L1 COMPACT

Ver 0.0

Features, Functions & Benefits

FEATURES	FUNCTIONS	BENEFITS
Proprietary Spatial Dispersion™ loudspeaker technology	The angle of each of the six drivers in the L1 Compact loudspeaker array are offset from one another, providing clear and powerful distribution of sound throughout the entire listening area.	Fill the room with lifelike sound from a single loudspeaker system. Sound remains consistent even at the extreme sides of the system.
Reduction in excessive reverb	The Cylindrical Radiator Loudspeaker projects sound in a wide wedge-like pattern, directing little energy to the ceiling or floor.	Minimal reflections from the ceiling, floor and walls help maintain a smooth, consistent sound that is less likely to induce feedback.
PA and monitors combined	Using proprietary Bose® technology, the L1 Compact system is designed to be located directly behind the musician.	The sound musician hears on stage is essentially the same sound that audiences hear in room, and the musician is in complete control of his/her sound.
Engineered for system efficiency	Acoustic design and system electronics are collective ly engineered to maximize power efficiency and performance.	Delivers clear and powerful sound to audiences of about 100 people, all from a system that can be carried in one trip.

Features, Functions & Benefits

FEATURES	FUNCTIONS	BENEFITS
ToneMatch® signal Processing	Automatically optimizes the sound of instruments or microphone for use with the L1 Compact system.	By making a series of adjustments to preserve the natural sound of the instrument and saving those changes as a preset that could be instantly recalled, at the touch of a button.
Compatible with T1 ToneMatch audio engine	For more advanced musical applications that require additional inputs, expanded tone library, and access to studio quality effects, T1 ToneMatch audio engine easily interfaces with the system.	Musicians can realize all of the unique benefits of the T1 ToneMatch audio engine with their system.
Accepts multiple sources	Flexible user interface allows for a variety of sources to be easily connected.	Plug in your favorite instruments or portable audio devices to add ambiance to presentations and celebrations.
Less equipment than most conventional systems	Located inside of the L1 Compact power stand is an integrated bass enclosure that produces low-frequency bass response.	Transporting the system is easy, as there are no external bass modules or subwoofers. The system also occupies a smaller footprint on stage than most conventional systems.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

Integrated **ToneMatch** ® signal processing provides a high level of tone customization to provide a listening experience that most musicians can only achieve using a recording studio.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

Signal/Clip indicator – Displays the input signal status in color.

Green : Input signal present

Red : Input signal clipping

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

<u>Volume control</u> – Adjusts the volume of your microphone.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

<u>Treble control</u> – Adjusts the amount of treble on your microphone.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

Bass control – Adjusts the amount bass on your microphone.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

Microphone input – Analog input for connecting a balanced XLR microphone cable. A **ToneMatch** ® microphone preset is built in.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

Signal/Clip indicator – Displays the input signal status in color.
Green : Input signal present & **Red :** Input signal clipping

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

<u>Volume control</u> – Adjusts the overall volume of all input sources connected to Channel 2.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

<u>⅛-inch stereo input</u> – Balanced analog input for connecting audio sources such as portable mp3 players, satellite radio, laptop computers, video projectors, and smart boards.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

RCA stereo input – Analog input for connecting audio sources such as DVD players, VCR players, video game consoles, DJ mixers, Keyboards and other instruments.

For best results, connect both, the left and right signals.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

<u>¼-inch input</u> – Balanced analog input for connecting guitars and other instruments. Accepts either ¼-inch TRS balanced or TS unbalanced cables.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

ToneMatch ® switch – Switches between Line Level and the built in **ToneMatch** acoustic guitar preset.

I/O Panel – Connections

Channel 1 *(Microphone input)* & **Channel 2** *(Utility channel – multiple input)*

Power LED – Indicates power status.
Blue : Power on

I/O Panel – Connections

Rear Panel Outputs

¼-inch output – Mono analog output that accepts either ¼ inch TRS balanced or TS unbalanced cables. Can be used to link multiple L1 ® Compact systems together.

I/O Panel – Connections

Rear Panel Outputs

RCA output – Mono line level analog output for connecting audio devices such as CD recorders and flash recorders

