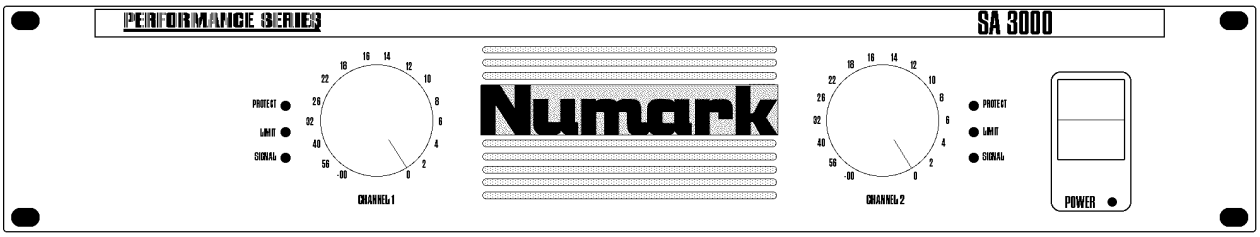
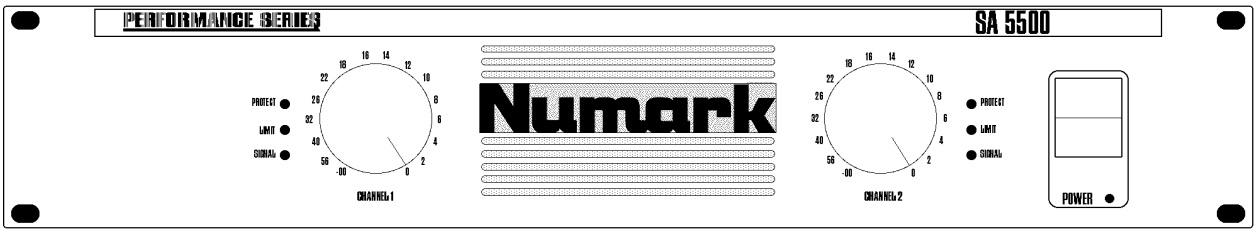
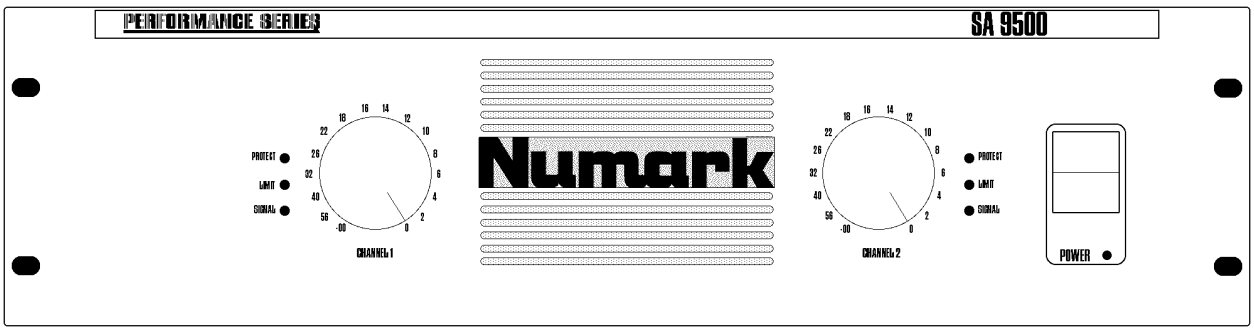
Owner’s Manual







Numark

SA3000/SA5500/SA9500

PERFORMANCE SERIES

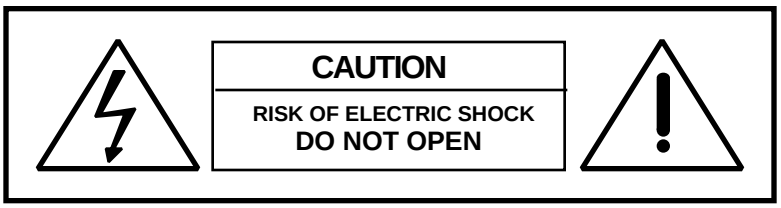
Amplifiers

SAFETY FIRST!

WARNING - TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

WATER AND ELECTRICITY DO NOT MIX. Keep this unit away from water. If water or other liquids are spilled on or into this unit, unplug the power cord immediately from the wall socket (with DRY HANDS) and get a qualified service technician to check it out before using. Keep this unit away from heaters, radiators and other heat producing devices.

DO NOT ATTEMPT TO SERVICE THIS UNIT. ONLY A QUALIFIED SERVICE TECHNICIAN SHOULD OPEN THIS UNIT FOR SERVICING.



