

GOLDENEAR TRITON TWO+

LOUDSPEAKERS

GoldenEar's Triton Two+ is, as you'd expect from the 'Plus' appended to the model number, a revised (upgraded) version of the original Triton Two, a design that's proved to be very popular for a good many years now... and for very good reason. Indeed I well remember giving it a rave review myself some years ago, so I was more than happy to take on the assignment of reviewing this newer Triton Two+.

So far as I can see, the most significant change—apart from a not-inconsiderable increase in the retail price!—is that the new 'Plus' model has new midrange drivers. The change I couldn't see—but could certainly hear—is that the digital signal processor that controls the internal 1,200-watt amplifier that powers the bass drivers has been reprogrammed to improve its soft-clipping action and modify the driver protection circuitry.

(I did see one other significant change, which is that the power-status LED is now a very bright blue—the old one was a dull green—but this change has not affected performance one whit.)

THE EQUIPMENT

As per the original design, the Triton Two+ is almost completely covered by a black cloth covering that conceals not only all the active drivers in the cabinet, but also the passive ones. In all the Two+ has seven drivers, two of which (the ones mounted to the sides) are passive radiators.

Also as per the original, although the high-frequency section of the Triton Two+ operates like a conventional loudspeaker (in that it must be connected to a standard hi-fi amplifier or receiver), the low-frequency section is active, so the speakers in this section are driven by the Triton Two+'s own internal amplifier, which requires that the speakers be connected to 240V mains power.

The passive section of the Triton Two+ comprises two 114mm midrange drivers mounted above and below a single 'HVFR'



tweeter. These two midrange drivers are made specifically for GoldenEar and have exposed, fluted, pole-piece/phase correctors that GoldenEar calls 'Multi Vane Phase Plugs' (MVPP). It's these two drivers that are 'completely different' on this new version, though I've used inverted commas because one of the changes is totally hidden from view—even if you remove the drivers—another is visible only if you remove them, and the other two require a sharp eye and sensitive fingers to detect. To make it clear, although the chassis and phase correctors are the same as on the Triton Two, the midrange drivers in the Triton Two+ have different

cones, different roll surrounds, different suspensions (spiders) and different voice coils compared to the original. As a result of the driver changes and the DSP programming changes, GoldenEar has also changed the crossover network to one that it says: '*is very similar to the crossover in the Triton One.*'

The 'HVFR' tweeter (the initials stand for 'High Velocity Folded Ribbon') is described by GoldenEar as being a 'ribbon' tweeter, but this isn't an accurate description, since it's really nothing like the style of tweeter most people would regard as being a 'ribbon' design. It also works completely differently to true 'ribbon' tweeters.

My own opinion is that the tweeter would better be described using the same terminology as the man who invented it: it's an 'air motion transformer' (AMT).

The AMT was invented by the legendary loudspeaker pioneer Oskar Heil, and its functional part (the diaphragm) is rather like the moving part of a piano accordion, being

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in essence a pleated membrane driven by its edges. As the 'pleats' or 'folds' move towards each other then away, they compress and rarefy the air between them to create sound waves. The beauty of this system is that the 'pleats' in the membrane are super-efficient at moving air (think of the difference between 'squirting' an orange pip away from you by squeezing it between your fingers, compared to throwing the pip with your hand). Also, because the pleated membrane is inherently 'loose' it has a resonant frequency that's well outside its operating range, which isn't true of, for example, dome tweeters (and especially hard-domed ones!).

