

Acoustic Energy Radiance Three

LOUDSPEAKERS

Take a good look at the tweeter in Acoustic Energy's new Radiance Three, because it's Acoustic Energy's new 'secret weapon'. Yes, I know it looks a lot like a 38mm Peerless XT ring radiator, but apparently, according to designer Mike Thomas, the trick is the surround in which it's mounted. He says the combination of the two technologies leads to the tweeter's dispersion matching that of the midrange and bass drivers, which '*dramatically naturalises the soundfield.*' Like all new technologies, it needed a catchy acronym, but the best Acoustic Energy could come up with was 'DXT Lens.'

THE EQUIPMENT

As you can see from the photograph, the Acoustic Energy Radiance Three is a floor-standing four-driver model. What you can't see are the 'outrigger' feet at the base of the speakers that are absolutely essential to ensure these moderately-tall loudspeakers are stable when they're sitting on the floor in your room, particularly if your room is carpeted. (Our photographer forgot to attach them for the photo shoot.) The four drivers are driven by a true 'three-way' crossover network, with the two 160mm alloy-coned bass drivers working in parallel to deliver the bass.

I got those bass driver specifications from Acoustic Energy's website, but when I ran a tape measure over the speakers supplied for review, the overall diameter of the bass drivers turned out to be considerably larger than claimed. I measured 180mm. Even the mounting hole diameter—which is usually used by manufacturers to identify diameter—was greater than claimed, at 170mm. However the only really important diam-

eter when it comes to cone drivers is their Thiele-Small diameter (Sd) which I measured as being 133mm. This gives a cone area of 138cm². The importance of this measurement is that it allows you to work out how big the bass driver would be if AE were to replace both smaller bass drivers with a single driver. The answer is that that driver would have an Sd of 276cm², so its overall diameter would be in the order of 240mm. That's very good considering the small footprint of this design! The bass driver has a pressed alloy chassis and the voice-coil is punched for cooling, plus there's under-spider cooling as well.

The size of the midrange driver is also at odds with the specification. I measured it at 150mm overall, with a mounting hole diameter of 139mm, whereas AE states it as being 130mm. In this case, however, AE is erring on the glossy side, because all other things being equal, smaller midrange drivers

have smoother frequency responses which are more extended at the high end. The build of the midrange driver is similar to that used for the bass drivers, with a pressed alloy cone and a rubber roll surround that operates from a cast alloy chassis. The large magnet is centred though its rear, to which a second flux-cancelling magnet is attached. The driver, which carries Acoustic Energy branding, is truly beautifully made.

In the introduction, I said that the Radiance Three's tweeter 'looks a lot like a 38mm Peerless XT ring radiator' because it does. The technical description of the tweeter supplied by Acoustic Energy also seems to match the description for the Danish manufacturer's trademark tweeter, right down to the twin-wound aluminium voice coils, but when I removed said tweeter from the AE enclosure to check for identification markings, there was no Peerless sticker attached, so I am no wiser.



However, removing the tweeter did reveal a 'bumped' backplate and double-stacked external magnets, as well as the fact that the tweeter's terminals are soldered to the internal wiring loom rather than connected by cheap 'nasty slide-on tag terminals, so the exploration wasn't entirely unfruitful. If you take a close look at the 'horn' in which the tweeter is mounted, you'll see it's not a simple shape, or even a curve, but a complex shape with three different 'slopes' at different radiuses.

As you'd expect of a four driver three-way design, the crossover is substantial, with

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three inductors (two air-cored and one laminate-cored, all of which are cross-mounted so there can be no magnetic interaction between them), and six capacitors, including two electrolytics made specifically for Acoustic Energy (they carry AE branding). Curiously, AE runs pairs of quite thin Figure-8 wire all the way up from the rear terminal block to the crossover PCB (mounted behind the midrange driver), but then runs enor-

mously thick Figure-8 wiring to each of the drivers. Very odd! The point at which the cable 'loom' went through the dividing baffle was not sealed. The cabinet is divided into 'bass' and 'midrange' chambers, with the bass chamber being vented to the rear of the cabinet via two 100×45mm ports, and the midrange chamber via a single 50×30mm port. The ports in the lower chamber had radiused entry and exit points, but the port in the upper chamber was simply cut to the correct length (with the resulting swarf still attached).

The terminal block on the rear of the Acoustic Energy Radiance Three is set up with twin pairs of terminals connected via gold-plated buss-bars that can be removed for bi-wiring/bi-amping. At the bottom of the cabinet is a threaded hole that gives access to a separate chamber that can be filled with sand (or lead shot) to improve stability (by lowering the centre of gravity) and also to 'anchor' the design to ensure maximum bass performance. If you're trying to work out what the Radiance Threes will look like in your living room, they stand 920mm high, are 230mm wide (at their widest point) and are 297mm deep. I emphasise 'widest' point because, as you can see from the photographs, the sides of the Radiance Three cabinet are curved. Each speaker weighs 18kg.