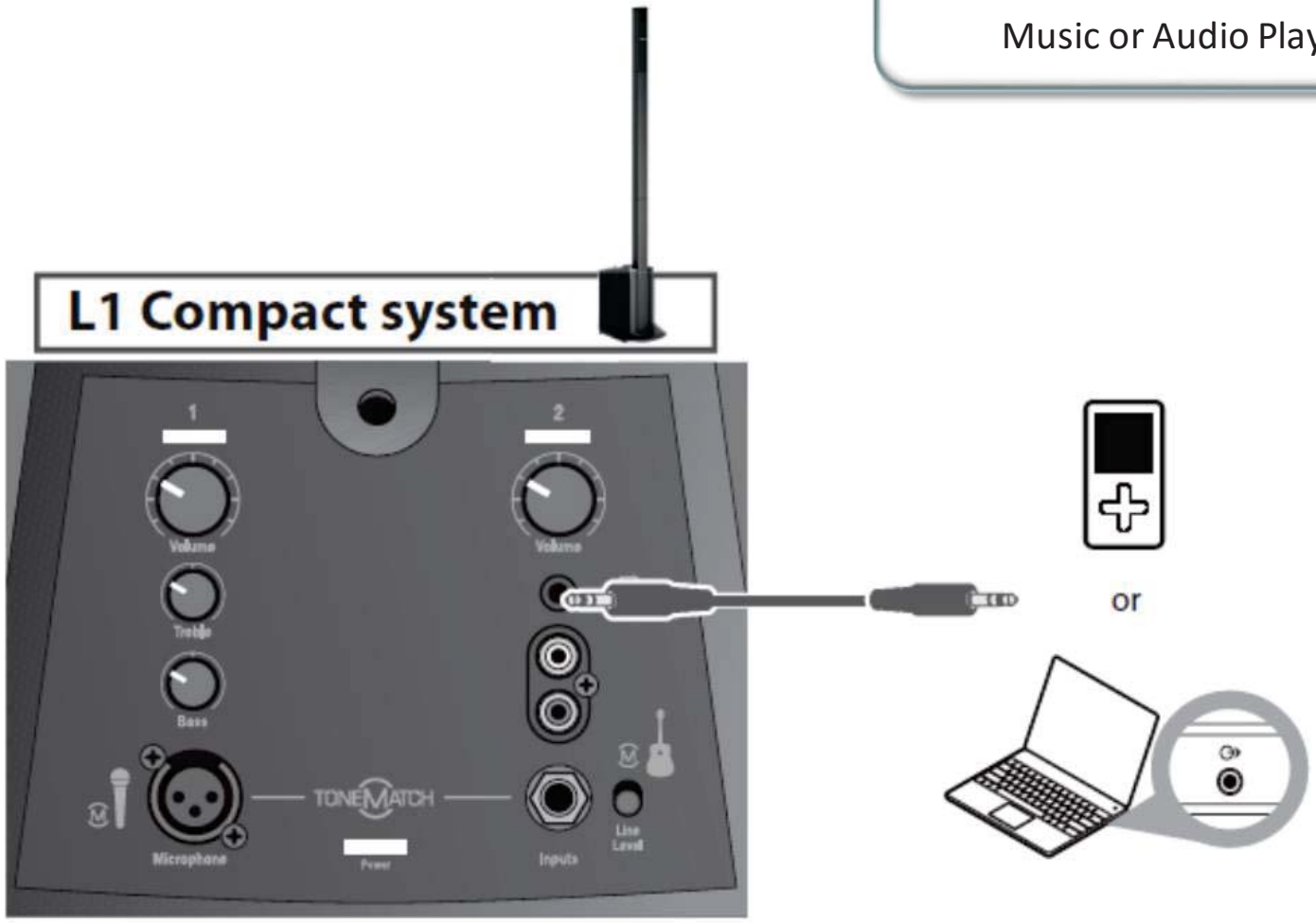
PRACTICAL APPLICATIONS OF L1 COMPACT

Application example 1

Voice Amplification

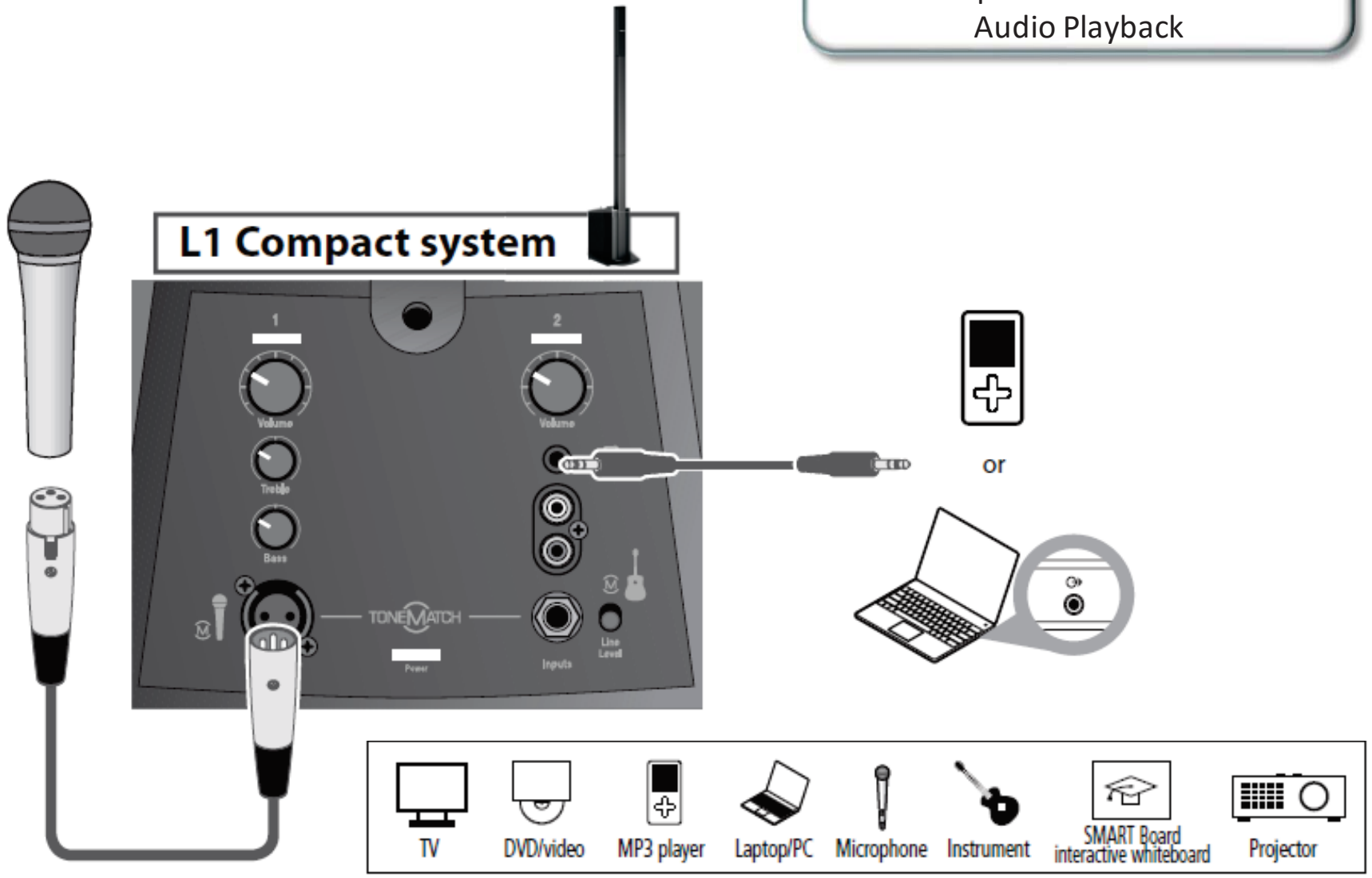
Application example 2

Music or Audio Playback



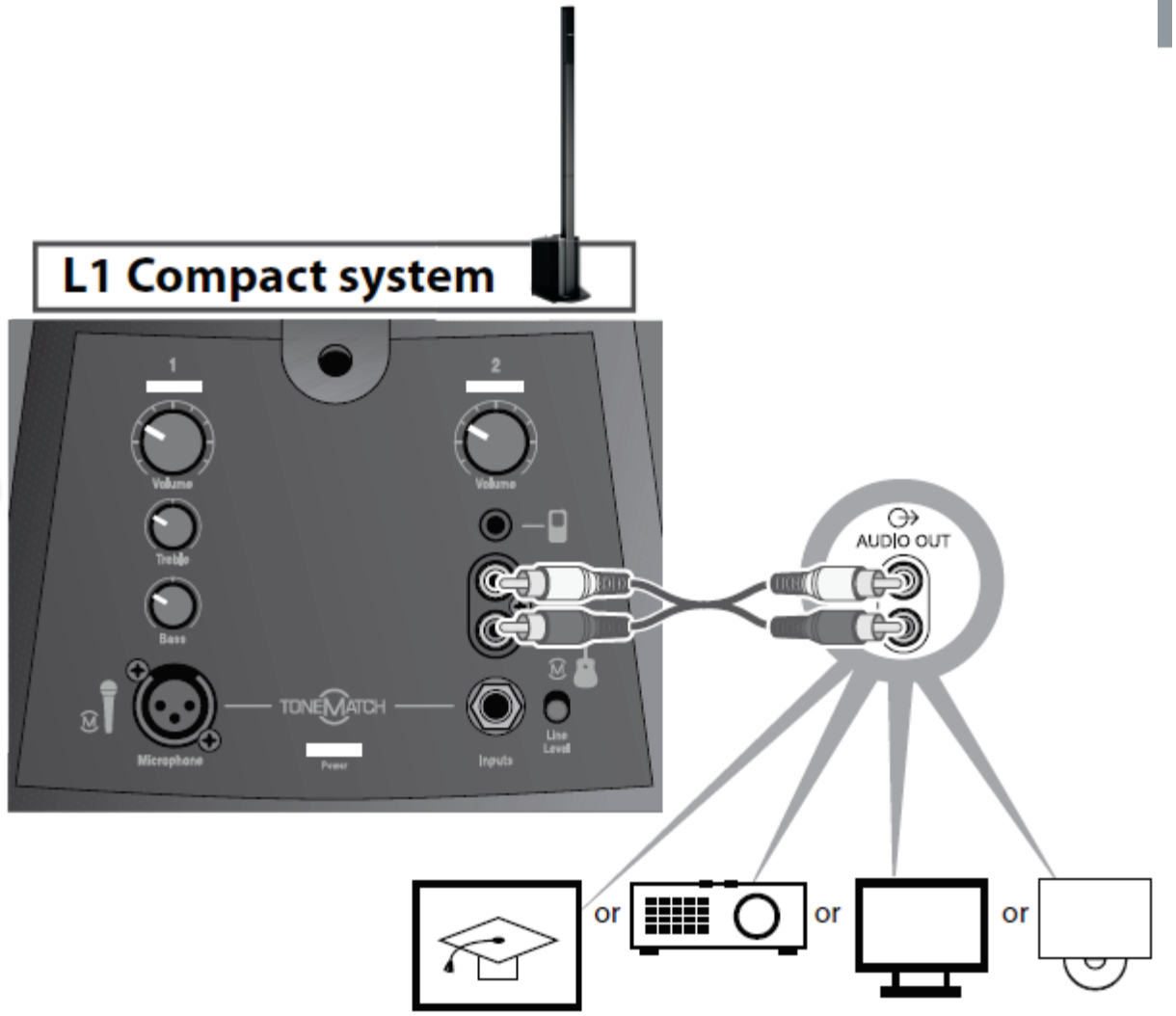
Application example 3

Voice Amplification with Music or Audio Playback



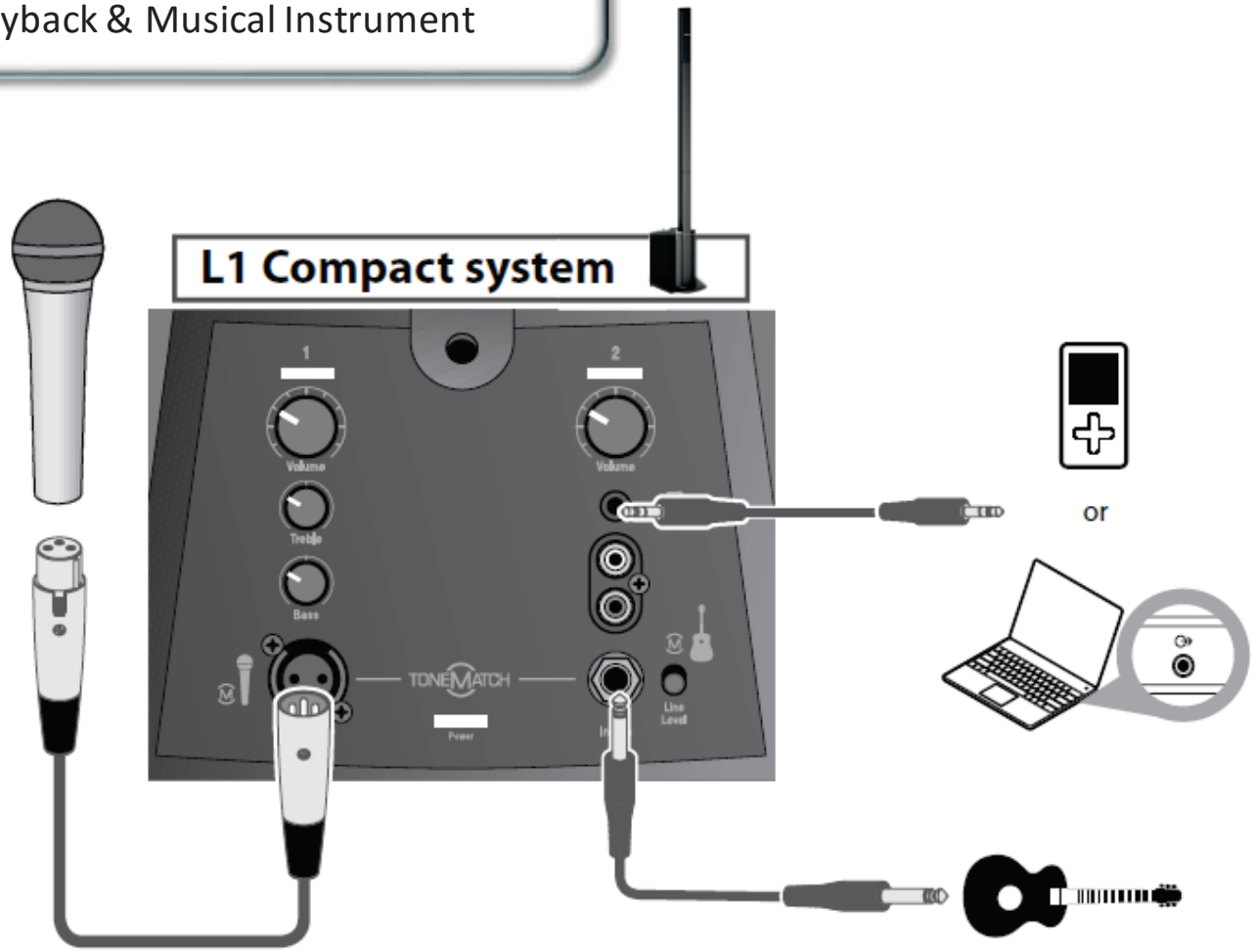
Application example 4

Audio Playback with Video



Application example 5

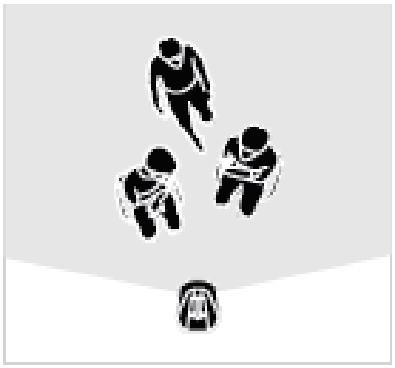
Voice Amplification with Music or Audio Playback & Musical Instrument

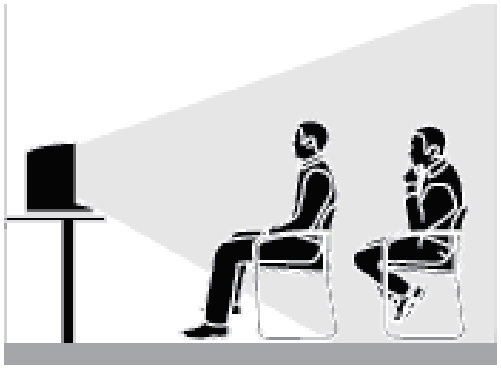


TV | DVD/video | MP3 player | Laptop/PC | Microphone | Instrument | SMART Board interactive whiteboard | Projector

Sound Coverage

Collapsed Tabletop

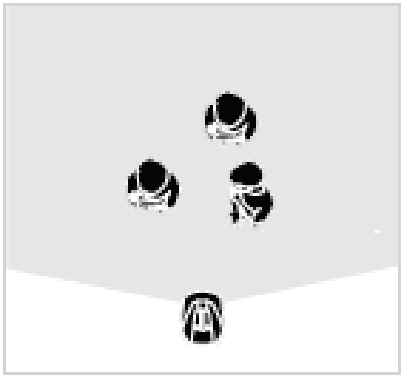


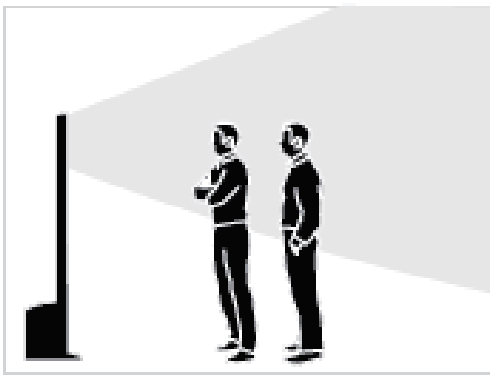


Top View

Side View

Extended Position

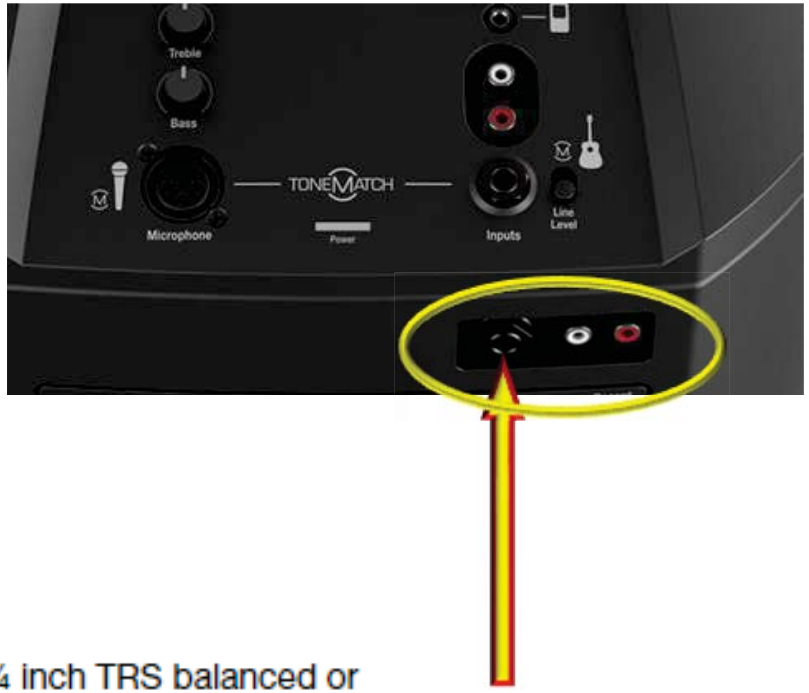


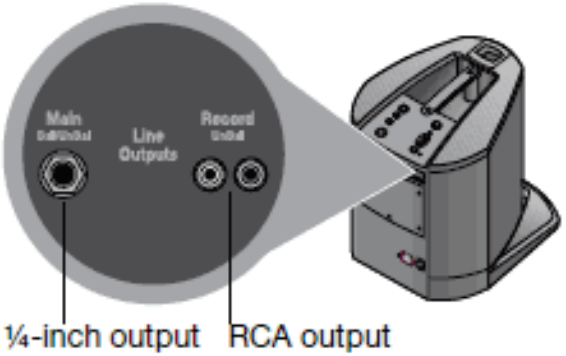


Collapsed

Extended

Daisy Chaining L1 Compact





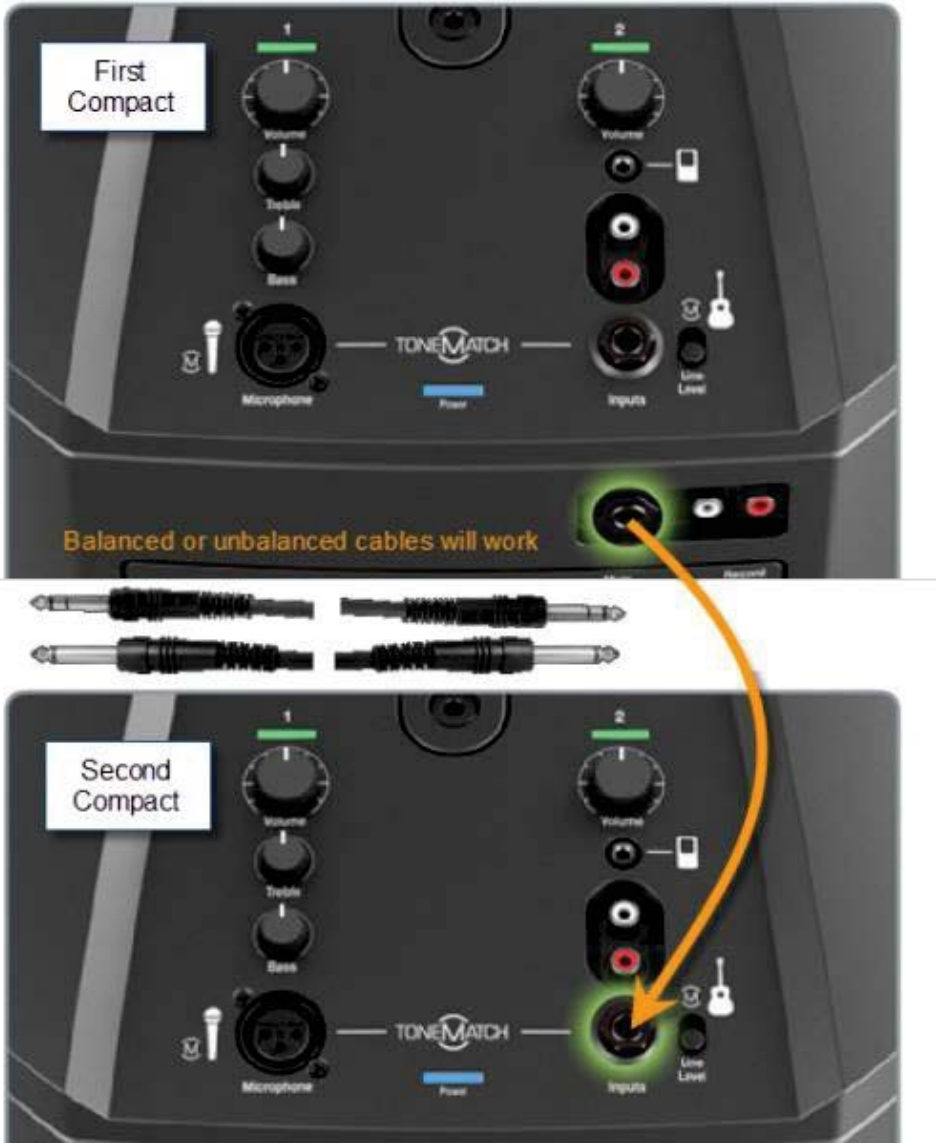
¼-inch output RCA output

Rear panel outputs

¼-inch output – Mono analog output that accepts either ¼ inch TRS balanced or TS unbalanced cables. Can be used to link multiple L1® *Compact* systems together by connecting the ¼-inch output from one L1® *Compact* system to the ¼-inch input (Channel 2) on a second L1® *Compact* system. This will provide additional coverage in larger spaces. You can also use the ¼-inch output to connect to a house PA system and use the L1® *Compact* system as your personal monitor.