Because the patent has long since expired on the air motion transformer, the many speaker manufacturers using it have created acronyms to describe its operation, then trademarked (™) those acronyms so other companies can't use them (though they're free to use the actual AMT technology, of course). Thus it is we find similar designs known by the initials AVT (Precide Audio), JET (Elac), ART (Adam Audio), FAL (Sorasound), ESS (ESS Speakers, the original licensee for Oskar Heil's AMT) and, no doubt, many others, not least of which is Martin Logan. Adam Audio has a particularly clear description of how the tweeter works on its website, so I'll reproduce it here, just as I did in my review of the original Triton Two: *'All other loudspeaker drive units—whether they are voice-coil driven, electrostatics, piezos or magnetostatics—act like a piston, moving air in a 1:1 ratio. This is undesirable, as the specific weight of air is much lower than that of the driving mechanics. Speaking in terms of electrical engineering one could say there is a bad match between source and load. The [air transformer] principle achieves a 4:1 velocity transformation between (the) driving diaphragm and the driven*

air. In other words, the air moves in and out four times faster than the folds are moving. This superior motor system is responsible for the enormous clarity and transient reproduction that is to be heard from the ART drive units.'

Below the passive MTM mid and tweeter array are two, oval-shaped drivers GoldenEar calls 'Quadratic Sub-Bass' drivers. Each one is around 130mm wide and 200mm long, but the Theile/Small measurements are 95mm and 190mm respectively, putting the Sd for each driver at 180cm² for a total of 361cm², so if GoldenEar had used a single, conventional, conical driver to provide the same cone area, it would need a diameter of 245mm. Both these bass drivers are driven by a DSP-controlled amplifier inside the Triton Two+ cabinet. GoldenEar rates this amplifier with a power output of 1,200-watts. Either side of the Triton Two+ are oval-shaped flat-plate passive radiators, with plates that measure around 180x254mm. These plates are moved only by variations of air pressure inside the cabinet created by the movement of the two active 'quadratic' bass drivers, so they essentially take the place of a bass reflex port (or ports).

At the rear of the Triton Two+ is a single pair of high-quality gold-plated multi-way speaker binding posts, a single LFE RCA input, a rotary volume control for the subwoofer section, a chameleon LED to indicate power status and a two-pin 240V socket.

IN USE AND LISTENING SESSIONS

The Triton Two+ speakers are quite tall (they stand 1.22 metres high) and have quite a small footprint (base area) of 190x381mm so I found they weren't as stable as less-tall speakers, or those with larger bases, and as a result, it didn't take much of a push to destabilise them, so it's just as well they work best when operated close to a rear wall, this attribute not least because the two side-firing passive radiators benefit from being located alongside a large flat surface.

The first thing you'll have to do is set the volume level of the internal amplifier on each speaker so that its output matches the low-frequency output of the passive section. Don't be surprised if you end up with different volume settings for the left and right speakers, because unless each speaker is identically loaded by the room (the same

distance from walls, ceilings, furnishing and so on) the bass level from each will be different (which in itself is an excellent argument for having an active bass section on a loudspeaker).

In my review of the original Triton Two I wrote that their bass performance was: 'awe-inspiringly realistic, with a body and presence that was such that I could have been sitting listening (and watching) a live music event ... you won't fail to be seriously impressed by the bass performance ... it digs deep (and I mean *really* deep), and it powers through like a freight train... you'll *feel*, rather than *hear* the thumps of a kick drum, and you will be able to rattle the room fittings when you're listening to bass-rich musical material, no matter whether you're listening to classical, rock, techno or any other genre.'



BEHIND THE SCENES

When hi-fi industry legend Sandy Gross came out of retirement, he told everyone who asked that he'd done so because he had a project in mind, one that involved reducing the cost of high-quality loudspeakers. Yet strangely enough, this is exactly what he'd been doing with two of the previous companies that he'd founded... companies that are still well-known for manufacturing value-for-money loudspeakers: those companies being Definitive Technology (aka 'DefTech') and Polk Audio (Polk was so-named because one of Gross's co-founders was Matthew Polk.). One of the ways Gross has reduced costs with his GoldenEar line is by eschewing the stratospherically-priced finishes found on many high-quality loudspeakers, which these days include leather, titanium, aluminium...even diamond. GoldenEar mostly does not use veneers or even painted finishes (the recent Triton Reference being a notable exception). Instead, it wraps its speakers in that ultimate in low-cost finishes—stretchy black cloth 'stockings'.

