

**SPECIAL
ISSUE**

**LOUDSPEAKERS TESTED,
FROM \$999/PAIR TO
\$93,000/PAIR**

stereophile

**ONLINE AUTHORITY:
WWW.STEREOPHILE.COM**

**AN AFFORDABLE
SUPER
LOUDSPEAKER**

GOLDENEAR'S TRITON REFERENCE

IN REVIEW

**SPEAKERS AT ALL PRICES
FROM ALTA, VIVID, QUAD, TOTEM**

**NETWORK MUSIC PLAYERS
FROM AURENDER, BRYSTON**

**THE AWESOME TECHDAS
AIR FORCE III TURNTABLE**

**TECHNICAL INVESTIGATION:
MQA IN THE TIME DOMAIN**



**SPL
VOLUME 8
P.41**



**BROOKLYN
RIDER:
THE FUTURE
OF THE STRING
QUARTET?**

TEN
THE
ENTHUSIAST
NETWORK

JANUARY 2018

JOHN ATKINSON

GoldenEar Technology Triton Reference

LOUDSPEAKER

Back in January 2010, in Las Vegas for the Consumer Electronics Show, I was prowling the corridors of the Venetian Hotel when I bumped into loudspeaker auteur Sandy Gross, cofounder first of Polk Audio and then of Definitive Technology. Knowing that Gross was no longer associated with Definitive, I asked him what he was getting up to in his retirement.

Retirement? He showed me a photo of a plain, cloth-covered, black tower speaker and promised to keep in touch. When next I heard from him, it was to announce that, along with his wife, Anne Conaway, and his former partner at DefTech, Don Givogue, he had started a new loudspeaker company, GoldenEar Technology, Inc.,¹ and that the plain black loudspeaker was the first in a line of models to be named Triton.

Our first review of a Triton was of the Two, in February 2012. In February 2015, Robert Deutsch reviewed what was then the top of the Triton line, the One,² priced at a very affordable \$4999.98/pair. But when I bumped into Gross at the 2017 CES, he walked me to the GoldenEar room at the Venetian to listen to his ultimate Triton, the Reference, which would cost \$8498/pair. “Sandy Gross has done it again!” enthused Robert Deutsch in his show report.³ I was sufficiently impressed by the sound the Triton References were making that I asked for a pair to review once the speaker was in production.

Design

The Triton Reference is larger than the Triton One, and while a cloth “sock” covered all of the lesser Tritons, the Reference’s enclosure is finished in high-gloss black, and there is a deep-curved grille in the shape of a vertical half-column. As in all the Tritons, the Reference’s tweeter is GoldenEar’s version of the Heil Air-Motion Transformer, from the 1970s. When Gross visited to set up the Triton

References in my room—a courtesy we extend to speaker manufacturers so that they can be sure that their products are working correctly and that there’s no problem with their interaction with the room—I asked him about the advantages of this kind of driver.⁴

“When we started the project, we wanted to make something that was better than whatever we’d made before,” he explained. “It is an evolution of the tweeter Dr. Heil designed back in the ’70s. I felt very strongly that it had performance advantages—it’s very fast. The biggest thing is that it doesn’t have a breakup in the very high frequencies. Domes all have a breakup; it’s a distortion that you not only can hear, but you can clearly measure—that ‘sparkle’ that stands out, but gets fatiguing after a while. . . . They promoted the Heil originally [by showing] that squeezing the air works a lot better than pushing and pulling it, but there’s no question that the mass that’s moving is the mass of each fold. So it’s very, very quick. The High-Velocity Folded Ribbon that we use in the Triton Reference is not the same as we use in the other speakers—they’ve all got the same diaphragm, but it has 50% more magnet material, more neodymium, which gives it a lot more control, makes it faster but better controlled, [gives it] higher sensitivity.”

