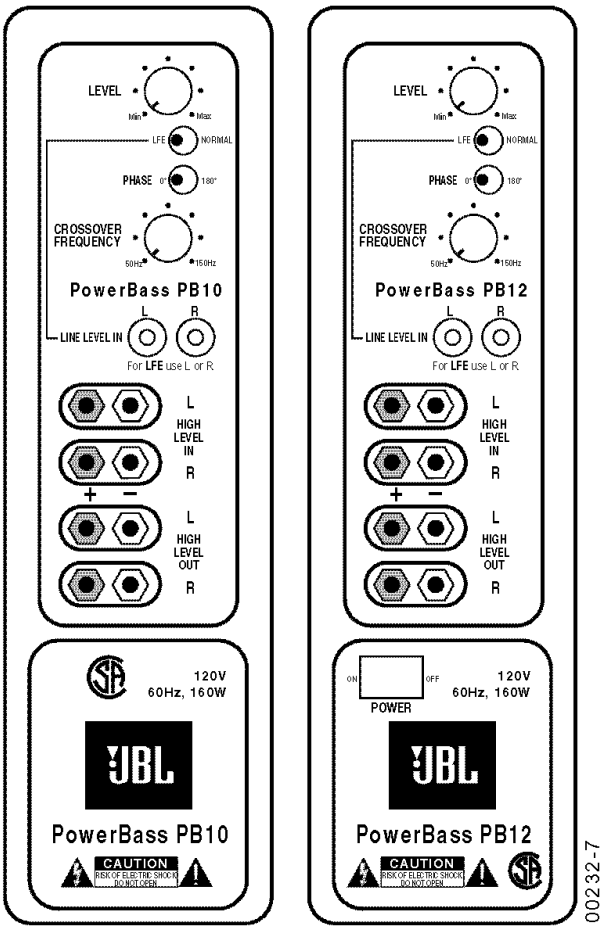
Note: It will take several minutes for the LEDs to turn from green to red after the input signal to the subwoofer is removed. Due to JBL's unique, high-output, high-efficiency amplifier design, power consumption is minimal when the subwoofer is not receiving a signal.

Level Control

The subwoofer Level Control adjusts the volume of the subwoofer relative to the rest of the system. Proper level adjustments depends on several variables such as room size, subwoofer placement, type of main speakers and listener position. Adjust the subwoofer level so that the volume of the bass information is pleasing to you.

Crossover Adjustments

The Crossover Frequency 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-150Hz. This control is not used when the LFE switch is in the "LFE" position.



Phase Control

The Phase Control determines whether the subwoofer's piston-like action moves in and out in phase with the main speakers or opposite the main speakers. There is no correct or incorrect setting. Proper phase adjustment depends on several variables such as 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; this switch offers the added flexibility to adjust your subwoofer for optimum performance for your specific listening conditions without having to move your speakers.

If at some time in the future you happen to rearrange your listening room and move your speakers, you should experiment with the phase switch in both positions, and leave it in the position that maximizes bass performance.

TROUBLESHOOTING

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

- Check that receiver/amplifier is on and source is playing.
- Check that powered subwoofer is plugged into and active electrical outlet and is switched on.
- 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.

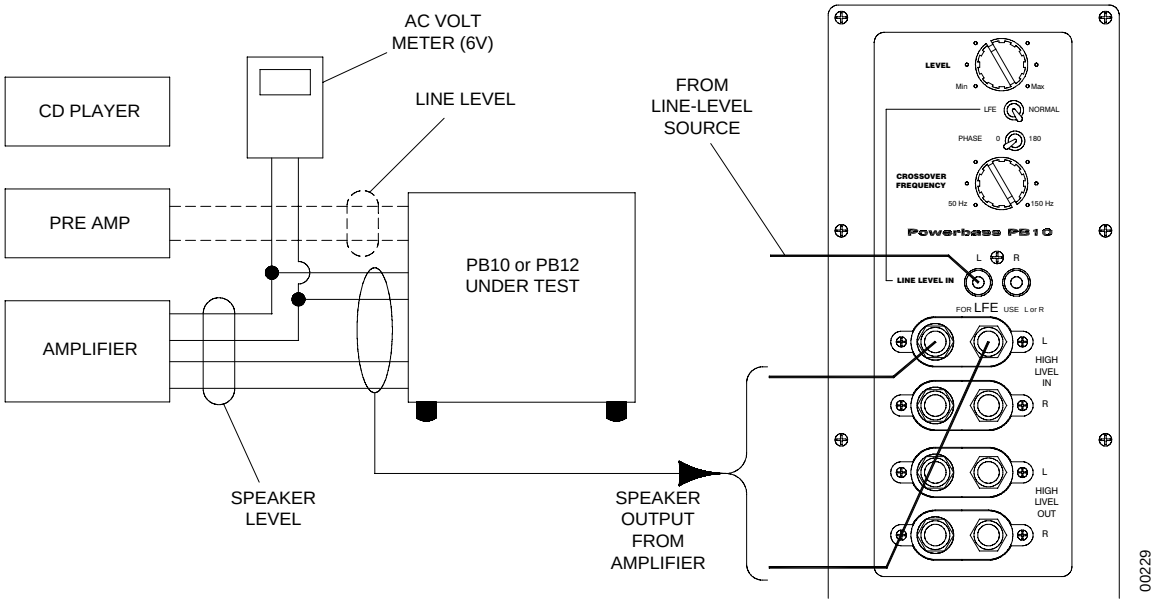
If there is low (or no) bass output:

- 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 and (PB12 only) switched on.
- 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 that receiver/amplifier is on and a source is playing.
- Check that powered subwoofer is plugged into an active electrical outlet and is switched on.
- 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.

PB12 TEST SET UP AND PROCEDURE



General Function

UUT = Unit Under Test

1. Connect one line level input cable (RCA) from signal generator to either Right or Left Level input on UUT. VOLUME control should be full conterclockwise. Make sure the LFE/Normal switch is in the NORMAL position.
2. Turn on generator, adjust to **100mV, 50 Hz.**
3. Plug in UUT; LED's on the front panel may be either Red or Green. Turn VOLUME control full clockwise. Low Pass control should be set fully clockwise (150 Hz).
4. LED should turn Green; immediately 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 either high level input terminal 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 **1.0V, 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 **4.8 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.

Service Bulletin

Service Bulletin JBL2001-03 - March 2001 | This is considered a Minor repair

To: All JBL Service Centers

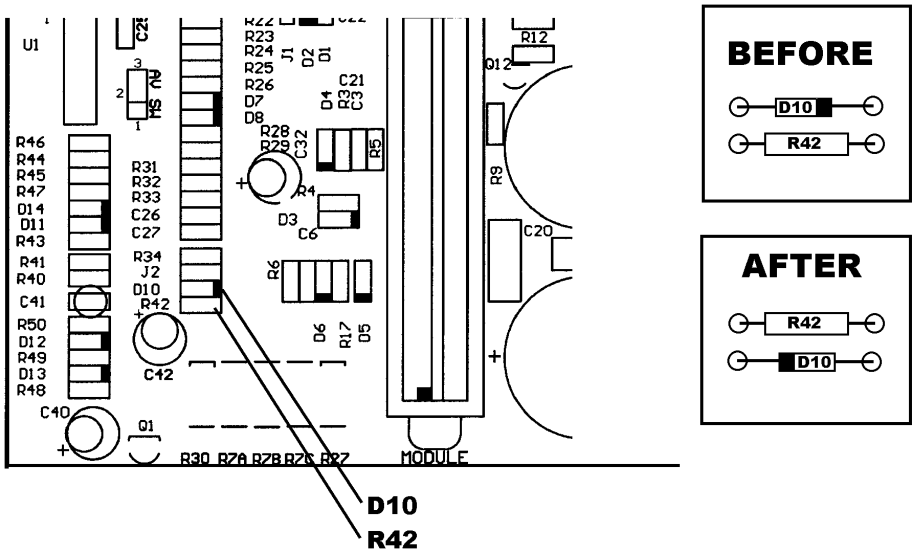
Models: PB10, PB12

Subject: Unit Will Not Switch To Standby Mode

When the power cord of the PB series subwoofer is plugged into a wall outlet, (and for the PB12 only, the power switch is on), and an audio signal is present, the LED's on the cabinet face will turn green, indicating the subwoofer is in the ON mode. With the audio signal removed, it will take 10 - 15 minutes for the LEDs to turn from green to red, indicating the subwoofer is now in the STANDBY mode. Power consumption is minimal in this mode.

In the event you receive a PB10 or PB12 subwoofer with the complaint: "The unit will not switch to standby mode, even when the audio signal is removed", (indicated by the subwoofer's green LED's remaining on), perform the following modification:

1) Set the unit on a padded surface and remove all external cables.
2) On the amplifier faceplate, remove the (10) Phillips mounting screws around the perimeter.
3) Remove the amplifier assembly from the enclosure. If the amp is turned and supported correctly, no other connectors need to be unplugged.
4) Locate Zener Diode D10 and Resistor R42 (22kΩ). See illustration. These parts must be "swapped", i.e. R42 soldered into the D10 location, and D10 soldered into the R42 location. VERY IMPORTANT: Observe polarity on D10 in new location.
5) Replace amplier; test subwoofer to assure the unit goes into the standby mode 10 - 15 minutes after removing the Audio input signal.



Model	Serial number	Status	Action
PB10 PB12	All serial numbers affected	Unit may not switch to Standby mode	Swap locations: Zener Diode D10, Resistor R42 (22kΩ). Observe D10 polarity.

Service Bulletin

Service Bulletin JBL2001-05 - June 2001 This is considered a Minor repair

To: All JBL Service Centers

Models: PB12

Subject: Popping Every Few Seconds During Play

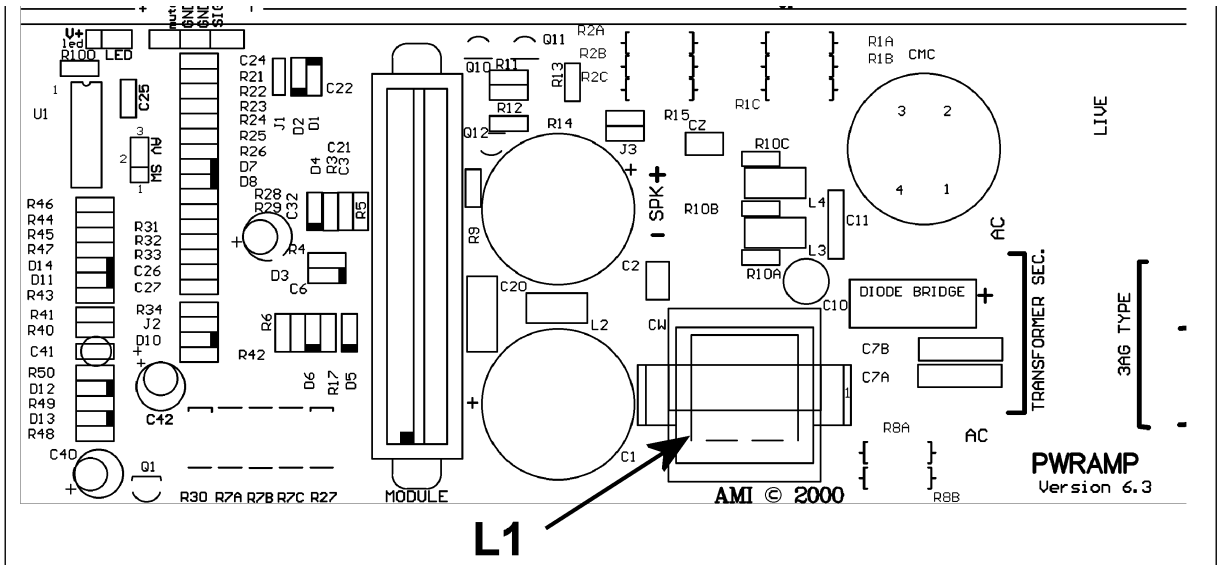
In the event you receive a PB12 subwoofer with the complaint: "The subwoofer "thumps" or "pops" every few seconds of play", follow the procedure below:

Probable Cause:

Inductor L1 (220uH) may be damaged.

Check and Replace L1 if necessary:

1) Set the unit on a padded surface and remove all external cables.
2) On the amplifier faceplate, remove the (10) Phillips mounting screws around the perimeter.
3) Remove the amplifier assembly from the enclosure. If the amp is supported correctly, no other connectors need to be unplugged.
4) Locate Inductor L1 on the main PCB. If the windings appear charred or burnt, it must be replaced.
5) Order JBL part# 80121 and replace L1.
6) Replace the amplifier assembly back into the cabinet; replace the screws.
7) Test the unit and confirm the original problem has been corrected.



