



S E R V I C E M A N U A L

ARC SUB 8

Discrete Output, High Current
8" Powered Subwoofer



JBL Consumer Products Inc.
250 Crossways Park Drive
Woodbury, N.Y. 11797

1112-ARCSUB8 Rev C 4/2001



This Product is Part of the ARC CINEMA II SYSTEM

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GENERAL SPECIFICATIONS

Amplifier Power (RMS)	80 watts @ 1% THD
Drivers	8" with high-polymer-laminated cone
Inputs.....	Line Level and High Level
Outputs*	High level with High-Pass filter at 180Hz
Crossover Frequency.....	50-150Hz (continuously variable)
Frequency Response.....	45Hz to 150Hz (determined by crossover setting)
Input Impedance.....	20k ohm
Input Sensitivity.....	220mV

External Dimensions (Inches)

Height	9 ¼"
Width	14"
Depth.....	12 ½"
Weight	18 lbs

External Dimensions (mm)

Height	235 mm
Width	356 mm
Depth.....	318 mm
Weight	8.1 kg

* High-Level (speaker) outputs are active only if high-level input are used.

Occasional refinements may be made to existing products without notice, but will always meet or exceed original specifications unless otherwise stated.

WARRANTY

This amplifier is warranted against defects in material and workmanship for a period of 90 days from date of shipment, when installed in accordance with the owner’s manual in a clean, dry, interior home environment. **THIS AMPLIFIER IS NOT SUITABLE FOR OPERATION OUTSIDE OR IN HARSH ENVIRONMENTS.** During the warranty period, the manufacturer will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be properly packed and returned to a service facility designated by the manufacturer. Buyer shall prepay shipping charges to the designated facility and the manufacturer shall pay shipping charges to return the product to buyer. However, Buyer shall pay all shipping charges, duties and taxes for products returned to the manufacturer from another country.

The manufacturer does not warrant that the operation of the product will be uninterrupted or error-free. The Buyer must determine the suitability of the product for his or her purposes.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied interfacing, unauthorized modification or misuse, operation

outside of the environment specifications for the product including inadequate ventilation, or improper site preparation, installation, or maintenance.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. THE MANUFACTURER SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCLUSIVE REMEDIES

THE REMEDIES PROVIDED HEREIN ARE BUYER’S SOLE AND EXCLUSIVE REMEDIES. THE MANUFACTURER SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

SAFETY SYMBOLS

The following symbols are used throughout this manual and in the product. Familiarize yourself with each of the symbols and its meaning before servicing this amplifier.



Instruction manual symbol. The product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the unit against damage.



Indicates dangerous voltages are present. Be extremely careful.



The **CAUTION** sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in damage to or destruction of the amplifier. Do not

proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.



The **WARNING** sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to could result in injury or loss of life. Do not proceed beyond a **WARNING** sign

until the indicated conditions are fully understood and met.

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GENERAL SAFETY CONSIDERATIONS

THIS UNIT DOES NOT HAVE A POWER SWITCH; HAZARDOUS VOLTAGES ARE PRESENT WITHIN THE UNIT WHENEVER IT IS PLUGGED IN.

There are voltages and hot components at many points in the amplifier which can, if contacted, cause serious injury. Be



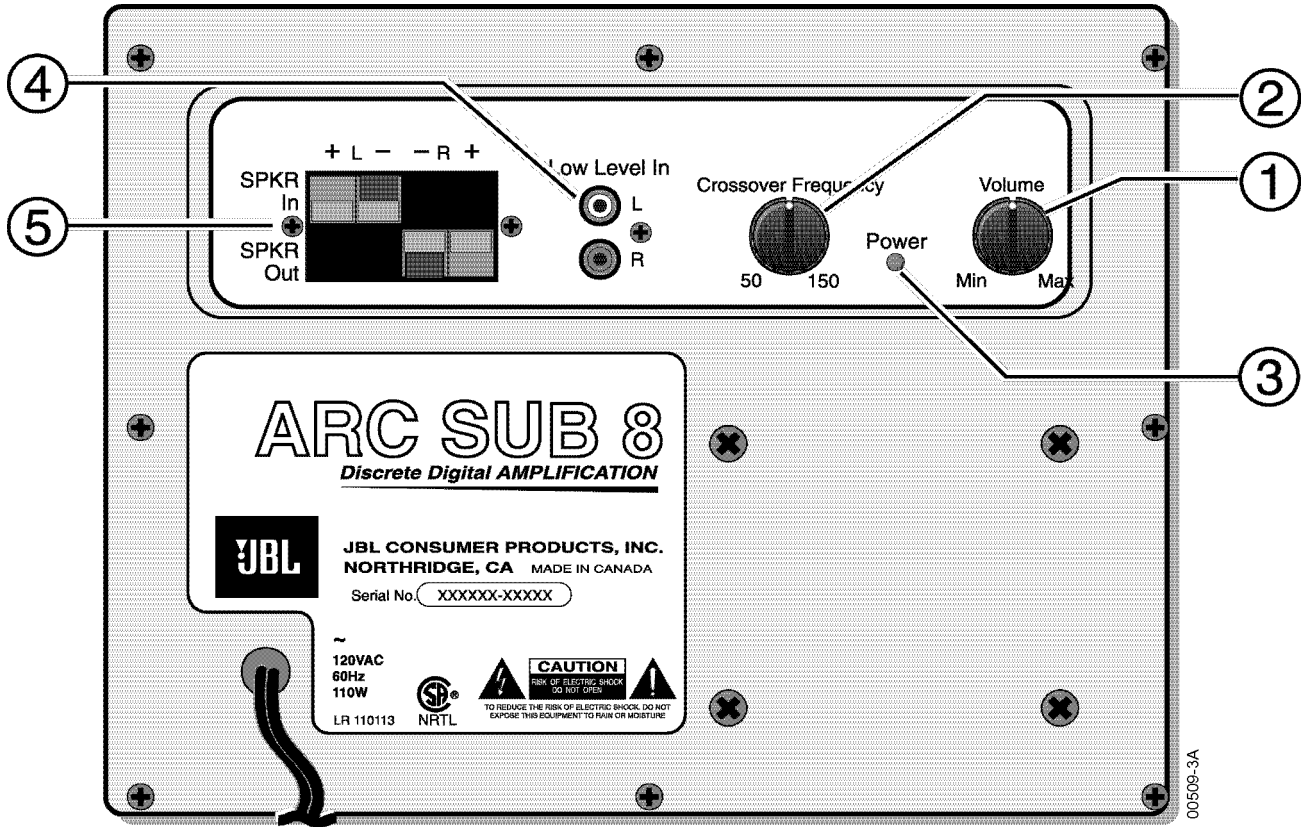
extremely careful. Any adjustments or service procedures that require operation of the amplifier out of its enclosure should be performed only by trained service personnel.