The speaker’s specified sensitivity is indeed very high, at 93.25dB/2.83V/m. Above and below the ribbon tweeter are twin 6" upper-bass/midrange drivers, these having a cast basket, a low-mass voice-coil, a newly developed polypropylene cone, and what GoldenEar calls a Focused Field

1 See David Lander’s interview with Gross in the June 2016 issue: www.stereophile.com/content/sandy-gross-true-confessions.

2 See www.stereophile.com/content/goldenear-technology-triton-two-loud-speaker and www.stereophile.com/content/goldenear-technology-triton-one-loudspeaker.

3 See www.stereophile.com/content/ces-2017-goldenears-new-flagship.

4 By the time you read this, a video of my interview with Sandy Gross will be posted on the *Stereophile* website.

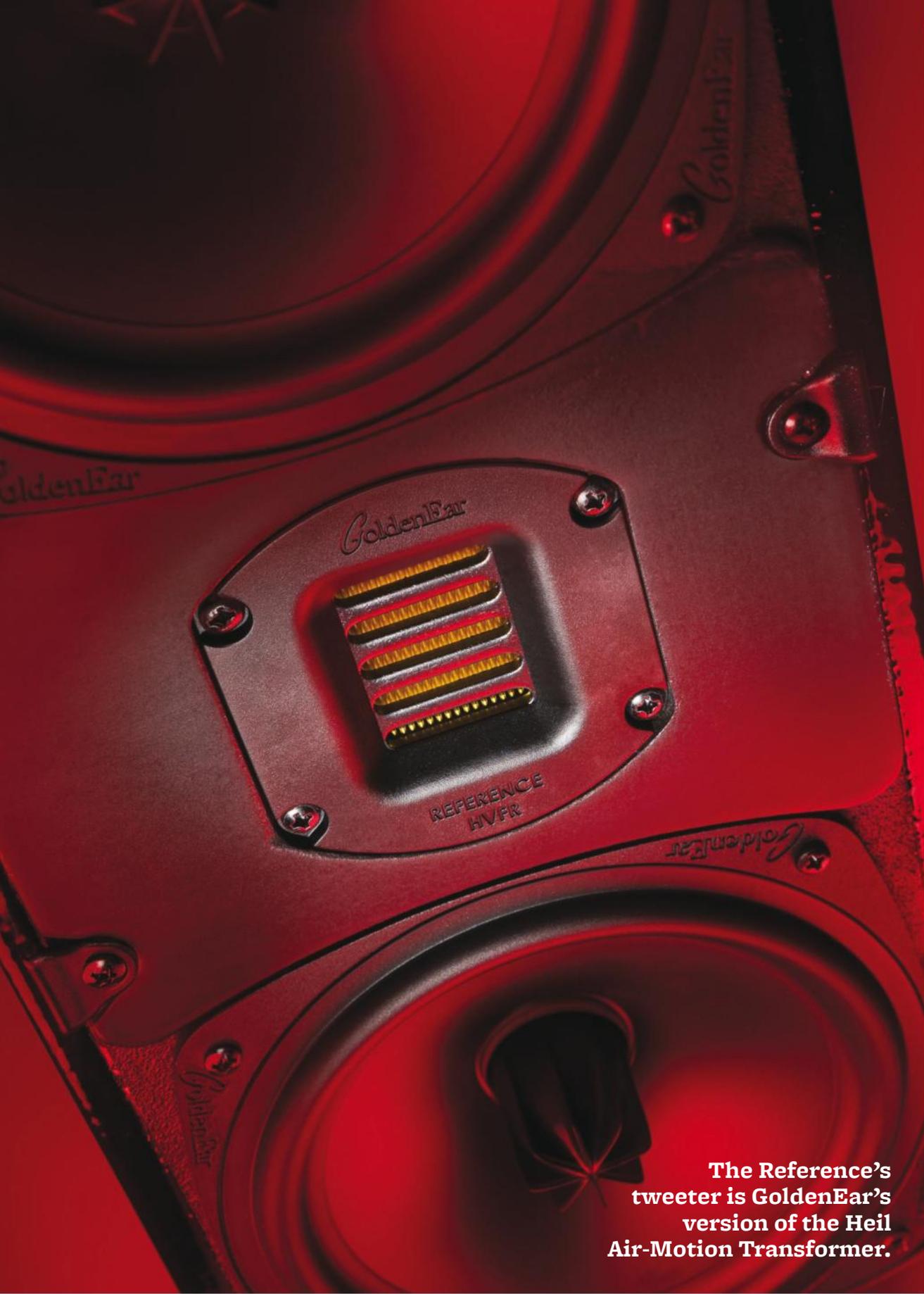
SPECIFICATIONS

Description Three-way, reflex-loaded, floorstanding loudspeaker with powered sub-bass section. Drive-units: High-Velocity Folded Ribbon (HVFR) tweeter, two 6" MVPP mid/bass drivers, three 10" by 6" sub-bass drivers, four 10.5"

by 9.5" passive radiators. Subwoofer power amplifier: 1800W. Frequency range: 12Hz–35kHz. Sensitivity: 93.25dB/2.83V/m. Nominal impedance: “compatible with 8 ohms.” Recommended amplification: 20–750Wpc. **Dimensions** 58" (1473mm)

H by 6.75" (172mm) W front by 9.25" (235mm) W rear by 18.75" (476mm) D. Base: 13.5" (343mm) W by 22.25" (565mm) D. Weight: 110 lbs (50kg). **Finish** Hand-rubbed, piano gloss-black lacquer. **Serial numbers of units**

reviewed O6118, O6119. **Price** \$8498/pair. Approximate number of dealers: 125. **Manufacturer** GoldenEar Technology, PO Box 141, Stevenson, MD 21153. Tel: (410) 998-9134. Fax: (410) 356-0808. Web: www.goldenear.com.



**The Reference's
tweeter is GoldenEar's
version of the Heil
Air-Motion Transformer.**

magnet structure, designed to better direct the magnetic flux into the voice-coil gap. Instead of a dustcap, these drive-units feature a ribbed extension of the magnet pole-piece.