Service Bulletin

Service Bulletin JBL2001-07 - November 2001 This is considered a Minor repair

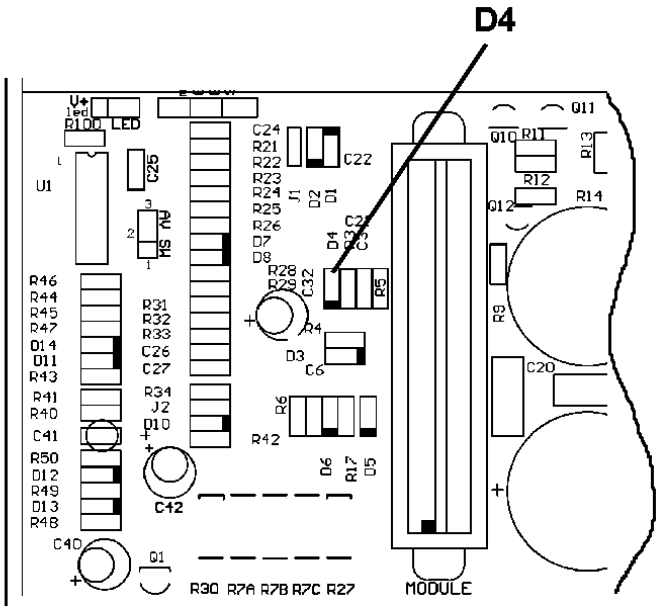
To: All JBL Service Centers

Model: PB12

Subject: Possible Missing Diode D4

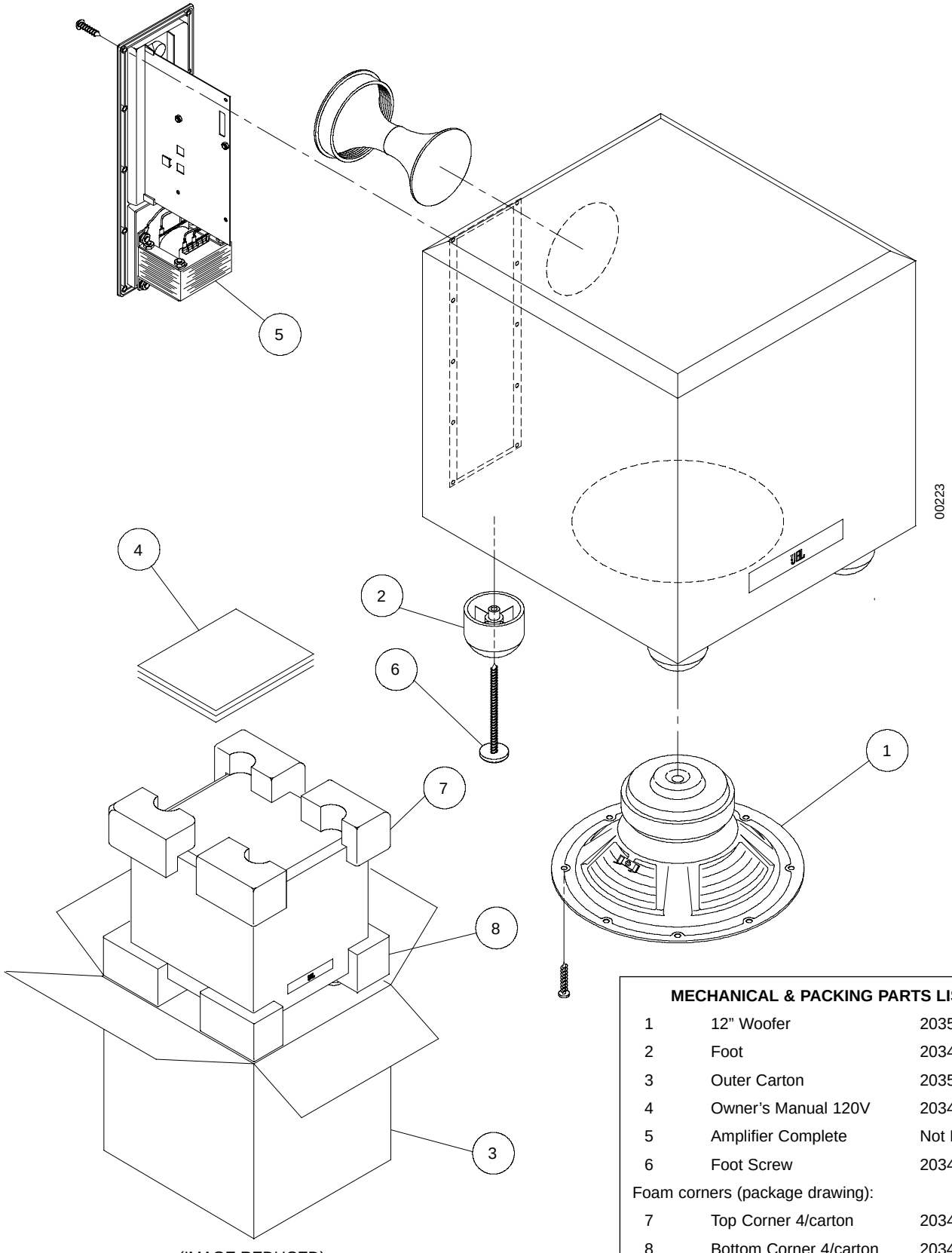
In the event you receive a PB12 subwoofer for any servicing reason, check for the presence of diode D4 on the Main PCB close to the Power Amp Module (see illustration). If D4 is missing or has been "cut out" of the circuit, it should be replaced; add JBL part# 50115. Observe polarity.

Note: The presence or absence of D4, in itself, does not contribute to, or solve, an amplifer failure. Purpose of D4 is to reduce the possibility of an occasional Turn-OFF pop noise.



Reference for general location only; all parts or designators may not conform exactly to this drawing.

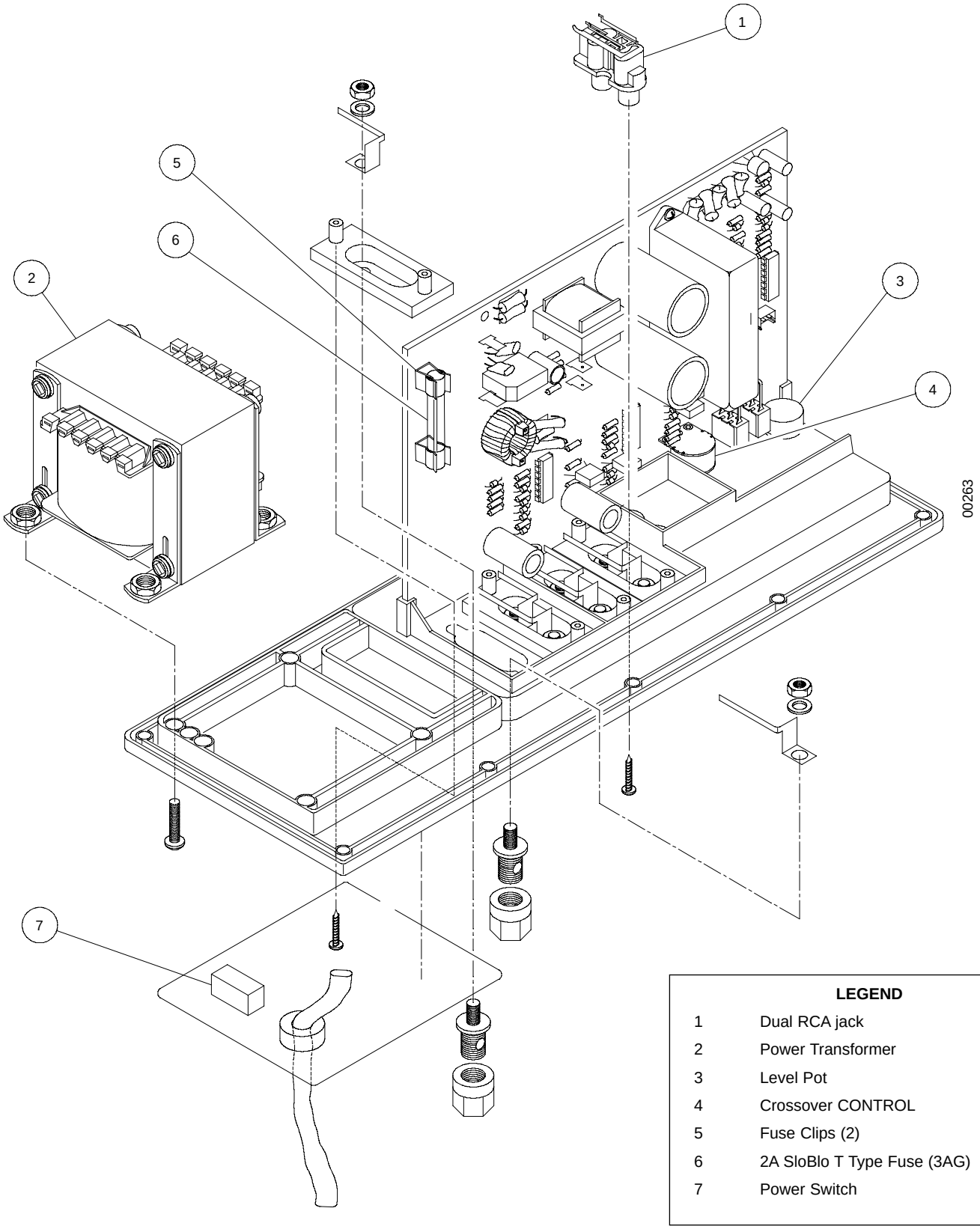
Exploded and Packaging Views



(IMAGE REDUCED)

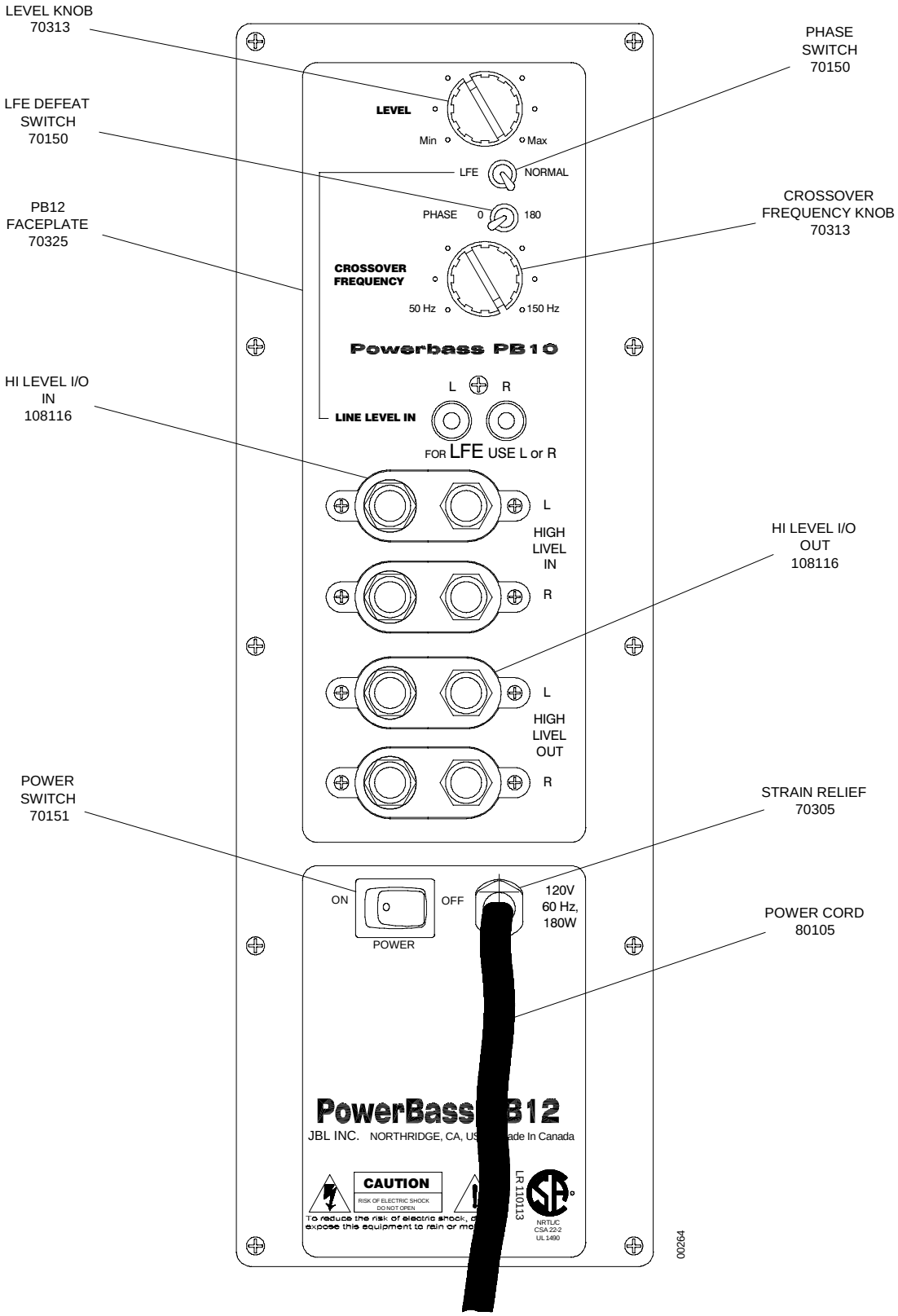
MECHANICAL & PACKING PARTS LIST		
1	12” Woofer	203500
2	Foot	203410
3	Outer Carton	203520
4	Owner’s Manual 120V	203430
5	Amplifier Complete	Not For Sale
6	Foot Screw	203411
Foam corners (package drawing):		
7	Top Corner 4/carton	203460
8	Bottom Corner 4/carton	203470

