

***Speaker*Power**

Installation and Operation Instructions for SP Series Plate Amplifiers

SpeakerPower Inc. 3001 S Harbor Blvd, Santa Ana CA 92704

I. Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.



15. **WARNING To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.**

16. The lightning flash with arrowhead symbol, within an equilateral triangle is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to humans.

17. The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.



NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance to the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

I. Introduction

1. Intended Application. To Be Installed Only in Restricted Access Areas (Dedicated Equipment Rooms, Equipment Closets, or the like) in Accordance with Articles 110-18, 110-26, and 110-27 of the National Electrical Code, ANSI/NFPA 70. The equipment must be operated and maintained only by trained personnel.

2. Installation in any other enclosure, like a rack, requires the speaker to connect via Class 1 wiring to the Speakon connector on the faceplate.

3. Enclosure construction.

a. This amplifier should only be installed in a wood (solid, plywood, particle board, etc) or metal enclosure. It should not be installed in a plastic enclosure.

b. The speaker cabinet must be 2 cu ft or larger to allow sufficient air for cooling. Allow at least 6 inches of space around the vents in the back of the amplifier. Do not block the circulation of air around the amplifier. Do not place flammable materials over or near the amplifier.

c. Sound deadening material should not be installed in contact with any electrical connections on the amplifier or speaker.

d. Sound deadening material should be flame rated HB or better by UL LLC.

e. Suitability of handles or mounting points should be determined by an appropriate testing facility.

f. All exposed edges and surfaces should be smooth and rounded to prevent injury during handling.

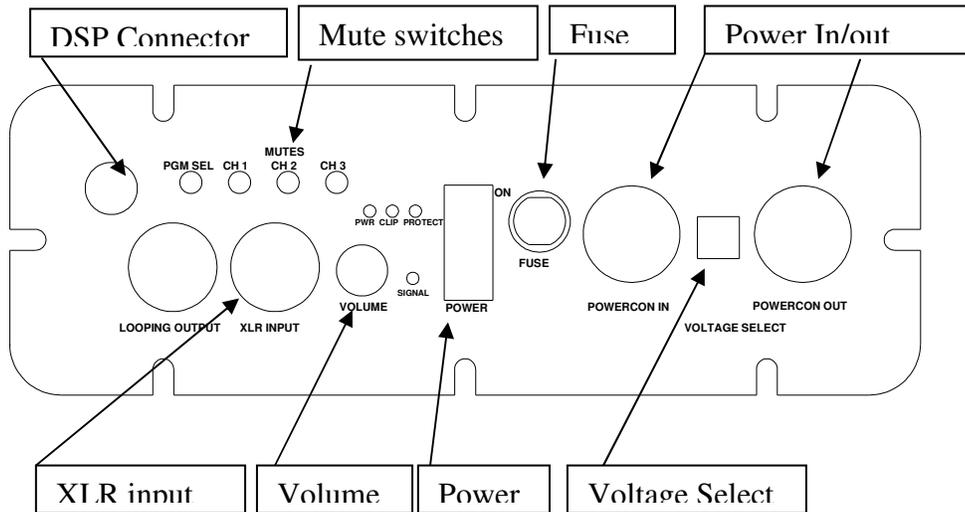
4. Installation in the cabinet. It is recommended that the amplifier be recessed into the speaker cabinet 3/8" to prevent abrasion and possible damage to the heatsink and connectors. It is not necessary or recommended to create a separate subenclosure for the amplifier in the speaker cabinet. If a ported cabinet, installation close to the port is recommended for best thermal capacity.

5. A copy of these safety instruction should be provided with each loudspeaker system.



6. Parts Check List. The amplifier comes with an appropriate AC power cord. The user must provide input and speaker cabling appropriate for the application.
7. Panel Layout. The arrangement of the connectors may differ from model to model.

II.