Both the One and Reference have powered subwoofer sections, but the three 10" by 6" "racetrack" low-frequency drivers have 40% more surface area than those in the Triton One, along with larger-diameter voice-coils and more massive Focused Field magnets. These drivers are reflex-loaded with four 10.5" by 9.5" passive planar radiators, two on each side of the Reference's cabinet. These are said to be similar to those used in GoldenEar's SuperSub X, but capable of greater excursion. The subwoofer drivers are driven by an 1800W class-D amplifier, and the crossover from the upper-frequency drivers is implemented in DSP with 56-bit precision. As well as a single pair of binding posts on the Reference's rear, the subwoofers can be driven from an RCA jack; their level can be adjusted with a knob.

Why powered subwoofers? "We have been building speakers with built-in powered subwoofers since 1995," Gross told me. "The reason we did it, even



The Triton Reference's drive-units, all developed specifically for the speaker.

though initially people thought it was to get the subwoofer box out of the room, was to get much better blending with the rest of the speaker."

Some North American speaker manufacturers, Paradigm for example, have told me they are repatriating production of their more expensive models, but GoldenEar's loudspeakers are created in the US, engineered in Canada, and made in China.

"The speakers are manufactured overseas because we find we can get extremely high quality, just like Apple manufactures their goods in China," explained Gross. "You can get any level of quality, but we work with suppliers who are very, very good, who can supply us with the quality level that we want. We design every component from the ground up, so we're not working with any parts off the shelf, but designing, for instance, our bass-midrange drivers from the ground up. We choose the cone—we actually design the curve of the cone, we tool the surround, everything—we can get a very high-quality bass-midrange driver that's comparable with some of the European drivers that some of the manufacturers are paying maybe ten times as much for, but that's