Amplifier Exploded View



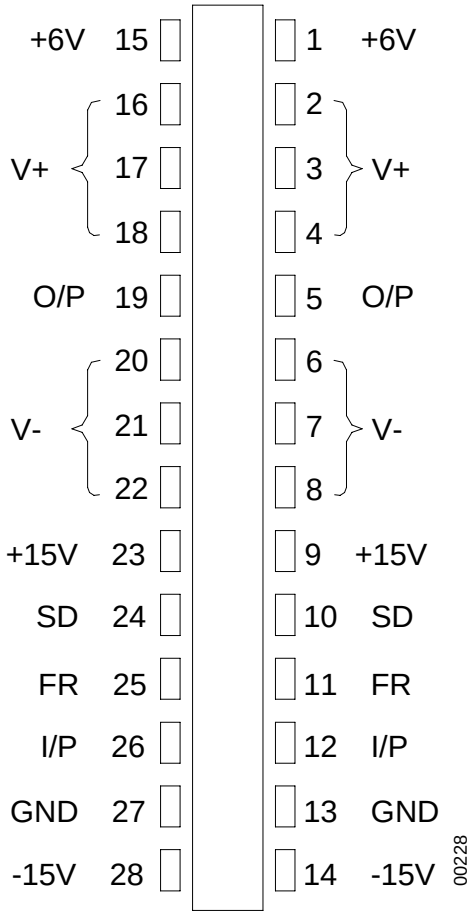
LEGEND		
1	Dual RCA jack	108320
2	Power Transformer	80116
3	Level Pot	40402
4	Crossover CONTROL	40707
5	Fuse Clips (2)	70323
6	2A SloBlo T Type Fuse (3AG)	80117
7	Power Switch	70151

Amplifier Faceplate Parts



Integrated Circuit Diagrams

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.

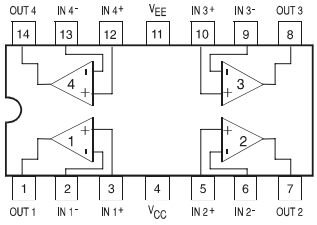
1. Align white indent marker on Amp Module with indent marker on main PCB; alternately observe position of label on top of the module; incorrectly replacing the Module 180° in the PCB slot will result in its destruction.
2. All AC powered test instruments (meters, oscilloscopes, etc.) must have a floating 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:

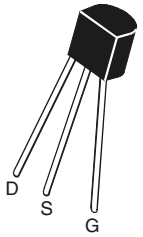
(2) part# 60301S (screws)

(2) part# 60301N (nuts)

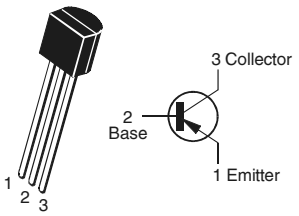
U1,U2 (LM324, TLO64))



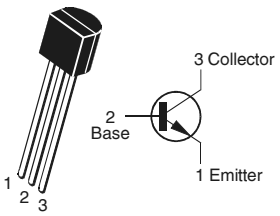
N-Chan JFET
Q1 2N5457



Q10,Q11 (MPSA56)



Q12 (2N4401)



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Testing Procedure

JBL PB12 TESTING PROCEDURE

A. Power Amp Section

Resistance Check	Resistance from O/P of the module to GND should be >1M (NO LOAD)
	Resistance from V+ of the module to V- of the module should read >10k
	Resistance from V+ of the module to O/P of the module should read >1M
	Resistance from V- of the module to O/P of the module should read >1M

2. Power Up LED RED

With a 5mV signal to Low level input, LED should change to GREEN

-Voltage measurements (DVM)

	OP AMP	
LED	P-U1(1)	P-U1(7)
RED	0Vrms	14VDC
GREEN	12Vrms	-14VDC

3. D.C. Operation

-Voltage measurements (DVM) on Power Amp Module

Between	+6V	V+	O/P	V-	+15V	S/D	FR	I/P	GND	-15V
And This Point	V-	GND	GND	GND	GND	V-	GND	GND	GND	GND
Get this Reading	+5.75V	+91.2V	0V	-91.2V	+15.5V	+5.1V	0V	0V	0V	-15.5V

4. Check Switching Frequency

Use scope (EITHER USES AN ISOLATION TRANSFORMER OR ATTACHES THE PROBE TIP TO SPK- and REFERENCE LEAD TO SPK+)

A 10mV signal may need from the input to trigger the **Switch** turn on

Reading 100kHz +/-10%,500mVpp

B. Pre Amp Section

1. Low Level Input Sensitivity

-Set up Turn level , Low-Pass Pot Fully CW and LFE switch off
Generator set at 200mV@50Hz
Signal to Low level input

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Integrated Circuit Diagrams (Cont.)

-Voltage measurements

OP AMP									SPEAKER OUTPUT
U1(7)	U2(7)	U1(1)	U2(1)	U1(14)	U2(14)	U2(8)	PU1(14)	PU1(8)	
354mV	529mV	520mV	736mV	699mV	661mV	1.40V	5.53V	4.79V	26.7V

2. High Level Input Sensitivity

-Set up Turn level , Lo Pass Pot Fully CW and LFE switch off
Set Generator at 2.0V@50Hz
Signal to High level input

-Voltage measurements 24.5V at speaker output

3. Low-Pass

-Set up Set Generator at 200mV@100Hz
Signal to Low level input
Measure voltage at speaker output

-Voltage measurement

Low-Pass Pot Setting	Output
CW	16.1V
CCW	4.60V

4. LFE

-Set up Set Generator at 200mV@200Hz
Signal to Low level input
Measure voltage at speaker output

-Voltage measurement

LFE Switch Setting	Output
OFF	702mV
ON	8.40V

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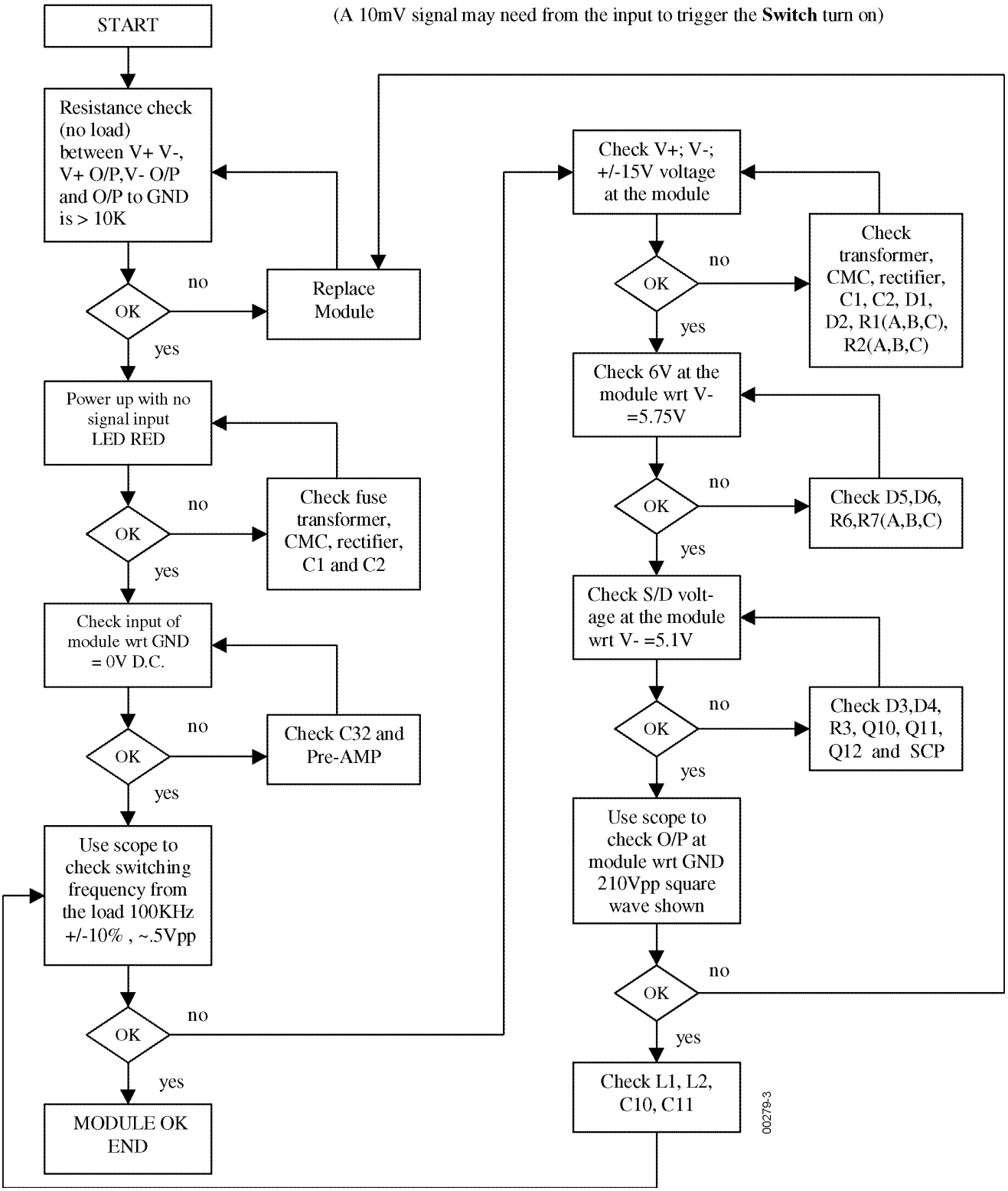
See flow chart next page for diagnostics.

Integrated Circuit Diagrams (Cont.)

PB12 POWER MODULE TESTING FLOW CHART

CAUTION : MODULE OUTPUT IS FLOATING AND IS ***NOT*** PROTECTED AGAINST A SHORT TO GROUND. ALL TEST INSTRUMENTS CONNECTED TO THE OUTPUT ***MUST*** BE FLOATING. ATTACH THE SCOPE PROBE TIP TO SPK - and REFERENCE LEAD TO SPK+.



PB12 Electrical Parts List

PB12 POWER AMP PCB Version 6.3 - 7.0.

Part #	Designator				Description
50100	BR RECT	RS604	6AMP		Bridge rectifier
50105	D1	1N4744A	15V		1w Zener
50112	D10	1N5242B	12V		.5w Zener
50104	D11	1N4148			Sig Diode
50112	D12	1N5242B	12V		.5w Zener
50104	D13	1N4148			Sig Diode
50104	D14	1N4148			Sig Diode
50105	D2	1N4744A	15V		1w Zener
50114	D3	1N5265B	62V		.5w Zener
50104	D4	1N4148			Sig Diode
50113	D5	1N4735A	6.2V		1W
50103	D6	1N5234B	6V		.5w Zener
50104	D7	1N4148			Sig Diode
50104	D8	1N4148			Sig Diode
60157	Q1	2N5457	25V		N-chnl FET
60155	Q10	2N5401	120V		PNP 600mA
60155	Q11	2N5401	120V		PNP 600mA
60156	Q12	2N4401	40V		NPN 600mA
60102	U1	TLO64			Quad OpAmp
Capacitors					
30710	C1	2200uF	100V	+80 / -20	Electrolytic 105C
30718	C10	4u7F	100V		**BP/NP Electr DF<.1**
30523	C11	330nF	100V		mono ceramic
30710	C2	2200uF	100V	+80 / -20	Electrolytic 105C
30532	C20	220nF	250V		metallized polyester
30502	C21	100nF	50V		mono ceramic
30502	C22	100nF	50V		mono ceramic
30527	C24	330nF	50V		mono ceramic
	C25	NOT USED			
30508	C26	10nF	50V		mono ceramic
30513	C27	3n3F	50V		mono ceramic
30502	C3	100nF	50V		mono ceramic
30711	C32	22uF	35V	+80/-20	Electrolytic
30715	C40	10uF	16V	+80/-20	Electrolytic
30716	C41	1uF	16V	+80/-20	Electrolytic
30717	C42	100uF	16V	+80/-20	Electrolytic
30502	C6	100nF	50V		mono ceramic
30521	C7A	100nF	250V		ceramic/film
30521	C7B	100nF	250V		ceramic/film
	CW	NOT USED			
30505	CZ	100nF	100V		ceramic/film

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PB12 Electrical Parts List (Cont.)