Getting Started

1. Speaker Connections. Speakers are connected to the internal amplifiers by the white 6 pin AMP mate n lock connector on the rear panel. The mating connector is AMP MATE-N-LOC 350715-1 (Digikey part number A14288-ND). The individual pins are Amp 350552-1 (Digikey A14303-ND) for .130 - .200 inch diameter wire insulation. Up to 14 gauge wire is accommodated by these pins. There is a relatively cheap hand tool that will crimp these pins. It is a Molex 63811-1000, Digikey part number WM9999-ND for \$38. A better tool is the AMP 90546-1. A cheap tool to remove the pins if (when?) you make a mistake is AMP 305183-R, Mouser part number 571-305183. A better tool is the AMP 318851-1.

a. Rack mounting or any enclosure other than a speaker cabinet. Speaker connections must be made with Class 1 wiring to the Speakon connector on the faceplate.



2. We recommend using twisted pair wiring to the speakers of at least 16 gauge. **Both + and - wires are “hot”, so they should not be allowed to touch any other wire, the amplifier cabinet, or ground.** The channels are brought out to the plug as shown in the drawings below.

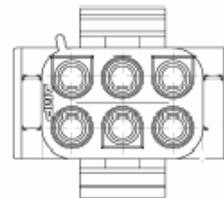
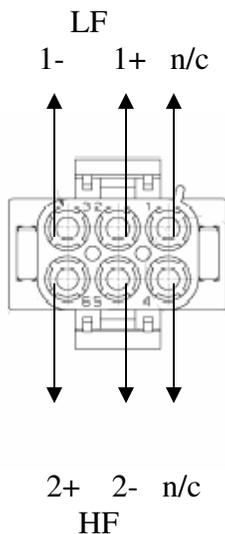
3. Channel 1 is the amplifier in the ASP module and is connected to the Low Frequency speaker in SP1, SP2 and SP3 models. In SP2 models, Channel 2 is the slave amplifier and is connected to a High Frequency speaker. In SP3 models, Channel 2 is connected to the Mid Frequency speaker and Channel 3 is connected to the High Frequency speaker.

SP1 and SP2

Rear View Wire Exits

Side View

End view

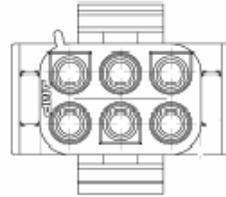
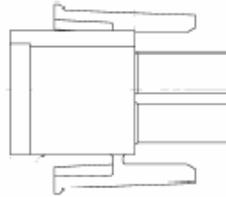
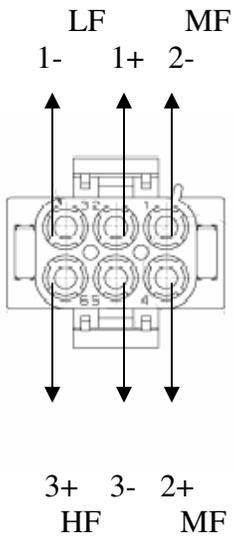


SP3

Rear View Wire Exits

Side View

End view





4. AC mains connection. The mains disconnect of the amplifier is the AC plug. It must be removed from the AC service to completely remove power from the amplifier. The AC mains power cord is connected to the front panel through the blue Neutrik Powercon. The mating cable end connector is NAC3FCA. The gray Powercon connector is a power outlet that allows looping to adjacent amplifiers. The looping outlet mating cable connector is NAC3FCB. **Do connect equipment to the power outlet that exceeds the marked rating of the outlet.**

5. Signal connection. Signal input is through locking XLR connectors. The input is transformer balanced. If an unbalanced source is connected, make sure that the signal is connected between pins 2 and 3. The input impedance is 45K Ohms.

III. Basic Operation



1. 115/230 V switch. **This switch changes the range of voltages accepted by the amplifier. Make sure it is set to the proper range before connected the amplifier to AC.** Once set to the proper range, the amplifier will regulate the internal voltages so that output power does not change with supply voltage. **If the switch position is changed, the fuse must be changed to the proper value as well.** Some models do not have a voltage selector switch. They must be connected to the supply indicated on the amplifier markings.