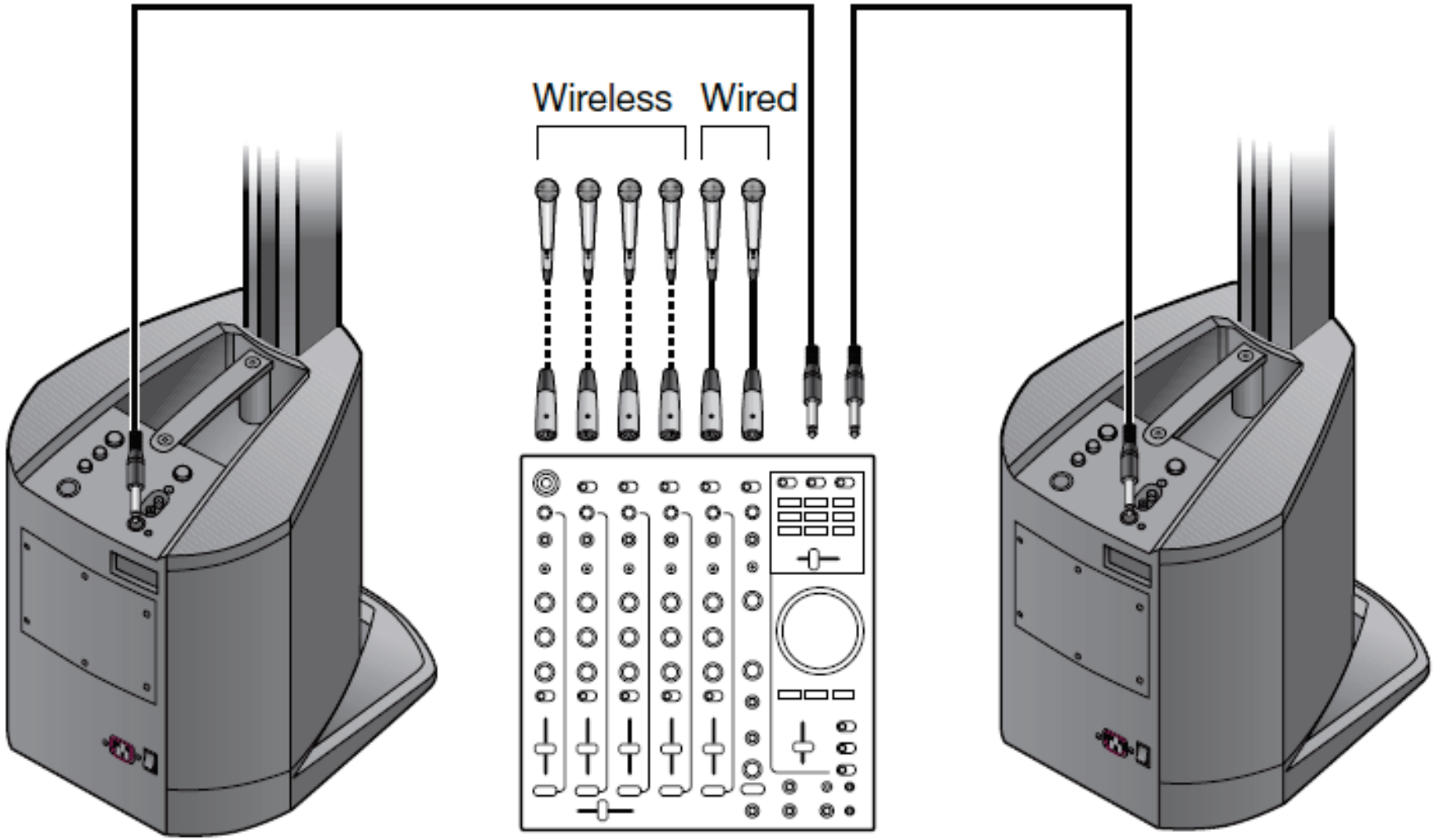
Note: *Using a TS unbalanced cable will result in a drop in the audio level of -6dBu.*

Daisy Chaining L1 Compact



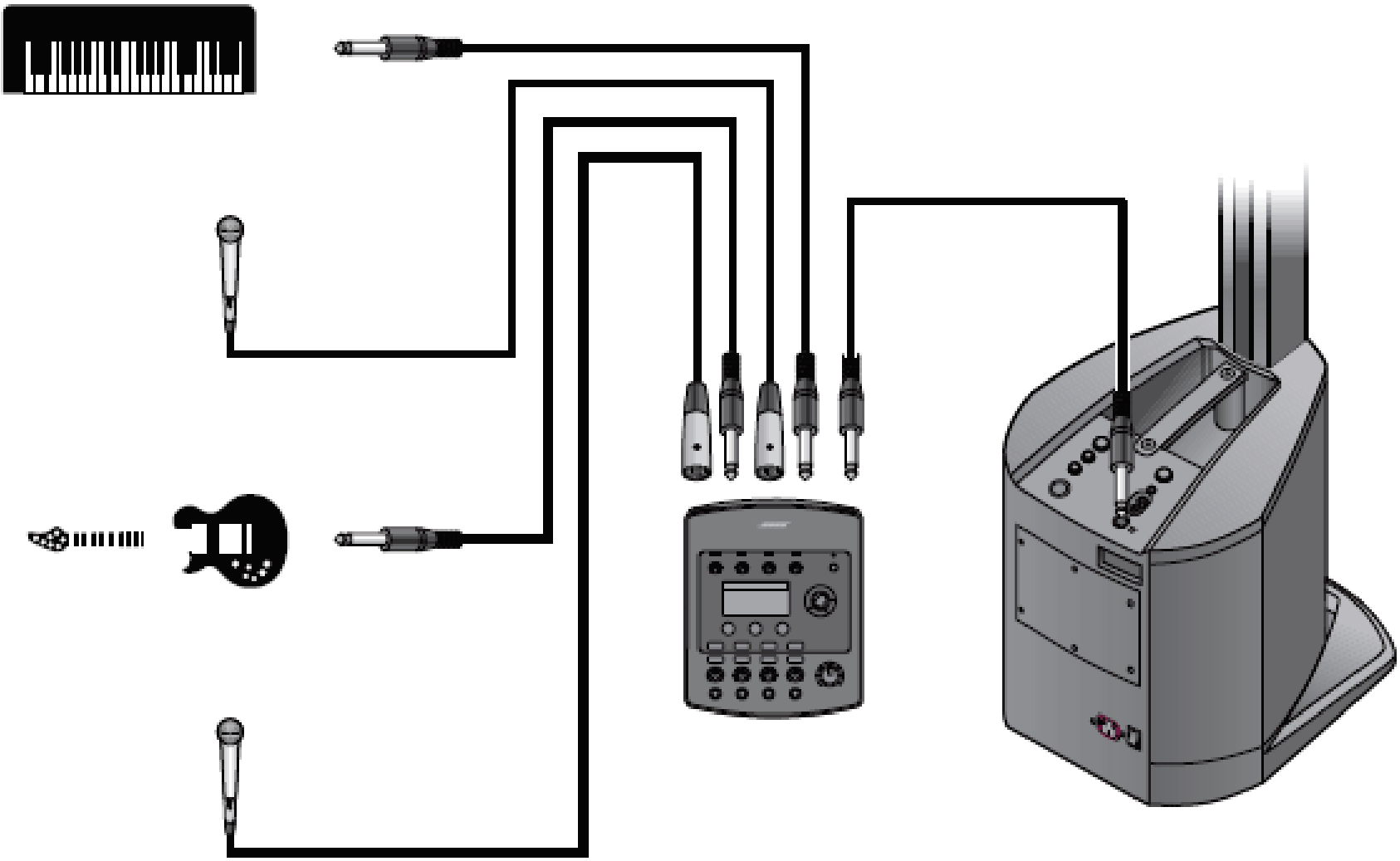
Application example 6

Within Auditoriums, set-up could include
2 or more L1 Compacts



Application example 7

Advanced set-up using the
T1 ToneMatch® audio engine.



*external power supply required for T1 ToneMatch®

DIS-ASSEMBLY / ASSEMBLY PROCEDURE

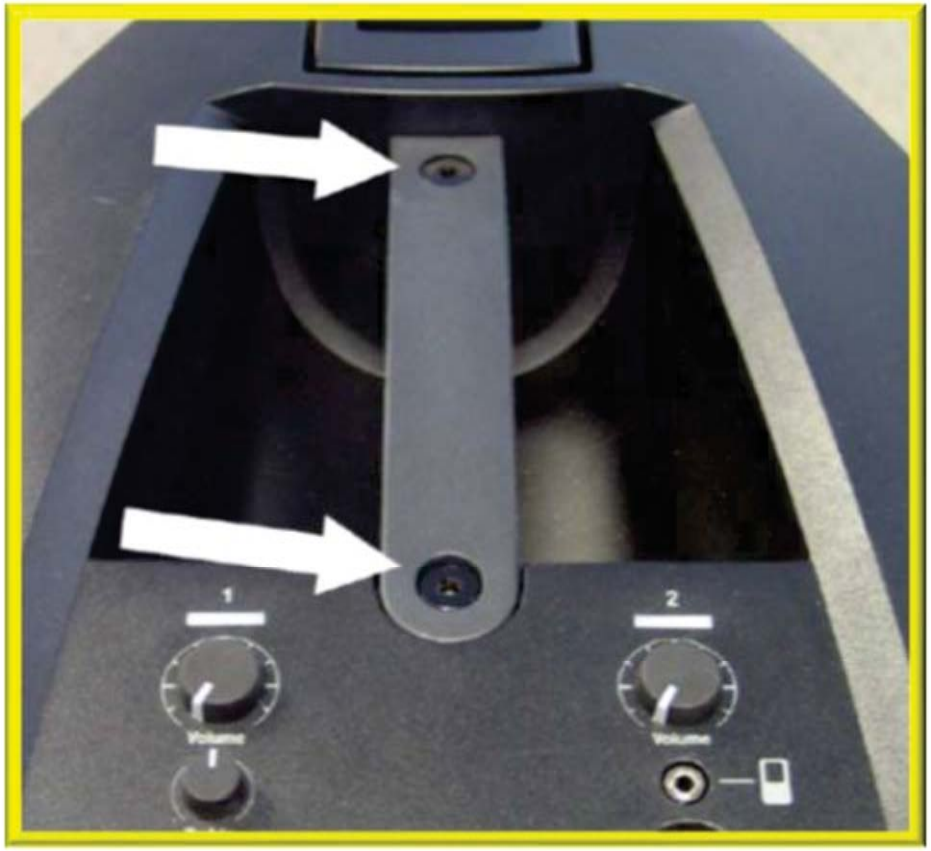
Caution…

- The SMD integrated circuits used on the Input / Output PCB are extremely sensitive to ESD damage.
- Be sure to use an approved and tested ESD strap that is properly grounded to your work bench before attempting disassembly or repair of the L1 Compact Power Stand.

Top Cover Removal

-Remove the two screws that secure the Power Stand handle to the top cover.

-Lift off the handle.



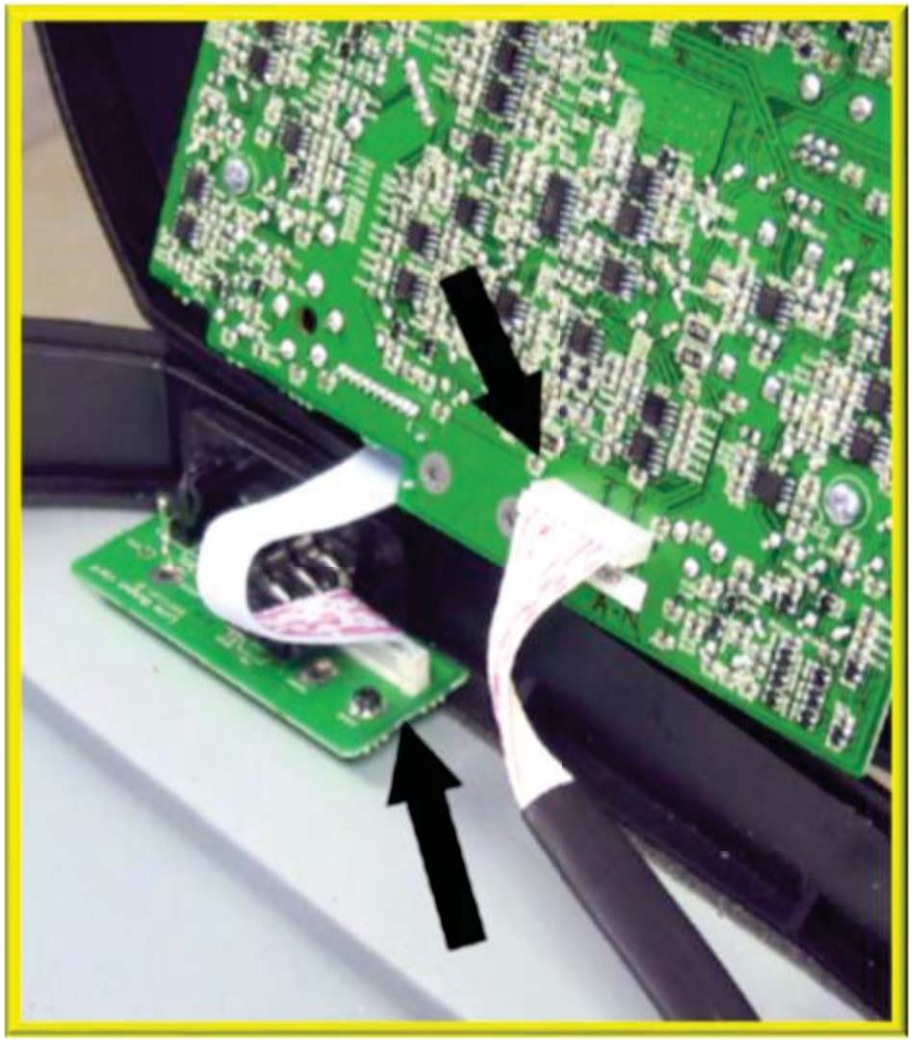
Dis-Assembly / Assembly Procedure

Top Cover Removal

-Lift up the top cover.

-Unplug the two cable harnesses from the I/O board at connector & from line O/P card.

-Lift off the top cover.



Assembly Notes

-Be sure the woofer grilles are properly aligned into the front groove of the top cover before re-installing the handle.

Input / Output PCB Removal

-Remove 4 knobs (vol. 1, vol. 2, Treble, Bass) on Input/Output panel.

Also remove the following items from top cover:

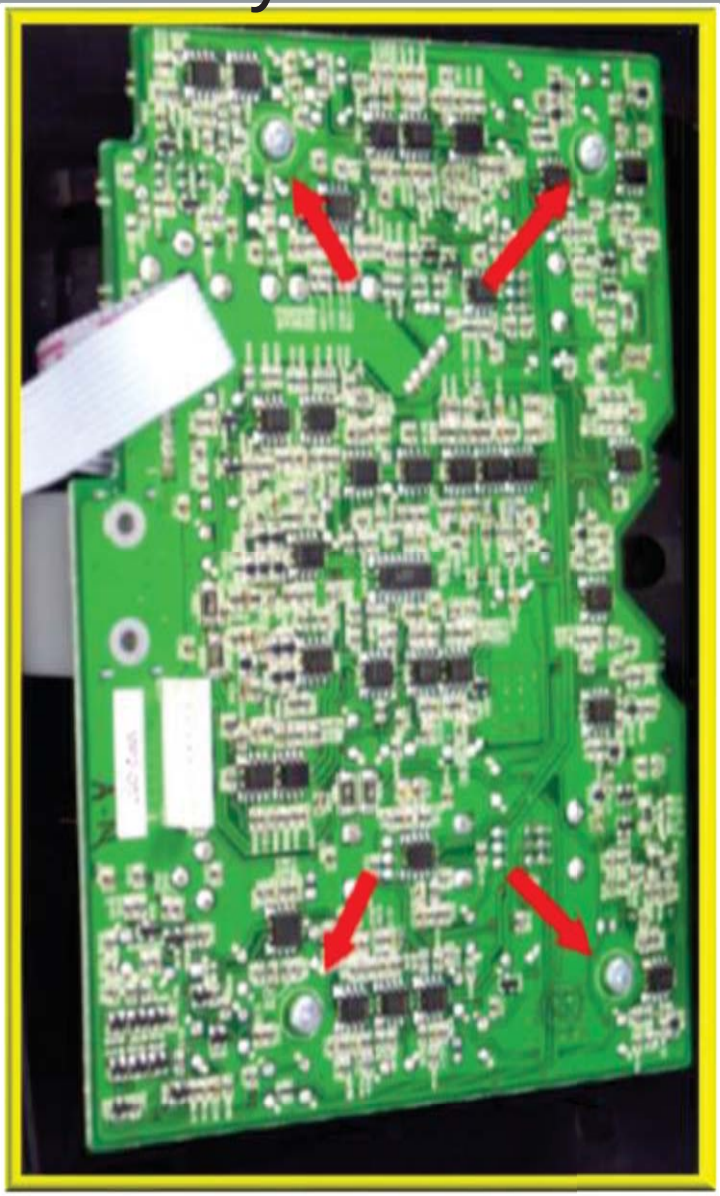
- 2 screws at microphone jack.
- 1 screw at RCA input jacks.
- ring at 3.5mm input jack.
- hex nut at 1/4” input jack.

