YAMAHA'S HIGH-END HEADPHONE COMEBACK CONTINUES

AUDIO ESOTERICA

HIGH PERFORMANCE AUDIO FOR THE MUSIC LOVER

australian hi-fi and home theatre technology

10 REVIEWS INSIDE!

REVIEWED

HOMEGROWN HEROES

SpectraFlora speakers from Victoria look and sound like nothing else!

REVIEWED

JUST TWO TO TANGO

Focal packs a whole system into two talented towers

STAR POWER

World-class amps from England to Arizona deliver killer watts

ALSO INSIDE: MUSICAL FIDELITY | MARANTZ | VITUS AUDIO | LEICA

FUTURE

ISSUE #1– 2025

A$14.99
NZ$14.99

9 340601 001022 01

REVIEW

SPECTRAFLORA
CELATA 88

Reviewer Greg Borrowman

LOUDSPEAKERS

Something old, something new, something borrowed, something blue, as goes the famous wedding rhyme that lists the items a bride is supposed to carry on her wedding day to guarantee a good marriage. It is also applicable to the various technologies and components in SpectraFlora's Celata 88 speaker design, though in this case they are to guarantee sonic, rather than marital, bliss.

SOMETHING OLD

To see the 'something old', you need look no further than the speaker cabinet itself, whose angular, bevel-edged shape, topped with an oversized horn, reminds us of the cinema speakers Altec-Lansing used to manufacture back in the 1940s and 50s. SpectraFlora's founder and head designer, Steve Van Sluyter, says the cabinet design is reminiscent of Onken speakers from Japan in the 60s and 70s, but with large front chamfers to reduce edge diffractions for the mid-bass driver, which in turn produces cleaner sound and better imaging.

SOMETHING NEW

Van Sluyter says that the oversized horn was inspired by the horn designs of Japanese designer Yuichi Arai, whose name we were unfamiliar with. Some internet sleuthing (initially misguided to the website of a Sushi restaurant owned by a famous Japanese chef with the same name!) revealed that Yuichi Arai was famous for designing two 95-degree hyperbolic constant directivity horns — the Arai 480 and the Arai 290, for use with 25mm and 50mm compression drivers respectively. Although Arai has long since retired and shuttered his website, you can still buy his unusually titled speaker design book ("Horn speaker production in the digital age: No need for prototypes! Fully predict actual characteristics through simulation") from Amazon. Unfortunately, it's in Japanese.

You should note that although the devices designed by Arai were certainly horns, and we would describe the device atop the Celata 88 cabinet as a horn, this SpectraFlora design element is actually a waveguide — or, as Van Sluyter prefers to call it, a 'Dynamic Waveguide'. Its design, he says, is the product of two incompatible theories: traditional horn theory, which dates to the early 1900s if not the late 1800s, and modern waveguide theory, which was first promulgated by Dr Earl Geddes, of GedLee Acoustic Science LLC, in 1989.

Like Arai, Geddes has also written several books about speaker design, and they're in English. However, unless you have a physics degree, they may as well be in Japanese, as you might gather for yourself if you care to peruse his chapter on waveguide design: https://tinyurl.com/geddeswaveguide.

Van Sluyter's explanation of how his Dynamic Waveguide works is only marginally less arcane. "The primary goal of a horn is to acoustically couple the driver with air, with directivity control a secondary consideration," he says. "Waveguides are the opposite — they control directivity as their priority, minimising what Geddes called 'Higher Order Modes' that contribute to the honky characteristic of horns. In early listening tests, we liked the dynamics of horns, a result of good acoustic coupling with air, and the intimacy of vocals that direct-radiating tweeters simply cannot match. But we also liked the transparency and constant directivity of waveguides based on Geddes' oblate spheroid profile. So, we tried using a traditional hypex profile vertically with a horizontal oblate spheroid profile, and they worked brilliantly together, [delivering] the dynamics of a horn without the honk, and the transparency and the constant directivity of a waveguide horizontally where it matters most. The 90-degree constant directivity horizontally assures that reflections off walls have the same frequency distribution of direct-radiating sound; the narrow vertical dispersion minimises floor and ceiling reflections. Both help the Celata 88s sound great even in highly resonant rooms."

Nestled in the throat of this waveguide is a 25mm compression driver with a mineral-loaded ketone polymer diaphragm and an 'oversized' 52mm voice coil. "Being oversized," says Van Sluyter, "the diaphragm has to travel less in the voice

coil gap than typical 25mm compression drivers and, as a result, intermodulation distortion is reduced. Further, it has a 110dB-per-watt efficiency, so it's highly attenuated to match up to the mid-bass driver and as a result has far more overhead than a direct-radiating tweeter, many of which would show signs of power compression and distortion when operating at the high sound pressure levels the Celata 88 is able to produce."

