



# ORPHEUS

## AURORA 3 LOUDSPEAKERS

Not many people know that Amar Bose, legendary founder of the company that bears his name, is superstitious. He believes in lucky numbers. The result is that he's recycled the model number of the speaker that made him famous for more than 30 years, and has said he will continue to do so so long as he's in control of Bose. The speaker, of course, is the Model 901 and understandably has almost nothing in common with the Model 901 that first went on sale in the 1960s!

I don't think that Brad Serhan, the chief designer at Australia's Orpheus Loudspeakers is superstitious, but he's seems to be fond of the name 'Aurora 3' because he's now used it on two completely different loudspeakers. I won't confuse you by detailing the characteristics of the Aurora 3 that was available from Orpheus 'way back in 1998, but I will tell you that the new 2004 version of the Aurora 3 is completely different. It has an entirely different bass loading technique, uses different bass drivers, and has a different tweeter and a different crossover network. And whereas the

old model had a budget vinyl-wrap, the latest Aurora 3 has a real wood veneer finish that's so flawless it would make a cabinet-maker gasp in admiration.

I'm on record that I'm not particularly fond of this trend to recycle model numbers. Bose may have started it, but at least he puts Roman numeral designations to indicate which version is which, so there's the 901 Series II, 901 Series III, 901 Series IV and so on, so it's pretty easy to work out which speaker is which. Why couldn't Orpheus call this version 'Aurora 3 Mark II', or 'Aurora 4'? Your guess is as good as mine.

### The Equipment

Serhan has always believed in using top-quality transducers in his creations, and he's retained this form with the Aurora 3s, to the point of extravagance. From their Kevlar cones to their enormous magnet assemblies, the Danish Peerless drivers that sit in the front baffle of the 3s ooze quality from every pore. Rated by Orpheus as having a diameter of 153mm, the important

Theile/Small dimension is 133mm, giving an effective cone area (ECA) of 139cm<sup>2</sup>. However, because there are two drivers, the total area is twice this, at 278cm<sup>2</sup>, which is roughly equivalent to a single bass driver with a nominal diameter of 210mm. The driver chassis are moulded from ABS plastic, so there's no fringing of the magnetic field. The roll surrounds are made from durable rubber, which won't rot away in Australia's harsh climatic conditions in the same manner as foam, which is a popular material for making roll surrounds.

The bass reflex cabinet is a loudspeaker designers' chance to have his cake and eat it too, because in this design, the sound coming from the rear of the bass driver, which would normally be trapped inside the cabinet, is instead harnessed and directed through the bass reflex port where (if it's properly tuned) it can deliver sound at lower frequencies than the driver itself, effectively extending the bass response of the loudspeaker system. Unfortunately, the port's output is restricted to a narrow range of

frequencies. In the Aurora 3, Brad Serhan is not only having his cake and eating it too, he's also grabbed an extra slice, because this design is not just a single bass-reflex enclosure, but *two* bass reflex enclosures. Each of the enclosures contains one of the bass drivers, and one of the enclosures is twice the volume of the other (15 litres vs 29 litres). The idea of this is that because there are two bass reflex ports, rather than just the one, each one can be tuned slightly differently, so that bass response can be extended lower than would be possible with just a single cabinet—even one containing two bass drivers. This isn't the end of the sleight-of-hand, because Serhan has also used a crossover configuration that means that both drivers handle all the bass at low frequencies, but the response of the bottom-most driver is rolled off with increasing frequency, eventually leaving the upper driver of the two to deliver the midrange on its own. Generally, manufacturers refer to this type of system as a '2.5-way' because although there are three drivers, it's not a three-way system, nor is it strictly a 2-way. Orpheus calls the combination of the two techniques 'differential bass loading.' Although this 'differential bass loading' has a lot going for it, there's one drawback, which is that it can result in some leakage of midrange frequencies from one or the other (or both) of the ports. This is the reason Orpheus has put the ports on the rear of the cabinet, so any midrange sound will be absorbed or scattered behind the speaker.