Dis-Assembly / Assembly Procedure

Input / Output PCB Removal

-Turn over the top cover.

-Remove the four screws that secure the I/O board. Lift off the board.

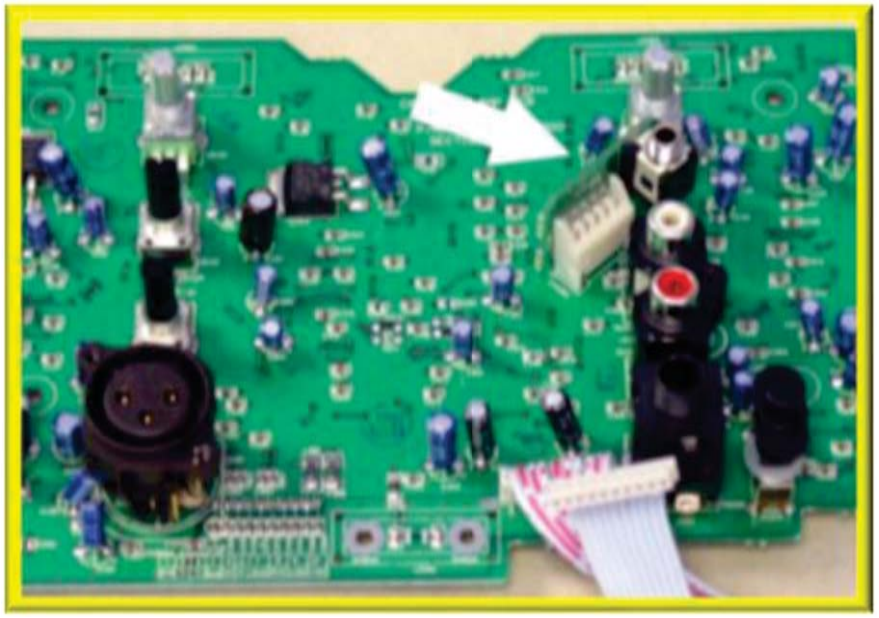


Jack Input PCB Removal

Note: *The jack input PCB is a plug-in daughter card located on the I/O PCB.*

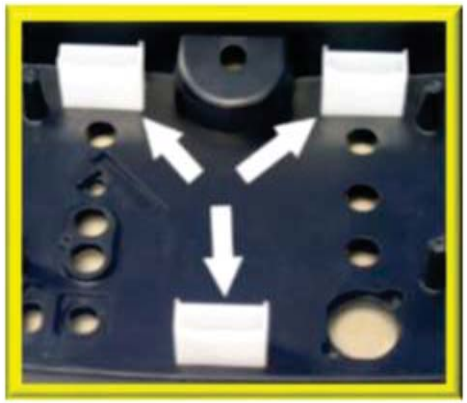
-Unplug the jack input PCB from the I/O PCB at connector CN308A.

-Lift off the board.



Assembly Notes

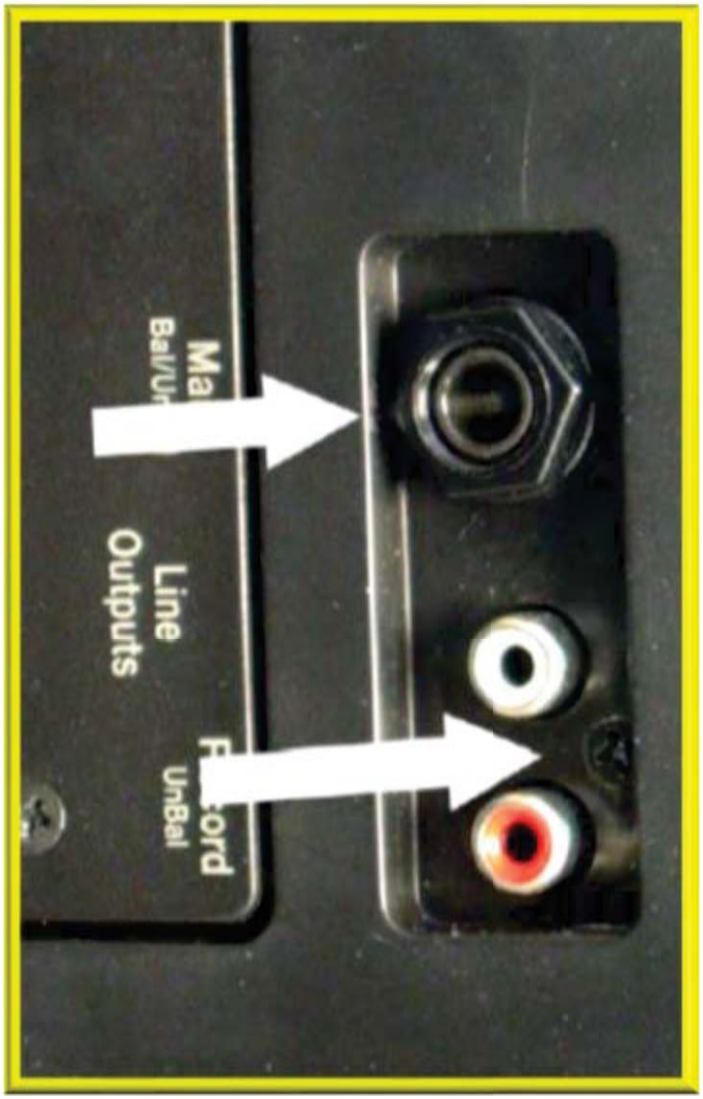
-Be sure that LED light-pipes are properly aligned with the holes in the PCB and the openings in the top cover when re-installing the I/O PCB assembly.



Line Output Card Removal

-Remove one screw at the RCA jacks.

-Also remove the plastic nut at 1/4” jack..



Line Output Card Removal

-Remove one screw that secures the line output card to the metal plate.

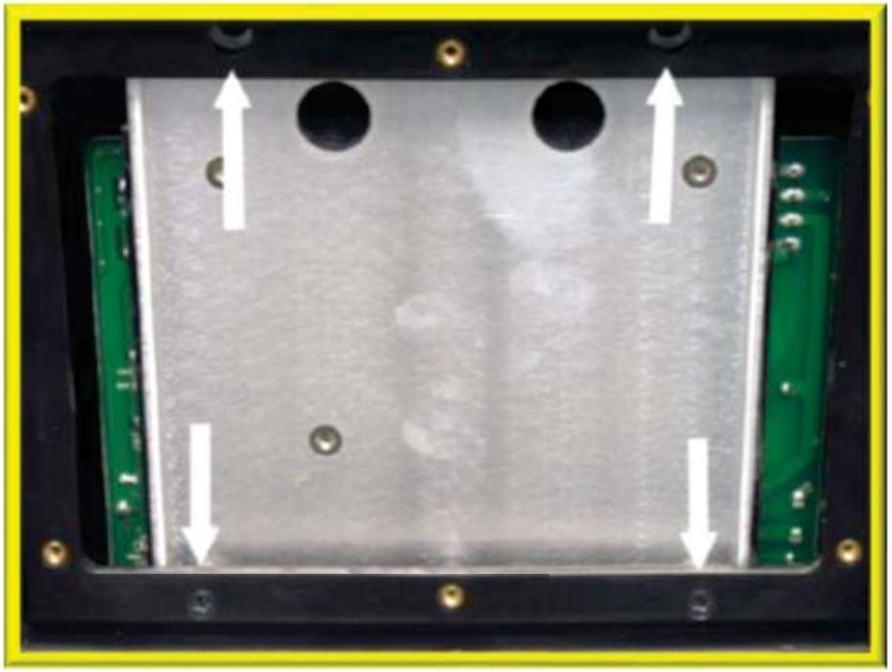
-Lift out the card.

Power Amplifier / SMPS PCB Removal

-Remove six screws that secure the rear access panel.

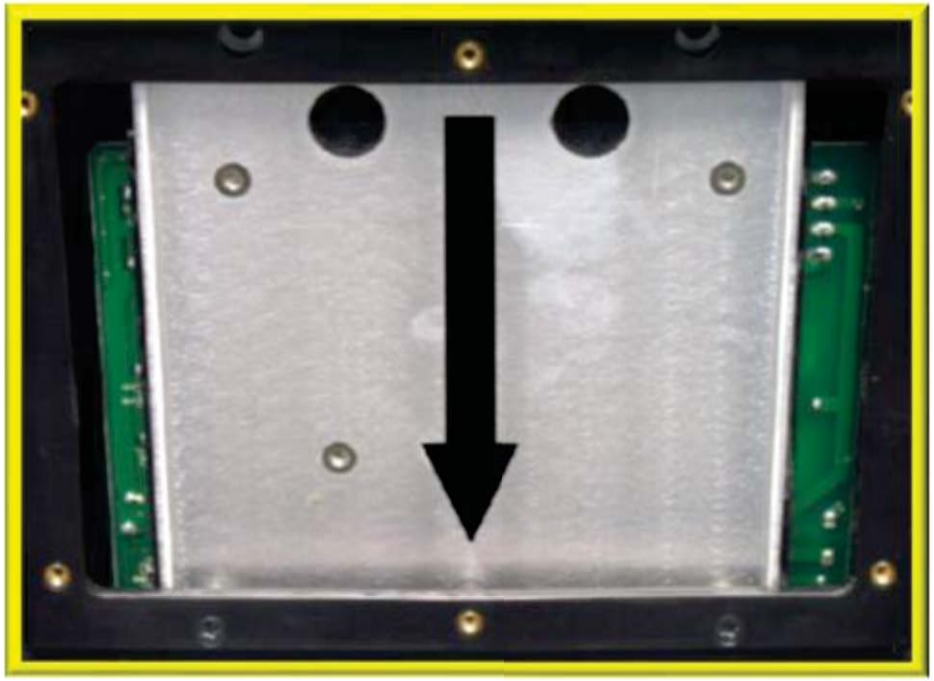
-Lift off the panel.

Power Amplifier / SMPS PCB Removal



-Remove the four screws that secure the power amplifier / SMPS PCB assembly to the power stand's mounting bracket.

Power Amplifier / SMPS PCB Removal



-Carefully slide the power amplifier / SMPS PCB downward until the top of the board clears the upper part of the bracket.

Power Amplifier / SMPS PCB Removal

-Slide the PCB assembly out through the access panel opening and disconnect the four wire harnesses.

-Lift out the board.

Assembly Notes

-Power amplifier / SMPS PCB assembly with heatsink attached should slide up between the plastic cabinet housing and the metal cavity bulkhead bracket.

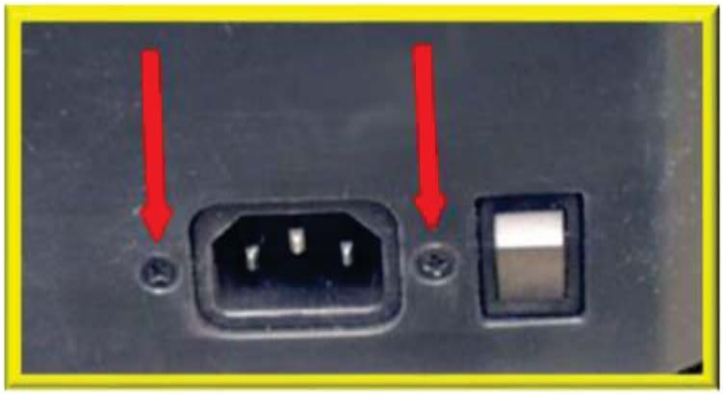
-Once it is in correct location, secure it in place with the four screws.

AC Inlet and Power Switch Removal

-Disconnect the 3 wires that connect to the AC inlet jack. Remove 2 screws that secure the AC inlet to the cabinet. Lift out the jack.

-Disconnect the 2 wires that connect to the AC power switch. Lift out the switch

Note: *The AC inlet and power switch are secured to the cabinet with glue to prevent air leaks. Be sure to re-seal the new parts.*



Assembly Notes

Remove the two screws that secure the Power Stand handle to the top cover. Lift off the handle.

Dis-Assembly / Assembly Procedure

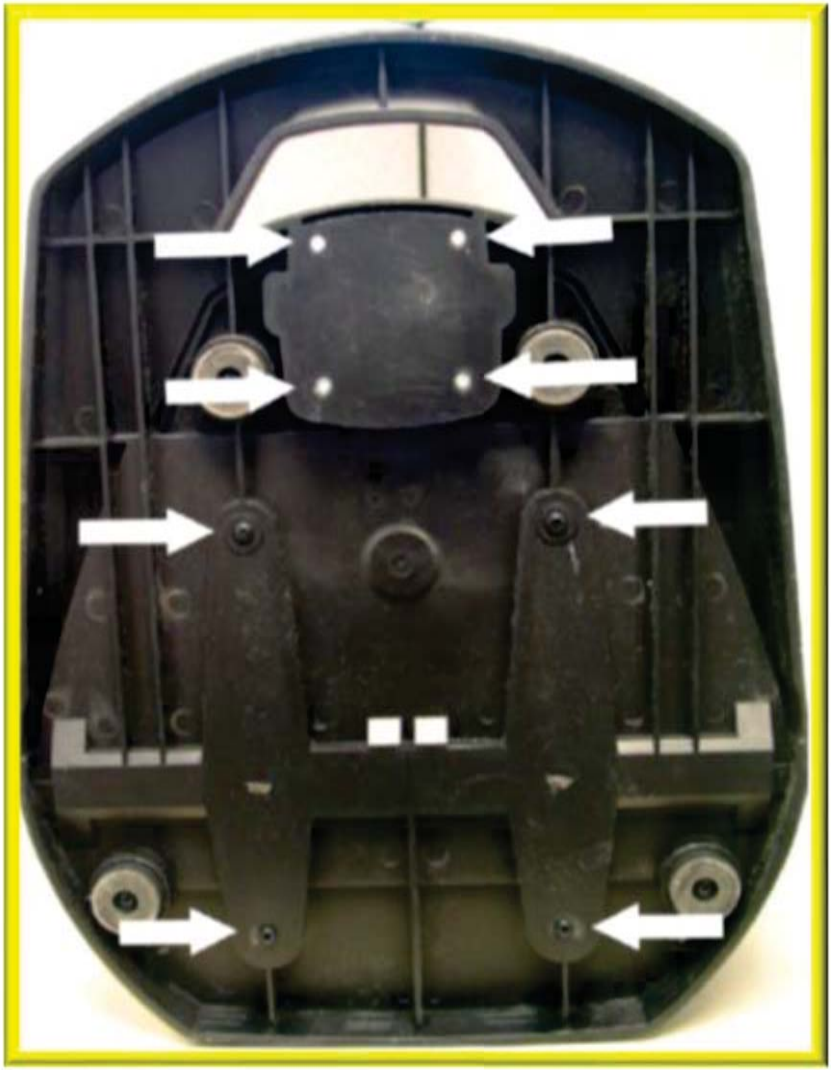
Woofer Removal

-On the bottom of the Power Stand, remove four screws located toward the center of the plastic foot.