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.
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.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

KEEP IT CLEAN: Dust, dirt and debris can interfere with the performance of this product. Make a special effort to keep this unit away from dusty, dirty environments. Cover the unit when not in use. Dust it regularly with a soft, clean brush. Careful attention to these details will be time well spent, and this product will reward you with years of trouble free operation.

Please take the time to read this manual before use. Store this manual in a safe place so that it is available should you ever need it again.

Contents

Introduction

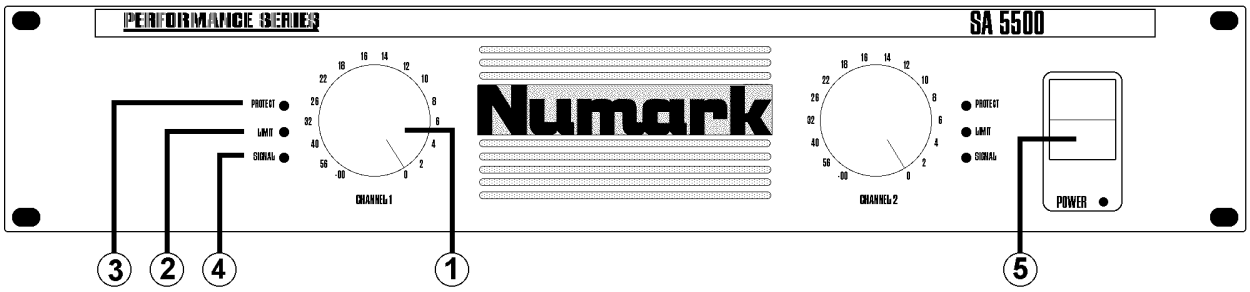
Thank you for choosing a Performance Series power amplifier from Numark. These units are designed to provide a good combination of power, audio clarity, and reliable operation. The basic circuit has been kept as simple as possible to reduce the amount of components, thereby shortening the signal path, coloration and the chance of component failure. However, we opted to add what we regard as essential protection against overheating, short circuits and power on transients.

An efficient heat dissipation system, comprising a high surface area heatsink coupled with one or two fans (depending on power rating of amp), ensures quiet and reliable cooling.

The sound quality and sturdy construction of the Performance Series makes these amps ideal for a multitude of amplification tasks, from installations, mobile DJs, home studios, houses of worship and touring bands.

Since all of the amplifiers are similar in operation, this manual serves for all models. Please take the time to read this manual before connecting and operating your unit, as there is important information contained within. File the manual in a safe place for future reference.

Front Panel Description



1. Gain Controls
These two knobs are the level controls for each channel of the amplifier. The gain increases as the knob is turned clockwise. The SA5500 features detented gain controls with dB calibrations to simplify set up.

2. Limit LED
If an audio signal is amplified beyond the limit of the amplifier, the extremes of the signal will not reach the appropriate levels, giving the appearance of being clipped off when viewed on an oscilloscope. The audible result is distortion, which in small amounts can lead to rapid ear fatigue, and in larger amounts a harsh and unpleasant breaking up of the sound which can damage speakers.

The SA5500 has a built in limiter on each channel to prevent clipping. Should the signal reach a level high enough to cause clipping, the limiter momentarily reduces the level just enough to prevent it. The limit LED lights whenever this occurs.

If your system has a dedicated compressor, you may decide to use the limiting function of this instead. Although the limiting function of the SA5500 has no noticeable effect on the sound quality below clipping, some users may seek to disable it. See feature 11.

3. Protect LED
The SA5500 features several types of protection to prevent damage to the circuitry during turn on or fault conditions. The power on protection relay prevents damaging thumps to the speakers as the power comes on. When the amp is switched on, the protect LED will light for a few seconds and then go out, indicating that the relay has closed, connecting the speakers to the amplifier.

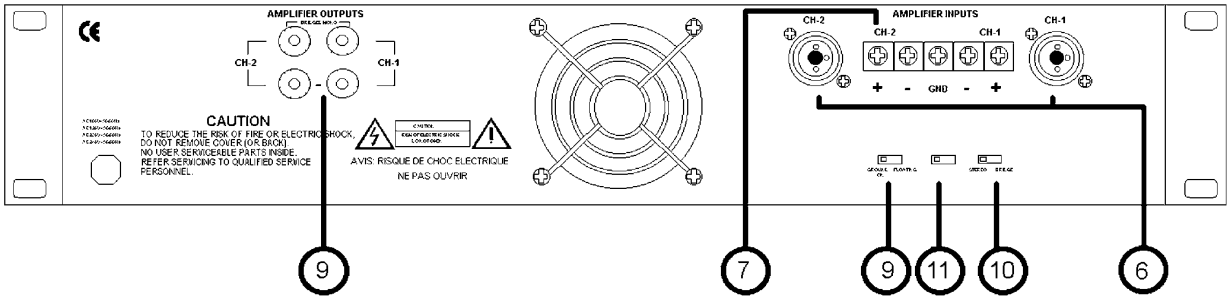
The protect light will also come on if the speaker terminals are short circuited, or the impedance of the load between them is too low. In these circumstances, the protect LED will stay lit until the fault condition is rectified.