2. Powering up the amplifier. **Before turning on the amplifier, check to make sure the voltage selector switch is set to the proper range for your service.** Connect the input, lower the volume control, and turn on all preceding equipment in the signal chain. **To turn on power, press the side of the power switch marked “ON”.** After applying the power, check that the mute switches are in the “out” position and slowly raise the volume.

3. LED Indicators. “CLIP” indicates when Channel 1 is clipping. “PROT” indicates when the power supply protective circuitry has been engaged. It may be necessary to cycle the power to reset the protective circuitry. “PWR” indicates that power is present in the amplifier. “SIG” indicates that signal is present at the input of the amplifier.

4. Muting switches. These switches mute the individual amplifier channels for setup and troubleshooting purposes. The channels are unmuted and operational when the switch is IN.

5. Volume control. This lowers in the volume in 1 dB steps down to -12dB, then the steps are larger until the input signal is completely shut off.

6. Program Select switch. This switch allows the selection between two DSP programs stored in EEPROM. The AC power must be cycled off and on for the selected program to be loaded.

IV. Advanced Operation

1. Software Installation and PC Interface Setup.

2. Make sure power is off on amplifier and computer
3. Plug the interface board into the parallel port of the computer
4. Plug the interface cable into the interface board and the SP amplifier.
5. Plug the speaker cable into the back of the SP1 and the loudspeaker. Channel 1 is LF, Channel 2 is MF and Channel 3 is HF.
6. Plug in XLR cable to input from music or test signal source. Make sure signal is OFF.
7. Plug in power cord to SP amp and turn it on.
8. Turn on computer. Enter CMOS setup. The first screen the computer shows while booting frequently tells you which key to press to enter Setup mode.
9. Set the parallel port to EPP mode in CMOS Setup.
10. Save setup and boot to Windows.
11. Unzip the files in ALE5.2.zip. Run Setup.exe to install.
12. Unzip the files in DASDCT3.1.zip. Run Setup.exe to install.
13. Unzip the files in softwareupdate.zip into the "DCT3.1" folder. Overwrite any existing files of the same name.

14. To Load an Existing Configuration

15. Plug interface cable from PC to amplifier before turning amplifier ON. This ensures it will come up in slave mode and accept commands from the PC.
16. Mute all channels from the faceplate of the SP amplifier.
17. Start DAS DCT 3.1 program
18. Open TAS3100Example.dat file in folder "DCT3.1"
19. After a few seconds you will see the EQ GUI box. Select "Detail GUI A"
20. LOAD your configuration file "_____.cfg". The configuration file SP2-500-250.cfg has a typical 2kHz crossover.

21. You may now unmute the amplifier channels and measure the response.
22. To save the configuration into the amplifier so it is available with the computer removed, select EEPROM on the EQ GUI panel. Select “EEPROM Write”. After several seconds you will see “EEPROM Done” Click OK and close the EEPROM panel.
23. Turn off the SP amplifier. Remove the interface cable. Turn on the SP amplifier.
24. The amplifier will now turn on with your program every time. This process may be repeated with the PGM SEL switch in the other position to load a second configuration. The amplifier power must be cycled when changing programs.

25. To Create a New Configuration

26. Generate filters. Start ALE 5.2 program
27. DEVICE menu select TAS3100. You have to do this every time you start the program.
28. VIEW menu select Settings. Under Frequency Limits tab set Fs Sampling Frequency to 96000. Press OK.
29. If you created filters before and saved them as a filter parameter (*.par) file, you may reload them from the FILE menu and proceed to modify them as shown in the next steps.
30. EDIT menu select Edit Filter Parameters.
31. Add filters to table.
32. EQ filters. Remember when adding eq filters that “bandwidth” in the ALE program is expressed in Hz, not octaves. If translating from a processor that expresses bandwidth in octaves, $BW \text{ in Hz} = \text{center frequency } F * BW \text{ in octaves}$. If translating from a processor that express bandwidth as Q, $BW \text{ in Hz} = 1.41 * F / Q$
 - a. Linkwitz-Riley Filters. Second order filters may be chosen directly on the Filter Parameters Grid. Fourth order (24dB/oct) versions, also know as “squared Butterworth” filters, are designed by adding two identical Butterworth filters. So for 24 db/oct L-R at 1000Hz make two 1000Hz entries under Butterworth 2-LP.
 - b. Third order filters. Are not in the Filter Parameters Grid. They may be designed by using the Low Vari Q and High Vari Q tabs. For Butterworth response, one Butterworth-1 filter and one Vari Q filter with a Q of 1.