As you've probably guessed, a twin-chamber, 2.5-way design requires a more sophisticated crossover network than usual but in this case it's even more complicated than usual because Serhan (quite rightly) insists on compensating for diffraction loss. The result is that the Aurora 3's PCB-mounted crossover is impressively large, with three big air-cored inductors (properly cross-mounted to eliminate any magnetic interaction between them), four wirewound ceramic resistors, three MKP capacitors and three bipolar electrolytics. Orpheus hasn't

undone the crossover by using poor quality internal cabling and cheap cable and spade-lug 'quick-connectors' to link the crossover to the drivers, either. Look inside and you'll find separate runs of high-quality multistrand cable from each driver back to the crossover, and that the wire is soldered not only to the PCB, but also to the drivers. This means there's no contact resistance to increase over the years, as can happen with spade-lug or any other type of press-fit connectors.

High frequencies are delivered by a 25mm diameter silk dome tweeter (also from Denmark) that has a very large magnet assembly and is distinguished from most ordinary tweeters by having a large integral chamber (encapsulated plastic) that improves its performance at the bottom of its frequency range. Orpheus has improved the transition between the midrange cone driver and the dome tweeter, by rebating the tweeter's frame into the baffle and overlapping it with the edge of the midrange driver's frame. This is a clever (and economical!) method of squeezing the acoustical centres of the midrange and tweeter close together.

The Aurora 3's cabinet is made from 18mm medium-density fibreboard (MDF). All internal surfaces are covered in non-allergenic foam sheets. Each cabinet stands 931mm high (without spikes) on a small built-in plinth, and is 220mm wide and 330mm deep. This height, combined with the relatively low footprint, makes the speakers a little top-heavy, but I found them stable enough even on a carpeted surface. As I said in the introduction, the external cabinet is finished in a real wood veneer that's stunningly finished. Even outdoors, in bright sunlight, I couldn't find a single flaw in the veneer or workmanship.

### Listening Sessions

All other things being equal, mirror-imaged speakers will deliver a better stereo image than speakers that aren't mirror-imaged. So why aren't most modern speakers mirror-imaged? The sad truth is because it's too difficult for manufacturers (and shippers!) to keep two separate

boxes together, to ensure each customer gets a 'left' speaker and a 'right' speaker. So it says something about Orpheus that the Aurora 3s come in mirror image pairs, in separate cartons.

With most mirror-image speakers, you can narrow the width of the stereo image by exchanging the 'left' speaker with the 'right.' The Aurora 3s are mirror-imaged, but swap them at your peril, because if you do, not only will the imaging be narrower, but it will also become rather ragged and the sweet spot will shrink. In terms of location in a room, I found the speakers work equally well close to a rear wall or well out from it, but the spaciousness of the sound alters

## ORPHEUS

**Brand:** Orpheus

**Model:** Aurora 3

**Category:** Loudspeakers

**Suggested Price:** \$1,795

**Warranty Period:** Five Years

**Distributor:** Orpheus Loudspeakers

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subtlety with different placements. I preferred the sound of the speakers when they were at least a metre clear of the rear wall.

Having previously been impressed by Orpheus' small Aurora 1 bookshelf speakers, I was expecting that since Aurora 3 uses similar drivers (albeit larger diameter, and with an additional bass driver to give more bass!), that the performance from the Aurora 3s would be substantially better, and indeed this was the case.

Aurora 3s deliver an authoritative bass voice all the way down to around 40Hz, and easily reproduced the lowest note on the piano keyboard (27.5Hz) at more than acceptable volume in my listening environment. Higher up in the audio band, I found the Aurora 3 exhibits a nicely-judged midrange, offering just enough presence to give vocals a nudge into the limelight, but not so large a nudge as to promote brightness. That said, I nonetheless thought the upper mids were a little fuller-sounding than they are on the Aurora 1, which tends to thicken the texture of massed choirs and orchestral pieces a tad, but adds richness to smaller ensembles and to individual instrumentalists and vocalists. Although I consider the bass response is more than sufficiently extended for hi-fi music applications, I'd suggest that if you plan on using them as front-main speakers in a home theatre system, you should still plan on using a separate, powered subwoofer.


