

ARC AUDIO 4000SE

Text and Measurements by Gary Springgay
Photos by Garry Springgay and supplied by ARC Audio

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I spend quite a bit of time visiting all kinds of car audio shops. I always find it interesting to see what's new, how it's being presented, and what makes both the store, and the products they have chosen to carry, different. I've been to stores that do a great job of pointing out the various benefits of their brands and what sets them apart. They sell their service, selection and professionalism. Other times, I get the impression that no one working in the place knows much about anything they sell, and don't even try to differentiate themselves from their competitor across town. The attitude is, "yeah, we have something sorta like that, and we're 10 dollars cheaper."

This same observation can be applied to a lot of the car audio brands available these days. As part of doing the consulting work that is the backbone of my company I also spend a considerable amount of time visiting the factories where much of the current car audio product on the market is manufactured. But, over the last 10 years or

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so, I've seen only a handful of really innovative products that were not basically a copy or a re-do of someone else's original idea or concept. Usually, with nothing more than a different cosmetic look to it, the same internals roll out the doors under several brand names, and these generic products find their way to store shelves, and eventually into our cars. In this age of individualizing everything from cell phones to running shoes, I have always found it interesting that we readily accept these generically devolved products.

Well, this review is not about one of those. This review is all about the Arc Audio 4000SE amplifier, and I'm here to tell you it's not assembled in a copy house. Its design comes from the legendary Robert Zeff, it's assembled in the USA, and it's unlike any other big subwoofer amp I've ever measured. It's not a Class D amp, nor is it Class A/B. It uses a sophisticated microprocessor, but it has no DSP. Interested now? >>>

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COSMETICS

The Arc Audio 4000SE is not a small amplifier by any measure you care to use. Measuring approximately 32 inches long, 10 inches wide, and 3.25 inches tall and weighing almost 25 pounds, this is a behemoth of an amp. It comes in a sturdy carton, and is delivered to the customer in a nice fabric velour-like bag that protects it from damage and provides a touch of class that you don't get from an amp wrapped in the usual shrink-wrap.

The top of the amp is constructed of heavy gauge sheetmetal, and powdercoated in a low-gloss black. A removable 4-inch wide brushed aluminum strip runs down the center of the amp and holds an illuminated badge and the script proclaiming this is a Robert Zeff signature edition amplifier. I'm told by Fred Lynch, Marketing and Special Projects Coordinator at Arc Audio, that the colour of the badge is customizable as well, in over 200 different hues between blue and red. When you remove the four small Phillips screws that retain the aluminum strip, you can access all the controls and settings that allow you to dial in the amp for your application. This particular amp was an early production unit, and was

shipped to me before an owner's manual was ready, so you'll have to excuse the omission of any mention of the manual in this review.

In the current market of flash and bling, the big 4000SE looks a little plain, but I don't know too many people who buy this type of amp to look at it.

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FEATURES & DESIGN

The 4000SE has all the usual features you'd expect on a subwoofer amp, and a few that are definitely different and cool. One look at the power connections and you know this thing's serious... it uses dual power and ground connections, with each sporting a pair of terminals that will accept 1/0 wire. Yes, you read it right: a total of four 1/0 connections!

The speaker wire connections are a little different as well. Sure, they take large gauge wire, (I used 8 gauge during testing) but these connections are covered by a protective shroud that prevent someone from >>

The following power measurements were obtained using industry standard methods. (100Hz @ 1.0% THD+N - Battery voltages shown +/- 0.2V)

MEASURED PERFORMANCE SPECIFICATIONS

Manufacturer's Rating	Measured Power @ 1.0% THD+N @ 14.4V Battery	Measured Power @ 1.0% THD+N @ 12.6V Battery
1,100 x 1 @ 4 ohms	1,180 x 1 @ 4 ohms	1,188 x 1 @ 4 ohms
2,200 x 1 @ 2 ohms	2,273 x 1 @ 2 ohms	2,311 x 1 @ 2 ohms
4,100 x 1 @ 1 ohm	4,278 x 1 @ 1 ohm	4,356 x 1 @ 1 ohm
Signal to Noise Ratio referenced to 2V output. (CEA-2006A) (1 watt @ 4 ohms)		-88.3dBA
Signal to Noise Ratio referenced to full output. (118 watts @ 4 ohms)		-119.0dBA
Distortion at rated power		0.006%
CEA-2006A rated 4 ohm Power (minimum power per channel developed between 10Hz and 100Hz)		1,120 watts
Maximum Efficiency at full 2 ohm power per ch.		66.5%
Idle Current		2.1A
Input Sensitivity		469mV - 5.5V
Frequency Response (-3dB)		476A
High Pass Crossover		<10Hz - 228Hz
Low Pass Crossover		N/A
Bass EQ boost		30-250Hz -12dB or -24dB/oct
Stereo Separation (Crosstalk)		+15dB @ 20-80Hz
		N/A