IMPORTANT SERVICE NOTES: When testing the ARC Series amplifier, a load must always be connected to the output terminals, whether the woofer, or a 4 to 8 ohm resistive load.

All AC powered test instruments (meters, oscilloscopes, etc.) must have a floating ground, i.e. be connected to an isolation transformer.

CONTROLS AND THEIR FUNCTION



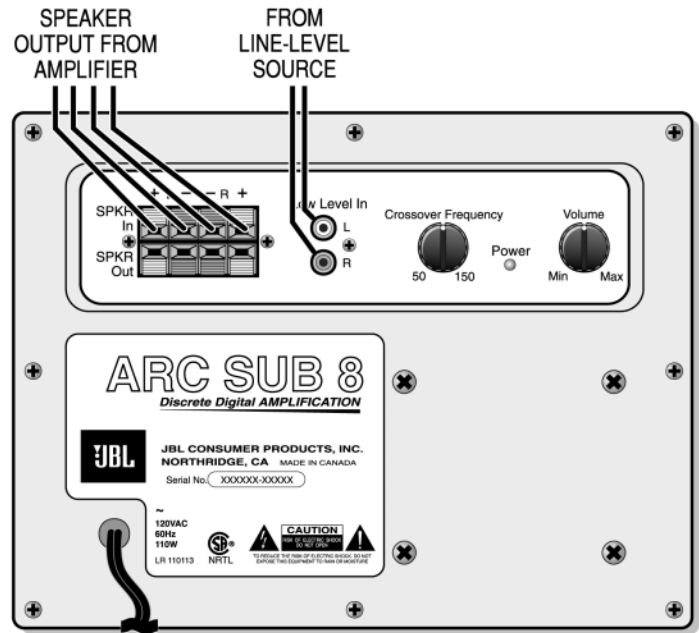
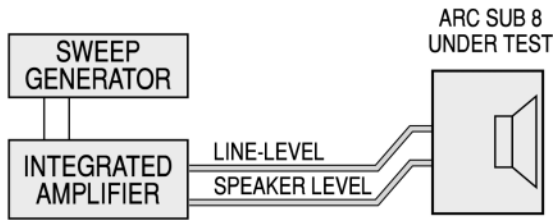
1. **Output Level** - The Output Level adjustment determines volume level strength.
2. **Crossover Frequency** - The Crossover Frequency adjustment determines the highest frequency the ARC SUB 8 will reproduce. It allows a seamless transition from the subwoofer to the satellite speakers.
3. **On (LED)** - This LED will light green when the unit is plugged in and is receiving signal. When in standby mode the LED is red.
4. **Low Level Input** - These left and right Line Level Inputs are normally used when the receiver/processor has line-level "pre-amp out" or "subwoofer out" jacks.
5. **High Level Inputs** - These High Level Inputs are for receivers that do not have line-level "pre-amp out" or "subwoofer out" jacks. When a pair of main or satellite speakers are attached to the OUTPUT terminals, frequencies below 180 Hz are attenuated by the high-pass filter.

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TEST PROCEDURES

EQUIPMENT

- Function generator/signal generator/sweep generator
- Integrated Amplifier
- Multimeter
- Cables - line level (RCA) and speaker cables



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.
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 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 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 **3.2 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.

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CAUTIONS AND WARNINGS

BEFORE THIS AMPLIFIER IS PLUGGED IN, make sure its rated voltage corresponds to the voltage of the AC power source to be employed. Failure to use the correct voltage could cause damage to the amplifier when the AC power cable is plugged in. Do not exceed the rated voltage by more than 10%; operation below 90% will degrade performance or cause the unit to shut off.

1. 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. High Level Inputs should be tested individually both differentially (signal from "-" to "+" with normal output) and in common mode (signal from low level ground to both "+" and "-" shorted together, giving virtually no output). While passing a signal, corner drop the enclosure a few inches to expose possible intermittent problems. Check woofer for rubbing of voice coil or tears in cone or surround. Check cabinet for loose extraneous articles which may have been pushed into front port.

Verify AC plug is disconnected. See WARNINGS in section 2.

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.

CAUTION

If line core or strain relief are replaced, it is necessary to seal them completely to panel with an approved conformal coating to prevent air "whistling" through any openings from woofer pressure.

WARNING

To reduce the risk of 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 4. If exact replacements are not available, order them from the factory or an authorized service center.



2. REMOVING THE AMPLIFIER.

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 PCB drawings for locations of hazards and familiarize yourself with their locations before starting.

- A. Remove the subwoofer grille.
- B. Remove the (4) 1" Black PPH screws attaching the woofer to the cabinet.
- C. Remove the woofer, unplug the two connecting wires.
- D. Remove the (8) 3/4" screws black pph screws attaching the amplifier assembly to the cabinet.
- E. Remove the amplifier assembly.
- F. For access to the input panel, first remove the three outer screws. Remove knob and nuts from potentiometers. Cut away the sealant securing the cover to the faceplate. The input PCB should now pull out completely.



- 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, (see schematic).
- B. With ohmmeter, verify voice coil of woofer is 3.2 ohms, and windings of transformer are continuous.
- C. Examine board and wiring for obvious damage, broken or poorly soldered connections, or discoloration.
- D. Repair or replace items identified above.
- E. For live power testing, attach a 4 ohm 100 watt resistor to the output wires.
- F. If the LED is not on, check for fuse continuity and then for cold solder joints on CMC1 and bridge diode.
- G. With a signal present at the input, the output to the power amp is at pin #8 of U1. If the signal is not present at pin 8, there is a problem with preamp section. Most likely, a cold solder joint will be the problem. Track back the signal path to locate problem.

3. TROUBLE SHOOTING AFTER REMOVAL

WARNING

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CAUTIONS AND WARNINGS (Cont.)

- H. If signal present at pin 8, but still no sound, check for cold solder joints on all power resistors, R4a and R4b and the the power amp module. If C24 is blown, C6 is not soldered or is defective. Check the signal at R2. On the down signal side, the voltage signal should be very small. If signal is similar on both sides of R2, the amp module is likely defective.
- I. If you hear a mechanical clicking noise from the amp module, this indicates that the short circuit protection has been engaged. Check that Q3, Q4 and Q5 are soldered correctly. Also check that Q3 is not shorted to power amp case.
- J. If you have to replace the power module, be very, very patient with the solder removal from this single sided PCB. **COMPLETELY REMOVE SOLDER BEFORE TRYING TO REMOVE THE MODULE!**
- K. Assembly notes. Top side soldering as below:

J5: solder both ends

J3: solder both ends

J1: solder both ends

R48: solder GND end

At junction of C7a/C7b: Pin to GND

Crossover pot Gnd wire from PDB pad to POT barrel. (Only physical contact required between pot body and faceplate).