SOMETHING BORROWED

Although not unique, the crossover network inside the Celata 88 is certainly rare and unusual. While it is technically a passive crossover, in that it uses traditional inductors, resistors and x capacitors (each network contains 42 capacitors… shades of Douglas Adams), many of the capacitors are DC biased by two 9-volt batteries wired in series to deliver an 18-volt bias voltage.

The DC-biasing technique used by SpectraFlora has been 'borrowed' from JBL, but, as Van Sluyter correctly points out, the American brand's patent on the technique has expired, meaning it is free for anyone to use. So why doesn't everyone use it? "The downside to DC biasing is that it is done by doubling the number of capacitors and increasing their capacitance twofold because each pair is in series, both of which add complexity and expense," explains Van Sluyter.

All of this begs the question as to why you would want to use DC bias in the first place. To answer this, it would be best to quote Gregory Timbers, the JBL engineer responsible for patenting the design, which the company marketed as a 'Charge Coupled Linear Definition Dividing Network'.

"The benefits of this technology lie in the nature of what applying a charge does to the capacitors themselves," he said. "When an audio signal passing through a capacitor changes polarity — that is, it passes through zero volts — the current flow changes direction, but it does not do so immediately; due to dielectric absorption, the capacitor 'remembers' its previous state and resists the change. This leads to blurring of transients in the drive signal, [which is] a highly audible distortion. Biasing a capacitor ensures that the signal does not reverse the current flow through the capacitor, so zero crossing distortion is eliminated." Timbers often likened the sonic effect to the difference between Class A and Class A/B amplifiers.

DC biasing also creates a piezo-electric force on the plates inside the capacitor that improves the capacitor's performance by minimising the flexing of the plates caused by the signals passing through it, but a discussion of the physics of this phenomenon is certainly beyond the ambit of this review.

SpectraFlora has borrowed intellectual technology from not only JBL but also Swiss acoustic engineer Samuel Harsch. The Celata 88 uses his quasi-transient-perfect crossover topology (which he first described in 2008, so it probably also falls into the 'something new' category) to ensure that the mid-bass driver on the SpectraFlora speaker's front baffle is time-aligned with the compression driver.

"The Dynamic Waveguide and mid-bass [driver] are perfectly time aligned, as opposed to the vast majority of tweeter/mid-bass combinations in which the mid-bass lags the tweeter in time," says Van Sluyter. "The result is coherent sound through the crossover point, crisp transients, and true-to-life timbre, especially for percussion and plucked instruments. Surprisingly, even instruments that play fundamental notes many octaves below the 1.3kHz crossover point, such as kick drums and double bass, benefit from the time alignment because their harmonics extend into the range of the Dynamic Waveguide."

> Although not unique, the crossover network is certainly rare and unusual... many of the capacitors are DC biased by two 9-volt batteries wired in series

These techniques make the Celata 88's crossover network very large and expensive, not least because all the waveguide capacitors are foil and film, including four custom-made copper foil ones. The mid-bass driver capacitors are all metallised polypropylene (MKP), some of which are bypassed with aluminium foil and film capacitors, including some very high-value ones (because of the low 130Hz crossover point with the bass drivers). The bass driver capacitors are electrolytics bypassed with MKP caps. SpectraFlora had to use electrolytic capacitors in this application due to the smaller physical size of the capacitors required to provide 3,500µF of capacitance. Even so, the size and layout of the Celata 88's crossover meant that the components had to be split over *three* printed circuit boards, rather than the more typical one.

WHAT IS A MID-BASS DRIVER?

You may possibly wonder why we refer to

that driver visible on the front baffle as a 'mid-bass'. Well, it's simply that it is neither a midrange driver nor a bass driver, but a bit of both.

You see, it isn't truly a bass unit because, while it does deliver some bass frequencies, most of the low-end is delivered by a pair of slot-loaded, axially aligned 204mm bass drivers, hidden away deep within the cabinet. SpectraFlora refers to these drivers as 'subwoofers', but since they have very little output below 20Hz we would call that description a bit of a stretch. They essentially operate from 30Hz up to 130Hz.

As you've probably now realised, it isn't truly a midrange unit either because, unlike most, which typically only start operating above 300Hz, the Celata 88's mid-bass driver starts operating at 130Hz, after which it continues up to 1300Hz before handing over to the compression driver in the waveguide.