The amplifier's large heatsinks, vents and fan should provide enough cooling even with a high ambient temperature. However, if the amp overheats, thermal shutdown protects the circuitry until the temperature is reduced to a safe level. Should the amp shutdown for thermal reasons, leave the power connected to the amp, try to improve ventilation, and reduce the gain. Without power, the fan cannot operate, and the amp will require longer to reach a low enough temperature to restart.

4. Signal LED
Each channel of the SA5500 features a signal LED to show that there is an audio signal at the input to the channel. The threshold for the indicator is -30dB, which should be enough that noise doesn't trigger the LED, but a faint audio signal will.

5. Power Switch
This turns the amp on and off. Although the SA5500 features power on muting, it is nevertheless good practice to reduce both the gain controls before turning on the amp. The turn on procedure for powering up an audio system should be to start from the instruments and mixer, and verify operation before moving on to the power amps. Once the amps are on, verify they are receiving a signal and then slowly increase gain.

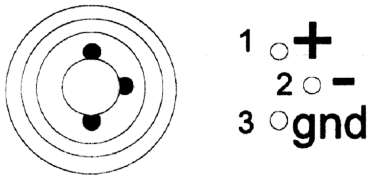
Back Panel Description



6. Neutrick Connector Inputs

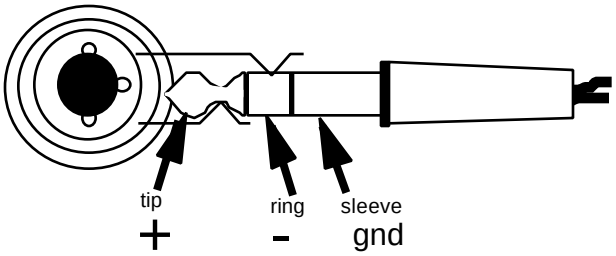
a. Balanced XLR Inputs

These combined inputs are commonly used for both mobile and installation set ups. The XLR provide a good combination of ease of connection and resistance to corrosion. They are wired as per the following convention:



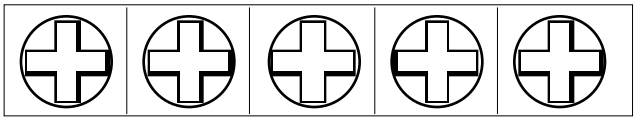
b. Balanced 1/4" Inputs

These types of jacks are featured on many audio products and are convenient if the amp is frequently connected and disconnected, such as for a mobile set up. The plugs used should be wired in the following way:



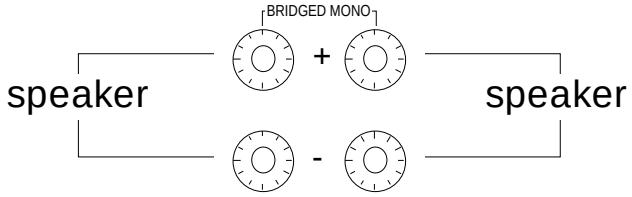
7. Balanced Barrier Strip Inputs

These connection points provide the best option for permanent or long term installation. Connections should be screwed down tightly to exclude oxygen, and care should be taken to avoid loose strands of wire that may cause short circuits.



+ - GND - +

8. Binding Post Outputs



These are suitable for banana plugs, spade lugs or bare wires. Spade lugs and bare wires should both be screwed down tightly to exclude oxygen, and care should be taken to avoid loose strands of wire that may cause short circuits.

9. Ground Lift Switch

This switch allows the circuit and chassis grounds to be separated in case of a ground conflict. In normal use the switch should be in the 'ground on' position. Lifting the ground ('floating' position) may resolve the ground conflict, but means that circuit grounding depends on other connected components. Deficiencies in the grounding of other components will affect the sound. A serious electric fault with the amplifier could damage other components in the system. For the best combination of safety and performance it is highly recommended to keep the switch in the 'ground on' position.

10. Stereo / Mono Bridge Switch

In stereo operation, each channel of the amplifier runs independently with its own signal and speaker(s). However, both channels can be configured to drive a single load with a single signal at twice the power.

To do this, follow these steps:

1 . **switch the amp OFF**

2. put one speaker of not less than 4 ohms impedance across the red (+) output terminals of the amplifier

3. ensure that there is only one input signal connected to channel 1 of the amplifier - channel 2 input must be vacant

4. switch the amplifier to bridged mono (back panel switch)

5. turn the gain down and turn on the amp

6. verify operation at low gain, and then increase power to desired level, ensuring that the gain controls on each channel are set equally.