PB12 POWER AMP section of PCB Version 6.3 - 7.0

Part #	Designator			Description
Resistors				
	R100	NOT USED		
40105	R10A	0.1R	.5W	metal
40105	R10B	0.1R	.5W	metal
40105	R10C	0.1R	.5W	metal
40420	R11	1k	.25W	carbon
40420	R12	1k	.25W	carbon
40417	R13	47k	.25W	carbon
40718	R14	3k3	.25W	carbon
	R15	NOT USED		
40735	R1A	7k5	2W	metal
40735	R1B	7k5	2W	metal
40735	R1C	7k5	2W	metal
40405	R21	4K7	.25W	carbon
40736	R22	42K2	.25W	metal
40737	R23	187k	.25W	metal
	R24	NOT USED		
	R25	NOT USED		
40722	R26	6k8	.25W	carbon
40738	R27	10k	2W	metal
40739	R28	1k2	0.25W	carbon
40739	R29	1k2	0.25W	carbon
40735	R2A	7k5	2W	metal
40735	R2B	7k5	2W	metal
40735	R2C	7k5	2W	metal
40703	R3	8M2	.25W	carbon
40738	R30	10k	2W	metal
40417	R31	47k	.25W	carbon
40417	R32	47k	.25W	carbon
40427	R33	23k7	.25W	metal
40403	R34	10k	.25W	metal
40740	R4	33k	1W	metal
40420	R40	1k	.25W	carbon
40701	R41	1000k	.25W	carbon
40741	R42	22k	.5W	metal
40701	R43	1000k	.25W	carbon
40406	R44	100k	.25W	carbon
40415	R45	470K	.25W	carbon
40701	R46	1000k	.25W	carbon
40409	R47	10k	.25W	carbon
40409	R48	10k	.25W	carbon
40726	R49	15k	.25W	carbon
40732	R5	56k2	.25W	metal
40727	R50	2k2	.25W	carbon
40111	R6	47R	.25W	carbon
40738	R7A	10k	2W	metal

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PB12 Electrical Parts List (Cont.)

PB12 POWER AMP section of PCB Version 6.3 - 7.0

Part #	Designator			Description
40738	R7B	10k	2W	metal
40738	R7C	10k	2W	metal
40738	R8A	10k	2W	metal
40738	R8B	10k	2W	metal
	R9	NOT USED		
Miscellaneous				
80121	L1	220uH	5 Amp	Gapped Ecore choke
80122	L2	8u5H	5 Amp	ferrite bead
80122	L3	8u5H	5 Amp	ferrite bead
80122	L4	8u5H	5 Amp	ferrite bead
80100	CMC	2m2H	5 Amp	choke
60302	MODULE	S64AMI		
108326	Led Harness	With two LED's,M	Glued into cabinet	
80116	Transformer	MCI4632	100VA	4632 transformer
70151	Switch	SW SPST		Power Switch
70322	LED socket			PCB mount LED socket
80117	3AG FUSE			2A SloBlo T type
70324	0.187" PCB Tabs		7	
70323	PCB Fuse Holders		2	
70325	PB12 faceplate			PB12 faceplate
80105	Power cord			Power cord
70305	Strain relief			Strain relief

PB12 PREAMP PCB Version #6.3

Part#	Designator	Description		
Semiconductors				
60102	U1	TLO 64		OP amp
60100	U2	LM324		OP amp
Capacitors	**Film Caps may be used in any position EXCEPT C1,C2**			
30707	C1	200uF	50V	BP Electrolytic
30504	C10	100nF	50V	mono ceramic
30504	C11	100nF	50V	mono ceramic
30504	C12	100nF	50V	mono ceramic
30504	C13	100nF	50V	mono ceramic
30530	C16	100nF	50V	mono ceramic
30531	C17	150nF	50V	mono ceramic
30100	C18	330pF	50V	mono ceramic
30100	C19	330pF	50V	mono ceramic
30707	C2	200uF	50V	BP Electrolytic
30502	C20	100nF	50V	mono ceramic

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PB12 Electrical Parts List (Cont.)

PB12 PREAMP section of PCB Version 6.3 - 7.0

Part #	Designator			Description
30502	C21	100nF	50V	mono ceramic
30502	C22	100nF	50V	mono ceramic
30502	C23	100nF	50V	mono ceramic
30101	C3	220pF	50V	mono ceramic
	C30	NOT USED		
30101	C4	220pF	50V	mono ceramic
30101	C5	220pF	50V	mono ceramic
30101	C6	220p	50V	mono ceramic
	C7	0r		
	C8	0r		
40730	C9	1k	.25W	Metal Resistor
Resistors				
40405	R1	4k7	.25W	carbon
40409	R10	10k	.25W	carbon
40731	R11	59k	.25W	carbon
40504	R12	45k3	.25W	metal
40412	R13	33k2	.25W	metal
40709	R14	68k1	.25W	metal
	R15	NOT USED		
	R16	NOT USED		
40732	R17	56k2	.25W	metal
40722	R18	6k8	.25W	carbon
40722	R19	6k8	.25W	carbon
40405	R2	4k7	.25W	carbon
40722	R20	6k8	.25W	carbon
	R21	0r		
40722	R22	6k8	.25W	carbon
	R23	0r		
40109	R24	604r	.25W	metal
40412	R25	33k2	.25W	metal
40405	R26	4k7	.25W	metal
40109	R27	604r	.25W	metal
40412	R28	33k2	.25W	metal
40406	R3	100k	.25W	carbon
40403	R30	10k	.25W	metal
40733	R33	12k1	.25W	metal
40734	R34	120k	.25W	metal
40451	R35	137k	.25W	metal
40406	R4	100k	.25W	carbon
40406	R5	100k	.25W	carbon

PB12 Electrical Parts List (Cont.)

PB12 PREAMP section of PCB Version 6.3 - 7.0

Part #	Designator			Description
Miscellaneous				
108320	RCA CONNECTOR			DUAL RCA-yellow
108116	HI LEVEL I/O	Binding Post	OUT	Binding Post
108116	HI LEVEL I/O	Binding Post	IN	Binding Post
40402	LEVEL	5k POT		Log (A) Pot
40707	Crossover CONTROL	20k POT		Lin (B) Pot.
70150	LFE switch	SW SPDT		mini-Toggle
70150	Phase Switch	SW SPDT		mini-Toggle

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PB12 Electrical Parts List Version 7.2

Part#	Ref. Designator	Description				

POWERAMP section of PCB Version 7.2

Resistors

40735	R1A	7k5	2W	5%	metal	***SAFETY***
40735	R1B	7k5	2W	5%	metal	***SAFETY***
40735	R1C	7k5	2W	5%	metal	***SAFETY***
40735	R2A	7k5	2W	5%	metal	***SAFETY***
40735	R2B	7k5	2W	5%	metal	***SAFETY***
40735	R2C	7k5	2W	5%	metal	***SAFETY***
40703	R3	8M2	.25W	5%	carbon	
40740	R4	33k	1W	5%	metal	***SAFETY***
40732	R5	56k2	.25W	1%	metal	
40111	R6	47 ohms	.25W	5%	carbon	
40738	R7A	10k	2W	5%	metal	***SAFETY***
40738	R7B	10k	2W	5%	metal	***SAFETY***
40738	R7C	10k	2W	5%	metal	***SAFETY***
40738	R8A	10k	2W	5%	metal	***SAFETY***
40738	R8B	10k	2W	5%	metal	***SAFETY***
	R9	NOT USED				
40105	R10A	0.1 ohms	.5W	5%	metal	
40105	R10B	0.1 ohms	.5W	5%	metal	
40105	R10C	0.1 ohms	.5W	5%	metal	
40420	R11	1k	.25W	5%	carbon	
40420	R12	1k	.25W	5%	carbon	
40417	R13	47k	.25W	5%	carbon	
40718	R14	3k3	.25W	5%	carbon	
	R15	NOT USED				
40405	R21	4K7	.25W	5%	carbon	
40736	R22	42K2	.25W	1%	metal	
40737	R23	187k	.25W	1%	metal	
	R24	NOT USED				
	R25	NOT USED				
40722	R26	6k8	.25W	5%	carbon	
40738	R27	10k	2W	5%	metal	***SAFETY***
40739	R28	1k2	0.25W	5%	carbon	
40739	R29	1k2	0.25W	5%	carbon	
40738	R30	10k	2W	5%	metal	***SAFETY***
40417	R31	47k	.25W	5%	carbon	
40417	R32	47k	.25W	5%	carbon	
40427	R33	23k7	.25W	1%	metal	
40403	R34	10k	.25W	1%	metal	
40407	R35	220K	.25W	5%	carbon	
40420	R40	1k	.25W	5%	carbon	
40701	R41	1000k	.25W	5%	carbon	
40741	R42	22k	.5W	5%	metal	
40701	R43	1000k	.25W	5%	carbon	
40406	R44	100k	.25W	5%	carbon	
40415	R45	470K	.25W	5%	carbon	
40701	R46	1000k	.25W	5%	carbon	
40409	R47	10k	.25W	5%	carbon	
40409	R48	10k	.25W	5%	carbon	

Part#	Ref. Designator	Description				
40726	R49	15k	.25W	5%	carbon	
40727	R50	2k2	.25W	5%	carbon	
Capacitors						
30710	C1	2200uF	100V	+80/-20	Electrolytic 105C	***SAFETY***
30710	C2	2200uF	100V	+80/-20	Electrolytic 105C	***SAFETY***
30502	C3	100nF	50V	20%	mono ceramic	
30502	C6	100nF	50V	20%	mono ceramic	
30521	C7A	100nF	250V	20%	ceramic/film	***SAFETY***
30521	C7B	100nF	250V	20%	ceramic/film	***SAFETY***
30718	C10	4u7F	100V	20%	BP/NP Electr DF<.1	
30523	C11	330nF	100V	20%	mono ceramic	
30532	C20	220nF	250V	20%	metallized polyester	
30502	C21	100nF	50V	20%	mono ceramic	
30502	C22	100nF	50V	20%	mono ceramic	
30527	C24	330nF	50V	5%	mono ceramic	
	C25	NOT USED				
30508	C26	10nF	50V	10%	mono ceramic	
30513	C27	3n3F	50V	10%	mono ceramic	
30711	C32	22uF	35V	+80/-20	Electrolytic	
30715	C40	10uF	16V	+80/-20	Electrolytic	
30716	C41	1uF	16V	+80/-20	Electrolytic	
30717	C42	100uF	16V	+80/-20	Electrolytic	
	CW	NOT USED				
30505	CZ	100nF	100V	20%	ceramic/film	
Semiconductors						
50105	D1	1N4744A	15V		1w Zener	
50105	D2	1N4744A	15V		1w Zener	
50114	D3	1N5265B	62V		.5w Zener	
50115	D4	1N4938		5%	Sig Diode	
	EDN 10025 changes D4 on poweramp section from 1N4148 to 1N4938 part # 50115 June 26					
50113	D5	1N4735A	6.2V		1W	
50103	D6	1N5234B	6V		.5w Zener	
50104	D7	1N4148		5%	Sig Diode	
50104	D8	1N4148		5%	Sig Diode	
50112	D10	1N5242B	12V	5%	.5w Zener	
50104	D11	1N4148			Sig Diode	
50112	D12	1N5242B	12V		.5w Zener	
50104	D13	1N4148			Sig Diode	
50104	D14	1N4148			Sig Diode	
60157	Q1	2N5457	25V		N-chnl FET	
60155	Q10	2N5401	120V		PNP 600mA	
60155	Q11	2N5401	120V		PNP 600mA	
60156	Q12	2N4401	40V		NPN 600mA	
50100	DIODE BRIDGE	RS604	6AMP		Bridge rectifier	***SAFETY***
60102	U1	TLO64			Quad OpAmp	
60302	MODULE	S64AMI			Power Amp Module	***SAFETY***
Miscellaneous						
80121	L1	220uH	5 Amp	5%	Gapped Ecore choke	
80122	L2	8u5H	5 Amp	5%	ferrite bead	

Part#	Ref. Designator	Description				
80122	L3	8u5H	5 Amp	5%	ferrite bead	
80122	L4	8u5H	5 Amp	5%	ferrite bead	
80138	CMC	3m6H	5 Amp		choke	***SAFETY***
70322	LED 3	Molex 2 header			Male connector	
108326	LED Harness	Molex 2 socket	Glued into cabinet		With 2 Bi-color LED	
70323	3AG TYPE	3AG PC CLIP			2 PCB-mount fuse clips	***SAFETY***
80117	3AG FUSE	2A fuse			SloBlo, 3AG	***SAFETY***
70324	0.187" Tabs	6			0.187" PCB fastons	
70328	0.250" Tabs	1			0.250" PCB fastons	
70325	PB12 faceplate				PB12 faceplate	
80105	Power cord				Power cord	***SAFETY***
70305	Strain relief				Strain relief	***SAFETY***
70151	Switch	SW SPST			Power Switch	***SAFETY***
80116	Transformer	MCI4632	100VA		4632 transformer	***SAFETY***