CAUTION

After repair, inspect for possible safety hazards, including loose hardware, missing lock washers, correct fuse and lead dress of primary wires (these must be held in position with cable ties so that they cannot touch secondary components). With ohmmeter, check that panel is connected to signal ground.

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 metal contact of the RCA jack (chassis) to the line neutral of AC cord. Resistance should be >100MΩ.

B) Hi-Pot Test

If a UL approved Hi-Pot tester is available, test line & neutral of AC cord to outer shell of RCA jack (chassis) at 1100VAC for 2 seconds.

Observe all of instrument manufacturer's instructions and safety warnings in performing this test.

Connect sub-woofer system to a music source. Play at high level while checking for air leaks around panel edge, driver, panel jacks and controls, and voice coil problems such as rubbing or loose turns. With the crossover "frequency" set to 50Hz, very little of the voice content should be heard.

4. REASSEMBLY

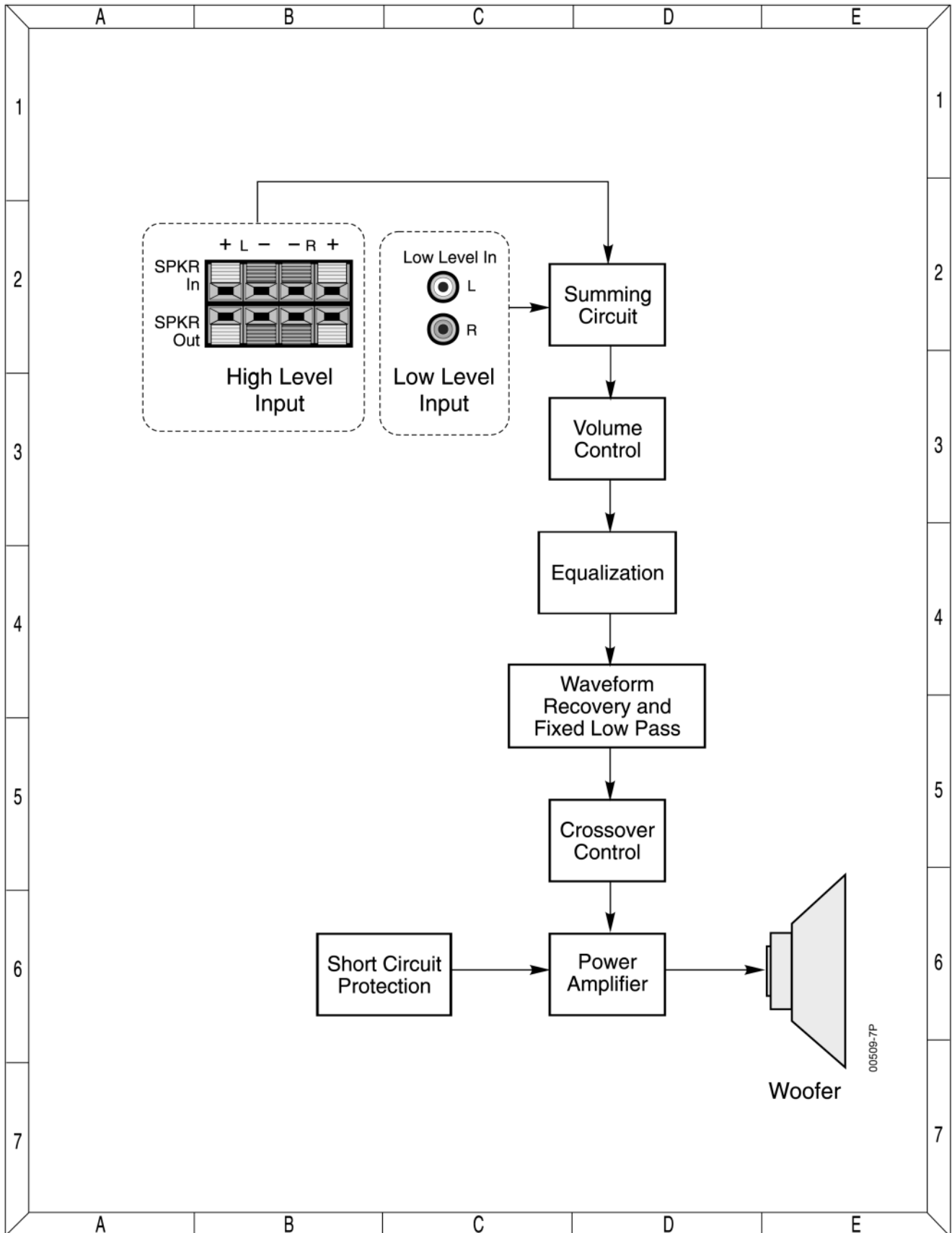
Follow all disassembly instructions in reverse order. If the input plate has been removed, it must be re-sealed with a small bead of silicon seal or air leaks may result.