-These are not the screws that hold the rubber feet in place.

-Remove four screws that secure the bottom of the array connector housing to the foot.

-Lift off the plastic foot.



Woofer Removal

-Lift out the woofer grilles and set them aside.

Woofer Removal

-Remove one screw that secures the array guide to the cabinet.

-Slide the array guide down and out from in front of the woofer.

Dis-Assembly / Assembly Procedure

Woofer Removal

-Remove fours screws that secure the woofer to the cabinet.

-Lift out the woofer.

-Disconnect the two fasted connectors from woofer.

Assembly Notes

-Be sure to align the woofer grilles to the slots in the top cover and the plastic foot when replacing the foot..

Dis-Assembly / Assembly Procedure

Grille Removal

-Grasp the grille and carefully pull it away from the array.

-Lift off the grille.

Assembly Notes

-Be sure if there is sufficient damping material in the array grooves to retain the grille and prevent buzzes.

-Perform the array sweep tests after replacing the grille.

Dis-Assembly / Assembly Procedure

Driver Removal

-Remove four screws that secure the driver to the baffle.

-Lift out the driver.

-Cut the wires as close to the driver terminals as possible.

Assembly Notes

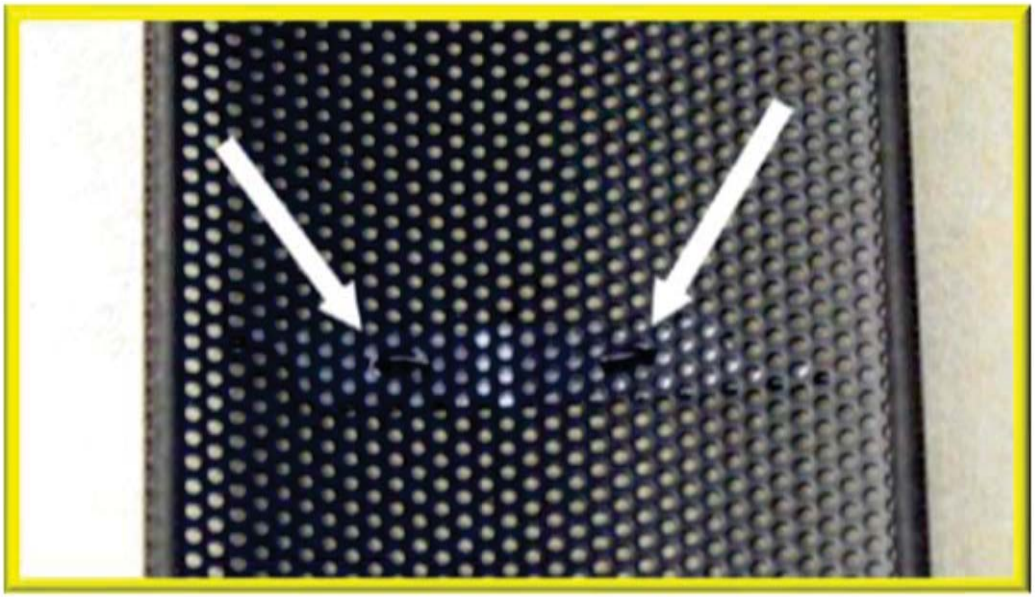
-Be sure to observe polarity when re-connecting the driver wires.

-There may be more than one wire per connection.

Dis-Assembly / Assembly Procedure

Logo Removal

-Unbend the legs of the logo and lift it off the grille.



Understanding LED Indications

Signal / Clip LED

LED Activity	Description
Green	Input Signal Present
Red	Input Signal Clipping

Power / Fault LED

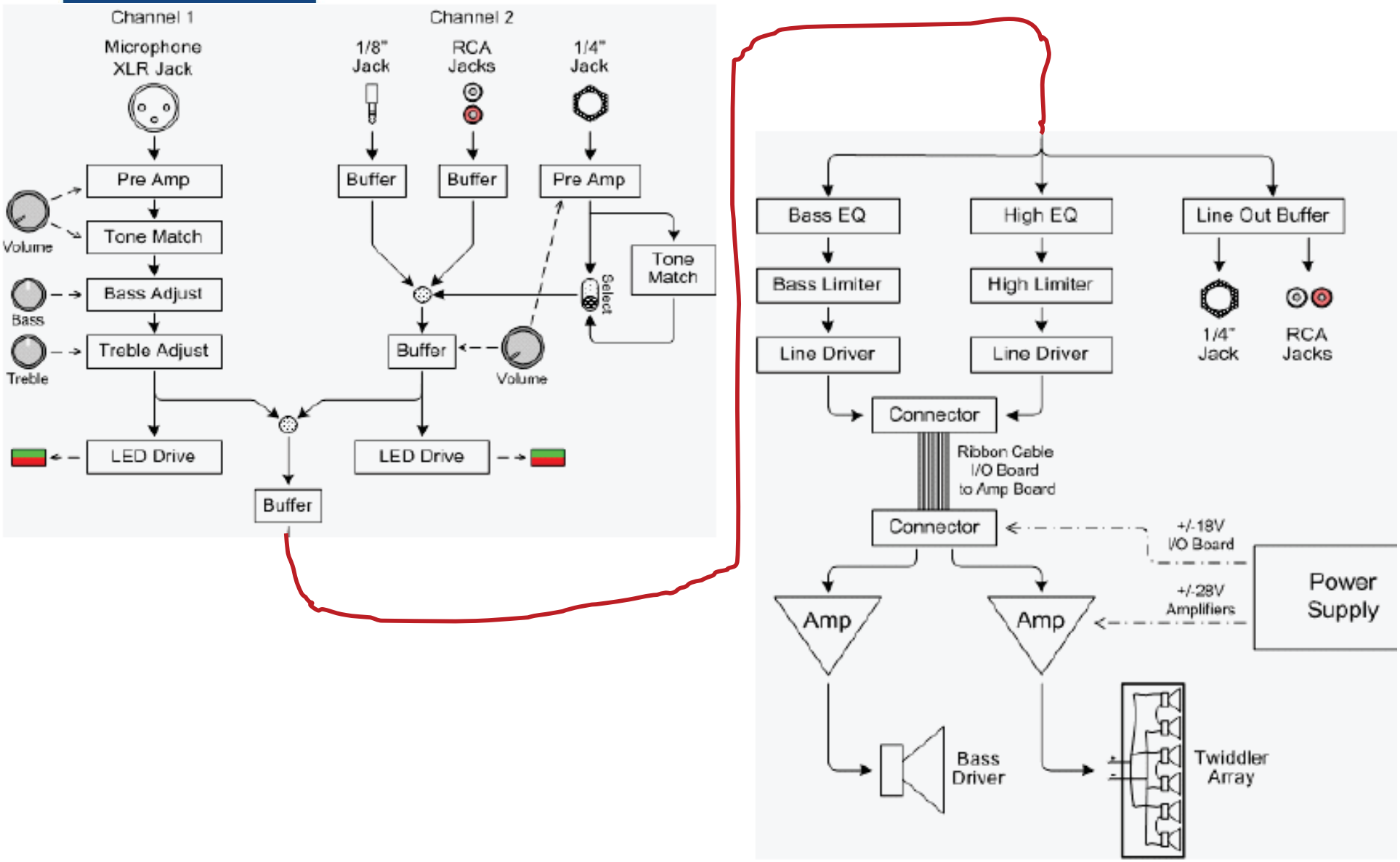
LED Activity	Description
Blue	System Powered ON & ready for use
Red	Fault Warning

Software, Firmware & TAP command

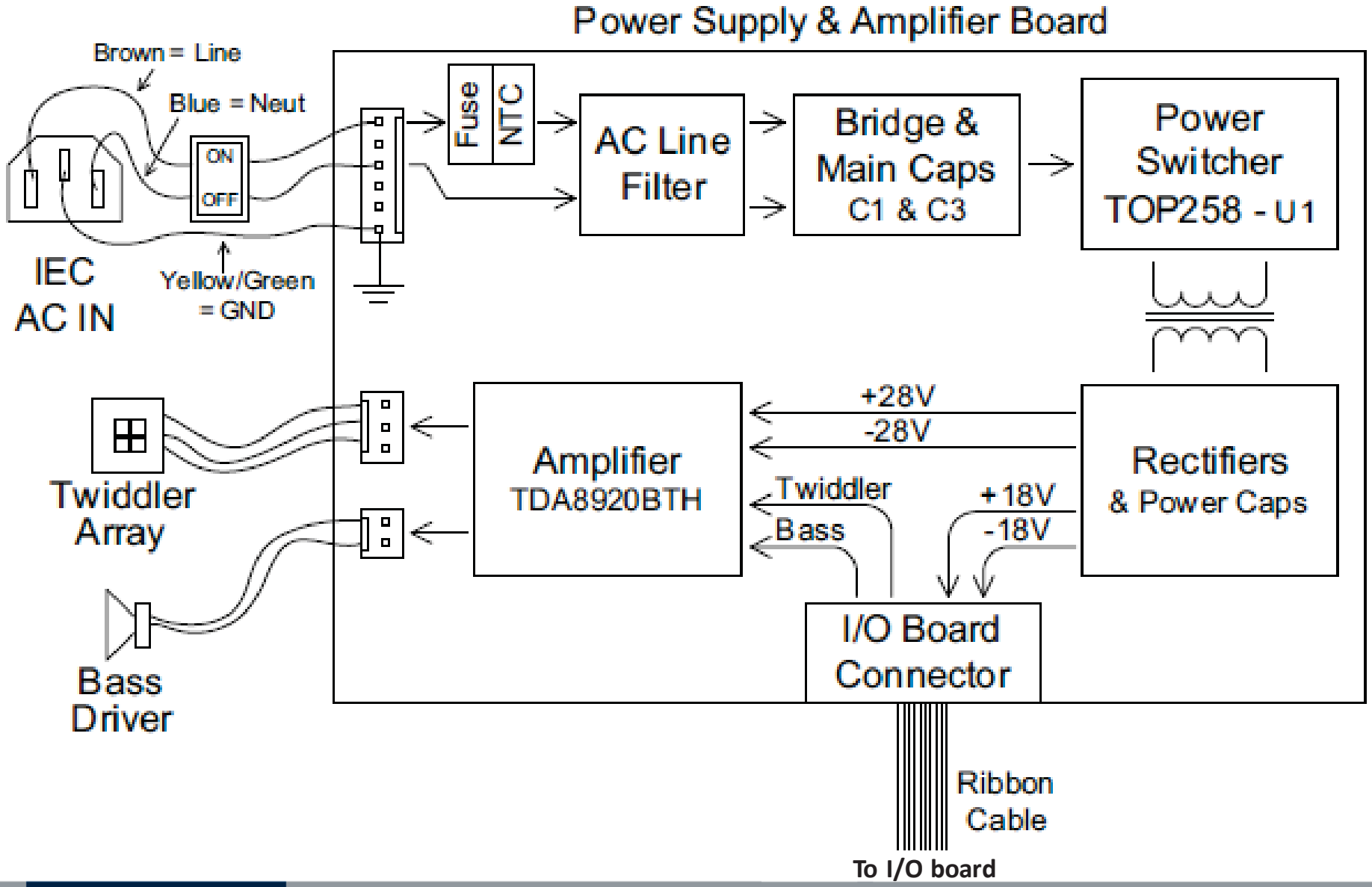
- Software upgrade is not applicable in case of L1 Compact.
- The L1 Compact is an analog product with no DSP.
- No TAP Commands are available for L1 Compact.