PREAMP section of PCB Version 7.2

Resistors

40405	R1	4k7	.25W	5%	carbon
40405	R2	4k7	.25W	5%	carbon
40406	R3	100k	.25W	5%	carbon
40406	R4	100k	.25W	5%	carbon
40406	R5	100k	.25W	5%	carbon
40406	R6	100k	.25W	5%	carbon
40717	R8	2k7	.25W	5%	carbon
40717	R9	2k7	.25W	5%	carbon
40409	R10	10k	.25W	5%	carbon
40731	R11	59k	.25W	5%	carbon
40504	R12	45k3	.25W	1%	metal
40412	R13	33k2	.25W	1%	metal
40709	R14	68k1	.25W	1%	metal
	R15	NOT USED			
	R16	NOT USED			
40732	R17	56k2	.25W	1%	metal
40722	R18	6k8	.25W	5%	carbon
40722	R19	6k8	.25W	5%	carbon
40722	R20	6k8	.25W	5%	carbon
	R21	0 ohms			
40722	R22	6k8	.25W	5%	carbon
	R23	0 ohms			
40109	R24	604 ohms	.25W	1%	metal
40412	R25	33k2	.25W	1%	metal
40405	R26	4k7	.25W	1%	metal
40109	R27	604 ohms	.25W	1%	metal
40412	R28	33k2	.25W	1%	metal
40403	R30	10k	.25W	1%	metal
40733	R33	12k1	.25W	1%	metal
40734	R34	120k	.25W	1%	metal
40451	R35	137k	.25W	1%	metal
40402	LEVEL	5k POT		20%	Log (A) Pot
40707	LOPASS	Dual 20k POT		20%	Lin (B) Pot.

Capacitors Film Caps may be used in any position EXCEPT C1,C2

Part#	Ref. Designator	Description			
30707	C1	200uF	50V	20%	BP Electrolytic
30707	C2	200uF	50V	20%	BP Electrolytic
30101	C3	220pF	50V	20%	mono ceramic
30101	C4	220pF	50V	20%	mono ceramic
30101	C5	220pF	50V	20%	mono ceramic
30101	C6	220p	50V	20%	mono ceramic
	C7	0r			
	C8	0r			
40730	C9	1k	.25W	1%	Metal Resistor
30504	C10	100nF	50V	10%	mono ceramic
30504	C11	100nF	50V	10%	mono ceramic
30504	C12	100nF	50V	10%	mono ceramic
30504	C13	100nF	50V	10%	mono ceramic
30530	C16	100nF	50V	5%	mono ceramic
30531	C17	150nF	50V	5%	mono ceramic
30100	C18	330pF	50V	20%	mono ceramic
30100	C19	330pF	50V	20%	mono ceramic
30502	C20	100nF	50V	20%	mono ceramic
30502	C21	100nF	50V	20%	mono ceramic
30502	C22	100nF	50V	20%	mono ceramic
30502	C23	100nF	50V	20%	mono ceramic
	C30	NOT USED			

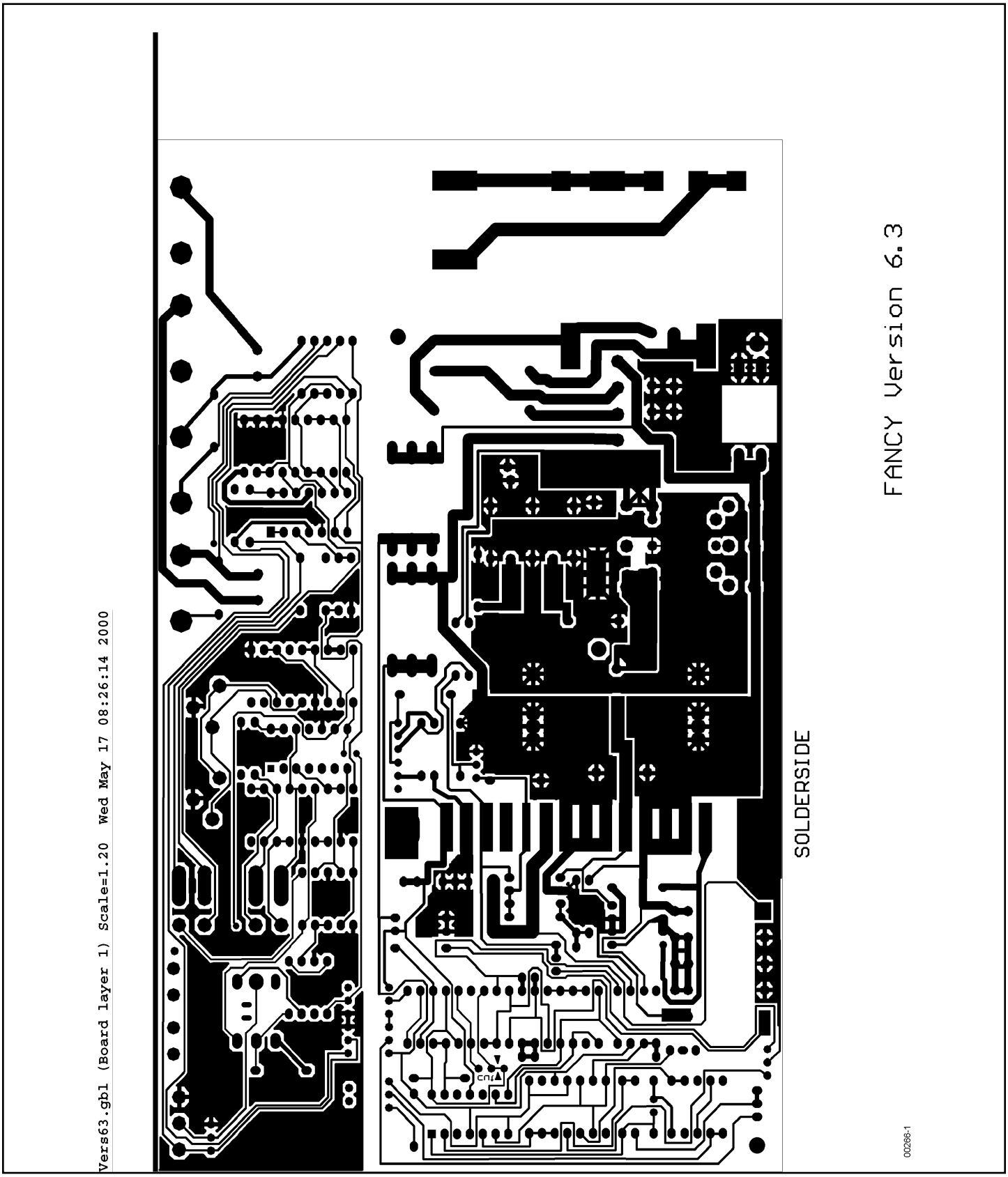
Semiconductors

50104	D50	1N4148		5%	Sig Diode
50104	D51	1N4148		5%	Sig Diode
50104	D52	1N4148		5%	Sig Diode
50104	D53	1N4148		5%	Sig Diode
50104	D54	1N4148		5%	Sig Diode
50104	D55	1N4148		5%	Sig Diode
60102	U1	TLO 64			Quad OP-AMP
60100	U2	LM324			Quad OP-AMP

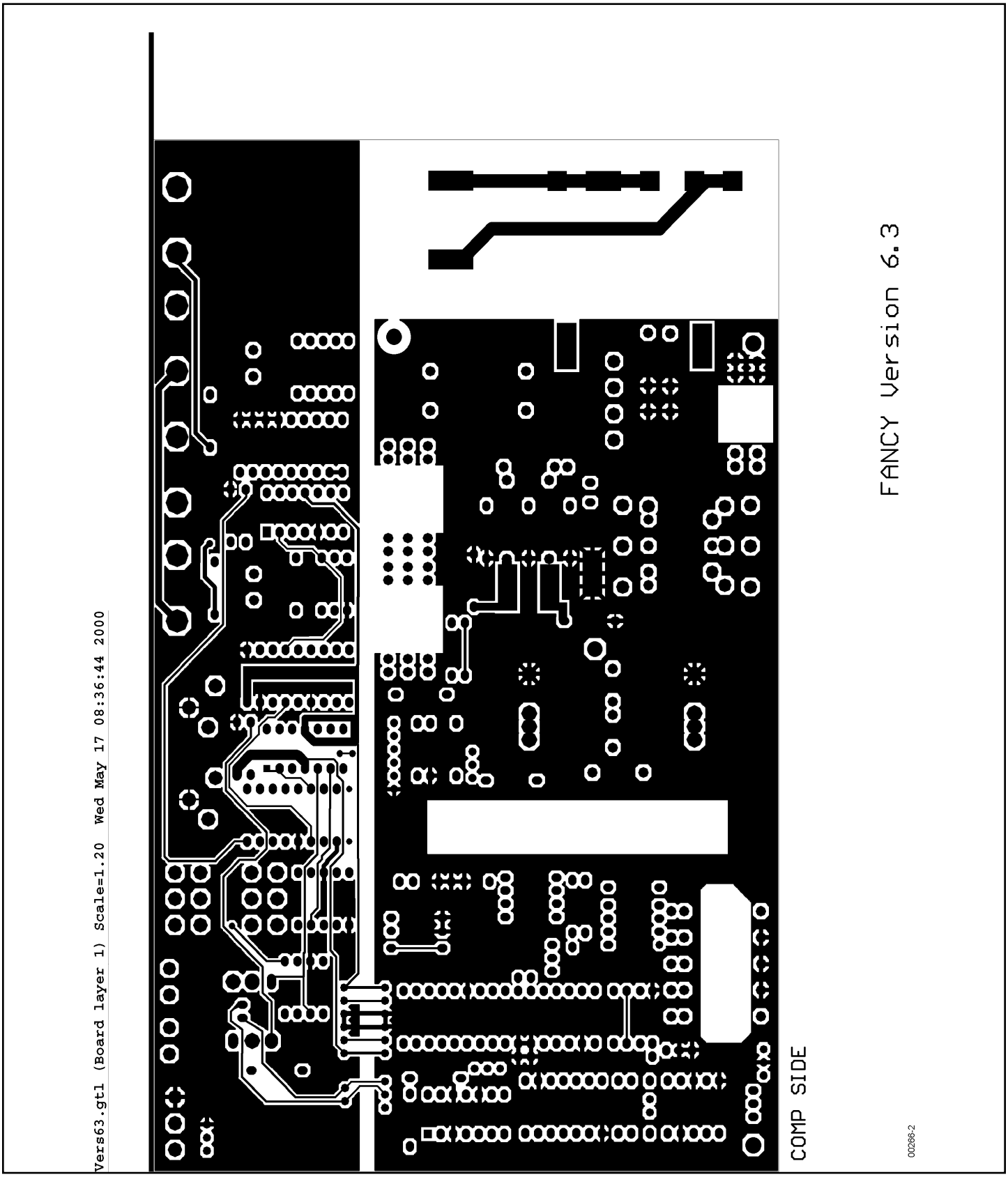
Miscellaneous (See pages 15-17 for more external parts)

70150	LP DEFEAT SW	SW SPDT		mini-Toggle
70150	PHASE SWITCH	SW SPDT		mini-Toggle
108324	Li, Ri	RCA connector	90 Deg	DUAL RCA-yellow
108116	HI LEVEL I/O	Binding Post	OUT	Binding Post
108116	HI LEVEL I/O	Binding Post	IN	Binding Post