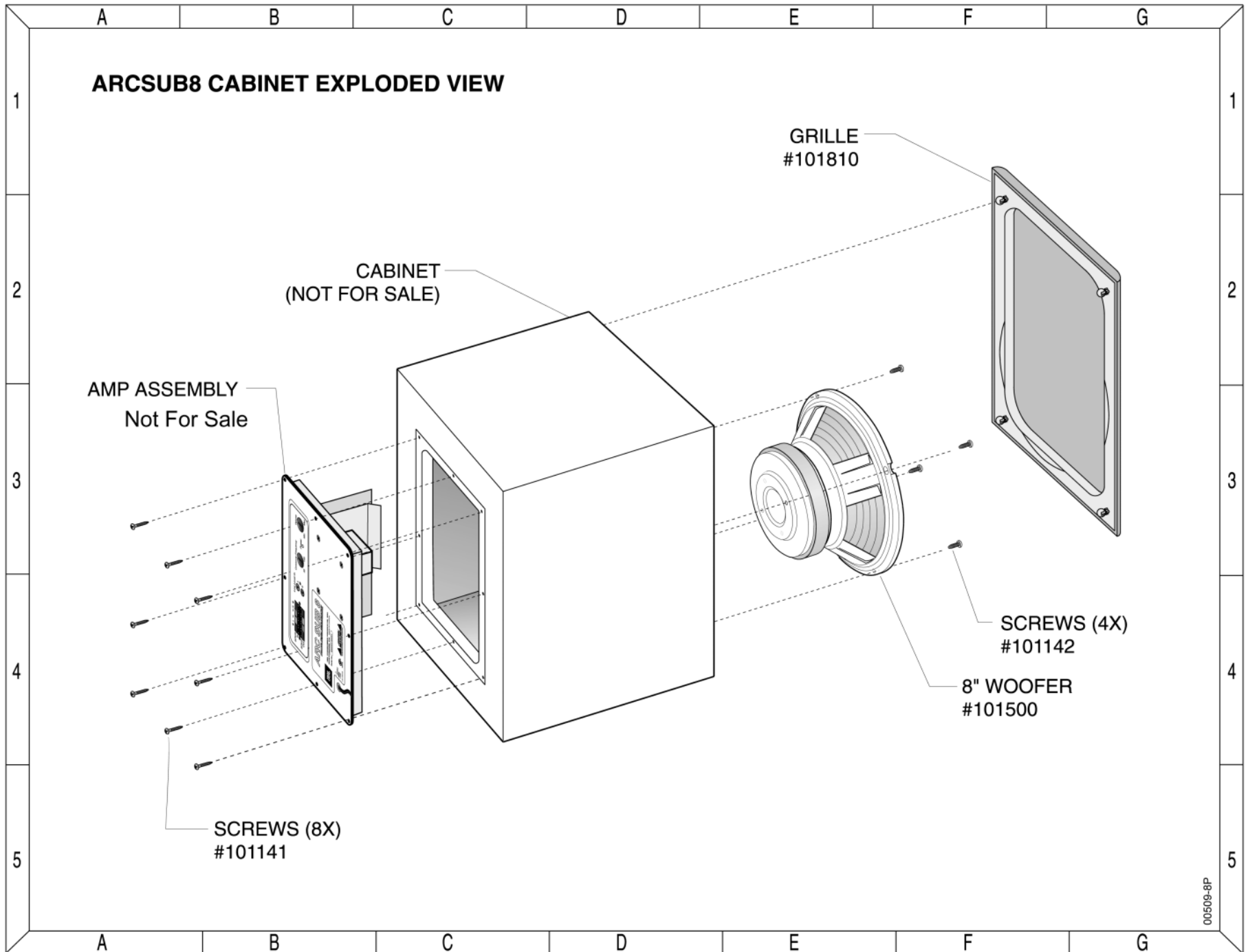
5. LIST OF SAFETY COMPONENTS REQUIRING EXACT REPLACEMENTS

F1	Fuse SLOW BLO 0.5A 250v T type UL approved
CMC1	mc4438 Neosid 28-52, 2x 2.2mH #23 awg @ 2x 24
L1	mc4436 Neosid 32-19 200uH #18SNSR @36
T1	Transformer #4300, Use only factory replacement
PWR CORD	SPT-2 better with polarized plug, UL appoved wired with the hot side to fused side. Use with UL approved panel strain relief only.
BDR	Bridge Rect. 200V 4A Use only factory replacement.
C1, 2	3300uF, 50V Electrolytic Radial. 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 pressures and vibration.
C6	10u 50V Electrolytic Radial.
R29	470Ω 0.25 +-1% Metal
S53AMI	Power Amp Module

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ARC SUB 8 AMPLIFIER BLOCK DIAGRAM





Service Bulletin JBL9903 Rev1 - February 2001

This is considered a Minor repair

To: All JBL Service Centers

Models: PSW-D110, PSW-D112, ARC SUB 8, ARC SUB 10

Subject: Check Solder Joints in Event of Failure

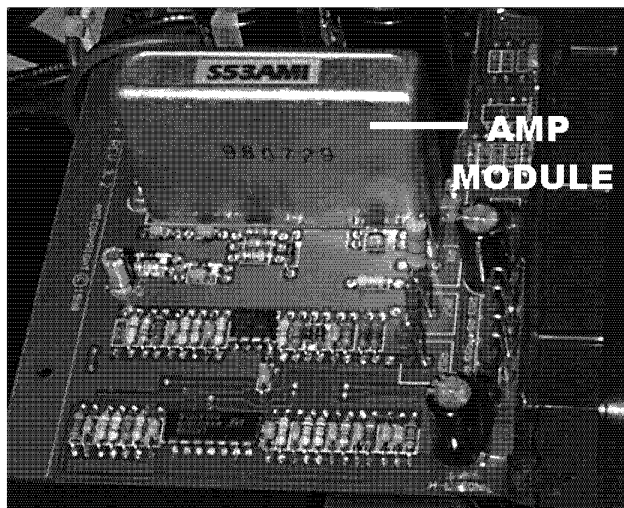
Some performance related complaints in the PSW-D110, PSW-D112, ARC SUB 8 or ARC SUB 10 powered Subwoofers may be caused by cold solder connections between the 28 pins of the Power Amp Module and the main circuit board. When troubleshooting, failure to check these joints can result in erroneous conclusions or wasted time.

In the event you receive a PSW-D110, PSW-D112, ARC SUB 8 or ARC SUB 10 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.

IMPORTANT SERVICE NOTES: When testing the PSW-D, or ARC Series amplifier, a load must always be connected to the output terminals, whether the woofer, or a 4 to 8 ohm resistive load.

All AC powered test instruments (meters, oscilloscopes, etc.) must have a floating ground, i.e. be connected to an isolation transformer.





Service Bulletin

Service Bulletin JBL2000-01 Rev2 - February 2001

Warranty labor rate: MINOR repair

To: All JBL Service Centers

Models: PSW-D110, DPS-10, ARC SUB8, ARC SUB10, DS-10

Subject: Failure of C6

In the event you receive a JBL subwoofer corresponding to one of the above models with the complaint "no output" and capacitor C6 (10uf 50v NPE) is damaged in the amplifier:

Order kit JBL part# 30721 and replace the following included parts:

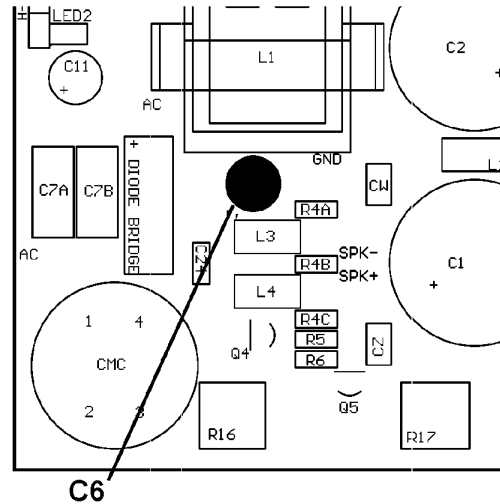
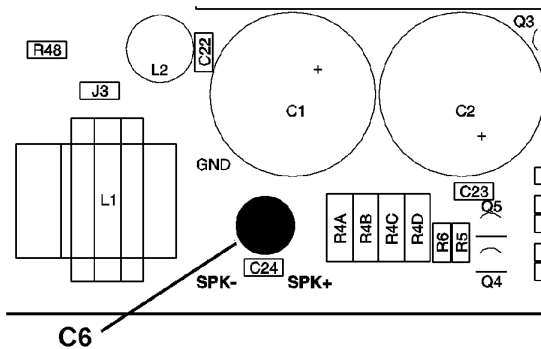
C6 – (10uf 100v NPE cap) C24 – (100nF 50v cap)

R46 – (47 1/4W resistor) R23 – (20k 1/2W resistor – only on models PSW-D110, DPS-10)

50K Crossover potentiometer – (replace only if necessary on models PSW-D110, DPS-10 - outer nut should be finger tight plus 1/8 turn with tool to avoid damage)

ARC SUB8, ARC SUB10, DS-10

PSW-D110, DPS-10



General reference for location only; not all parts or designators may conform to these drawings.