IN USE AND LISTENING SESSIONS

I have to confess at the outset that I was initially astounded by how much deep bass energy was delivered by the Acoustic Energy Radiance Threes in my listening room. My room is fairly large, quite starkly furnished, has high ceilings and so when, after I'd set up the Radiance Threes I then moved back to take a look at what they looked like, I was

a little surprised by how small they seemed to be, and kind of immediately assumed that they might not be up to the task of delivering high volume levels—and deep bass—in such a large room. Indeed I'd already started wondering if I shouldn't have set them up in my home office instead, even though it doesn't really lend itself to use with floor-standers (though I always use it when auditioning bookshelf-style speakers).

As you've gathered, the bass output of the Radiance Threes made a nonsense of my visual assessment of them! For such physically small speakers—and such small bass drivers, even with the undeniable benefit of metal cones—the bass extends remarkably low, and it has an authority that it is impressive. Positioning will play a significant part in performance—because of those rear-firing ports—but I found that so long as you keep the ports fairly close to a rear wall, the bass will always be highly satisfying.



◀ Take a close look at the 'horn' in which the tweeter is mounted, you'll see it's not a simple shape, or even a curve, but a complex shape with three different 'slopes' at different radiuses.

ACOUSTIC ENERGY

Radiance Three Loudspeakers

BRAND: Acoustic Energy

MODEL: Radiance Three

CATEGORY: Floorstanding Loudspeakers

RRP: \$3,999

WARRANTY: Five Years

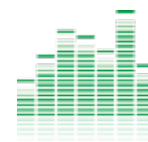
DISTRIBUTOR: Radiance AudioVisual

ADDRESS: Unit 33, 5 Gladstone Street
Castle Hill, NSW 2154

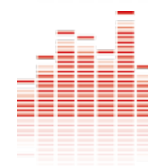
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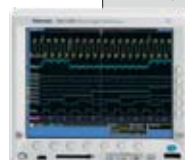
- Strong bass
- Highly dynamic
- Attractive cabinet



- Outtrigger feet
- Hard sound if overdriven

LAB REPORT

Readers interested in a full technical appraisal of the performance of the Acoustic Energy Radiance Three Loudspeakers should continue on and read the LABORATORY REPORT published on page 64. 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.



Lab Report on page 64

I'd been listening to Cloud Control's new album, 'Bliss Release', prior to the arrival of the Radiance Threes, and found when I listened to it using the AEs that the way they deliver the fast-paced bass lines that embellish *My Fear #2* was impressive, particularly notes from the E-string. The understated kick drum sound is also magnificently delivered by the Radiance Threes. The 'raw' sound of this home-recorded album is refreshing, but be warned that CC is also prone to injecting plenty of FX and also occasionally overloads one or more of the devices in its recording chain. However, when they get it right, which is more often than not on *Bliss Release*, it's a great listen, and most particularly when Heidi Lenffer is kicking out with that extraordinary voice of hers!

The clarity of the bass was also highlighted on The Triffids track *Red Pony*, with Martyn P. Casey absolutely wringing the neck off his bass. He and drummer Alsy McDonald also duet on the intro to *Kathy Knows*, but this track is also notable for the clarity of McComb's vocal (at least when it's not laden down with echo, as in the choruses) which highlights the Radiance Threes' credentials over the midrange. You can also hear this in the sound of 'Evil' Graham Lee's pedal steel

in the evocative song *The Seabirds* (a Triffids classic). Since I'm mentioning the midrange I have to say that the mids delivered from Emma Sidney's new album, 'Bossa Eyes' had a smooth, warm and very velvety feel that was nigh on indescribable. Released on Move (MD 3335) this CD has Sidney singing a variety of songs that she describes as 'a fusion of acoustic Latin rhythms and laid-back jazz improvisations', but that I'd just describe as being 'cool as.' She mixes such classics as Antonio Carlos Jobim's *Corcovado* with Kate Bush's *Man with the Child in his Eyes* to Cole Porter's *I Concentrate on You* and even throws in one of her own (*Catching the Wave*). Todd Sidney's piano sound is also highly revealing of the Radiance Three's nuances.

Spinning up the hot-off-the-press 'Bright Victory', from Cabins, revealed that the upper mids could be a bit in-your-face, but then this is a very sharply-recorded CD, with not a lot of aural warmth, and so the Radiance Threes were being goaded into it! It certainly meant that there was more than the average amount of 'air' around the extreme highs, and also far better-than-average detailing in the upper treble.