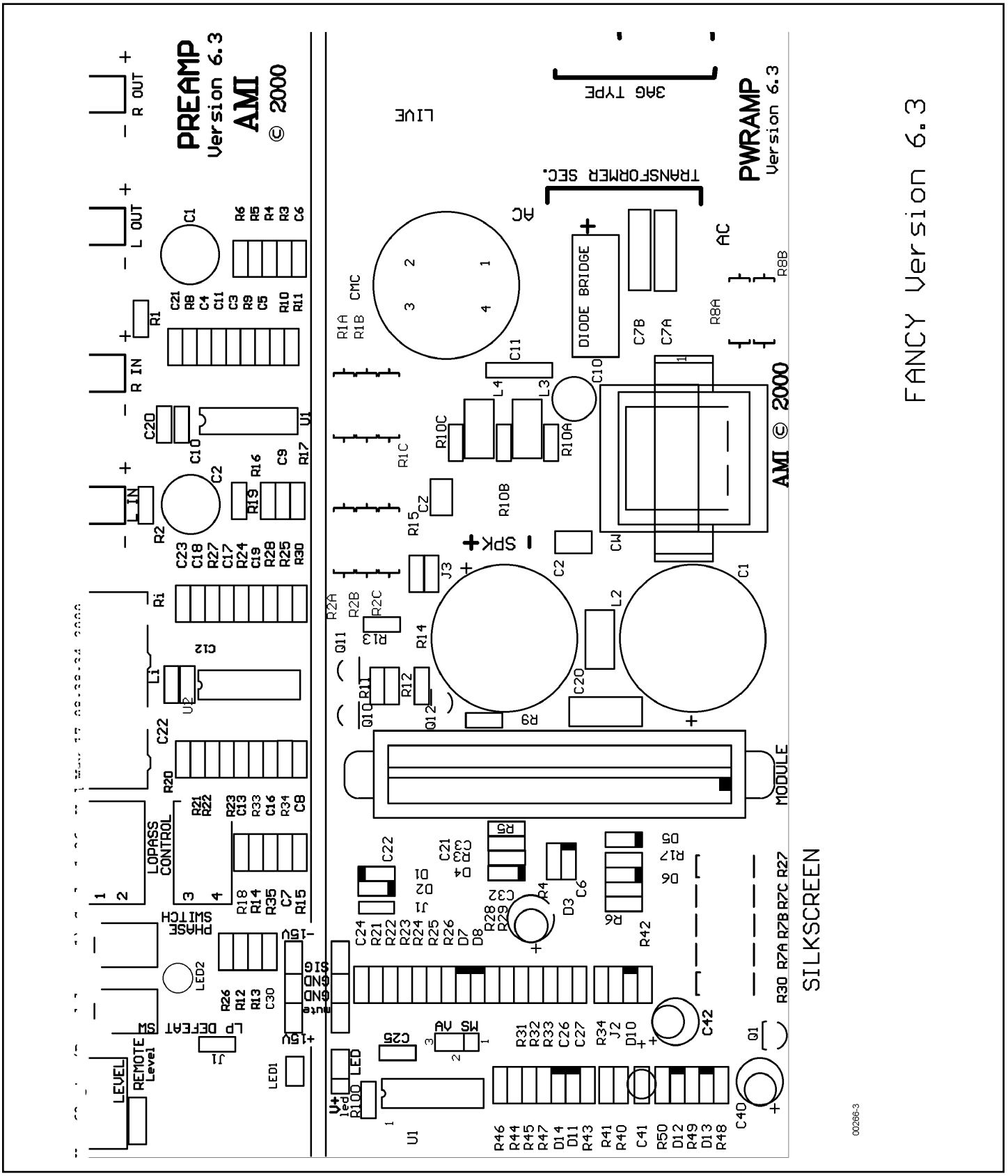
PB12 PCB's version 6.3



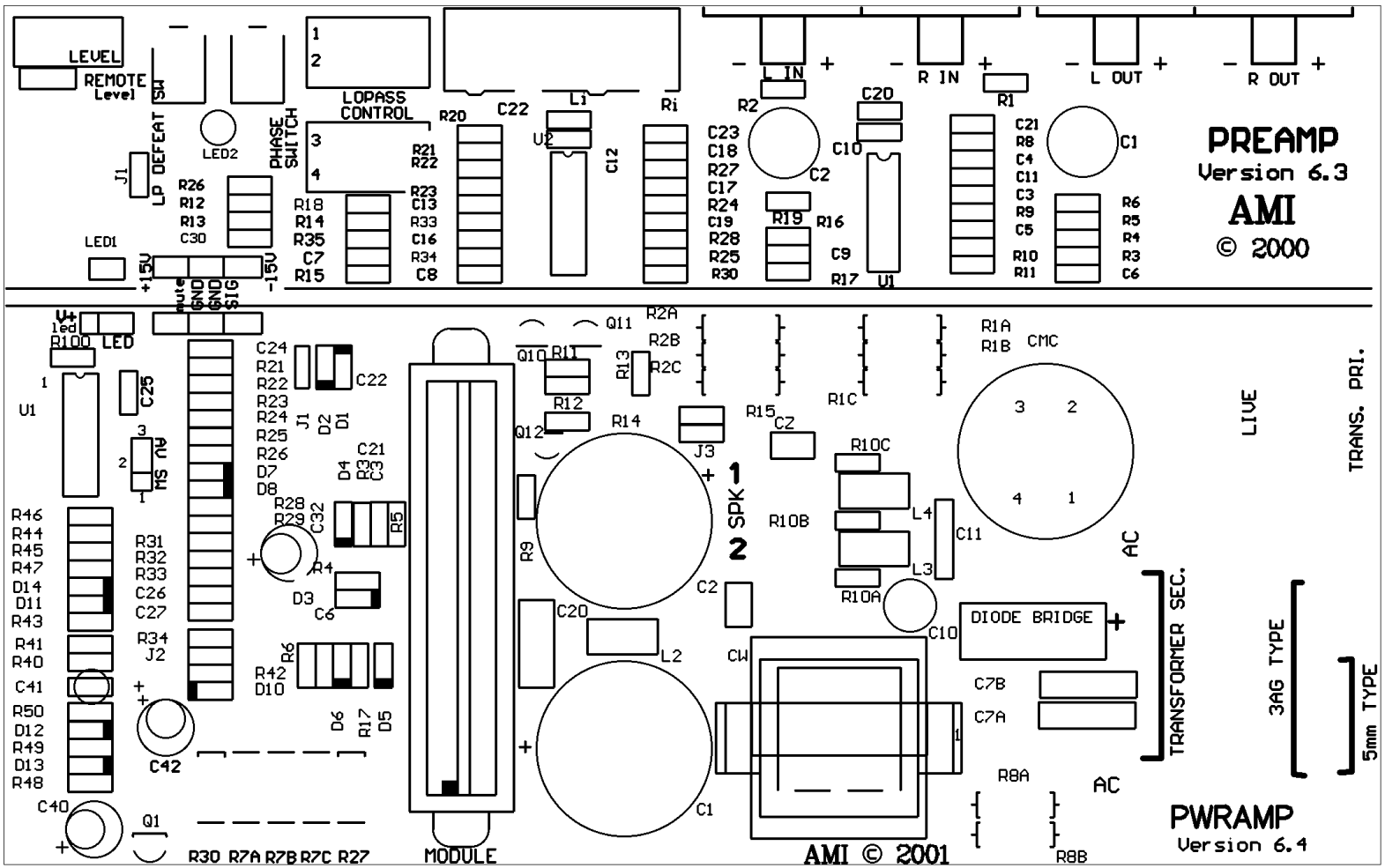
PCB's version 6.3 **(Cont.)**



PCB's version 6.3 (Cont.)



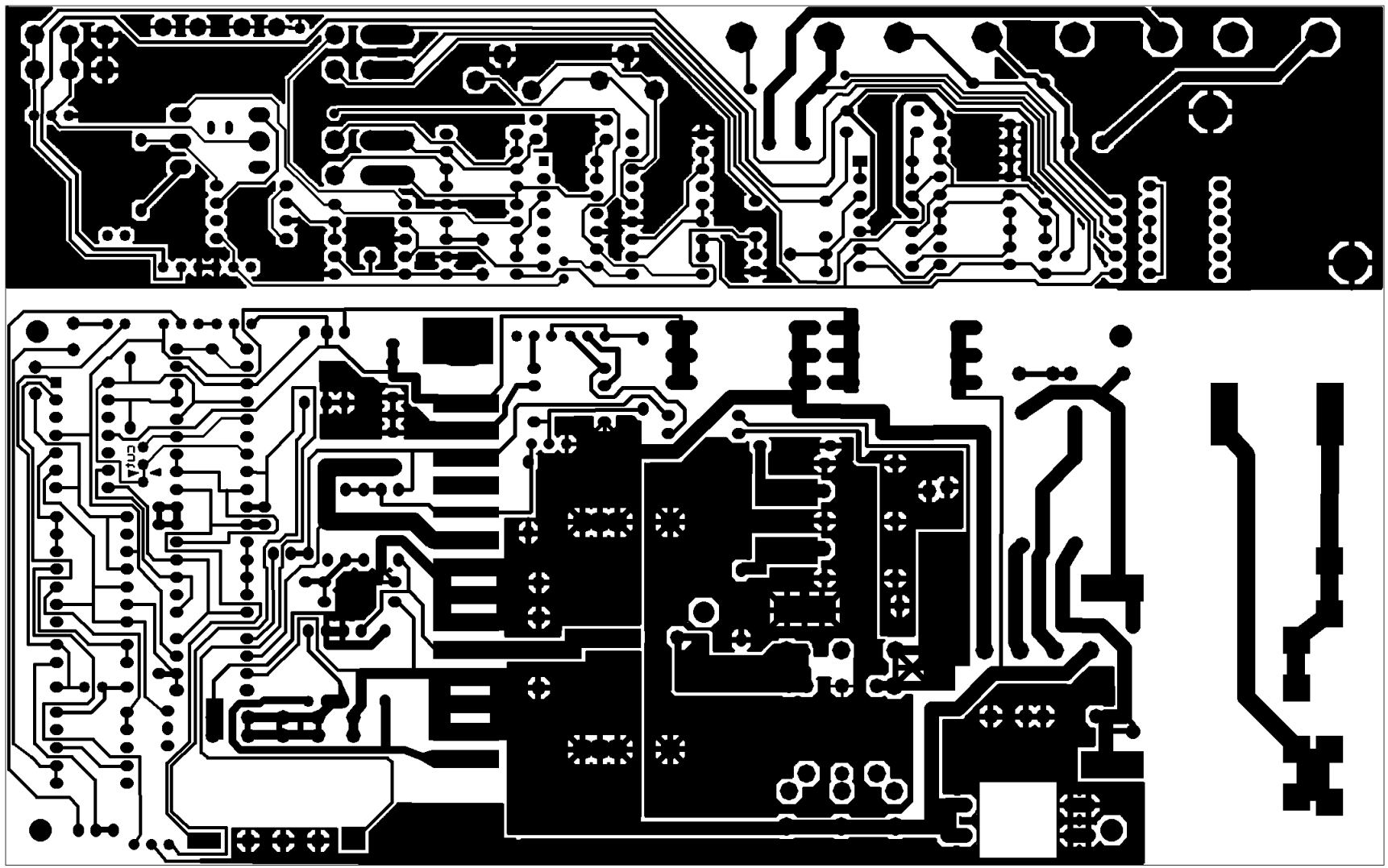
PCB version 6.4 (Power Amp only)



SILKSCREEN

FANCY Version 6

(PCB version 7.2)

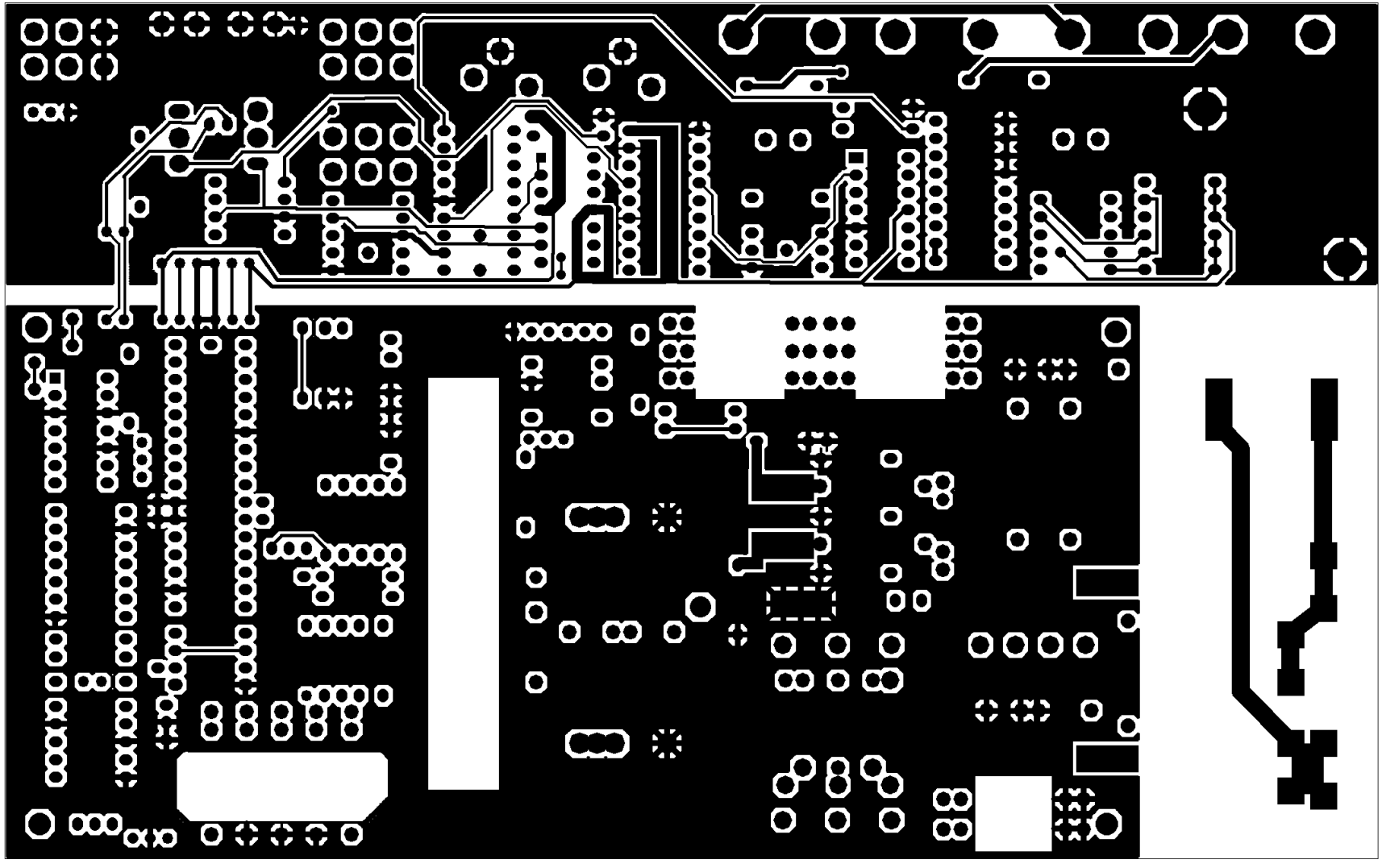


SOLDERSIDE

FANCY Version 7.2

.125 holes NOT thru-plated

(PCB version 7.2)