FOLLOWING THE REPAIR:

Follow instructions included in bulletin #JBL9903 rev1.

IMPORTANT SERVICE NOTES: When testing the PSW-D, ARCSUB, or Decade Series amplifier, a load must always be connected to the output terminals, whether the woofer, or a 4 to 8 ohm resistive load.

All AC powered test instruments (meters, oscilloscopes, etc.) must have a floating ground, i.e. be connected to an isolation transformer.

Models	Serial number 120/230V	Status	Action
PSW-D110 DPS-10 ARC SUB8 ARC SUB10 DS-10	All serial numbers affected	Replace if damaged	Replace C6,R23, C24, R46 with JBL part# 30721

00509-10



ARC SUB 8 ELECTRICAL PARTS LIST

Ref #	Part #	Description	Qty.	Ref #	Part #	Description	Qty.
Capacitors				R14, 20	40405	4.7KΩ 1/4W +/-5% CARBON FILM	2
C1, 2	30701	3300μF 50V +/-20% ELECTROLYTIC RADIAL	2	R16, 17	40101	820Ω 2W +/-5% CARBON FILM	2
C3	30501	.1μF 50V +/-20% MONO-CERAMIC AXIAL	1	R18	40407	220KΩ 1/4W +/-5% CARBON FILM	1
C4, 5, 9, 17, 24	30502	.1μF 50V +/-20% BIPOLAR MONO-CERAMIC	5	R22	40410	3.3K 1/4W +/-5% CARBON FILM	1
C6	30705	10μF 50V +/-20% BIPOLAR ELECTROLYTIC RADIAL SEE PAGE 10 (SERVICE BULLETIN JBL2000-01)	1	R26, 49	40701	1 Meg ohm 1/4W +/-5% CARBON FILM	2
C7, 25	30503	.0022μF 50V +/-10% MONO-CERAMIC	2	R27	40411	24.9KΩ 1/4W +/-1% METAL FILM	1
C7A, 7B	30505	.1μF 100V +/-20% METAL POLYESTER RADIAL	2	R29	40103	470KΩ 1/4W +/-1% METAL	1
C8, 10, 14, 18, 19, 20	30504	.1μF 50V +/-10% MONO-CERAMIC	6	R30	40413	274KΩ 1/4W +/-1% METAL FILM	1
C11	30702	100μF 35V +/-20% ELECTROLYTIC RADIAL	1	R31	40414	49.9KΩ 1/4W +/-1% METAL FILM	1
C12	30703	4.7μF 35V +/-20% ELECTROLYTIC RADIAL	1	R32	40415	470KΩ 1/4W +/-5% CARBON FILM	1
C13	30506	.001μF 50V +/-10% MONO-CERAMIC	1	R35	40416	221KΩ 1/4W +/-1% METAL FILM	1
C15, 16	30704	200.μF 50V +/-20% ELECTROLYTIC RADIAL BIPOLAR	2	R37	40417	47KΩ 1/4W +/-5% CARBON FILM	1
C21	30508	.01μF 50V +/-10% MONO-CERAMIC	1	R39	40418	22KΩ 1/4W +/-5% CARBON FILM	1
C28	30507	.01μF 50V +/-20% MONO-CERAMIC	1	R40	1-114-154-24	150KΩ 1/4W +/-5%	1
Diodes				R46	40104	4.7Ω 1/4W +/-5% CARBON FILM	1
DBR	50100	BRIDGE RECT 200W 4A	1	R48	40419	6.04KΩ 1/4W +/-1% METAL FILM	1
D1	50101	1N5256B 30V +/-5% 1/2W	1	R53, 54, 55, 56	40106	100Ω 2W +/-5% CARBON FILM	4
D3	50102	1N4749A 24V +/-5% 1W	1	VR1	40401	100KΩ 1/4W +/-10% SINGLE LOG POT, FRQ POT	1
D6	50103	1N5234B 6.2V +/-5% 1/2W	1	VR2	40402	5KΩ 1/4W +/-10% SINGLE LINEAR POT, VOL LEVEL POT	1
D7, 8	50104	1N4148 100V +/-5% 0.1A	2	Integrated Circuit			
D9, 10	50105	1N4744A 15V +/-5% 1W	2	U1	60100	LM324 QUAD OP-AMP +/-15	1
Resistors				Transistors			
R1	40403	2.2 Meg ohm 1/4W +/-5% CARBON FILM	1	Q1	60151	MPS A13 30 NPN(Darl)	1
R2	40408	8.45KΩ 1/4W +/-1% METAL FILM	1	Q2	60152	2N3906 40 PNP	1
R3	40412	33.2KΩ 1/4W +/-1% METAL FILM	1	Q3	60153	2N3904 40 NPN	1
R4A, 4B	40105	0.1Ω 1/2W +/-5%	2	Q4, 5	60154	MPS A56 80 PNP	2
R5, 6, 19	40420	1KΩ 1/4W +/-5% CARBON FILM	3	Miscellaneous			
R7, 21, 44, 45	40409	10KΩ 1/4W +/-5% CARBON FILM	4	CMC1	80100	mc4438 Neosid 28-52, 2x2.2mH #23awg @ 2X 24	1
R8, 15, 34, 36, 38, 42, 43, 57	40406	100KΩ 1/4W +/-5% CARBON FILM	8	L1	80101	mc4436 Neosid 32-19 200uH #18SNSR @ 36	1
R9	40421	3.9KΩ 5W +/-5% 3W CAN BE USED	1	L2	80102	BL02RN2-R62 FERRITE BEAD	2
R11, 12	40100	330Ω 1/2W +/-5% CARBON FILM	2	LED1	50106	DUAL CIR LED (2 LEGGED)	1
R10, 13	40404	1KΩ 2W +/-5% CARBON FILM	2	T1	80104	TRANSFORMER #4300	1
				U2	60301	S53AMI POWER AMP MODULE	1