All those same comments are also true about the bass from this Triton Two+ design. Obviously I wasn't able to compare the two models side by side, but I used the same listening material to audition both, and my notes about the Triton Two+ were pretty-much the same for each track I listened to as they had been for the Triton Twos. I hadn't noticed any issues with the soft-clipping circuitry on the original design (maybe I wasn't playing them loudly enough to activate the circuitry) and I certainly didn't have any issues with the soft-clipping circuitry on these Triton Two+ speakers, so either once again I wasn't playing the speakers loud enough, or GoldenEar's new DSP programming has meant that I couldn't hear the soft-clipping circuit activating. I can't quite believe I wasn't playing the speakers loudly enough to activate the soft-clipping, because I thought I was giving them something of a caning the volume levels were so loud... but this is something you could try for yourself before purchase. Just make sure the room you're listening in has roughly the same (or greater than) the volume as the room in which you will be using the speakers.

Another performance area where my notes were indicative of improvements for the Triton Two+ compared to the original Triton Two regarded the midrange, suggesting that GoldenEar's two new bass/midrange drivers have had the desired effect of improving the overall sound quality. Although I thought the frequency balance across the midrange was the same as I had noted previously (that is, it was beautifully linear) I found the *quality* of the sound more effortless and the sound was certainly a tad cleaner overall, though this will really only be evident when you're listening to well-recorded music, and mostly when there's just a single voice or instrument to concentrate on. The problem with improving a speaker that was already excellent to start with is that any improvements are bound to be only incremental, rather than earth-shattering, and this is pretty-much what I found.

Another area where I thought the Triton Two+ gained an edge was in stereo imaging which, by comparing my notes, showed that this new 'Plus' model had superior imaging to the originals. I can only imagine that the material used to make the new cones and surrounds is more consistent, which means less sample-to-sample variation (or, if you prefer, tighter manufacturing tolerances) is what's responsible for these improvements.

Finally, I would have loved to have had the 'old' and the 'new' speakers side by side, because even though the tweeter on

the Two+ is identical to the one GoldenEar used on the Two, I'd swear that the new one sounds better. Since the tweeters are the same, it's likely that fitting the new midrange drivers has allowed a more seamless acoustic blend with the tweeter, or perhaps it's because of those changes in the crossover network, or maybe it's a combination of both. Again, there wasn't much in it, but the new tweeter definitely seemed to be a bit more 'airy' and a bit sweeter than previously.

CONCLUSION

When I reviewed the Triton Twos, the Australian dollar was actually worth more than the US dollar (the first time in my life this had ever occurred), whereas this time around, when I was reviewing the Triton Two+ design, the good ol' Aussie was only worth around 78 cents, so obviously the local price had to increase to compensate for the huge drop in the exchange rate. The good news for Australian audiophiles (and home theatre enthusiasts, because the Triton Two+ speakers make truly superb front-left and front-right speakers) is that the new Triton Two+ speakers are better-sounding than the originals, and since the originals sounded so good, this is really saying something. *— Jutta Dziwnik*

Readers interested in a full technical appraisal of the performance of the GoldenEar Triton Two+ Loudspeakers should continue on and read the following Laboratory Test Report. 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.

CONTACT DETAILS

Brand: GoldenEar
Model: Triton Two+
Category: Floorstanding Loudspeakers
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- Huge & adjustable bass
- Ease of placement
- Involving soundfield



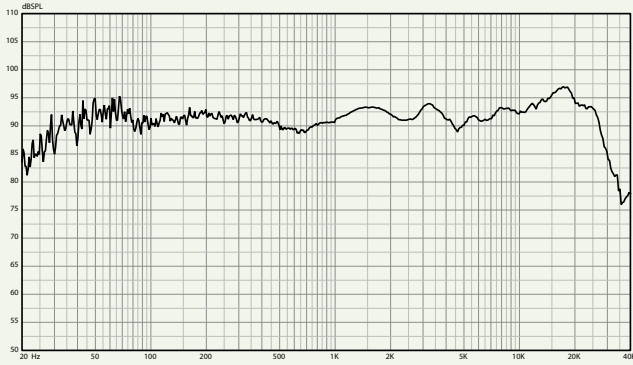
- High centre of gravity
- Colour choice