IMPORTANT: NEVER SWITCH BETWEEN STEREO AND BRIDGED MONO OPERATION WHEN THE AMPLIFIER POWER IS ON.

11. Limiter On / Off Switch

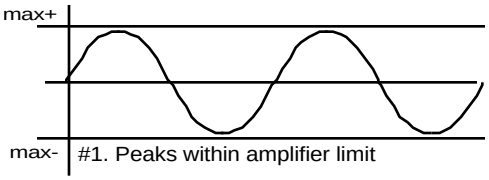
In cases where a dedicated compressor / limit unit precedes the SA5500, some users may seek to disable the on board limiting. Sliding the switch to the off position removes the limiting from both channels of the amplifier.

Audio Terms

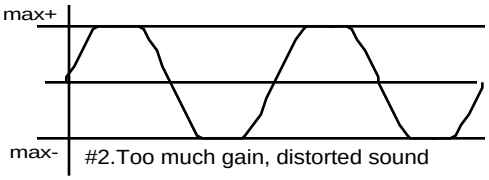
Gain

This is the factor by which an input signal is amplified (increased) or attenuated (reduced) when passing through an amplifier. Gain is generally measured in decibels (dB) which is a logarithmic ratio of input to output. Unity or zero gain means that the signal comes out at the same level that it went in.

With all this gain available, it may seem tempting to turn the amp up to full to get the loudest sound possible. And why is it that smaller amps have roughly the same gain even though they are less powerful? The answer is that an amp can only amplify up to a certain point, which depends on its power rating. Past this point, the output just distorts in what is called clipping. The peaks of the signal are 'clipped' as they exceed the limit.



#1. Peaks within amplifier limit



#2.Too much gain, distorted sound

Noise

Noise is typified by a hissing sound. It is present in all analogue electronics due to random thermal vibration of atoms within the components. However, good circuit design and proper operation reduces this to a minimum.

Gain structure, i.e. how gain is set throughout the signal path, is very important in minimizing noise. Most audio signals go through several gain stages such as input trim, fader gain, main fader gain, EQ and compressor gain, and power amplifier gain. If the signal is boosted early on to a high level, any noise subsequently picked up will be relatively small in comparison to the audio signal (i.e. higher S/N, or sound to noise ratio).

If the gain is low early on, the noise will be relatively loud compared to the signal. When amplified at the power amp more gain must be used to make the signal reach required levels. This gain also acts on the noise, hence a noisier final sound. Of course, care must be taken not to set the gain too high, this will cause clipping distortion (see first section on 'Gain').

Hum and Buzz

Hum typically is a lower pitched sound of around 50 or 60Hz, depending on the AC supply. If the hum or buzz is very loud, this is generally caused by bad connections - check cables and plugs for faults.

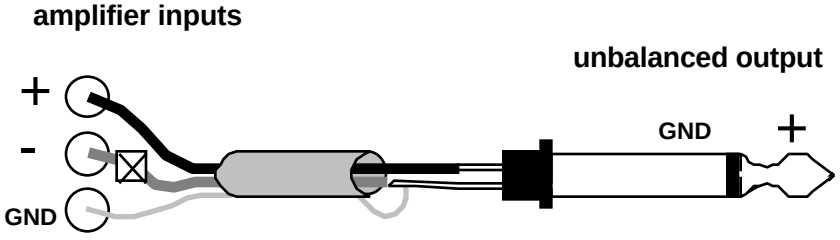
Lifting the Ground

In other cases, a ground conflict between the chassis and the circuit ground can induce hum. This happens when a magnetic field induces a small voltage in the casing of the amp, making it slightly different in potential from the circuit ground. This hum sounds more subtle than it would be for a bad connection and is generally ignored. If your environment requires the highest quality sound, it may be eliminated by 'lifting the ground'. This is accomplished by moving the back panel switch from the 'ground on' position to the 'floating' position. The electronic ground is then dependent on other connected components. For the best safety protection and protection of other components, it is strongly advised to keep the switch in the 'ground on' position.

Balanced Lines

Power transformers and other devices which cause magnetic fields can induce hum in audio cables. This can be best combated by using balanced lines where inputs and outputs permit. Balanced lines use two conductors plus a shield (ground) to send a positive and negative version of the audio signal down the line. These are in close proximity and therefore pick up the same hum or interference. At the input, the inverted (-) signal is flipped back and mixed with the original, canceling any hum or interference.

Since all the inputs of the Numark amps are balanced, accepting signals from a balanced output is no problem. Should the output be unbalanced, the cable should be wired as follows to ensure the best possible performance. This applies to XLR, 1/4" and barrier strip inputs alike:



Where ⊠ is a variable resistor, adjustable between 0 and 600 ohms.