THE BASIC THEORY OF OPERATION

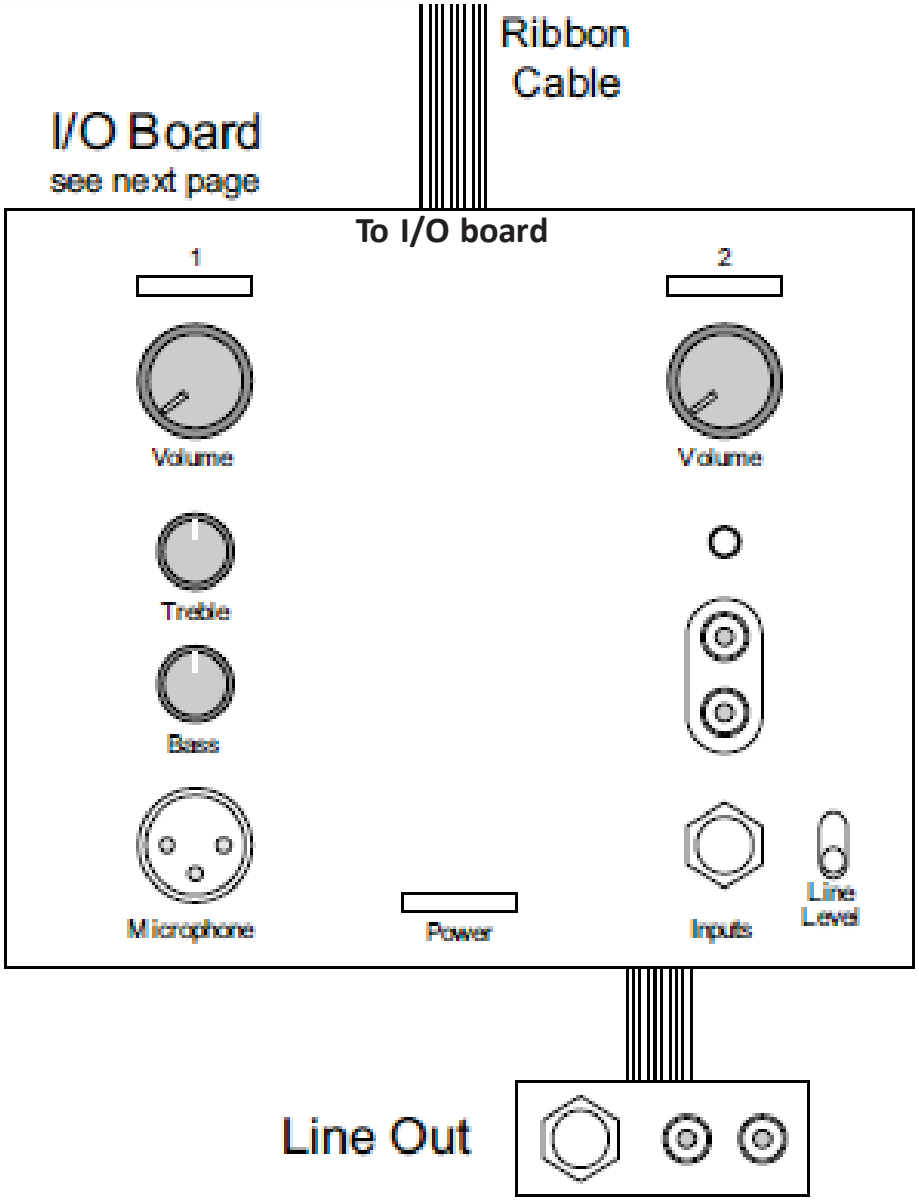
Block Diagram



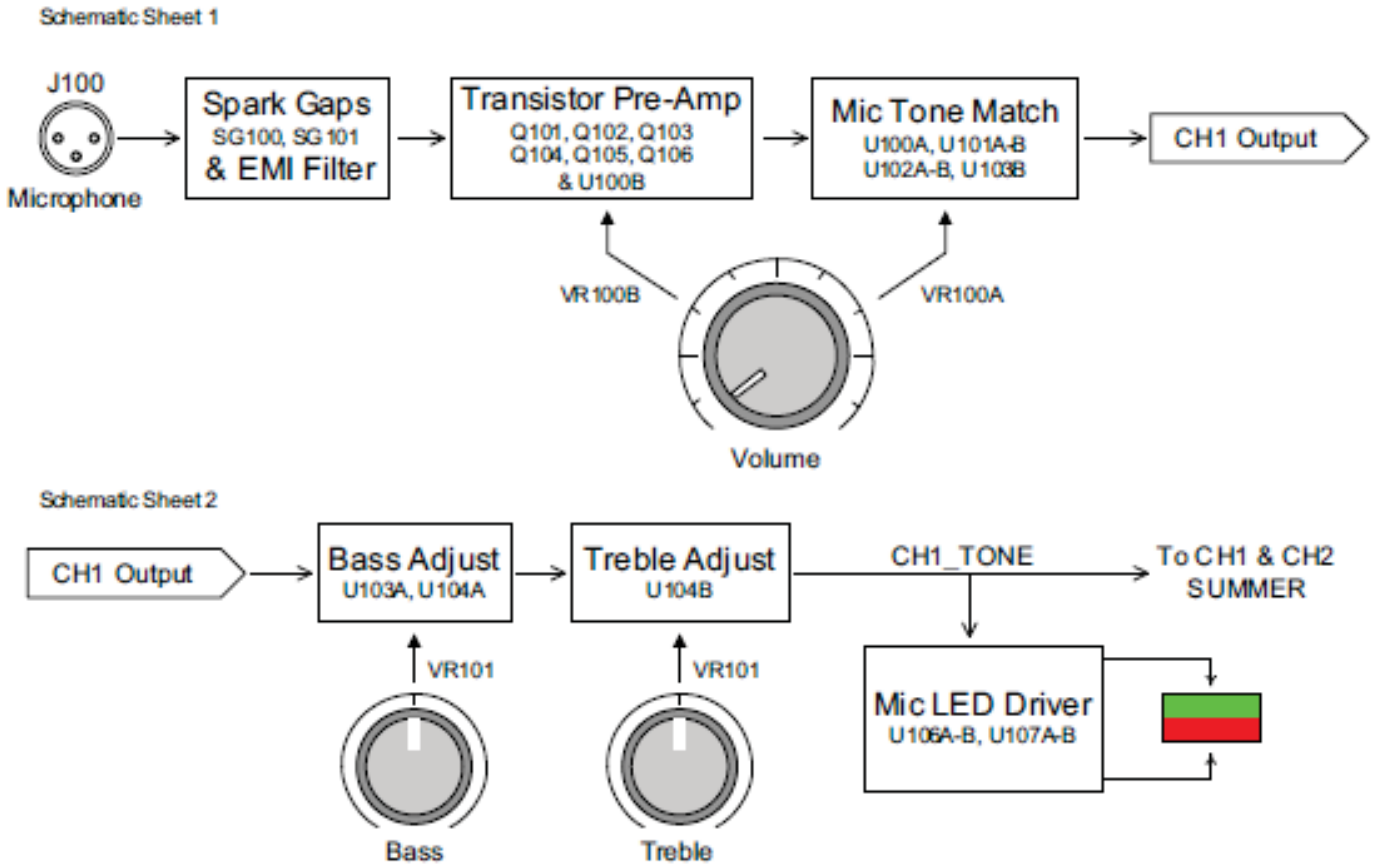
PCB Layout


Power Supply & Amplifier Board
Brown = Line
Blue = Neut
ON
OFF
IEC
AC IN
Yellow/Green
= GND
Fuse
NTC
AC Line
Filter
Bridge &
Main Caps
C1 & C3
Power
Switcher
TOP258 - U1
Twiddler
Array
Bass
Driver
Amplifier
TDA8920BTH
+28V
-28V
Twiddler
Bass
+18V
-18V
Rectifiers
& Power Caps
I/O Board
Connector
Ribbon
Cable
To I/O board

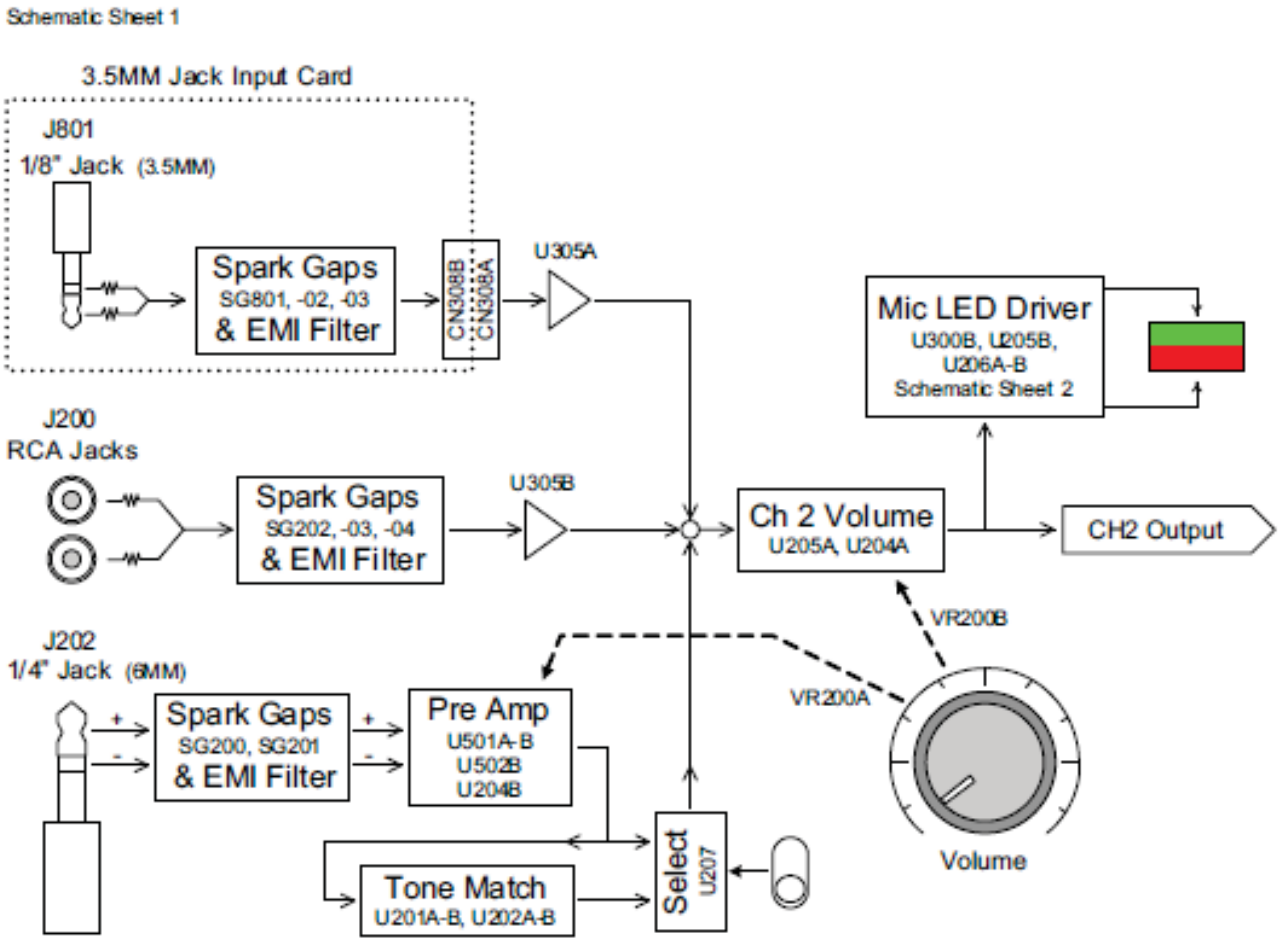
PCB Layout


Ribbon Cable
I/O Board
see next page
To I/O board
1
2
Volume
Volume
Treble
Bass
Microphone
Power
Inputs
Line Level
Line Out

Channel 1 (mic) Input Section



Channel 2 Input Section



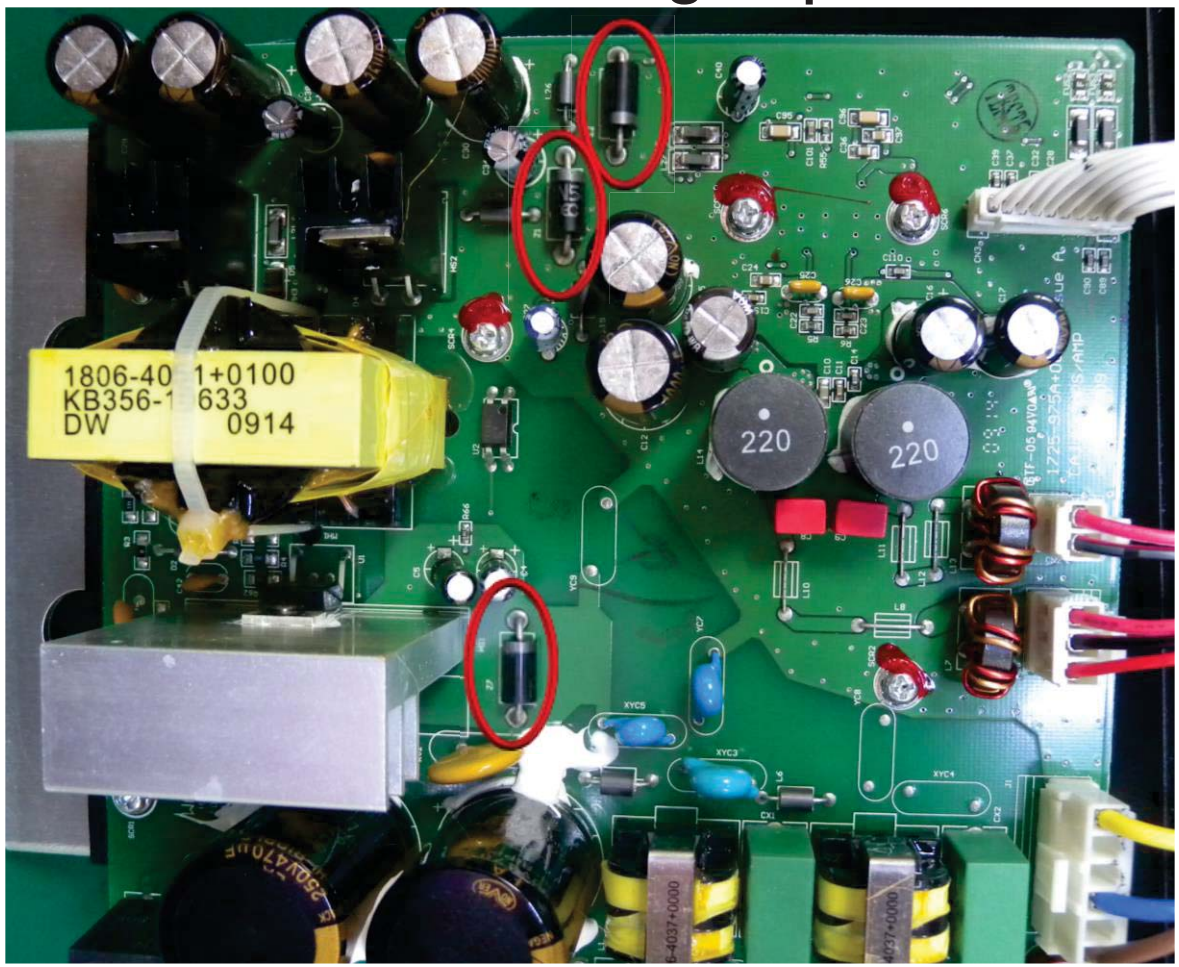
TROUBLESHOOTING TIPS

Troubleshooting Tips

Preventive Maintenance

Symptom

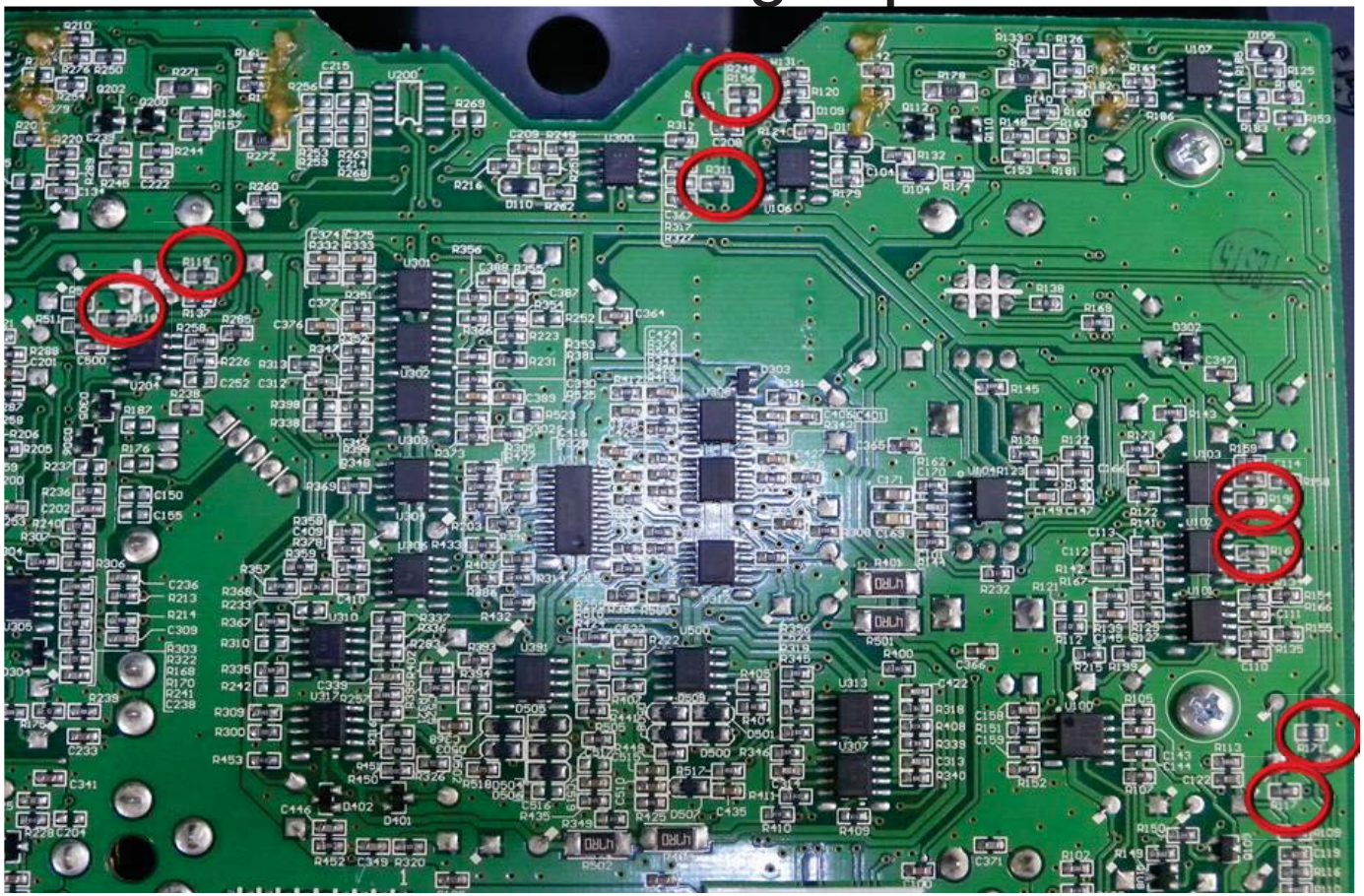
System/unit Dead.
No Power LED.