The mid-bass driver itself is a 180mm unit, made by SEAS and with a graphene-coated magnesium cone. As you can see from the image on the right, there is no dust cap at the cone's centre but instead a copper-plated phase plug. The driver has a 39mm titanium voice coil former with a long copper winding and large linear excursion (14mm linear, 26mm maximum), facilitated by a reinforced rubber surround. The overall diameter is actually slightly smaller than the listed one, at 176mm. The Thiele/Small diameter is 135mm, giving an effective cone area of 136cm^2 (slightly less than expected because of the absence of a dustcap).

It's housed in its own enclosure, which is ported via the two rectangular slots at either side of the driver. The two rectangular slots below these deliver the output from the two aforementioned axially aligned 204mm drivers.

UNUSUAL BASS CONFIGURATION

This pair of slot-loaded drivers is arranged in a rather unusual push-pull configuration. This creates a 6th-order band-pass filter that delivers 2dB of gain, but, unusually, both drivers face the same direction, so you don't get the benefit of force cancellation. This directionality was, Van Sluyter says, necessary to fit them into the compact cabinet: "Sonically, the benefit of push-pull subwoofers is that even-order harmonic distortion cancels out, which is the commonly cited reason push-pull woofers sound good. However, we believe an additional reason for their superior sound compared to direct-radiating woofers is that two cones working in opposition provide a sort of

> You don't need us to tell you that the Celata 88's cabinets are wood-working masterpieces... so complex they have to be created with a CNC robotic machine

negative feedback that reduces overshoot and ringing. In other words, they produce crisp, clean bass that is well matched to the mid-bass."

We should point out that, although we call this configuration 'unusual', it is actually one that a great many high-end loudspeaker manufacturers have employed at one time or another. In fact, Dali once used it across a complete loudspeaker range.

COMPLEX CABINETRY

You don't need us to tell you that the Celata 88's cabinets are wood-working masterpieces, with the Dynamic Waveguide and several other features sporting shapes so complex they have to be created with a 7-axis CNC robotic machine. You literally could not create them by hand or with conventional cabinet-making machinery.

The timber used is responsibly sourced here in Australia, with the plywood made from hoop pine (*araucaria cunninghamii*), plantation-grown in Queensland. SpectraFlora also uses plantation-grown Northern silky oak (*cardwellia sublimis*) and sometimes salvaged timber. It currently employs salvaged timber (*red ironbark/eucalyptus sideroxylon*) in its 'Limited Range'.

At the time of writing, SpectraFlora sells two 'Limited Range' models — a black-stained pair with diamond-stitched leather and a silky oak Dynamic Waveguide, and a natural, clear satin polyurethane-finished pair with highly veined cherry leather and a red ironbark Dynamic Waveguide finished with hardwax oil. The red ironbark timber was salvaged from a former Royal Australian Air Force base in Dubbo, New South Wales, built during WWII. Pricing for these limited models is $38,000 per pair, plus $1,000 for matching stands.

Should these models not be available at the time you are reading this review, SpectraFlora says it can customise its speakers specifically for your application, offering various colours of stain for the cabinet and waveguide, painted finishes, and leather or fabric exterior panels. Custom designs are priced per project and require a $10,000 deposit before fabrication commences.

BATTERIES AND BUTTONS

Around the rear are two pairs of high-quality multi-way speaker terminals. In a standard configuration, the lower pair drives the dual internal drivers while the upper pair takes care of the front-firing mid-bass driver and the waveguide. The two sections are linked via gold-plated bus-bars. These terminals can, however, be changed so that the upper terminals connect directly to the waveguide.

Above the speaker terminals are two fold-down compartments holding the 9V

batteries that provide the voltage to bias the capacitors in the crossover. You would be best advised to use either Alkaline or Lithium batteries, but you needn't worry about replacing them regularly, as the load presented by the network is such that the batteries will essentially operate for whatever shelf life is printed on the battery, so you'll only need to replace them every five or ten years!

Above the dual battery compartments is a small push-button enabling you to adjust the speakers' frequency balance by boosting the waveguide's treble output. 'The button on the back provides a treble boost designed to benefit listeners with hearing loss, particularly age-related, at high frequencies,' according to SpectraFlora.

Above this is a glorious floral design that is CNC-routed into the cabinet and stained. It's certainly very clever and beautiful. The only pity is that it's on the back of the speaker, where it will rarely, if ever, be visible.