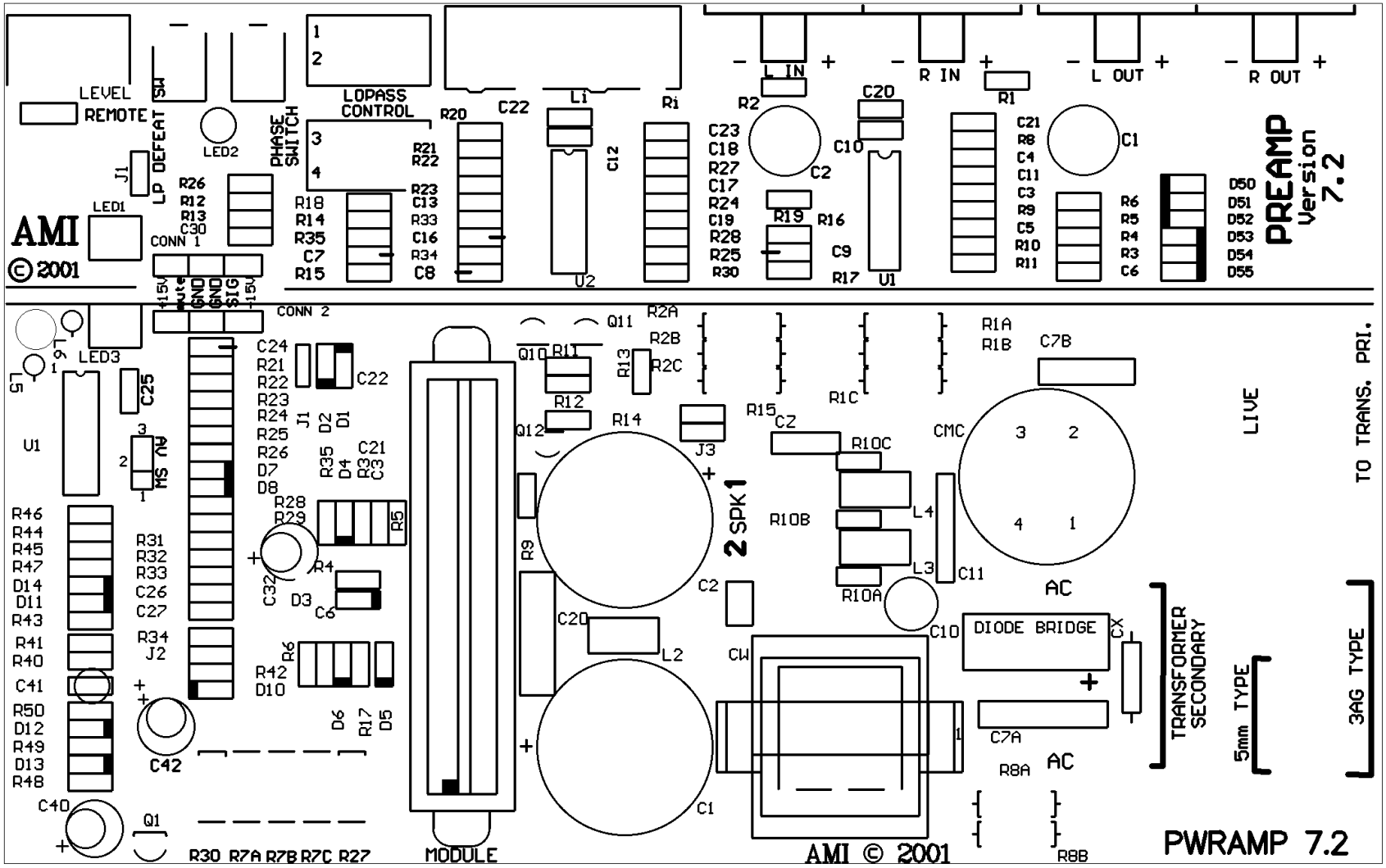


COMP SIDE

FANCY Version 7.2

.125 holes NOT thru-plated

(PCB version 7.2)