I found the Radiance Threes to be highly dynamic—it was easy to hear they're efficient



as well—but I also found that in my large room I needed to be careful not to overdrive them, because whenever I did they immediately told me to 'wind down the volume' by sounding rather forced and hard. However, this very efficiency and dynamism actually predisposes them to deliver their best performance at low-to-average volume levels... and this, after all, is exactly what most loudspeakers spend most of their time doing!

Try as I might, I could not hear any particular sonic characteristic that I could definitely attribute directly to the presence of that so-called 'DXT Lens', but the stereo imaging of the Radiance Threes is superb, and there's certainly a wider-than-normal sweet spot, not to mention rather more sound-staging depth than I might have expected, so if the DXT Lens was even a minor contributor to any or all of these admirable traits, it's a definite plus in the design sense.

CONCLUSION

This is an impressive new design from Acoustic Energy, one that punches well above its weight in the bass. Position the AE Radiance Threes properly in any average-sized room, partner them with good-quality amplification and they'll return the favours by delivering performances that will keep you coming back for more!  **Andrew Haddon**

SEE REVIEW ON PAGE 20

TEST RESULTS

As you can see from *Graph 1*, the frequency response of the Acoustic Energy Radiance Three was extended—both in the bass and the treble—and also highly linear, with the overall linearity ameliorated only by slight elevations in level at around 100Hz, 700Hz–1.2kHz and in the region 4–8.5kHz, with this last being sufficiently high in the audio band that it would affect only harmonics, and not the more important fundamentals. The trace on this graph is actually a composite, with the data for the trace below 500Hz coming from the pink noise response (an average of nine individual sweeps) and the response above 500Hz coming directly from the on-axis gated high-frequency response, an expanded and more detailed view of which is shown in *Graph 2*. By using the two graphs, we can see that the overall frequency response measured by *Newport Test Labs* for the Acoustic Energy Radiance 3 comes in at 55Hz to 30kHz ± 3 dB. Other than the slight variations in response at the frequencies noted, the response is inherently linear, with the spectrum not tilted one way or the other. Its only other very slight characteristic is a very minor depression around 250–500Hz. Note that all these variations are so small that they fall within the ± 3 dB specification, so they would ‘characterise’ the sound of the Radiance Three design, rather than define it.

Graph 3 shows the low-frequency performance of the Radiance Three’s two bass drivers and dual ports. You can see that the matching of the drivers is excellent: the small differences that are visible are mostly caused by the differences in the physical locations of the four elements on the front baffle. However you can see also that the upper driver is very slightly affected by a resonance

that also appears at its corresponding bass reflex port, while both the upper and lower ports in the lower chamber of the Radiance Three exhibit resonances at 950Hz. However the level is very low compared to the primary forward output, and the Q is very high, so it’s unlikely to impact on the sound, and I certainly couldn’t see that it had any effect on the frequency response.

Graph 4 shows near-field microphone measurements made of the Radiance Three’s midrange driver, as well as of the port behind it. The output is not what I would have expected from a dedicated midrange driver in a four-driver speaker system with a three-way crossover. Some of this I attribute to inherent deficiencies in the particular test methodology used by *Newport Test Labs*, which is not ideal for measuring midrange drivers at the best of times, and most particularly when it is not possible to isolate the output of the other three drivers, as is the case with this design. However it does appear to me that Acoustic Energy has only a high-pass filter (and with a low turnover) in circuit with the midrange, which I find odd.

The impedance modulus (*Graph 5*) of the Radiance Three shows where AE has got all that bass energy from, with the enclosure tuned to a very low 37Hz (the two impedance peaks are at 21Hz and 70Hz). The pair matching is excellent, as you can see from the only minor differences in the impedance traces of the left and right speakers. Phase angle is superbly controlled. There is some evidence on the traces of that resonance at 950Hz, but don’t confuse this with the glitch at 1kHz, which is caused by the test instrument switching measuring ranges. I’d be tempted to rate the Radiance Three with a nominal impedance of 6 Ω because the impedance stays above this value over most of its operat-

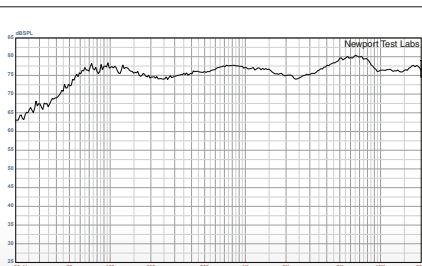
ing range, and where it dips below at 40Hz and 125Hz, the infractions are only minor. However, going by the strict ruling of IEC dictate 268-5, which is the legal mechanism that covers this specification, the nominal impedance should be stated as being 4 Ω , because of the way it dips below this value above 13kHz. (In fact, a low and/or diminishing impedance at high frequencies is not a desirable trait for any loudspeaker in any case, since it can coax a poorly-designed amplifier into instability.) Although the design presents a comfortable load for any well-designed amplifier, my feeling is that you will get best performance from an amp that will deliver at least its 8 Ω rated power into 4 Ω as well... and preferably more. But that really shouldn’t be a big ask.