The variable resistor is to ensure an impedance balance between the positive and negative inputs, and should be adjusted until any hum is at a minimum.

Balanced lines are also the most effective means of reducing or eliminating RF or 'radio frequency interference'. Long unbalanced cable runs are likely to pick up radio signals. While these will be at a low level, they can be easily audible once they are amplified through a gain stage. This also applies to inputs to your mixer, so use balanced inputs wherever possible.

Losses Due to Cable Runs

To connect the speakers to the amplifier, some type of cable must be used. This cable must be able to carry the signal some distance with the minimum amount of degradation along the way. Unlike earlier stages in the audio chain, the signal is at a relatively high level, therefore it is relatively immune to noise, RF interference and hum. However, power losses and a reduction in damping factor (the ability of the amp to control the speaker accurately) can occur, and these depend on a number of factors:

- cable gauge - the higher the gauge, the smaller the cross section of each conductor in the wire. This gives the signal more resistance and therefore results in more power loss and a reduction in damping factor. For best performance use 8, 10 or 12 gauge cables as opposed to 16 or 18 gauge.
- cable length - the longer the cable, the higher the losses. For best performance use the shortest possible cable (i.e. don't use a 100ft cable to connect to an amp that is only 20ft from the speakers).
- speaker load - a 4 ohm load will have double the power loss associated with an 8 ohm load and half the damping factor.

The difference that these factors can make is significant. For example, a Numark amp with 5ft of 12 gauge cable and an 8 ohm load will have a power loss of 0.2% and a damping factor of 142. The same load with a 40ft, 10 gauge cable will have a power loss of 1% and a damping factor of 67. Increasing the cable length to 320ft of 8 gauge, the losses are 5% and the damping factor is just 18.2.

Overload

It may seem an obvious point to make, but overloading speakers can permanently damage them, so care should be taken to select speakers capable of handling the rated power output and peak output of the amp. If the system uses a crossover, ensure that the high frequency 'tweeter' cabinets are not driven with signals of a lower frequency than they are designed for, either by wrongly setting the crossover, or by hum which appears in the amp or anywhere between the crossover and the amp.

Another overload which should be avoided is that of the human ear. Observe health and safety regulations where necessary regarding levels and exposure times.

Bridged Mono Operation

The amp comes factory configured for stereo operation. In this mode, each channel drives a separate speaker load with a separate signal. However, in some circumstances, it may be necessary or desirable to drive a single load at a higher level. This can be achieved using the amp in bridged mono mode.

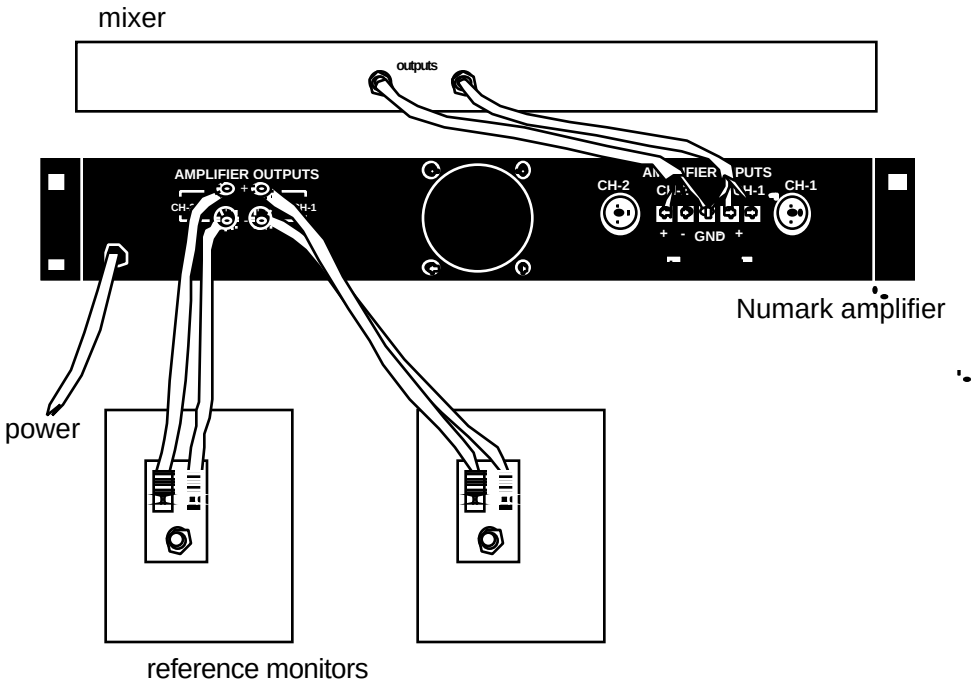
What this essentially does is uses one signal in positive polarity through one terminal and negative through the other. The combined voltage across the terminals is then twice what it would be between a positive terminal and speaker ground (0 V). This is like two cars driving towards each other at 50mph; the relative speed between the two is actually 100mph.