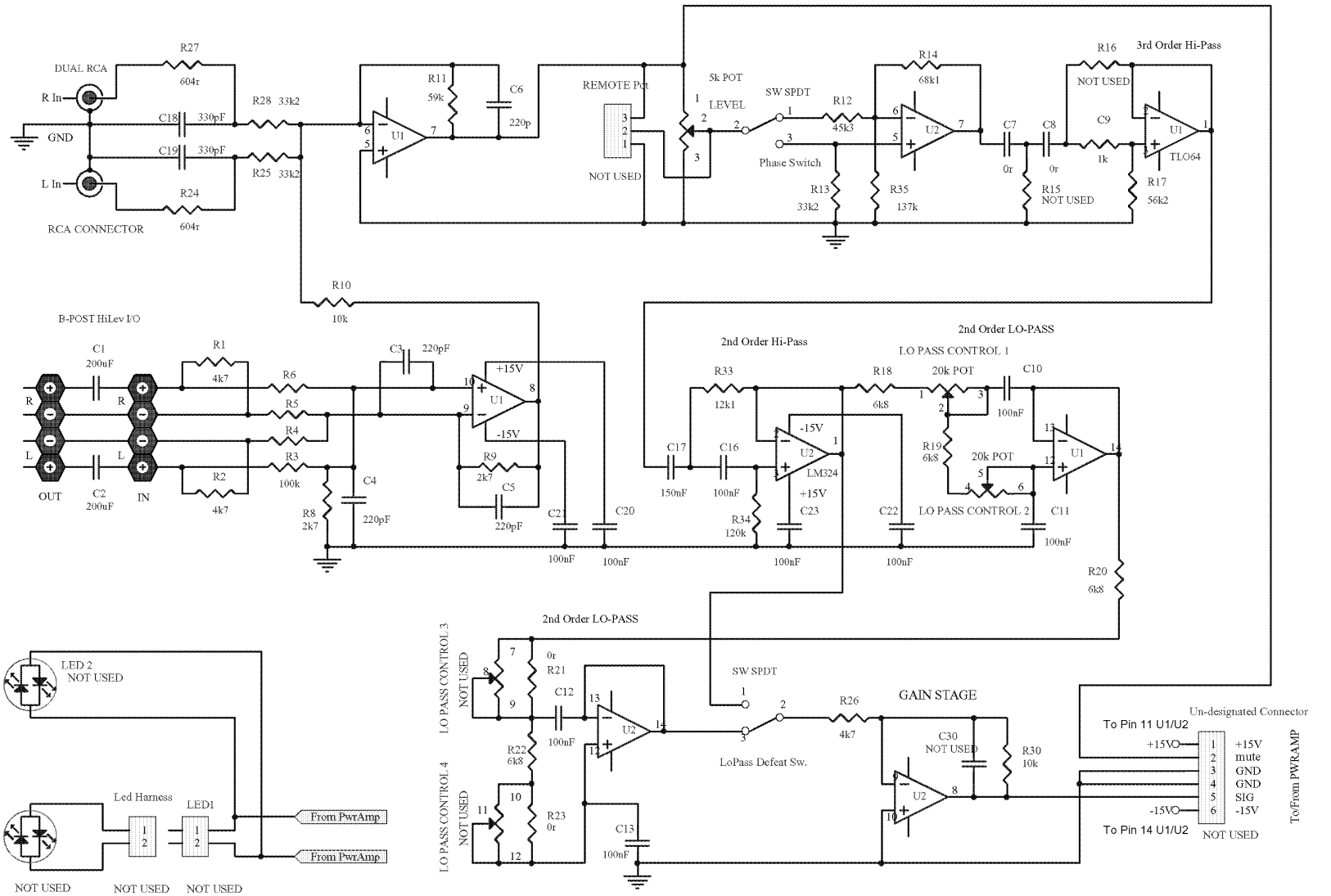
SILKSCREEN

FANCY Version 7.2

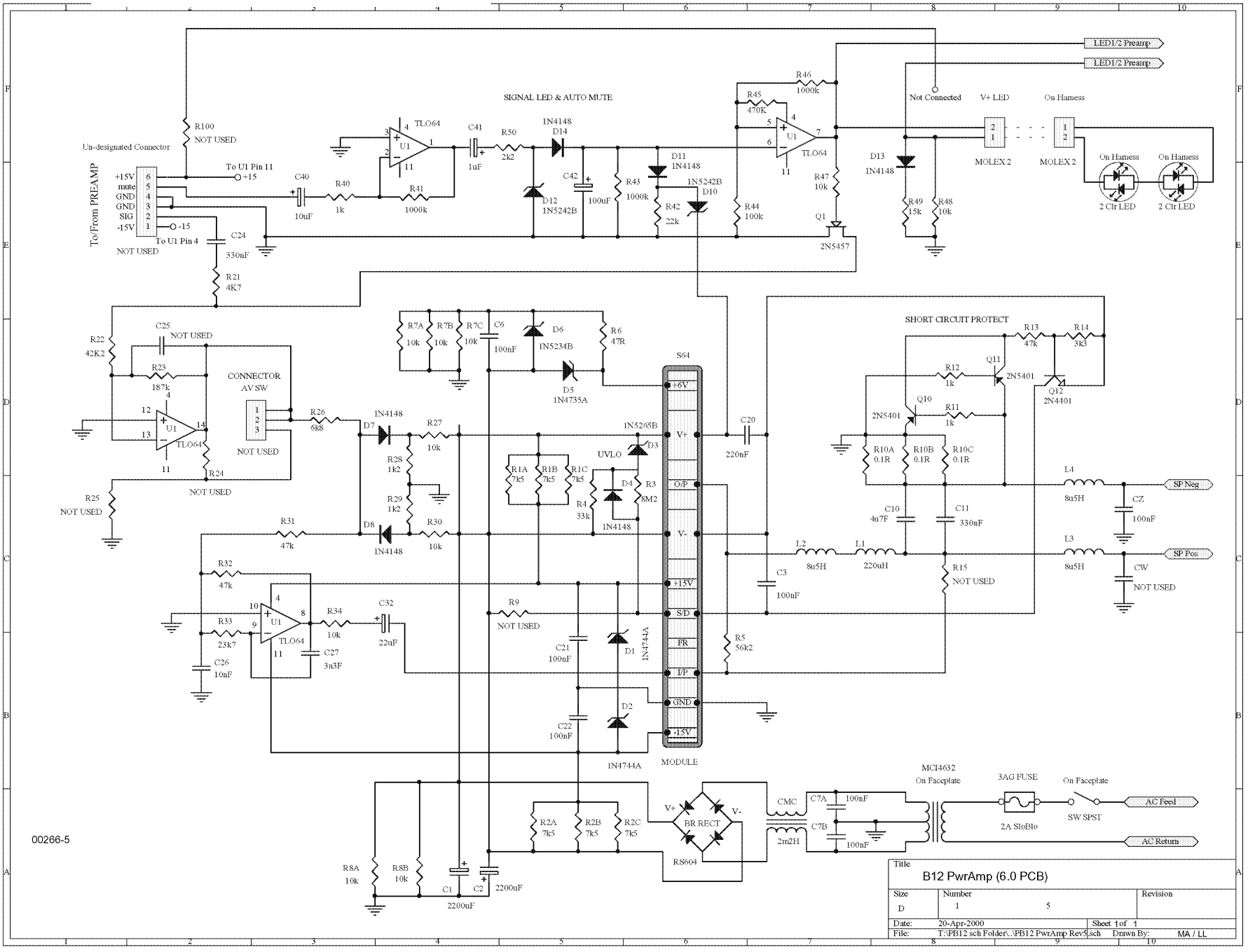
.125 holes NOT thru-plated

SCHEMATIC DIAGRAMS

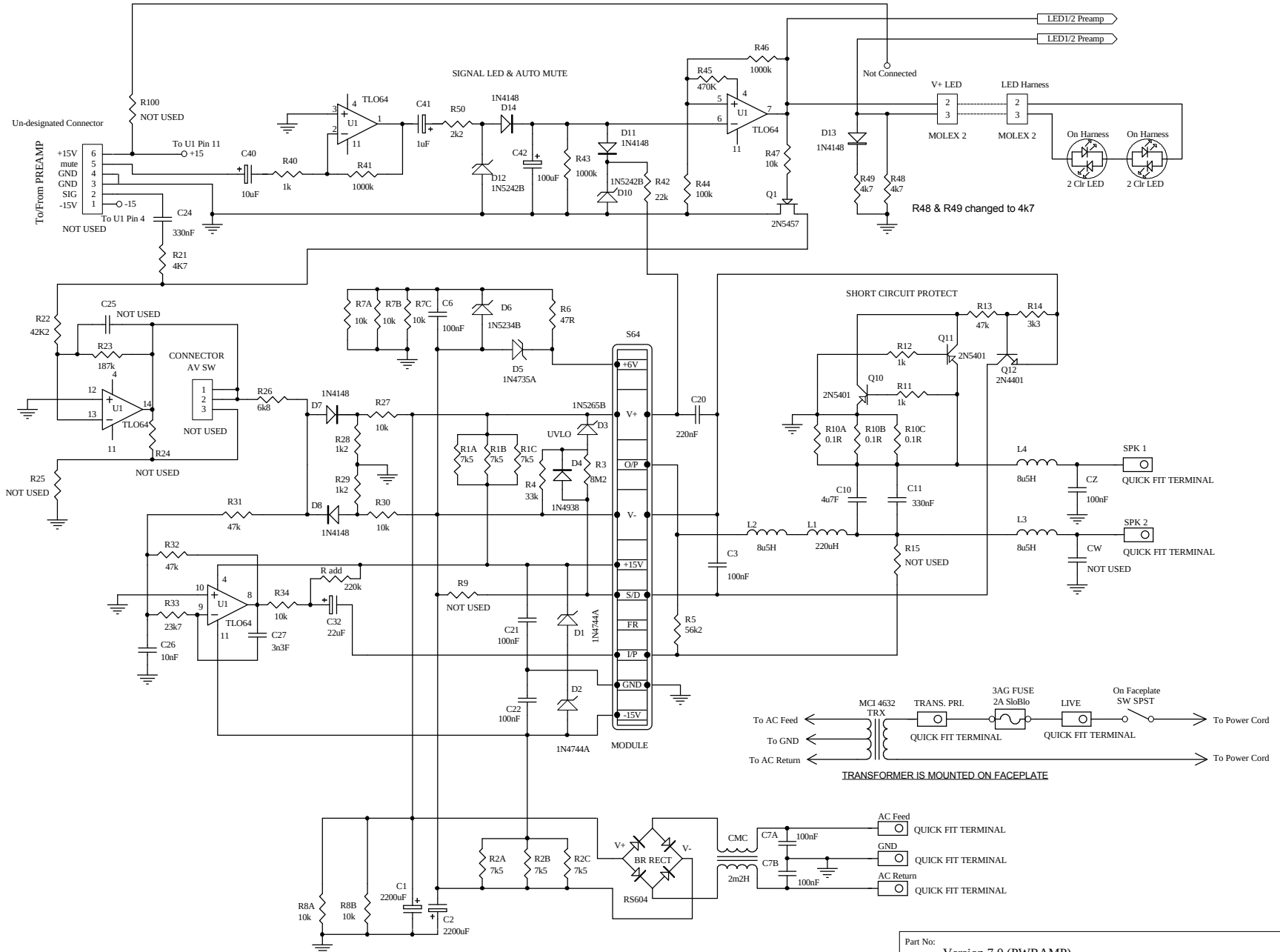
Pre Amp (PCB version 6.3)



Power Amp (PCB version 6.0-6.3)

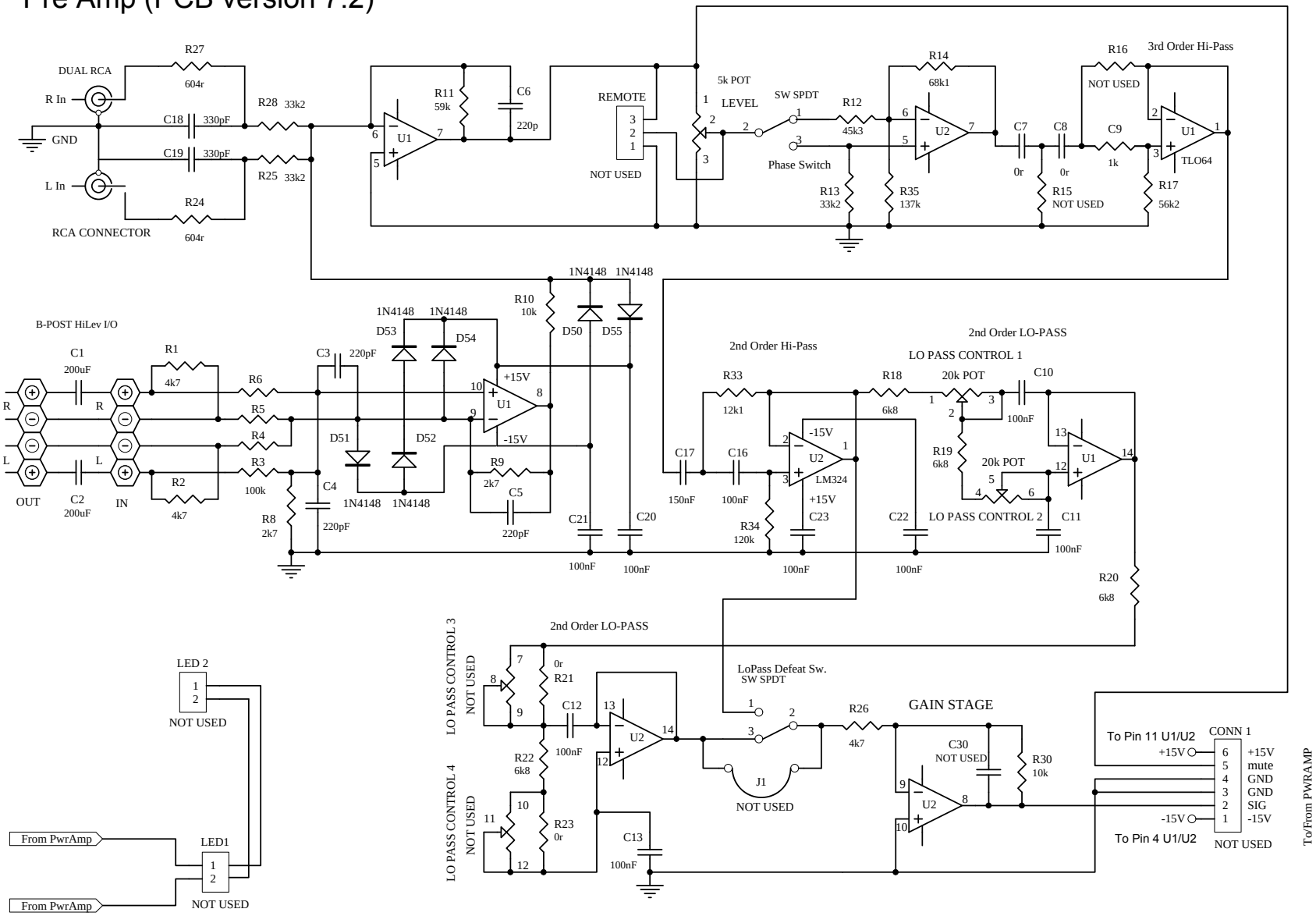


Power Amp (PCB version 7.0)



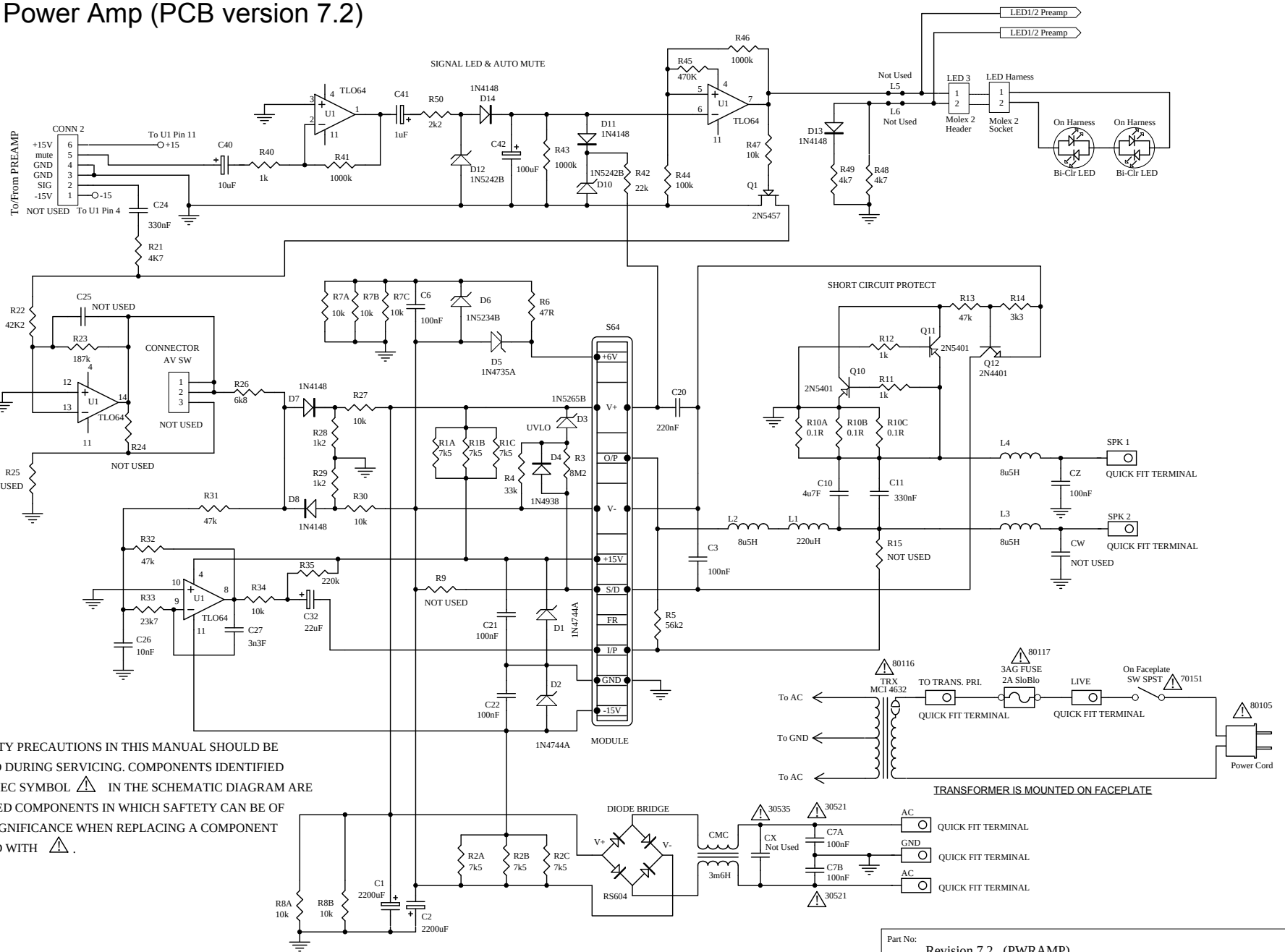
Part No:	Version 7.0 (PWRAMP)
Date:	14-Feb-2001
Drawn:	MS/LL
Rev.	1
Sheet:	2 of 2

Pre Amp (PCB version 7.2)



Part No:	Revision 7.2 (PREAMP)
Date:	25-Oct-2001
Drawn:	MS/LL
Rev. 1	Sheet: 1 of 2

Power Amp (PCB version 7.2)



*ALL SAFETY PRECAUTIONS IN THIS MANUAL SHOULD BE FOLLOWED DURING SERVICING. COMPONENTS IDENTIFIED WITH THE IEC SYMBOL ⚠ IN THE SCHEMATIC DIAGRAM ARE DESIGNATED COMPONENTS IN WHICH SAFTETY CAN BE OF SPECIAL SIGNIFICANCE WHEN REPLACING A COMPONENT IDENTIFIED WITH ⚠ .

Part No:	Revision 7.2 (PWRAMP)
Date:	25-Oct-2001
Drawn:	MS/LL
Rev. 1	Sheet: 2 of 2