The final graph (*Graph 6*) I’ve selected for inclusion on these pages is a composite in which all the traces on the preceding graphs have been re-scaled by post-processing and then ‘fitted’ into the averaged pink noise response, in order that you can see how the drivers integrate with each other to produce the overall response noted earlier (55Hz to 30kHz ± 3 dB.)

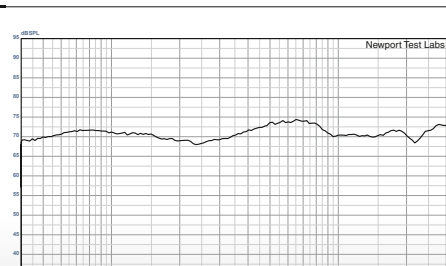
Acoustic efficiency of the Acoustic Energy Radiance Three design was high, with *Newport Test Labs* reporting a test outcome of 89dB SPL at one metre, using the lab’s usual very stringent test methodology. This is a higher-than-average result, even though it comes up a full 1dB short of Acoustic Energy’s specification.

Overall, I found the measured performance of the Acoustic Energy Radiance Three to be excellent, even though I also found several aspects of the design itself a little unusual, mostly regarding the implementation of the midrange driver. I guess it’s a classic case of the proof being in the pudding!

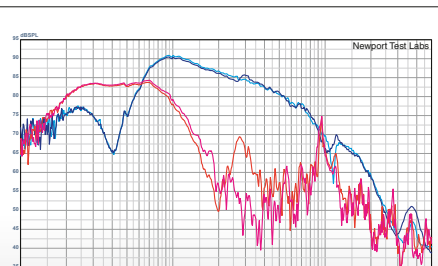
Steve Holding



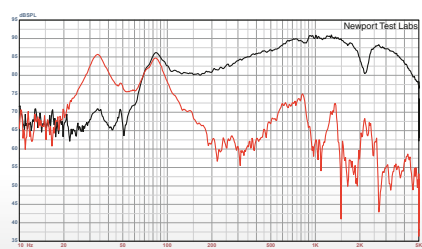
Graph 1. Frequency response. Traces below 1kHz is the averaged result of nine individual frequency sweeps measured at three metres, with the central grid point on-axis with the tweeter using pink noise test stimulus with capture unsmoothed. This has been manually spliced (at 500Hz) to the gated high-frequency response, an expanded view of which is shown in Graph 2. [AE Radiance 3]



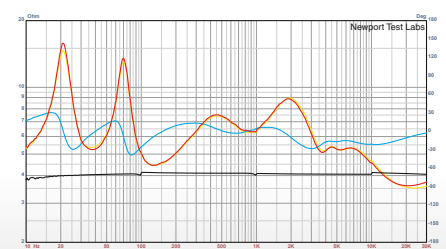
Graph 2. High-frequency response, expanded view. Test stimulus gated sine. Microphone placed at three metres on-axis with dome tweeter. Lower measurement limit 400Hz. [AE Radiance Three]



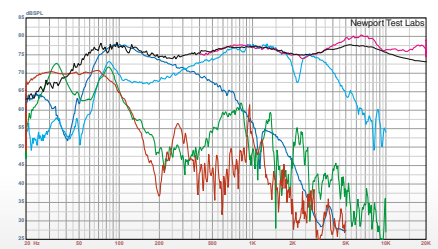
Graph 3. Low frequency response of front-firing bass reflex ports (red and pink traces) and upper and lower woofers (dark and light blue traces). Nearfield acquisition. Portwoofer levels not compensated for differences in radiating areas. [AE Radiance Three Loudspeaker]



Graph 4. Nearfield frequency response of midrange driver (black trace) and port behind midrange driver (red trace). Trace levels not compensated for differences in radiating areas. [AE Radiance 3]



Graph 5. Impedance modulus of left (red trace) and right (yellow trace) speakers plus phase (blue trace). Black trace under is reference 4-ohm precision calibration resistor. [AE Radiance Three]



Graph 6. Composite response plot. Red trace is output of bass reflex port. Dark blue trace is anechoic response of bass driver. Light blue trace is anechoic response of midrange driver. Green trace is nearfield output of midrange driver port. Pink trace is gated (simulated anechoic) response above 400Hz. Black trace is averaged in-room pink noise response (from Graph 7). [AE Radiance Three]