LAB REPORT

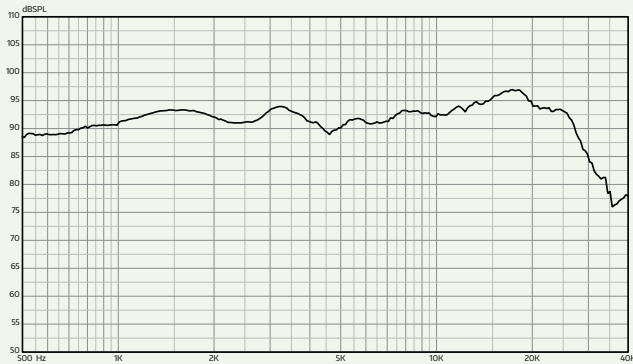
LABORATORY TEST REPORT

Newport Test Labs measured the frequency response of the Triton Two+ speakers with various settings of the bass level control. The response shown in Graph 1 was obtained with the control set so its calibration mark was at the '1:30 o'clock' position. You can see that in essence, with the control in this position, the response of the Triton Two+ extended from 30Hz to 26kHz $\pm 3\text{dB}$ which is excellent. If you're comparing the lab's result with the claim made by the manufacturer (16Hz–35kHz) you should note that GoldenEar does not attach any dB limits to this frequency span, so it's really only claiming that the speaker will reproduce signals between 16Hz and 35kHz. *Newport Test Labs'* graph shows that it will indeed reach these frequency extremes, except that at 16Hz the level of the response would be more than 10dB down, and at 35kHz, 18dB down. Within the $\pm 3\text{dB}$ envelope the response is not as flat as I have seen, with a broad suck-out centred at 750Hz, and a sharper one up around 4.5kHz, plus a high-frequency response that increases with increasing frequency to peak at 18kHz before falling off to return to reference at 25kHz, after which it rolls off very rapidly. A more detailed trace of the high-frequency response is shown in Graph 2.

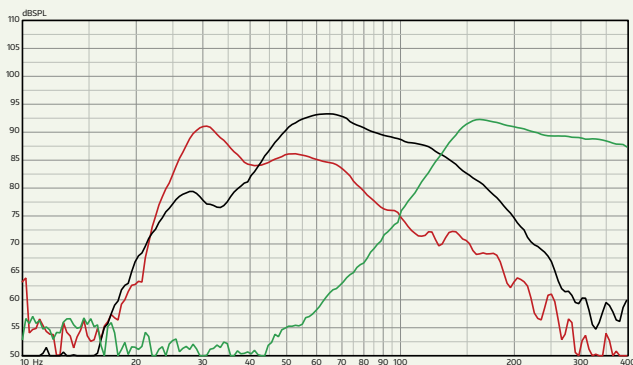
Graph 3 shows the low-frequency response of the Triton Two+ in greater detail, with the responses obtained using a near-field measurement technique that simulates the response that would be obtained in an anechoic chamber. You can see the woofers deliver high output levels down to 55Hz before rolling off to a minima at around 33Hz. The output of the side-mounted passive radiators kicks in to 'fill' the gap and deliver their maximum output at 30Hz. Below this frequency the response of the passive radiators rolls off extremely steeply, but above it an initial drop in output shelves at 40Hz and stays shelved out to around 70Hz before rolling off, so the radiators