Note that in this way, a load of twice the impedance can be driven at twice the power compared to stereo operation (see specifications).

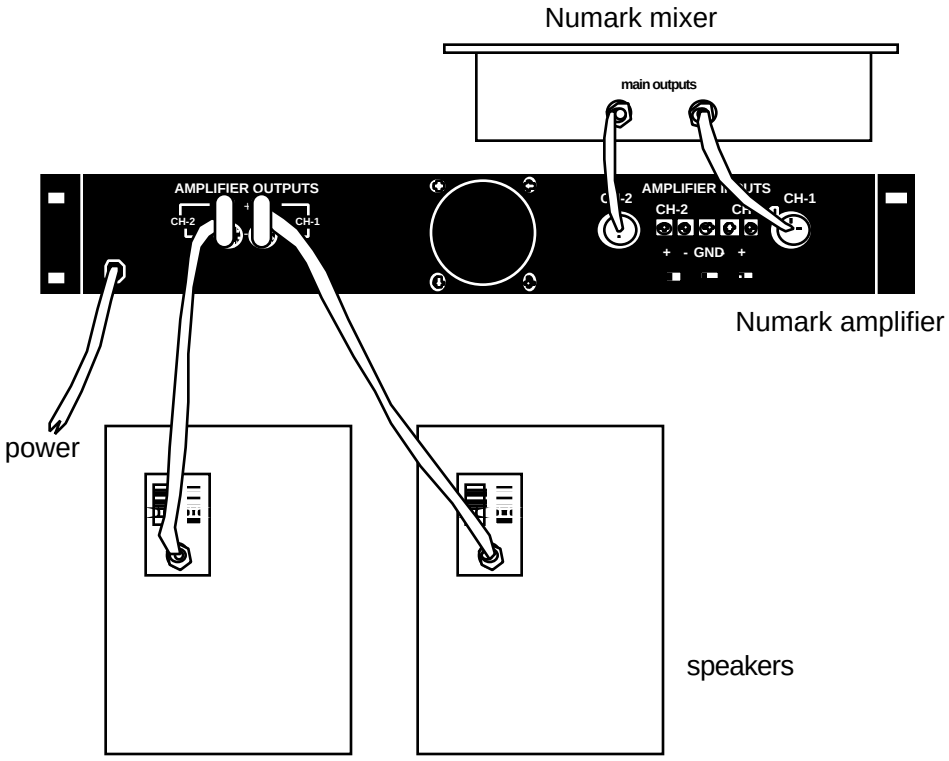
In order to configure your Numark amplifier for bridged mono operation, follow the instructions listed under bridged mono, 10 in each amplifier's description (front half of manual).

The speaker outputs of the Performance Series can be high enough to constitute a shock hazard (especially in bridged mono mode). Always make speaker connections with the power off, and ensure that there are no loose strands to cause short circuits.

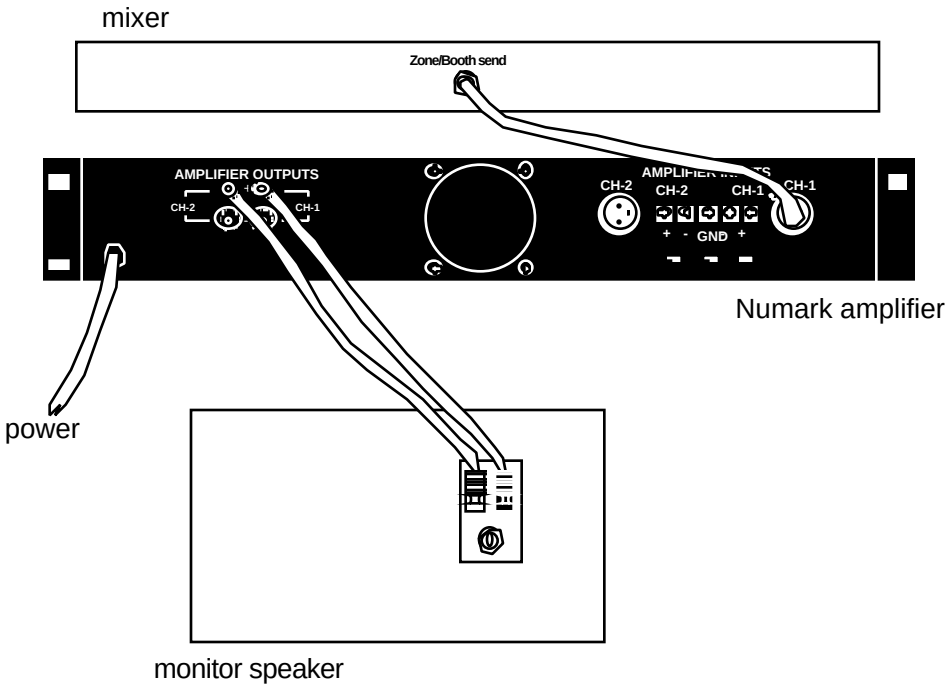
Hook up #1 Home Studio Reference Amplifier