Product	Check	Action
L1 Compact	Check DOM embedded in product serial number.	If the date code is before 7/24/09 (DOM 9205), replace zener diodes Z1, Z2 and Z7 using the rework procedure outlined in Service Bulletin 318882-B1. These diodes are located on the Amplifier / Power Supply PCB assembly.

Troubleshooting Tips

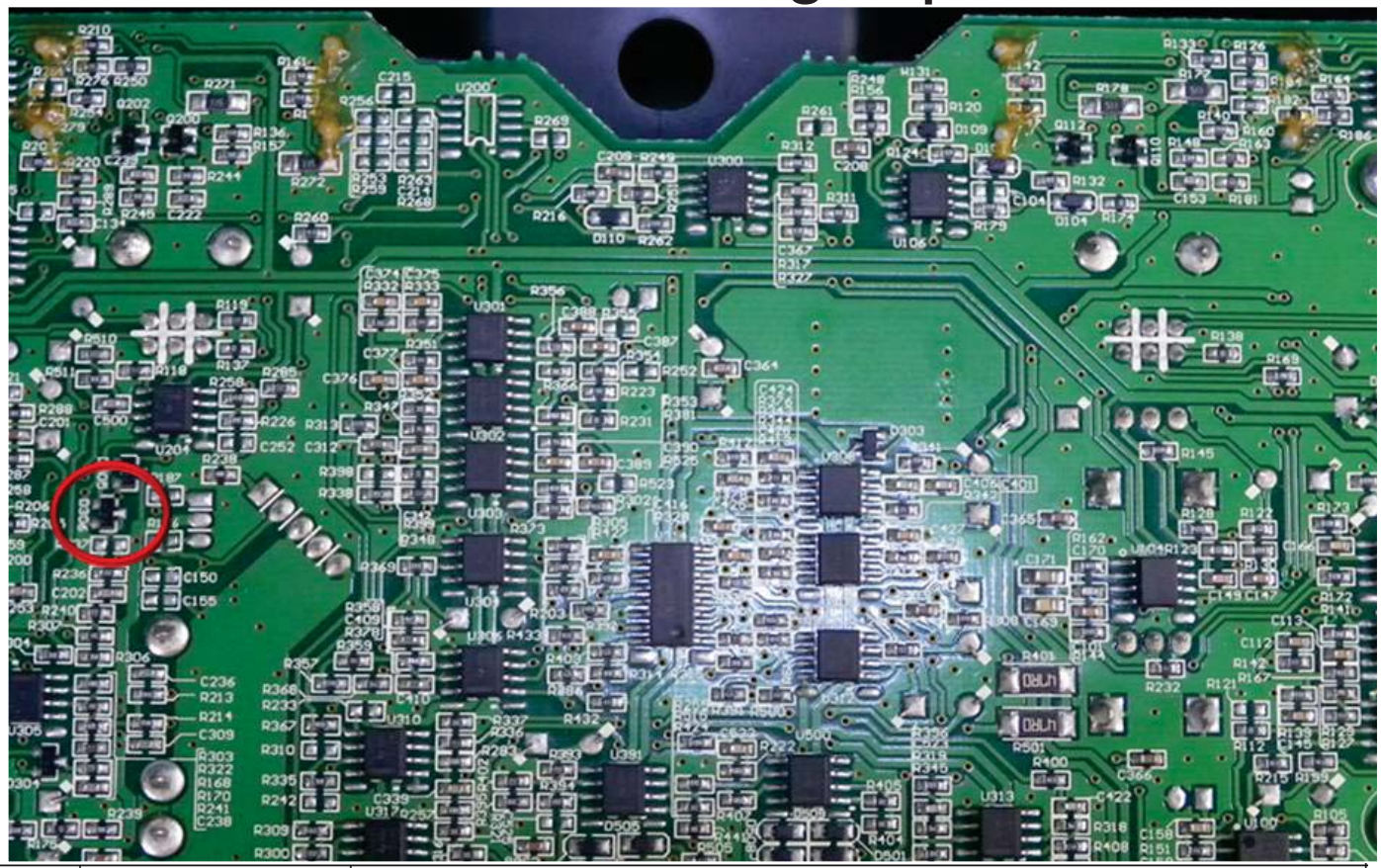
Troubleshooting Tips



Product	Symptom	Check	Action
L1 Compact	Excessive noise floor on the Channel 1 Mic Input.	DOM of product.	If the date code is before 8/18/09 (DOM 9230), replace resistors R117, R171, R165, R311, R248, R190, R118 and R119 with new values as listed in the rework procedure outlined in Service Bulletin 318882-B2. These resistors are all located on the Input/Output PCB assembly.

Troubleshooting Tips

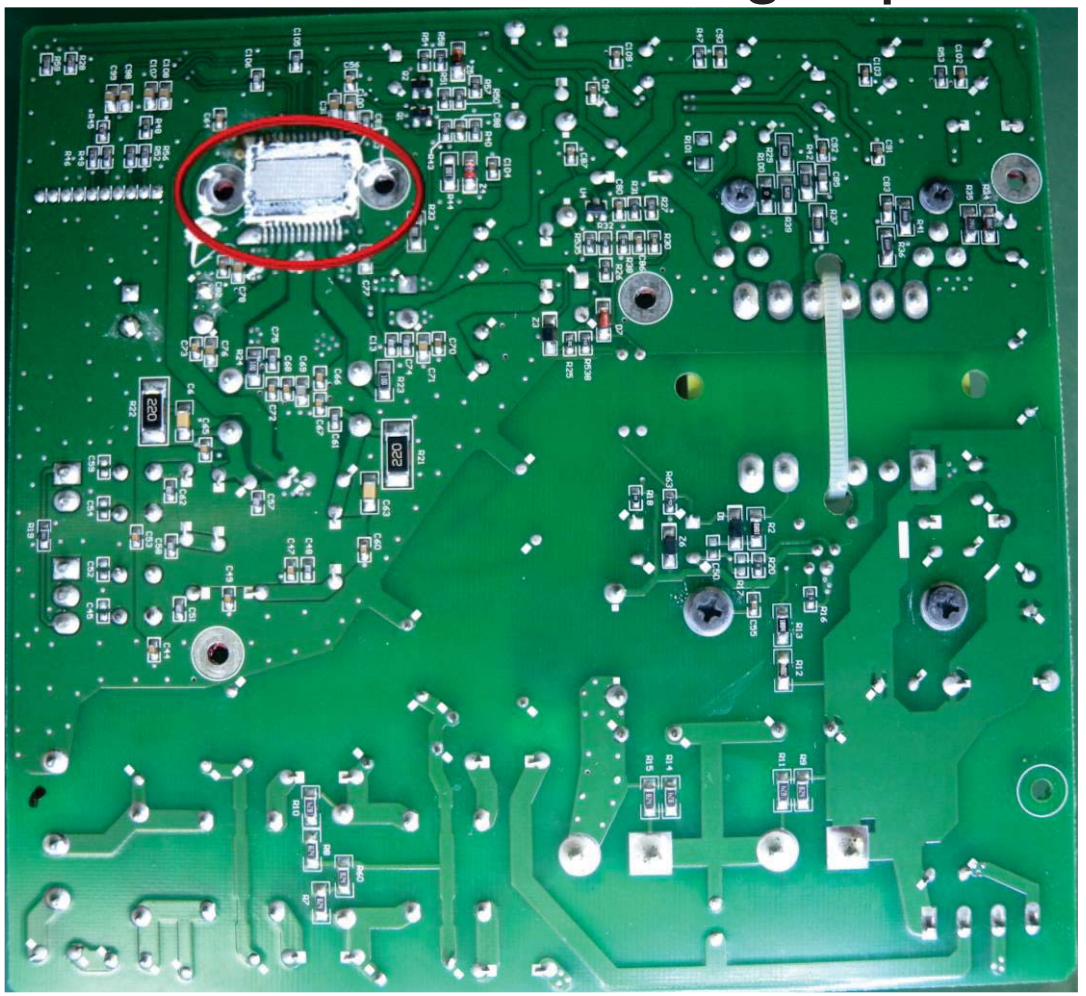
Troubleshooting Tips



Product	Symptom	Check	Action
L1 Compact	Loud crackling noise on channel 2 inputs – no sources connected.	Solder on D306 on the I/O PCB	Channel 2 noise complaint. Unit makes a cracking noise as if the pot was dirty or if a cord was defective. Occurs on all channel 2 connectors. With no inputs connected, unit has very loud crackling noise as soon as channel 2 is turned up. Re-solder the pins on diode D306. D306 is a dual diode that clamps the input voltage from the 1/8 jack to protect the input Op-Amp.

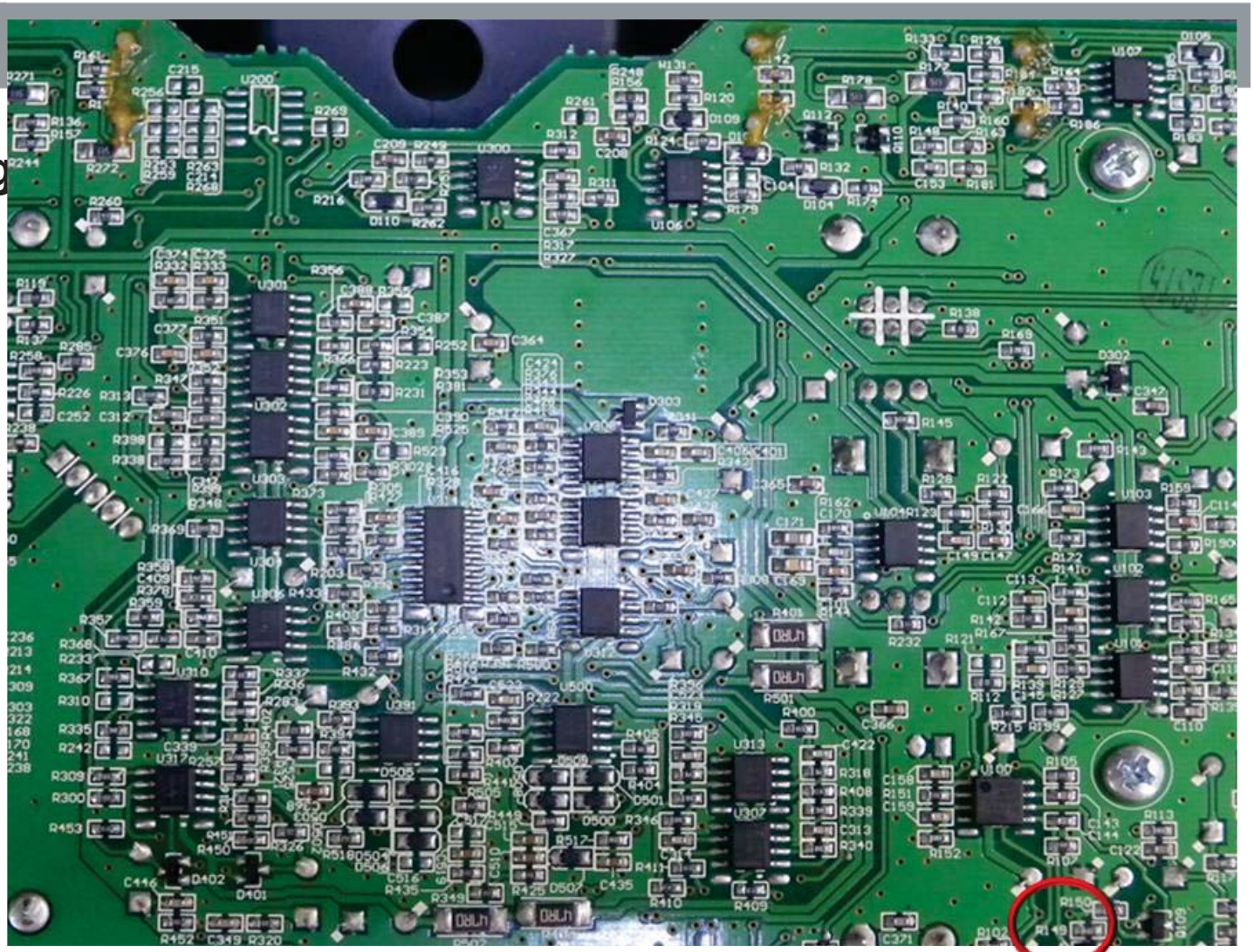
**Please get this corrected in service manual.*