MEASUREMENTS

I used DRA Labs' MLSSA system and a calibrated DPA 4006 microphone to measure the GoldenEar Triton Reference's frequency response in the farfield, and an Earthworks QTC-40 for the nearfield and in-room responses. The GoldenEar's sensitivity is specified as a very high 93.25dB/2.83V/m; my estimate was close to that at 92.5dB(B)/2.83V/m, which places the Triton Reference in exalted company. Speakers this sensitive are rare. Fig.1 shows how the impedance and electrical phase vary with frequency. The magnitude does dip below 6 ohms in the midrange and high treble, with a minimum value of 3.4 ohms at 320Hz and a combination of 4 ohms and -45° phase angle at 73Hz. Though GoldenEar specifies the Triton Reference's impedance as "compatible with 8 ohms," I would use an amplifier with this loudspeaker that is comfortable driving 4 ohms.

The traces in fig.1 appear free from the glitches that would suggest the presence of panel resonances, but

under magnification a slight discontinuity can be seen in both traces between 600 and 700Hz. While the Triton Reference's side panels seemed generally inert, the rear panel was relatively lively between 500 and 800Hz, with resonant modes at 550, 665, and 760Hz. Fortunately, the areas affected are small and face away from the listener; these frequencies are also sufficiently high that they should have no audible effects.

The green trace in fig.2 shows the response of the midrange units below 312Hz, measured in the nearfield. It rolls off smoothly below 100Hz, and I've plotted the nearfield response of the woofers (red trace) at a level that suggests that the crossover occurs at 80Hz. This is an arbitrary decision, however, as the woofers' level control has a range of 28dB between its minimum and maximum positions. The output of the woofers rolls off rapidly above and below a relatively narrow passband, as does that of the passive radiators (blue trace). The slight notch at 22Hz in the woofers' response sug-

gests that this is the tuning frequency of the radiators, but peculiarly, their output has a peak at the same frequency at which the woofers' output is greatest. The black trace below 300Hz in fig.2 shows the complex sum of the midrange, woofer, and passive radiator outputs, summed in the ratio of the square roots of their radiating areas. The large peak at 63Hz appears to be real, and not merely an artifact of the nearfield measurement technique, but the Triton Reference's low-frequency output extends to a low 25Hz with then

Stereophile GoldenEar Triton Reference Impedance (ohms) & Phase (deg) vs Frequency (Hz)

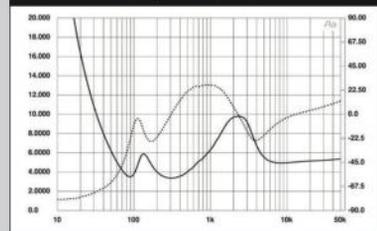


Fig.1 GoldenEar Triton Reference, electrical impedance (solid) and phase (dashed) (5 ohms/vertical div.).

part of the way we can produce a speaker which is so good and so affordable.

“We sweat over all the little details. On this particular product the glue bond between the surround and the [bass-midrange] cone was one of the final things to get done, because we wanted something that was strong but light. We must have gone back and forth a half dozen times on the glue bond, until we got it exactly where we wanted it.”

At a hair less than \$8500/pair, the Triton Reference is a lot less expensive than other companies' flagship models. I asked Gross what he'd tried to achieve with the Triton Reference that he hadn't with the earlier Tritons. “We are trying to come out with a step up from the Triton One that was better in every respect. Triton One is really terrific, but we felt we could make it even better in terms of the sonics, and in the industrial design



and the cosmetic presentation of the product.”

Sound Quality

When Sandy Gross visited, he brought with him a CD-R containing several of the tracks he's found most useful in setting up speakers—not only recordings with a wealth of soundstage information, but also vocal recordings from Dean Martin and Brazilian singer Ana Caram. (Sandy is an aficionado of the human voice.) We began by placing the Triton References where the KEF Reference 5s⁵ had worked best, but ended up with the speakers quite far away from the wall behind them (91"), closer to the listening chair (113" compared with the KEFs' 123"), and farther away from the sidewalls. My room is somewhat asymmetrical, so the woofers of the left-hand speaker were 51" from the nearest sidewall, those of the right-

5 See my review in the October 2017 issue: www.stereophile.com/content/kef-reference-5.

measurements, continued

a very steep, sixth-order rolloff.