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ARC AUDIO 4000SE

// THIS HYBRID CLASS G/H DESIGN IS EFFICIENT AND SOUNDS COMPARABLE TO A CLASS A/B OUTPUT STAGE WITHOUT THE RADIATED NOISE OF A CLASS D.

getting a good zap if they'd accidentally touch the speaker wires while the amp was playing. Yes, this baby makes enough voltage and current to give you a potentially painful jolt! To ensure that some lazy installer doesn't just chuck the guard away, they have cleverly made it a safety interlock, so if the guard is not fastened in place, the amp won't turn on. This way, there is no chance for an accidental shock to the installer or user.

The amp's control features are pretty much what you'd expect from Mr. Zeff; a full complement of the tools you need to get the amp dialed in exactly the way you want. In addition to the usual gain pot and remote gain control, there is a 30-250Hz crossover pot, with selectable -12 or -24dB slopes, an adjustable 10-80Hz defeatable subsonic filter, and a parametric-style bass EQ that provides up to 15dB of boost at any frequency you select between 20 and 80Hz.

There are other features hidden inside as well that make this amp really unusual. The 4000SE is a fan-cooled 4,000 Watt Class G/H mono-block amplifier. This topology uses three stages of secondary windings in the power supply to deliver different voltages to the output devices by a "Rail Switcher."

The voltage rails are coupled to the outputs by high current MOSFETs. To further improve the efficiency, the amp modulates the power supply to hold the rail voltages closer to the output. This hybrid Class G/H design is efficient and sounds comparable to a Class A/B output stage without the radiated noise of a Class D.

To achieve this hybrid design, the engineers at Arc Audio incorporated a very advanced microprocessor to control the power supply and the protection. In a 4,000 Watt design, fast, reliable protection is extremely important. This high-speed microprocessor can sample the output circuit very rapidly at many points in each sine wave, simultaneously monitoring the current and the voltage at the output devices. The processor is constantly looking at the ratio between voltage

and current. If, at any point in the sine wave, this ratio changes to one outside the normal expected parameters, the processors shut the 4000SE down.

The processor also provides feedback to the user or technician regarding the operation of the amp. It incorporates coded LED flashes to be used as trouble codes for thermal, shorted output or power supply failure. This allows Arc Audio's customer support staff to quickly run down problems that may occur in the field.