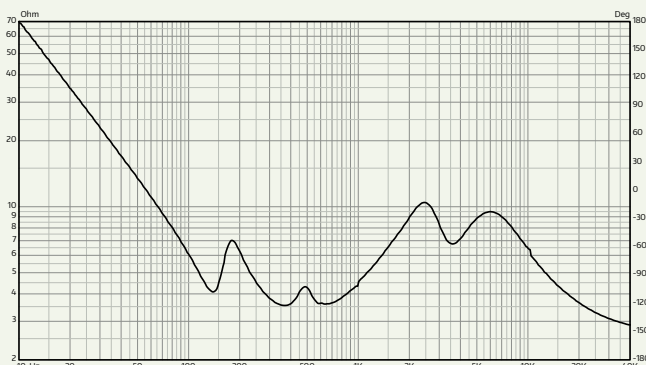
Graph 1. Frequency response. Trace below 700Hz is the averaged result of nine sweeps measured at three metres, with the central grid point on-axis with the tweeter using pink noise. This has been manually spliced (at 700Hz) to the gated high-frequency response, an expanded view of which is shown in Graph 2.



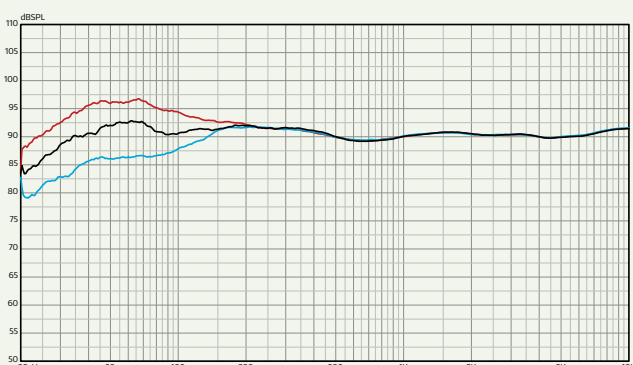
Graph 2. High-frequency response, expanded view. Test stimulus gated sine. Microphone placed at three metres on-axis with dome tweeter. Lower measurement limit 500Hz.



Graph 3. Low frequency response of passive radiators (red trace), woofers (black trace) and midrange drivers (green trace). Nearfield acquisition. Levels not compensated for differences in radiating areas.



Graph 4. Impedance modulus of GoldenEar Triton Two+ Loudspeaker.



Graph 5. Frequency response showing effect of bass volume control using pink noise test stimulus (smoothed to one-third octave). Red trace (maximum), black trace (control set to 1.30 o'clock), blue trace (control set to 12.00 o'clock).

Extraordinary bass extension, more-than-adequate high-frequency extension and exemplary linearity across the midrange...

would be giving considerable support to the front-firing bass drivers across this range. The midrange drivers are obviously rolled off by the crossover network, rather than being run full-range, and take over from the bass drivers at around 130Hz.

Because of the active bass section, the impedance of the Triton Two+ lacks the usual classic 'double-hump' but the rising impedance that is shown means the speakers will present a very easy load to any driving amplifier at low frequencies. However you can see from the trace that the impedance dips to 3.5Ω at around 350Hz and again at 650Hz, then drops below 3Ω at 35kHz. This indicates that you should only drive the Triton Two+ speakers with an amplifier capable of driving 4Ω loads.

Graph 5 shows the effect of the bass level control over the GoldenEar Triton Two+'s performance and you can see that it's considerable, offering a variation of around ±5dB across the region from 20Hz to 80Hz, and around ±2.5dB from 80Hz to 150Hz. This means considerable latitude in adjusting the amount of bass the speakers deliver to compensate for deficiencies in your room's acoustics, or to cater for your personal bass preferences.

Given the active nature of the Triton Two+ design, its efficiency will vary slightly with the setting of the volume control, but *Newport Test Labs* put its 'average' efficiency at 90dB SPL at a distance of 1 metre, for a 2.83V_{eq} input, which is an excellent 3dB higher than the average for a typical three-way floor-standing passive design and means you won't need to use a powerful amplifier to obtain high sound pressure levels in your listening room.

GoldenEar has done an excellent job of marrying the active low-frequency section with the passive high-frequency section and delivered a loudspeaker that has extraordinary bass extension, more-than-adequate high-frequency extension and exemplary linearity across the midrange. Overall, a good speaker design, and well-executed. *— Steve Holding*