Above 300Hz, the black trace in fig.2 shows the Triton Reference's farfield response, averaged across a 30° horizontal window centered on the tweeter axis. It is impressively flat, though the mid-treble is shelved down by a dB or so. The speaker's upper-frequency response is disturbed by narrow peaks and dips. These won't be audible as such, but result, as I explain below, from reflections of the tweeter's output from the rather bulky grille. I repeated the tweeter-axis measure-

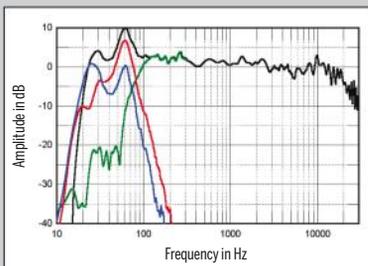


Fig.2 GoldenEar Triton Reference, anechoic response on tweeter axis at 50°, averaged across 30° horizontal window and corrected for microphone response, with nearfield responses of midrange units (green), woofers (red), and passive radiators (blue), respectively plotted in the ratios of the square roots of their radiating areas below 312Hz, 200Hz, and 170Hz, with complex sum of nearfield responses plotted below 300Hz.

ment without the grille; the response ripples were absent, and there was about 0.5dB more energy present above 1.2kHz. However, the small, narrow suckout at 5kHz was unaffected by removing the grille.

The Triton Reference's plot of lateral dispersion, normalized to the tweeter-axis response (fig.3), reveals that the speaker has smoothly controlled off-axis behavior up to the cursor position just below 9kHz. Above that frequency the GoldenEar becomes more directional throughout the treble, though the dispersion doesn't narrow significantly until above 15kHz. In the vertical plane (fig.4), a suckout develops more than 10° above or below the tweeter axis, which is 41" from the floor. (Work by

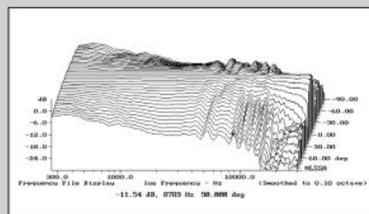


Fig.3 GoldenEar Triton Reference, lateral response family at 50°, normalized to response on tweeter axis, from back to front: differences in response 90°-5° off axis, reference response, differences in response 5°-90° off axis.

Thomas J. Norton 20 years ago for *Stereophile* found that 36" was the average height of a seated listener's ears.) This is why I tilted the speaker forward by placing cones under the rear of its base, to get the optimal treble balance at my listening position.

Fig.5 compares the spatially averaged response of the Triton Reference (red trace) with that of the KEF Reference 5 (blue), which I reviewed in October 2017! (Using SMUGSoftware's FuzzMeasure 3.0 program and a 96kHz sample rate, I average 20 1/6-octave-smoothed spectra, individually taken for the left and right speakers, in a rectangular grid 36" wide by 18" high

1 See www.stereophile.com/content/kef-reference-5-loudspeaker-measurements.

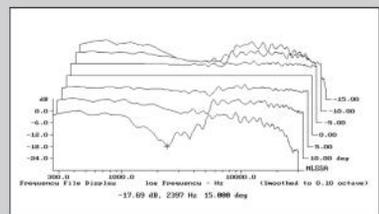
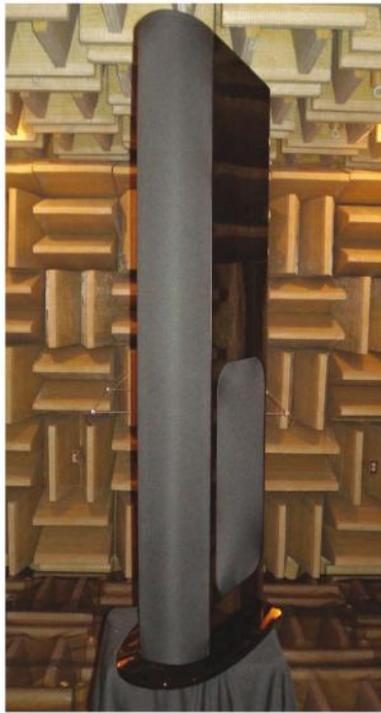