- c. Fourth order Butterworth. Use two Vari Q filters, one with a Q of 1.31 and the other with a Q of 0.541.
- d. Eighth order Butterworth. Use four Vari Q filters with Q of 0.51, 0.60, 0.90, and 2.56.
- e. Eight Order Linkwitz-Riley. Use four Vari Q filters with Q of 0.541, 1.31, 0.541, 1.31.

- 33. Close the Filter parameters table and select the Wand icon to Draw Filters.
- 34. Go back to Edit Filter parameters until you have added all the filters you need for one channel of the amplifier.
- 35. EDIT menu select Generate TAS3xxx Data.
- 36. FILE menu select Save As Filter Parameters (optional).
- 37. FILE menu select Save As TAS31xxx Program Data. Name and save the file to the existing folder "DAP Config Tool 2.0"
- 38. Repeat steps 2 – 8 for each channel of the amplifier.

39. Generate limits

- 40. Set Threshold 1 to -155dB (-90 ref full output_ to gate out the noise floor. Expansion slope = -10
- 41. Set threshold 2 based on 1W output limit = -95.5. Compression slope = 30
- 42. Region 2 = 1:1
- 43. Don't forget to set Integration Attack and Release times in DCT.

44. Operate DSP

- 45. Plug interface cable from PC to amplifier before turning amplifier ON. This ensures it will come up in slave mode and accept commands from the PC.
- 46. Mute all channels from the faceplate of the SP amplifier.
- 47. Start DAS DCT 3.1 program
- 48. Open TAS3100Example.dat file in folder "DCT3.1"
- 49. After a few seconds you will see the EQ GUI box. Select "Detail GUI A"
- 50. LOAD #.cfg file. For SP1 and SP2 load "allflat_2way.cfg". For SP3 load file "allflat_3way.cfg"

51. The value of 0XF9 in the configuration file must read 01 41 24 11 to enable 96Khz operation. Xf5 and Xf7 should have values 00 04 04 04.

52. Select “BQ12” on the flow chart.

53. Pull down Ch1 drop down menu, select wipe.EQ310X and press ENTER. You must do this before loading an EQ310X file to wipe out the previous settings. Now select your LF.EQ310 file and press the ENTER button. Repeat for channels 2 and 3 using the filters appropriate for the channel. Default Channel assignments in the DSP architecture are:

	LF	MF	HF
SP1	Ch3	na	na
SP2	Ch3		Ch1
SP3	Ch3	Ch2	Ch1

54. IMPORTANT NOTE: On the front panel mute switches and the speaker connector, channels 1 and 3 are reversed from the DSP internal labeling. 1 is 3 and 3 is 1. Or to put it another way, To the outside world ch1 is LF and Ch3 is HF.

55. Select ‘PAGE 2’

56. Select “Vol”. Set the volume offset between channels using the sliders. Close the dialog box.

57. Select “Delay3” button. Add desired delay to channels. Each increment is 10.4uS. Close dialog box.

58. Select “SAVE” Enter a new unique file name for this configuration.

59. You may now unmute the amplifier and measure the response. Volume may be readjusted with the mute removed, but filters should be loaded with mute on in order to avoid sending pops and clicks through the system.

60. When the program is complete, select EEPROM on the EQ GUI panel. Select “EEPROM Write”. After several seconds you will see “EEPROM Done” Click OK and close the EEPROM panel.

61. Turn off the SP amplifier. Remove the interface cable. Turn on the SP amplifier.

62. The amplifier will now turn on with your program every time.