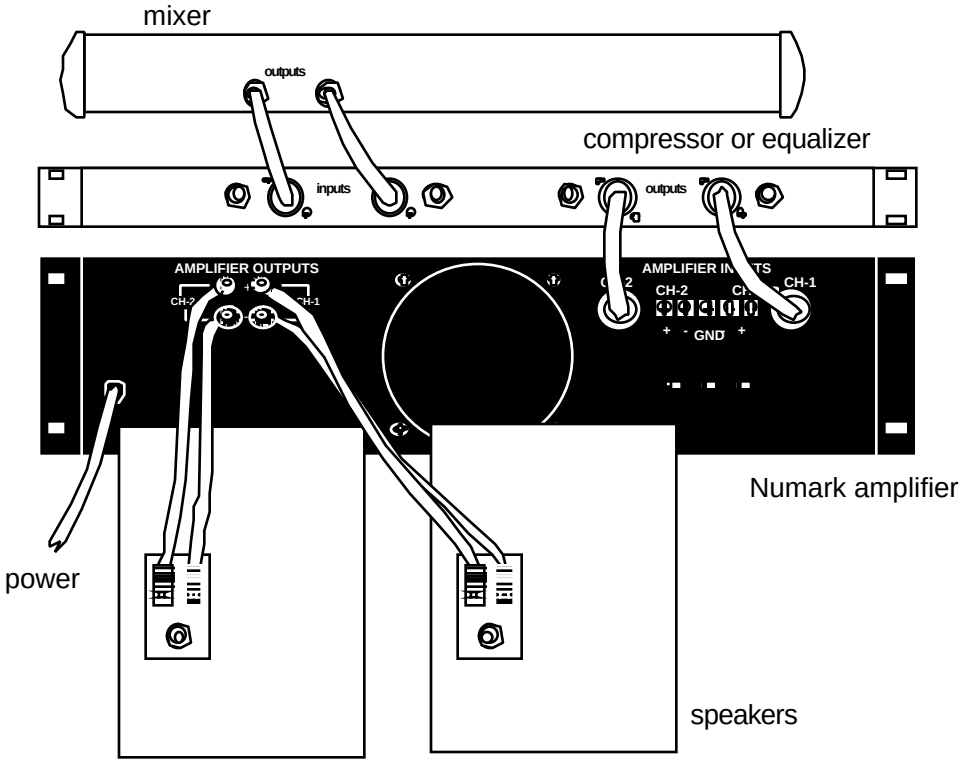
Hook up #2 Mobile DJ Stereo PA



Hook up #3 Monitor Amplifier (in bridged mono)