Fig.4 GoldenEar Triton Reference, vertical response family at 50°, normalized to response on tweeter axis, from back to front: differences in response 15°-5° above axis, reference response, differences in response 5°-15° below axis.

hand speaker 60". Sandy began with the speakers firing straight ahead, but once he was satisfied with their positions, he toed them in slightly so that their inner sidewalls were just visible from the listening position.

Listening to the dual-mono pink-noise track on my *Editor's Choice* (CD, Stereophile STPH016-2), I found I had to sit up straight in my chair, as the balance changed more than I was expecting if I sat below the tweeter axis, which is a higher-than-usual 41" from the floor. As suggested by Gross, I tilted the speakers forward a little by placing two Mod Squad TipToes under the rear of each Triton Reference's base.

The Triton Reference is a lot more sensitive than other speakers I've had in my room in recent months, or even years—I had to turn down the volume control on the DACs I was using by 10dB or so to set the playback level to what I'm used to. I used the MBL Corona 15 monoblock amplifiers during Gross's visit, which he didn't feel were quite optimal for the Triton



References. As I was scheduled to measure the Pass Laboratories XA60.8 monoblocks, to accompany Jim Austin's review of the Passes in the December 2017 issue, I hung onto them after the testing. My review findings are based on driving the GoldenEars with both the MBL and Pass Labs amps. In addition, my auditioning was split into two periods of six weeks separated by a month, due to my having to have the listening-room ceiling replaced and rebuilt after Labor Day. (The joys of owning a century-old house.)

I stuck with the subwoofer level set by Gross during his visit: each control was at its detented midpoint. The 1/3-octave warble tones on *Editor's Choice* extended cleanly and evenly from 200 to 100Hz, with then the 80Hz band somewhat attenuated, and the 63Hz and 50Hz bands louder. The 40Hz band was also attenuated, although, as is always the case, the 32Hz tone was boosted by the lowest-frequency mode in my room. The 25Hz

measurements, continued

and centered on the positions of my ears.) While a flat treble response is not what you want to see in a graph like this—a room's furnishings are more absorbent at high frequencies than they are lower in the audioband—this graph explains both why I felt the Reference 5 sounded a little sweet, and why the Triton Reference's treble balance sounded more natural in my room. The GoldenEar has a bit more midrange energy than the KEF and definitely more bass, especially in the 60Hz region, where the nearfield response peaked. (The volume controls for the active woofers were set midway between their maximum and minimum positions.)

Turning to the time domain, the GoldenEar's step response on its tweeter axis (fig.6) indicates that its tweeter, midrange drivers, and woofers are all connected in positive acoustic polarity. The decay of the tweeter's step smoothly blends with the start of the midranges' step, and the decay of their step in turn smoothly blends with the rise of the woofers' step, all of which suggests optimal crossover design. However, there is a strong reflection of the tweeter's output 600µs after its initial arrival at the microphone, which must be from the bulky grille. This reflection gives rise to the ripples in the response seen in figs. 2 and 3.

Finally, the Triton Reference's cumulative spectral-decay plot on the tweeter axis (fig.7) shows an initially clean decay, but a lot of low-level hash develops, particularly in the high treble. I conjectured that this is connected with that strong reflection of the tweeter's output, but while the initial decay was somewhat cleaner when I repeated the measurement without the grille, there were still some low-level artifacts in the treble. These could, therefore, be due to reflections of the tweeter's output from the edges of its chassis. Apart from that quibble, the Triton Reference's measured performance reveals excellent engineering.