You will gain an excellent taste of the Aurora 3s' versatility with a new release from ABC titled 'Classic' which has 16 tracks excerpted from other best-selling ABC CDs and ranges from Idea of North's *a Capella* arrangement of Cole Porter's *It's Alright with Me* to Mahler's Symphony No 5 (*Adagietto*) with the Melbourne Symphony Orchestra. Listen to how well the Aurora 3s deal with Diana Doherty's oboe on the beautiful *Adagio* from Benedetto Marcello's 'Concerto in D minor for oboe strings and continuo.' There's even a track containing pipe organ so you can be impressed by the Aurora 3s' bass response (Track 2, *Be still, my soul*, Jean Sibelius.) Check the imaging with Paul McMahon's tenor voice on John Hughes' *Bread of Heaven* (from the disc 'The Rise and Rise of Australian Rugby').

To listen to piano I would not recommend 'Classic', because the two examples it contains are in my opinion not that well recorded. For piano sound, you can do no better than Ian Holtham's new release on Move: 'Chopin. Complete ballades and scherzi.' Glorious music, beautifully played and fabulously recorded. If you'd prefer something a little more modern, Move has also captured a great piano sound on jazz great Mark Lockett's latest CD 'About Time.' The sound of the other instruments (tenor and soprano saxes, trombone, bass and drums) featured on this disc is also excellent.

Following Missy Elliot's Australian tour, I gave her 'so Addictive' DVD-A a spin through the Aurora 3s. I can't say I'm a fan of her music, but I thought the speakers handled the *electronica* well, and it was immediately obvious they won't have any problem handling kickdrum, synthesised drums or electric bass—even at high volume levels—so when you're auditioning, feel free to blast away with any type of high-energy rock, heavy-metal or hip-hop that takes your fancy. The Aurora 3s will

deliver the goods at any volume level, from a whisper to a roar.

### Conclusion

I have only one concern about the Aurora 3s, and it's that these speakers sound too musical for their own good. There's no exaggerated bass response to suck in inexperienced listeners and no high-frequency peak in the tweeter response to make the treble seem airy. So in the heated environment of the demo room, when they're A-B'd against the often wildly inaccurate speakers that are pitched at same price-point, it will take an educated ear to hear that it is Orpheus' Aurora 3s that offer the listening experience that most closely approaches the truth. 

greg borrowman

## LAB REPORT

Readers interested in a full technical appraisal of the performance of the Orpheus Aurora 3 Loudspeakers should continue on and read the **LABORATORY REPORT** published on the following pages. All readers should note that the results mentioned in the report, tabulated in performance charts and/or displayed using graphs and/or photographs should be construed as applying only to the specific sample tested.

### Test Results

The Orpheus Aurora 3 loudspeakers measured extraordinarily well in *Australian HI-FI Test Laboratories'* laboratory. Looking at the graph that shows the speakers' frequency response when driven by pink noise, the flatness is immediately apparent. Between 65Hz and 10kHz, the response varies by little more than  $\pm 1.2\text{dB}$ , which is simply excellent. You can see that

# TEST RESULTS


the response is hinged slightly, so the trend is for the low frequencies to hover around +0.6dB and the higher frequencies around -0.6dB, so one might guess a little bass emphasis to the sound, but if audible at all, it would only be very slight. The frequency response measured according to the normal  $\pm 3\text{dB}$  limits, extends from 42Hz to 20kHz  $\pm 3\text{B}$ . Excellent performance.

The second graph shows a section of the high-frequency response in fine detail, this time using a gated sine wave as a test stimulus, to give a slightly more accurate view of the response above 10kHz, due to the fact that pink noise tends to portray tweeters in their worst light. On this graph, the response extends from 500Hz to 16kHz  $\pm 1.2\text{dB}$  before rolling off to be a further 2.5dB down at 20kHz. What's also important to note here is the extreme smoothness of the response, which augurs well for the clarity of the sound, as well as the high-frequency extension.

The graph showing the performance of the two bass drivers and two ports was all graphed in the near-field, and the data from the ports is 'raw', in that it has not compensated for differences in radiating area. Although the four traces make interpretation a little difficult, you can see clearly that the two ports are tuned differently, with one peaking at 43Hz with a fairly high Q and the other at around 65Hz, with a lowish Q. One of the ports appears to let quite a bit of acoustic energy through at 250Hz, and

has a slight effect on the response of the associated driver (visible immediately above on the same graph). This resonance is also visible as a slight 'bump' on the impedance trace. You can see that although the two bass drivers are identical, the different cabinet volumes and the effect of the crossover, mean that the lower of the two driver responses starts rolling off rapidly at 700Hz, whereas the other continues on (albeit a little bumpily) to give useful output right up to 2.5kHz, though it appears the crossover starts having an effect at 1.6kHz.