LISTENING SESSIONS

We initially set up the Celata 88 on stands some distance from the rear wall of our listening room, and were immediately impressed by both the bass quality and extension. Indeed, we cannot remember when we last heard similarly sized speakers capable of delivering such low frequencies. Still, we believed that the low-end would benefit from some boundary-loading, so we moved the speakers backwards, almost to the wall, and were gratified to hear that the sonic quality remained while the volume of the deepest bass increased, as did the extension. We were also pleased to hear that the Celata 88's stereo image did not narrow, as often happens when speaker cabinets are put close to a wall. We can only put this unusual attribute down to the unique waveguide.

That the Celata 88 performed optimally so close to a rear wall is a huge plus in our book. After all, the last thing you want to be doing with your speakers is moving them out of the way for your day-to-day routine, only to have to move them back into their 'optimal' position whenever you want to do some serious listening — which is what you have to do with the majority of standmount speakers.

Listening to Steve Hackett's classic album Defector was all it took for us to appreciate the speakers' ability to deliver superb bass. The Celata 88 made it child's play to hear the difference between Dik Cadbury's bass guitar and his Moog Taurus, while the sound from John Shearer's drum kit was simply amazingly delivered. The speed of his sticks on the track *Slogans* is almost unbelievable, yet the Celata 88's drivers not only kept up with the pace but also delivered the dynamics of the myriad transients. With Nick Magnus's keyboard work on the same track, his finger-work is insanely good, and the precision of the delivery of the SpectraFloras lets us appreciate every single note.

If you aren't a prog-rock fan, you'll also hear the extent of the Celata 88's superb bass detail and extension by listening to Massive Attack's Mezzanine. Opening track *Angel* is a perfect vehicle, but don't miss how well the speakers deliver the underlying atmospherics. Listen to the clarity of the sound in the lead-up to *Teardrop*, too, and the perfection of Elizabeth Fraser's vocal projection through the tapestry of sound. Don't miss how the waveguide can reproduce the Morse code-like 'beeping' in the background so that it's always audible, and without disturbing the mix.

Speaking of which, the articulation of the compression driver means that all the frequencies within its compass are delivered with jaw-dropping precision, not to mention crisply, cleanly and without a hint of the 'sizzle' that can tarnish the treble delivery of conventional tweeters, particularly those of the metal-domed variety. (And if you do want 'sizzle', it will only be a matter of pushing those rear buttons to give the highs a boost. We would not recommend this, though, as the boost is absolutely massive — in our minds, to 'overkill' levels.)

The compression driver's articulation is splendidly exemplified on Steely Dan's rightly-lauded Aja, which deservedly won a Grammy for Best Engineered Recording. Altogether, it took 40 musicians to get it onto vinyl (it was 1978, after all), and their contributions are all honoured by the performance of the SpectraFlora speakers. Despite the articulation, there's still a natural and very pleasing warmth to the delivery of the upper mids and lower highs that is totally aurally satisfying.

You will need to ensure your amplification is up to scratch if you want to extract the best performance from the Celata 88, because they are not overly efficient (SpectraFlora's specification is 86dBSPL) and their impedance is lower than average, remaining below six ohms over almost the entire audio spectrum.

CONCLUSION

So we are very close to the end of this review and haven't yet explained what that 'something blue' inside the speaker might be. Well, it's the colour of some of the capacitors in the Celata 88's crossover! However, we must say that we started feeling a little blue upon learning how much we would have to dip into our savings to own a pair of Celata 88, because we had wanted to purchase the review pair rather than send them back. (How's that for a recommendation?) After all, we had never heard such good sound — or so much deep bass! — from a pair of speakers so small, room-friendly and good-looking that our better half would allow them to grace our living room's decor, rather than banish them to our 'audiophile den'.

Sure, the SpectraFlora Celata 88's asking price means that if speaker size is not an issue for you (or your significant other), many very large and very good-sounding floorstanders could complicate your buying decision. But if cabinet size is a deciding factor, you need neither look nor listen any further… just choose your preferred finish.

SPECIFICATIONS

SpectraFlora Celata 88

Price: $35,000/pair (speakers); $1,000/pair (stands)
Warranty: 4 years
Frequency range: 33Hz-20kHz
Impedance: 4ohms
Sensitivity: 86dB
Recommended amplifiers: >40W tube; >70W solid state class A or A/B
Maximum power: 300W (peak)
Dimensions (HWD): 71.7 x 35.3 x 44.8cm
Weight: 46kg

Contact: SpectraFlora
T: (04) 1265 3966
E: steve@spectraflora.com
W: www.spectraflora.com