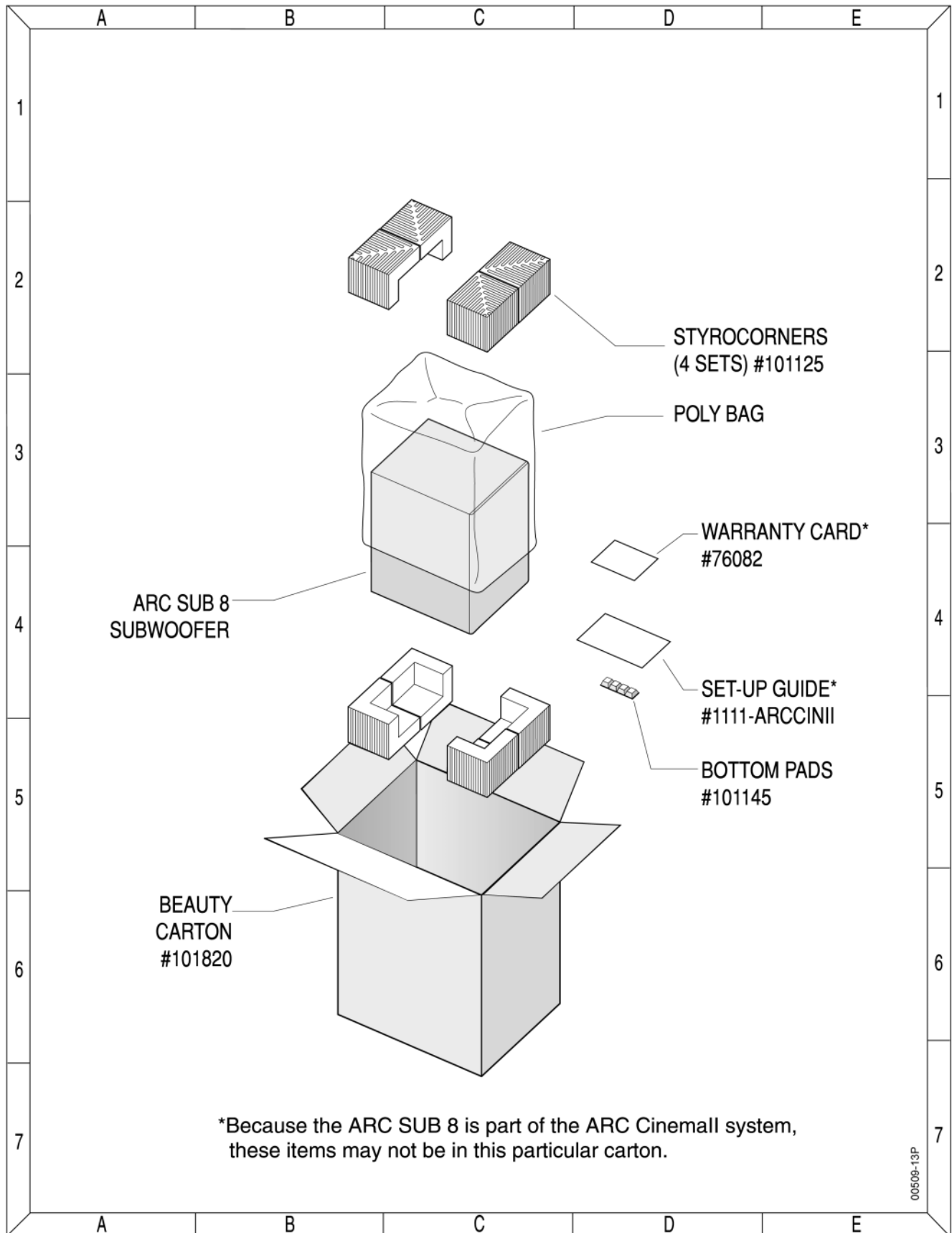
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ARC SUB 8 MECHANICAL PARTS LISTS

Item	Part #	Description	Qty.
SCREWS	70170	#4x0.5" SCREWS TO SECURE INPUT JACKS	2
MACHINE SCREWS	70170	#10x1" BOLTS FOR TRANSFORMER	4
NUTS	70172	#10 KEPS NUTS FOR TRANSFORMER	4
SCREWS	70173	#6x.5" SCREWS FOR FUSE PCB	2
SHIELD	A70301	METAL BRACKET MOUNTED ON TRANSFORMER.	1
KNOBS	A70302	KNOBS FOR CONTROLS	2
F1	80104	250V, 0.50A, T TYPE SLO BLO FUSE	1
POWER CORD	80105	POWER CORD, 2 CONDUCTOR	1
STRAIN RELIEF	70305	POWER CORD STRAIN RELIEF	1
FUSE PCB	80106	PCB COMPLETE WITH CONNECTORS	1
FACEPLATE	70303	FACEPLATE WITH LABELS	1
COVER	A70304	HERMETIC COVER	1
SPEAKER TERMINALS	108115	HIGH LEVEL INPUT AND OUTPUT TERMINALS	1
INPUT JACKS	108320	DUAL RCA INPUT JACKS	1
WOOFER	101500	A8AMI WOOFER 8"	1
GRILLE	101810	COMPLETE GRILLE	1
CARTON	101820	SHIPPING CARTON	1
MANUAL	1111-ARCCINII	OWNER'S MANUAL	1
AMPLIFIER	101850	COMPLETE AMPLIFIER	1

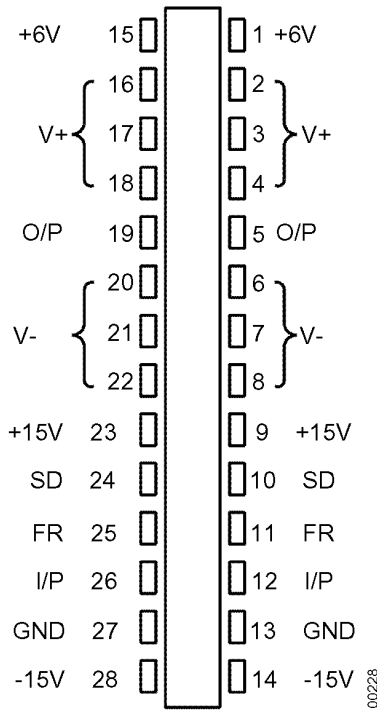


PACKAGING EXPLODED VIEW



INTEGRATED CIRCUIT DIAGRAM

S53AM/S64AMI - Power Amp module SAFETY PART



NOTE: THE FOLLOWING PROCEDURES MUST
LOWED WHEN INSTALLING NEW S53AMI/S64AMI
MODULES:

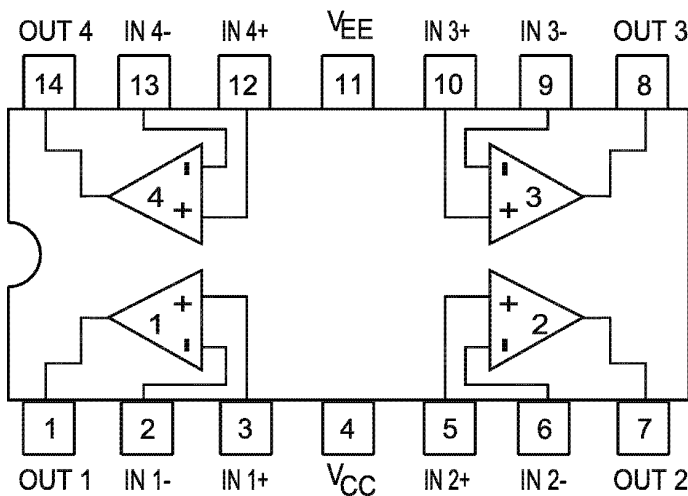
FAILURE TO FOLLOW ONE OR MORE OF THESE STEPS
MAY RESULT IN THE INSTANT DESTRUCTION OF
MODULE WHEN POWERED UP.

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.

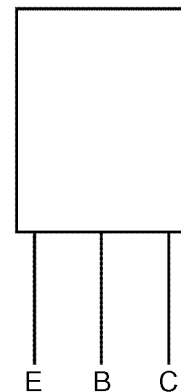
If the new S53AMI/S64AMI Amp Module has larger mounting hole(s) in the case, and the stock screws no longer will fit, and screws of the proper type cannot be obtained locally order:

- (2) part# 60301S (screws)
- (2) part# 60301N (nuts)