Troubleshooting Tips



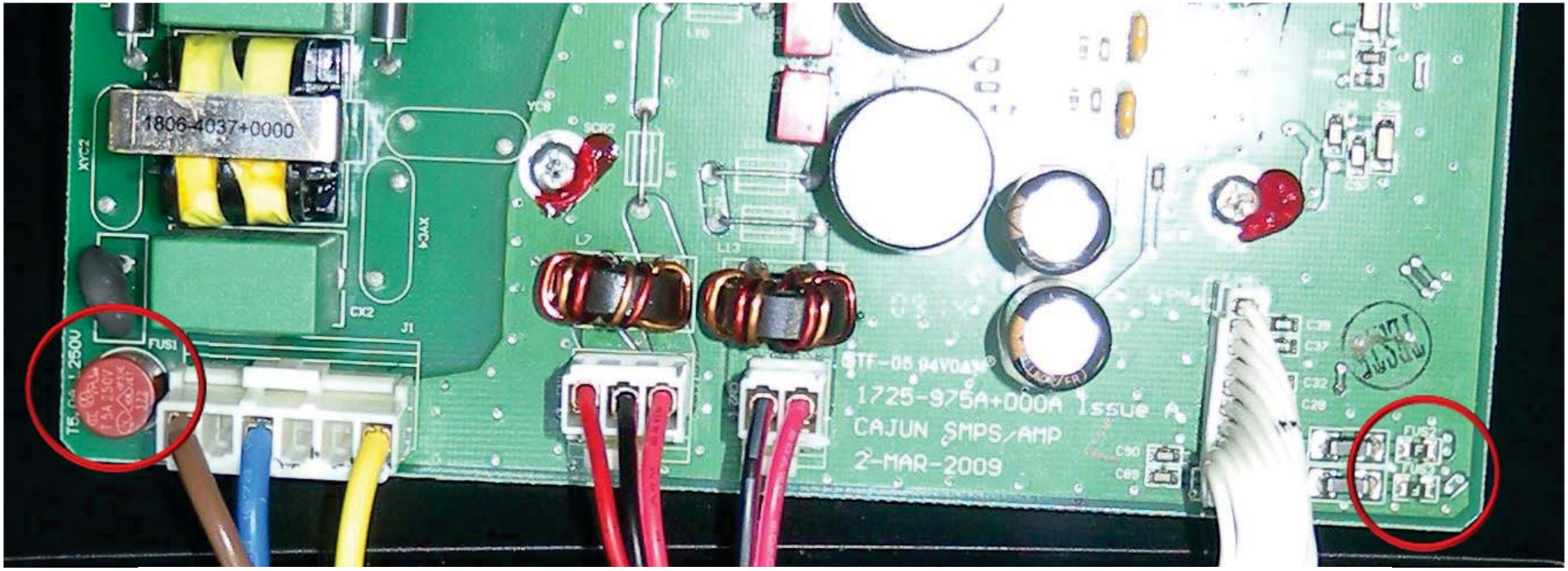
Product	Symptom	Check	Action
L1 Compact	Clicking sound. No audio output.	Check for failed audio amplifier IC U3.	Defective Amplifier IC, TDA8920 on Power supply PCB. Clicking sound is caused by the amplifier detecting the fault, shutting down and then attempting to restart.

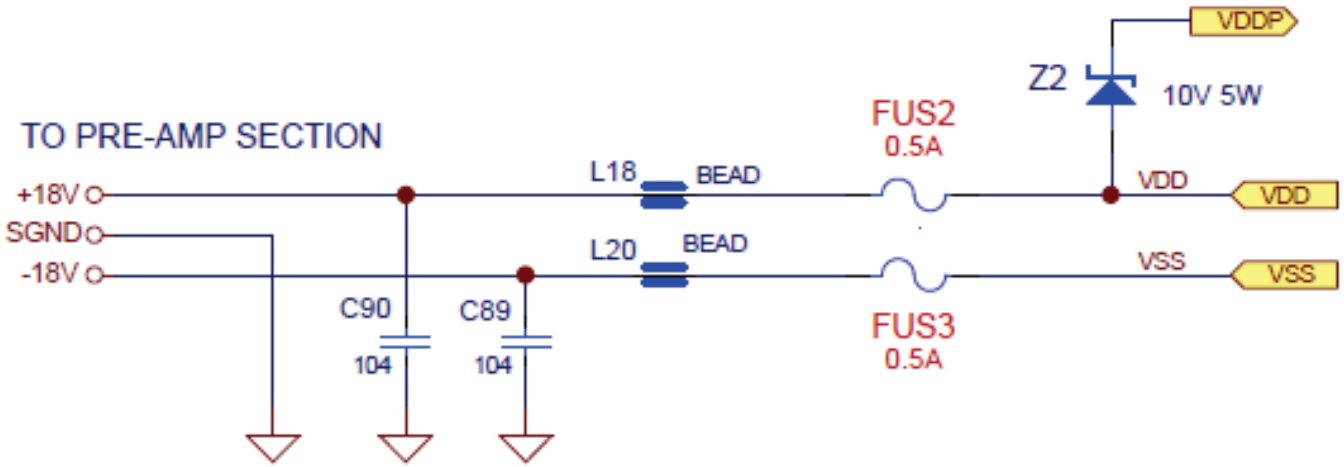
Troubleshooting Tips



Product	Symptom	Check	Action
L1 Compact	Channel 1 noise. Intermittent.	R149 solder connections.	Channel 1 noisy with no sources connected. Can be intermittent. Noise fades after about 2 to 15 minutes. Check R149 for solder issues or failure. This resistor is located on the Input / Output PCB assembly.

Troubleshooting Tips





Thank You

SERVICE BULLETIN

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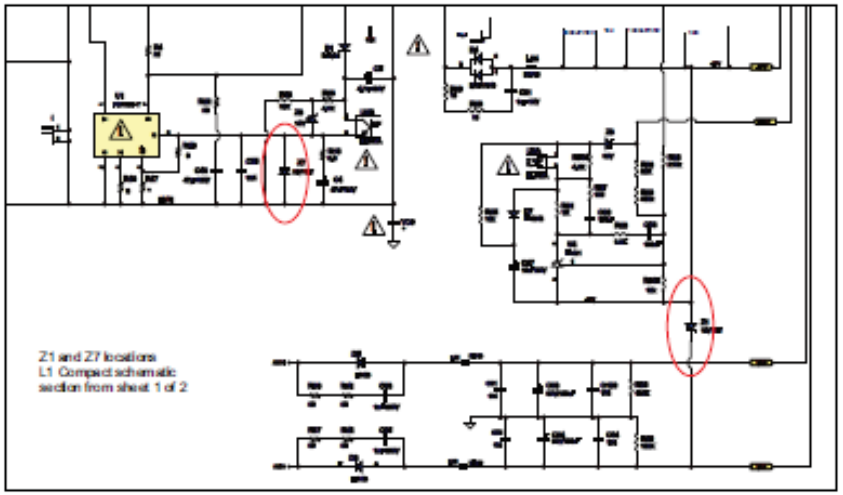
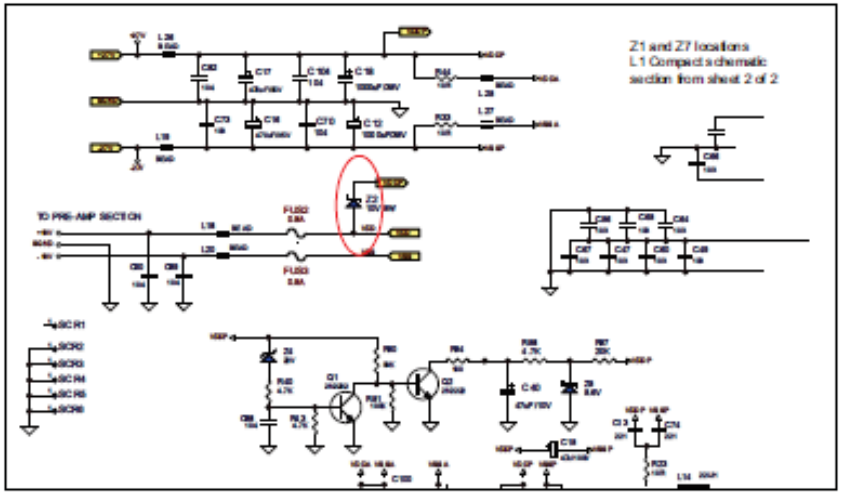




Bulletin Part Number: 318882-B1

Product: L1 Compact Portable Line Array System

Subject: Defective diodes from vendor

Disposition: On all L1 Compact systems built before 7/24/09 (DOM 9205)that are sent in for service, replace Zener diodes Z1, Z2 and Z7 using the following procedure.

Symptom: No symptom or dead unit.

Reason: Defective diode(s) from the part manufacturer may fail prematurely.

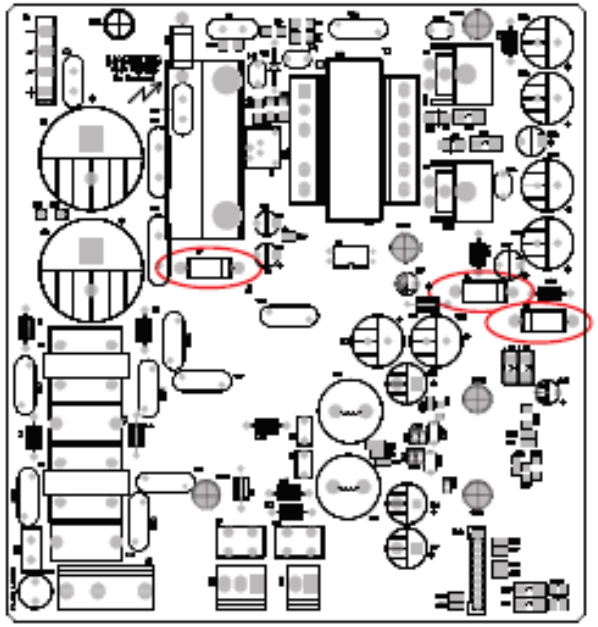
Solution: Perform the rework procedure below.

Rework Procedure:

1. Using the disassembly procedures in the service manual, remove the power supply / power amplifier PCB assembly from the power stand cabinet.
2. Locate and remove zener diodes Z1, Z2 and Z7. Discard.
3. Using Bose part number 325372-001S, replace Z1, Z2 and Z7 with new parts. The diodes are On-Semi 1N5347B, 5W, 10V zener diodes with axial leads. Be sure to observe polarity when installing the new parts.
4. Re-install the power supply / power amplifier PCB assembly into the power stand cabinet.
5. Perform the power stand test procedures located in the L1 Compact service manual to ensure proper operation before returning the system to the customer.

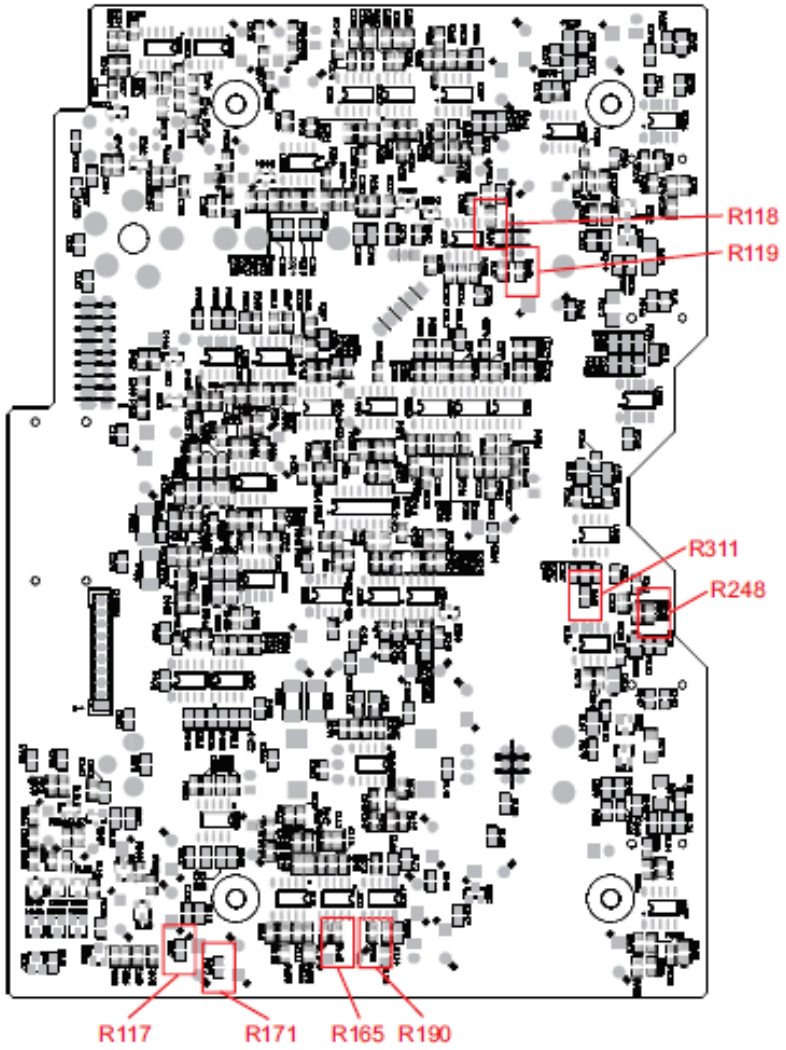
Notes:

1. Refer to the L1 Compact service manual, 318882-SM, located on the service web site located at http://serviceops.bose.com for disassembly and test procedures.
2. Refer to the board layout diagram at right and the schematic diagram located on page 2 of this bulletin for the locations of Z1, Z2 and Z7 in the circuit and on the circuit board.



Date Issued: 8/09

SERVICE BULLETIN



Bulletin Part Number: 318882-B2

Product: L1 Compact Portable Line Array System

Subject: Excessive noise floor on the Channel 1 mic input

Disposition: On all L1 Compact systems built before 8/18/09 (DOM 9230) that are sent in for repair due to excessive noise floor on the channel 1 mic input, replace the six resistors listed in step 2 of the below rework procedure. Also replace two resistors in the channel 2 circuitry to improve the long-term performance of the channel 2 volume control potentiomenter.

Symptom: Excessive noise floor on the Channel 1 mic input.

Reason: Circuit gain initially set too high during design.

Solution: Perform the rework procedure below.

Rework Procedure:
CAUTION! The integrated circuits used on the Input / Output PCB are extremely sensitive to damage from electrostatic discharge. Observe all ESD handling procedures to prevent damage to the PCB assembly during the rework process.

1. Using the disassembly procedures in the service manual, remove the handle from the power stand. Remove the top cover with the Input / Output PCB mounted to it. It is not necessary to remove the I/O board from the top cover plastic to perform this rework procedure.

2. Locate the following SMD resistors and replace them with the values listed below. Refer to the board layout diagram on page 2 of this bulletin for the resistor locations. All resistors are SMT package size 0603, 1% parts.

Mic (channel 1) Noise Reduction:
Change R117 to 47.5 Ohm - Bose part number 191465-47R5
Change R171 to 4.7K - Bose part number 191465-4701 (position was unused previously)
Change R165 to 68.1K - Bose part number 191465-6812
Change R311 to 24.9K - Bose part number 191465-2492
Change R248 to 13.7K - Bose part number 191465-1372
Change R190 to 10K - Bose part number 191465-1002

Lower Wiper Resistor Value for Channel 2:
Change R118 to 68.1K - Bose part number 191465-6812
Change R119 to 68.1K - Bose part number 191465-6812

3. Re-Install the I/O PCB assembly and the handle into the power stand cabinet.
4. Perform the power stand test procedures located in the L1 Compact service manual to ensure proper operation before returning the system to the customer.

Note: Refer to the L1 Compact service manual, 318882-SM, located on the service web site located at http://serviceops.bose.com for disassembly and test procedures.

Date Issued: 8/09