Hook up #4 Stereo PA System

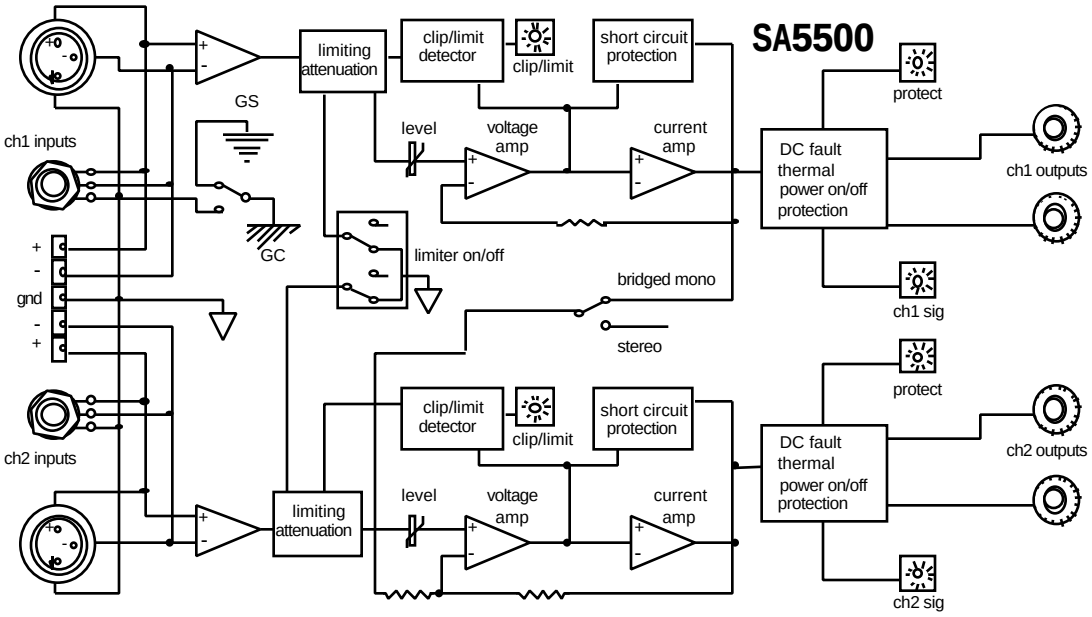


Specifications

	SA9500	SA5500	SA3000
Frequency response (8 ohms , 20Hz - 20kHz @ 1 W)	+0, -1dB	+0, -1dB	+0, -1dB
Total harmonic distortion	0.1%	0.1%	0.1%
Signal to noise ratio	102dB	102dB	102dB
Slew rate	20V/uS	20V/uS	20V/uS
Damping factor	>200	>200	>200
Crosstalk	80dB	80dB	80dB
Rated power			
(per channel RMS Watts, both channels driven)			
2 ohms,1kHz,1% THD	1000W	550W	300W
4 ohms, 1kHz, 1%THD	650W	480W	240W
8 ohms,1kHz,1% THD	400W	270W	150W
(bridged mono operation)			
4 ohms,1kHz,1% THD	2000W	1100W	540W
8 ohms,1kHz,1% THD	1300W	850W	420W
Input sensitivity			
8 ohms, 1kHz @ rated power	1.22 V RMS	1.22 V RMS	1.22 V RMS
fixed voltage gain	34dB	31dB	28dB
Input impedance			
unbalanced (inverting polarity) @ 1kHz	10k ohms	10k ohms	10k ohms
balanced @ 1kHz	20k ohms	20k ohms	20k ohms
Protection circuits			
load short protection	1.0 ohms	1.0 ohms	1.0 ohms
load short: current limit	4.5 A	4.5 A	4.5 A
Power consumption	1050W	750W	400W
Power requirements	115V / 60Hz, 220V / 50Hz,	240V / 50Hz	(depending on country)
Residual noise 8 ohms, volume at min.	0.4mV	0.4mV	0.4mV
Intermodulation distortion 8 ohms, 1kHz @ 1W	0.1%	0.1%	0.1%
Dimensions			
mm	480 x 132 x 435	480 x 87 x 435	480 x 87 x 435
inches	19 x 17 5/8 x 5 1/4	19 x 17 7/16 x3 1/2	19 x 17 7/16 x 3 1/2
Weight			
Net kgs (lbs)	18.5 (40)	14.4 (33)	12.5 (27.5)
Gross kgs (lbs)	20 (44)	17 (35.2)	15 (29.7)

E & OE. Due to continual product development, all features and specifications subject to change without notice.

Block Diagrams



Numark

Professional Disc Jockey Products

LIMITED WARRANTY

Numark Industries, LLC and Numark International, Inc. (hereafter “Numark”) warrants each new amplifier manufactured and/or supplied by it to be free from defects in material or workmanship under conditions of normal use and service for 3 years, beginning on the date of purchase from an authorized Numark Dealer, but not to exceed 4 years from date of shipment by Numark.
The Numark obligation under this warranty is limited to repairing or replacing, at its option, the product or part(s) therein; which upon examination by Numark shall appear to be defective or not up to factory specifications; providing the Numark product is returned (transportation prepaid) to Numark.
Numark shall not be liable for any damages, consequential or otherwise, resulting from the use and operation of this product and makes no other warranty(s) either express or implied on this product, including any warranty of merchantability.
This warranty does not extend to any of our products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or use in violation of instructions furnished by us, nor extended to units which have been repaired or altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced, or changed, nor to accessories used therewith not of our own manufacture. Numark reserves the right to make changes or improvements in its products, during subsequent production, without incurring the obligation to install such changes or improvements on previously manufactured equipment.
To place this warranty into effect, the enclosed WARRANTY REGISTRATION CARD must be returned to Numark Industries, LLC within thirty (30) days after date of purchase.
This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you.

SERVICE INFORMATION

In the unlikely event of a product defect or if your equipment ever needs factory service, please call (401) 946-4700 and request a return authorization number. Packages sent without an RA number will be refused. Send the product to be repaired in its original packaging by insured prepaid freight to the address below. We cannot guaranty the safety of your equipment if it is not properly packed.
If the product is no longer covered by warranty we will still repair the unit, however you will be subject to charges for parts and labor. We will contact you by phone or fax to inform you of the charges and you can prepay by check or have your repaired unit returned to you C.O.D. (including shipping charges).

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