On the impedance graph, *Australian HI-FI Test Laboratories* has overlaid the responses from the left and right speakers to show how well they're matched. Apart from differences below 45Hz, which indicate slight differences in the arrangement of the damping on the internal surfaces inside the two cabinets, the match between the two speakers is almost perfect, demonstrating excellent quality control at all stages of manufacture. The graph shows that the impedance falls below 4-ohms in the region 100–600Hz, reaching a minimum of 3-ohms at 200Hz. This means that the 'nominal' impedance is not 4-ohms, as stated by Orpheus, but a little less. A rating of 3.5-ohms would be more appropriate. This means that to get the best sound quality from the Aurora 3s, I'd suggest using a good-quality amplifier, one that is comfortable with 4-ohm loads. I would not recommend paralleling these speakers with any others.

The output of the Aurora 3s was measured at 90.9dB SPL at one watt, for an equivalent 2.83V input, as per *Australian HI-FI Test Laboratories'* standard test procedure. Because this test is more stringent than most, this means the Aurora 3s are very efficient—more efficient than most other loudspeakers—despite not quite meeting Orpheus's quoted specification. 

Steve Holding

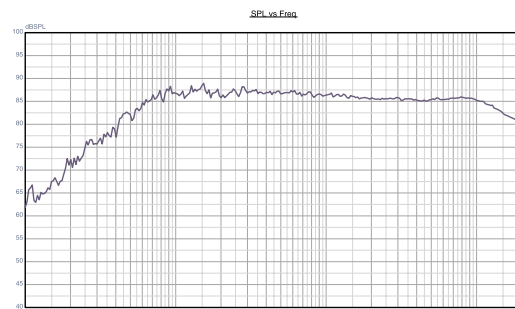


Figure 1: Pink noise frequency response at one watt at one metre.

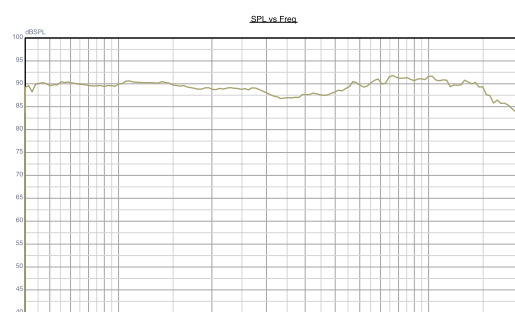


Figure 2: Gated sine frequency response at one watt, at one metre.

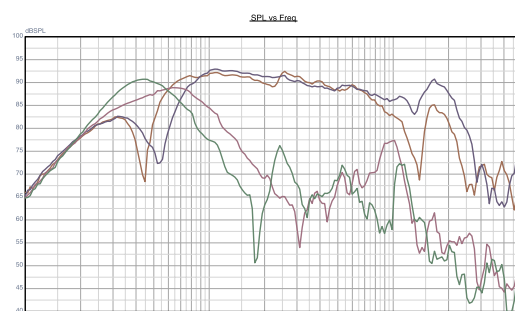


Figure 3. Nearfield frequency responses, showing both bass driver responses and both port responses. (Note data for ports has not been re-scaled to compensate for difference in radiating area. See copy.)

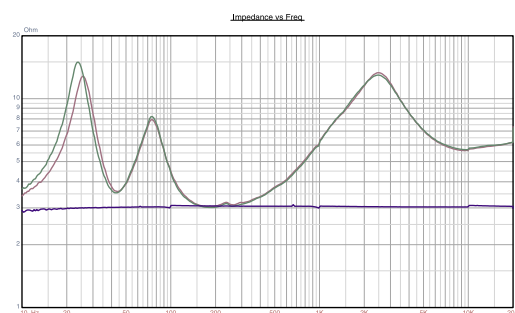


Figure 4. Impedance vs Frequency. Left and right channels shown. Trace under is that of a reference 3-ohm precision resistor, measured at the same time for calibration purposes.