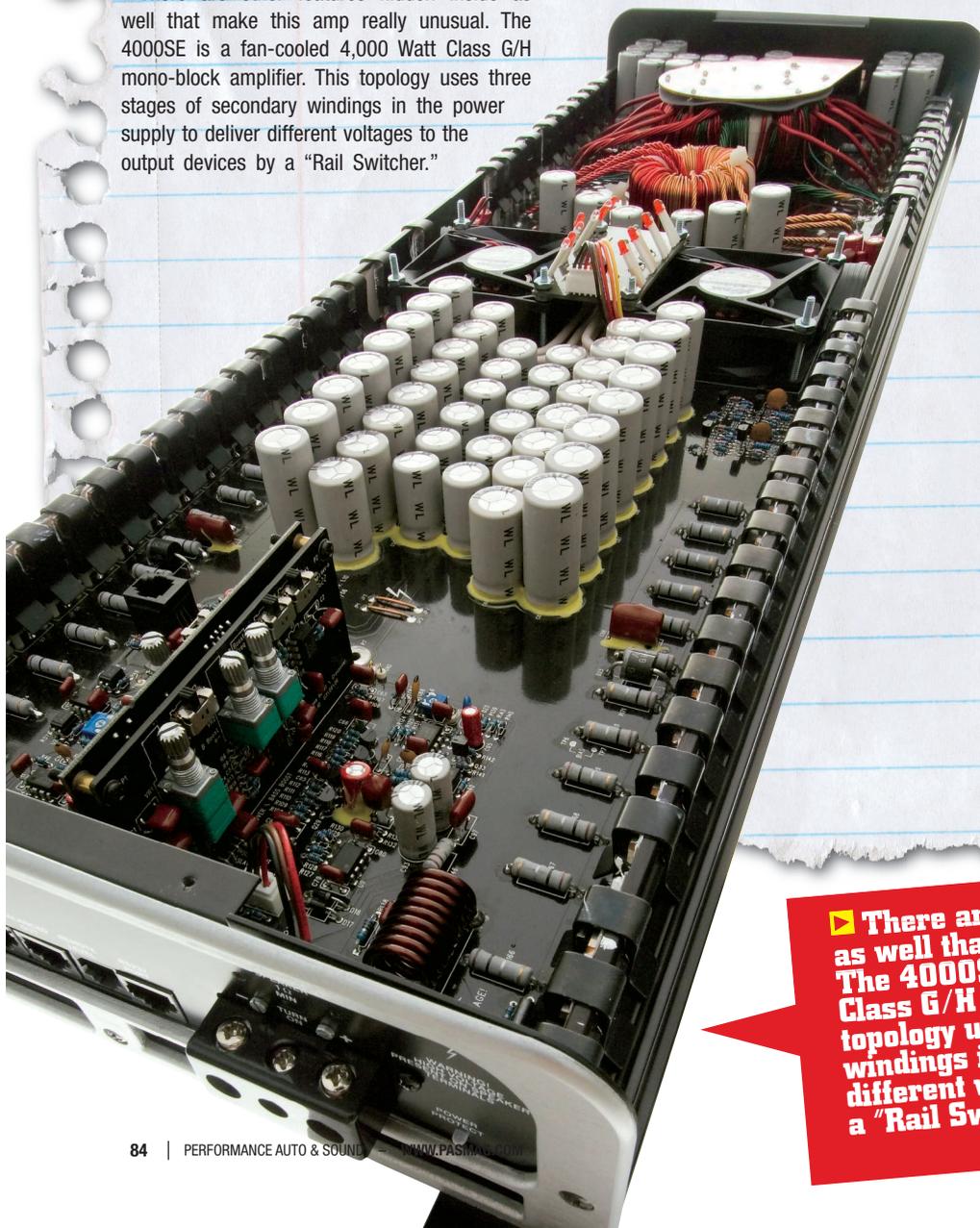
See, I told you it was different!

The amp is really impressive when you take the top off (I don't recommend this, as it will void your warranty, but I figured you needed to see the inside for yourself). There are the large twin cooling fans and an abundance of capacitance in both the power supply and the output section. The layout is clean and meaningful. There are no less than 12 high current MOSFETs in the power supply, and no less than 24 more Sanken Bipolar devices for the output. And remember, this is a single-channel amp! After one look inside, there's no doubt this amp means business! And if all that is still not enough, this amp is strappable to a second one! After one look inside, there's no doubt, this amp means business!

LISTENING

To try and describe the unreal performance of this amp across to you in words is almost impossible. I'd wear out the adjective machine. This is an amp that really needs to be experienced to be understood. Suffice it to say, aside from being incredibly powerful, the big bad boy from Arc Audio sounded phenomenal. It's got great woofer control, an abundance of power at any load impedance, and enough tuning capability to get the exact bottom-end sound you want.

I wish all subwoofer amps could sound this good. The bass from this amp was so strong and clean, I didn't want to shut it off until I'd heard all my favourite tracks. Amazing and awe-inspiring. Listening to this amp on a pair of high-quality woofers proves once again the old adage that there's no such thing as too much power. The >>



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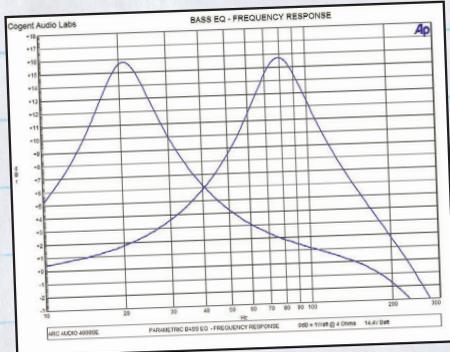
ARC AUDIO 4000SE

only small criticism I have is that because the top trim panel must be removed to access the controls, the amp is difficult to tweak. To most people this is of little concern, but I'm a tweaker, and as nice as it is, I'd probably end up leaving the brushed aluminum trim panel off the amp for a few weeks until I felt like I had it really dialed in.