—John Atkinson

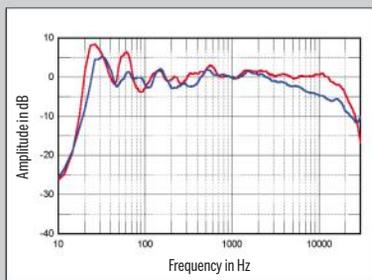


Fig.5 GoldenEar Triton Reference, spatially averaged, 1/6-octave response in JA's listening room (red); and of KEF Reference 5 (blue).

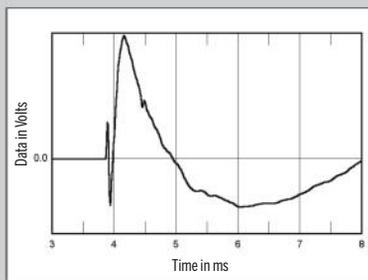


Fig.6 GoldenEar Triton Reference, step response on tweeter axis at 50" (5ms time window, 30kHz bandwidth).

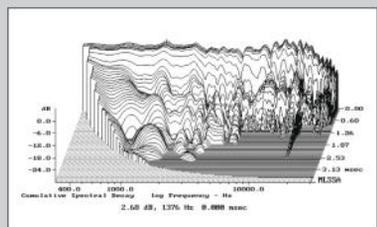


Fig.7 GoldenEar Triton Reference, cumulative spectral-decay plot on tweeter axis at 50" (0.15ms risetime).

tone was easily audible at my normal listening level, but the 20Hz tone was rolled off. The half-step-spaced tonebursts on *Editor's Choice* were reproduced evenly, other than the 64Hz toneburst, which was louder than those to either side.

When I listened to the GoldenEars' cabinet sidewalls with a stethoscope as music played, they seemed acoustically inert. However, the rear wall was rather lively, though I could hear none of the midrange coloration with solo-piano recordings that might have stemmed from this behavior. (Solo piano is very revealing of colorations due to the lack of masking—if some notes are emphasized, there is nowhere for them to hide from the listener.) In fact, piano recordings sounded consistently superb through the Triton References: naturally balanced, with a convincing spread of sound from low bass to high treble. (Again, this was with the subwoofers set as Gross had left them.)

In heavy rotation here in recent months has been a CD of piano duets recommended to me by Amazon. Recorded in concert in 2014, it features Martha Argerich and Daniel Barenboim, born in Argentina a year apart, and both high in my personal pantheon (Deutsche Grammophon/Euroarts 479 392 2). I first became familiar with the CD's final track, Stravinsky's *The Rite of Spring*, as arranged by the composer for four hands, when I recorded a performance by Wu Han and Max Levinson at the 1996 Santa Fe Chamber Music Festival, for possible release as a Stereophile CD. Rights issues prevented this from happening, unfortunately, but listening to the unreleased files in the years since, I grew to appreciate how the reduction from the massive orchestral forces usually employed revealed so much more of Stravinsky's musical mischief making. Through the Triton References with the volume as high as I could bear—SPLs at the listening seat were typically in the high 90s, with peaks reaching 106dB (Studio Six iPhone app set to Fast)—the power of the pianos was in full evidence when the 5/8 pounding starts to announce *The Naming and Honoring of the Chosen One*. These GoldenEars played loud without strain or overload.

DG's recording places the pianos closer to the listener than mine—the Berlin audience is noticeably noisier—and the Triton's midrange was slightly on the forward side of neutral with this CD, which perhaps reduced image depth a little. The soundstages of some of my own recordings were not as deep as I'm used to, and the central image of the pink-noise track on *Editor's Choice* was somewhat wider than the pinpoint I experienced with the KEF Reference 5s. However, the imaging was stable, and the pink-noise image didn't widen or wobble at some frequencies. I wondered if the broadening of the image and the slight reduction in soundstage depth was due to early reflections from the rather bulky grille (see Measurements sidebar). Therefore, with care, I removed the grilles—each is held in place with two bolts in the speaker's base, and slides up and away from retaining clips to the sides of the front-firing drivers. But the soundstaging remained unchanged; in fact, the treble balance was now a little brighter. I replaced the grilles and resumed my listening.