U1 - LM324 Quad Op Amp

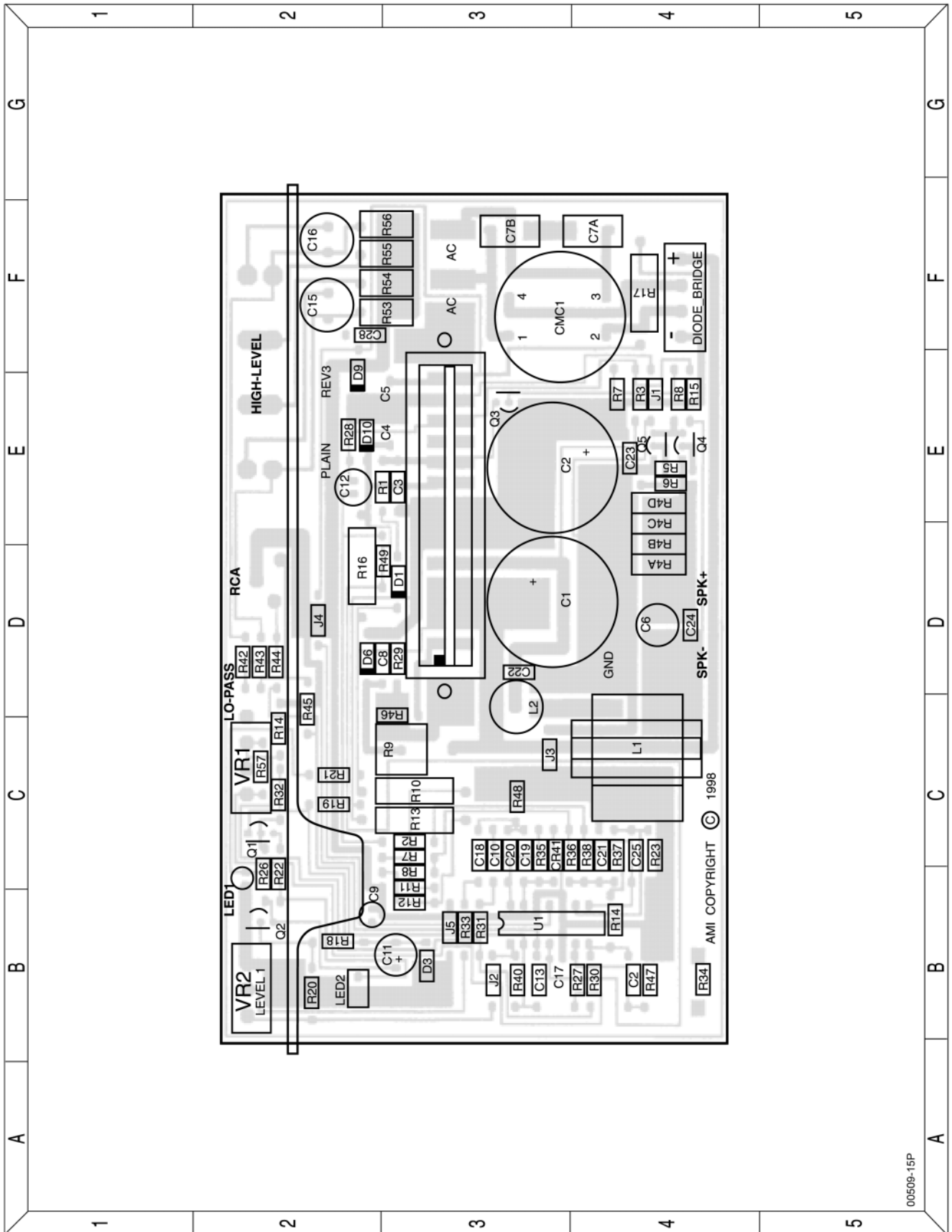


MPS A13
2N3904
2N3906
MPS A56

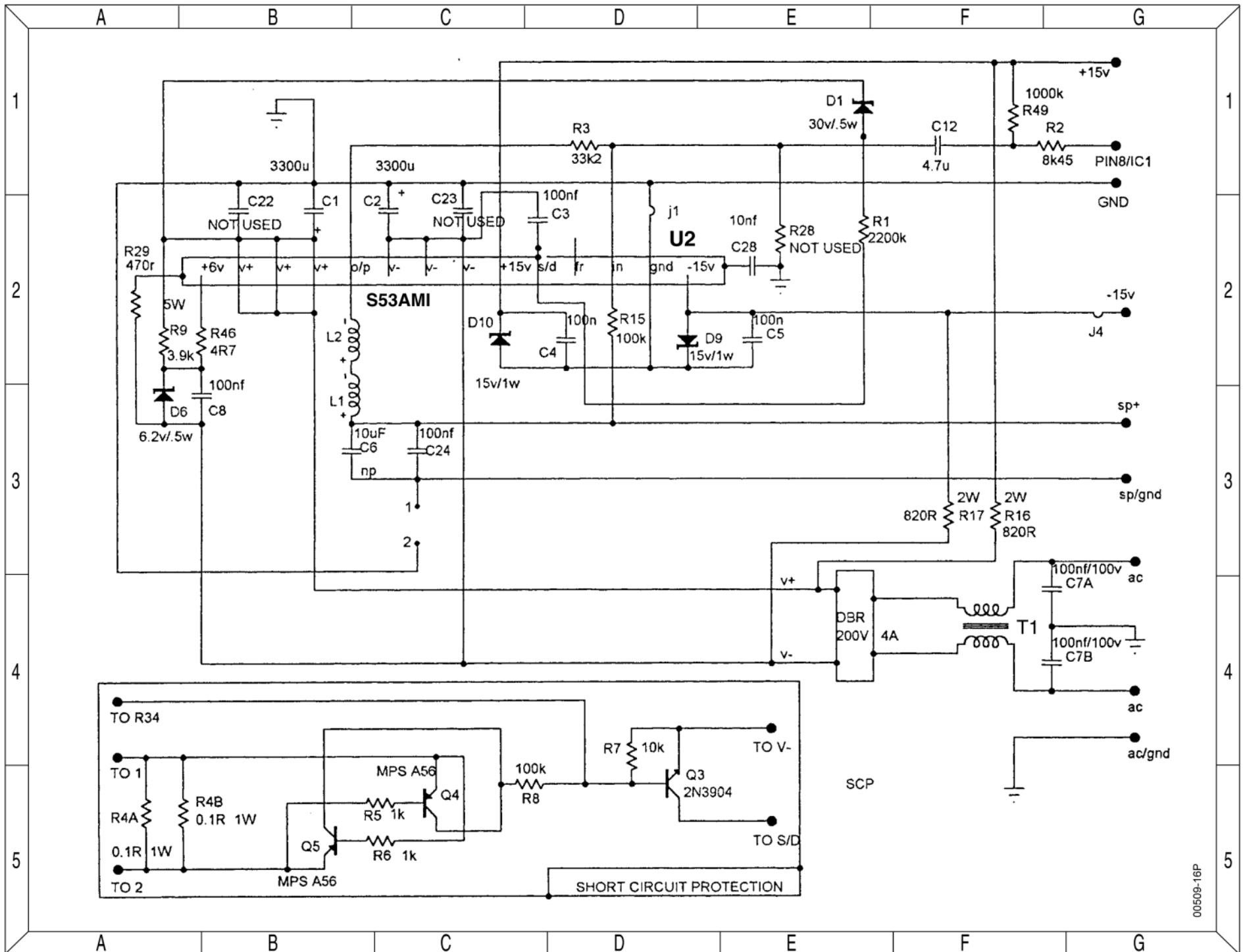


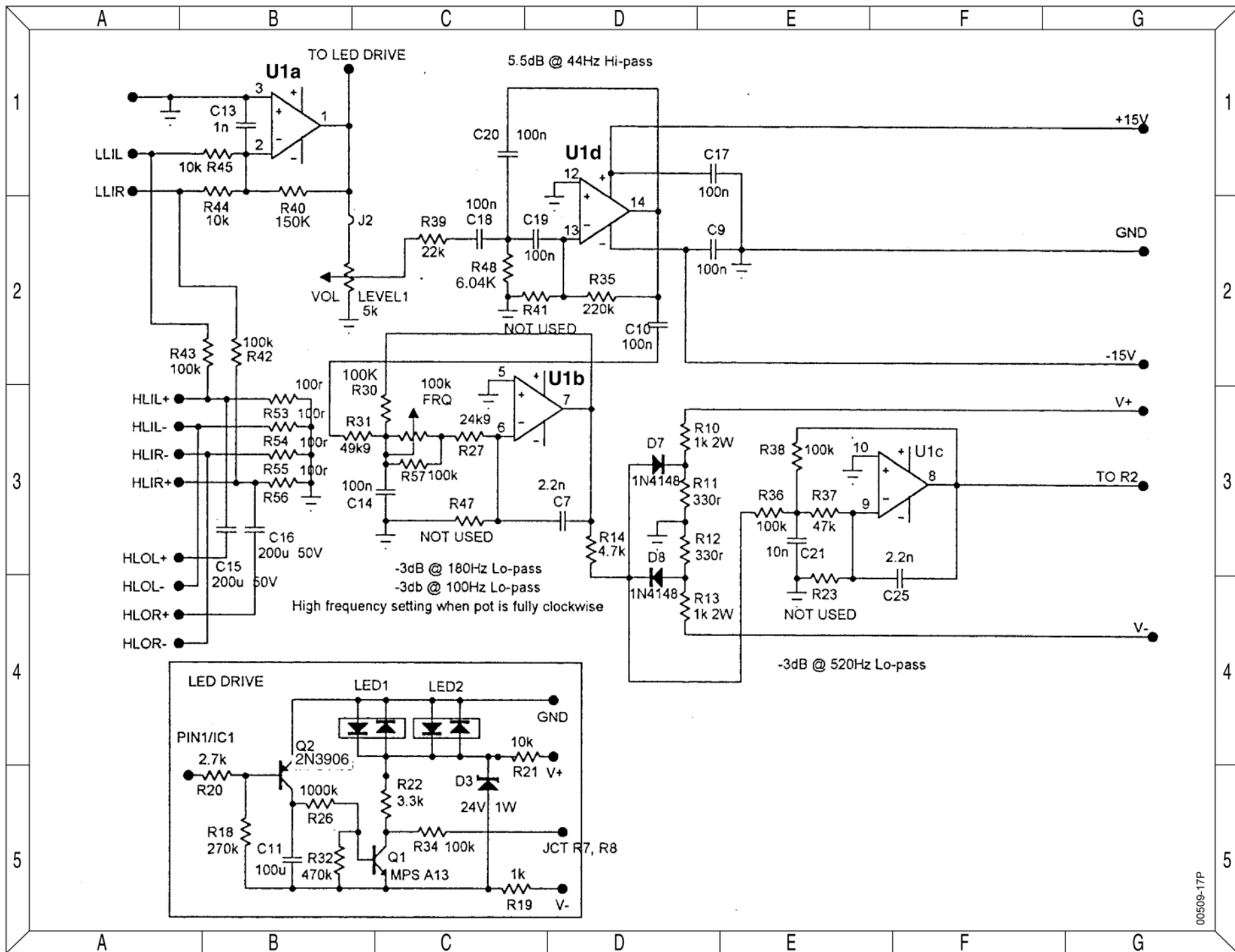
00508-14

PRINTED CIRCUIT BOARD (TOP VIEW)



00509-15P





00509-17P