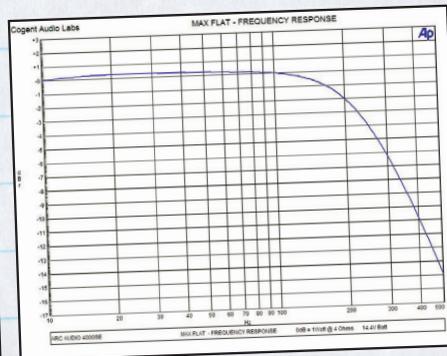
BENCH PERFORMANCE

As with every other Arc Audio amp I've tested in recent memory, this one met or exceeded all of its published specifications. The amp uses a highly regulated supply, controlled by the microprocessor mentioned earlier, and makes virtually identical power at battery voltages from 11.5 to 14.5 Volts. Speaking of power, the maximum output was very impressive, with the amp making over 4,300 Watts into 1 Ohm. For those of you who appreciate the numbers behind this, that's over 60 Volts of output, with over 70 Amperes of current! You'd better have some serious power-dissipation capability in your woofer system if you want to use this amp to its full potential. At 4 Ohms and 2 Ohms, the power was more than respectable as well, at over 1,100 and 2,300 Watts respectively.

Bass EQ



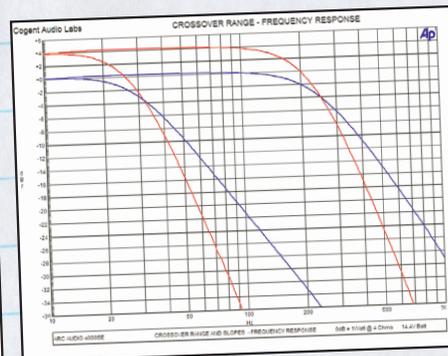
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"I'VE TESTED POPULAR FULL-RANGE AMPS THAT ARE NOISIER THAN THIS SUBWOOFER AMP. THE ATTENTION TO DETAIL AND YEARS OF CIRCUIT DESIGN AND LAYOUT EXPERTISE ARE OBVIOUS.

You'll also need some serious current capability in your battery and charging system, as this amp will draw over 450A at full power into 1 Ohm.

Distortion at rated power was the best I have ever measured on a monoblock amplifier. At rated power at 1 Ohm, the THD+N was extremely low, at only 0.008%. Yes, you read it right, eight one thousandths of a percent!

Signal-to-noise was excellent for a huge amp, at better than -85dBA referenced to 1 Watt.

I've tested popular full range amps that are noisier than this subwoofer amp. The attention to detail and years of circuit design and layout expertise are obvious.

I have some previous experience with Class G and H designs, and I was curious to see how this amp fared when compared to a good Class D amp in terms of efficiency. As I suspected, it's better than most very large Class AB designs, but not as efficient as the best Class D designs. But, it sounds much better, and does not have all the internal heat issues related to the output

filters that are required in a Class D design. A good compromise in my opinion, if sound quality matters to you. Also, bear in mind that with this power supply design, the overall efficiency of the amp will increase as the battery voltage drops closer to 12 volts than our measurement standard of 14.4V.

The crossover filters worked as intended, with 4dB of boost applied when the -24dB slope was selected. This amp has an effective bandwidth of below 10Hz to around 110Hz, where the output begins to fall off. (See graph.)

Thermally, the big 4000SE performed well, with the twin cooling fans allowing the amp to play well past the allotted test time, and as an added bonus feature, I noticed that the Arc Audio badge on the top of the amp would change colour as the amp got hot. It would fade from blue to purple to red, and seemed to change faster as the amp got hotter.

That's kind of cool, and it offers an easy way to tell if the amp is running hot.

CONCLUSION

This is not an amp for everyone, but if owning a real piece of American engineering, full of original ideas and performance-driven solutions means anything to you, it's among the best out there. Without question, it's one of the best-sounding, ultra high-powered subwoofer amps you can buy, at any price.

If you are like me and have an unnatural fondness for really big power, do yourself a favour and have a look at this amp. With one of these in your trunk, there are very few cars on the road whose owners could honestly say "mine is bigger." **PBS**

THE SOURCE

ARC Audio
4719 Green Leaf Cr. #4
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Dave MacKinnon, Performance Auto & Sound Magazine

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