Even with the grilles in place, the Triton Reference's high treble balance sounded more natural in my room than had that of the big KEF, and the high frequencies were clean. Not that that helped the CD version of this issue's "Recording of the Month," Robert Plant's *Carry Fire* (Nonesuch 563057-2). I agree with Robert Baird that this album is musically inventive, but the CD mix is so relentlessly overcooked that even the Triton References couldn't make it listenable.

ASSOCIATED EQUIPMENT

Analog Source Linn Sondek LP12 turntable with Lingo power supply, Linn Ekos tonearm, Linn Arkiv B cartridge.

Digital Sources Aurender N10 music server, NAD Masters Series M50.2 digital music player; Ayre Acoustics C-5xe^{MP} universal player; PS Audio PerfectWave DirectStream D/A converters; AudioQuest JitterBug, UpTone Audio ReGen USB cleaner-uppers; Mac mini running Audirvana 1.5, Pure Music 3, Roon 1.3, Vinyl Studio; Ayre Acoustics QA-9 USB A/D converter.

Phono Preamplifier Channel D Seta L.

Power Amplifiers MBL Corona C15, Pass Laboratories XA60.8 (monoblocks).

Cables Digital: AudioQuest Coffee (USB), Canare (AES/EBU). Interconnect (balanced): AudioQuest Wild Blue. Speaker: Kubala-Sosna Elation!. AC: Kubala-Sosna Elation!, AudioQuest NRG (Niagara 1000), manufacturers' own.

Accessories Target TT-5 equipment racks; Ayre Acoustics Myrtle Blocks; ASC Tube Traps, RPG Abffusor panels; Shunyata Research Dark Field cable elevators; Audio Power Industries 116 Mk.II & PE-1 AC line conditioners (hard drive, computers). AudioQuest Niagara 1000 Low-Z Power/Noise-Dissipation System. AC power comes from two dedicated 20A circuits, each just 6' from breaker box. —John Atkinson

But when a recording had been mixed with musical intelligence, the big GoldenEars stepped out of the way. The haunting piano-and-drums intro to "September in Montreal," from Canadian singer-pianist Anne Bisson's *Blue Mind* (FLAC, Fidelio FACD025), was crystal-clear, and the sound and size of her voice were both superbly natural. At Sandy's subwoofer-level setting, however, the kick drum and double bass were too ripe. When I backed off the controls from 12 to 10 o'clock, this recording's low frequencies were in better balance with the midrange.

The bass had been a factor with Robert Plant's *Carry Fire* CD. When I selected "Fortune Teller," from Plant and Alison Krauss's *Raising Sand* (24/96 ALAC file, Rounder 11661-9075-2), on NAD's Masters Series M50.2 digital music player, to remind myself that this album had been much better recorded than *Carry Fire*, I had to turn the subwoofers down another notch. I found that while Sandy's default setting of the Triton Reference's subwoofer level was perfect for solo piano and chamber music, and while classical orchestral sounded a touch too magnificent, I was not going to complain about that. But when I wanted to rock out, I had to remember to turn the subwoofers down before the music started. This may be due to my room not being quite large enough for a large speaker like the Triton Reference, but it may well also be a function of the specific tuning of the powered woofers, which goes for weight and power rather than absolute low-frequency definition.

Summing Up

GoldenEar Technology's Triton Reference isn't quite as exquisite a time slicer as the top-of-the-line speakers from Magico, Rockport, Vandersteen, Vivid, and Wilson, all of which I've auditioned in the past year. What it does do is offer an expansive, almost always involving sweep of full-range sound for a price that is a small fraction of what any of those models cost. ■