Unity Audio Mini Boulder

Three-way Active Monitors

Unity are known for the uncompromising approach to studio monitoring, and their latest design doesn't disappoint!

PHIL WARD

I wonder if, when Unity Audio launched the original Rock active nearfield monitor around a decade ago, they realised that a whole series of geologically themed product names would ultimately be required. Having found themselves in the position of calling their newest product, and the subject of this review, the Mini Boulder, I suspect the answer might be no. Surely boulders, by definition, aren't mini? Anyhow, be that as it may, here it is, rolling into view: the Mini Boulder.

Unity Audio have, over that last decade, built themselves a distinct monitor brand and engineering identity, based on closed-box active monitors constructed in robust, birch ply enclosures, loaded with interesting and often technologically advanced drivers. The Unity Audio approach to internal amplification is also typically characterised by generous power ratings and a muscular, no-nonsense vibe. I don't think there's ever been a Unity Audio monitor launched where I've wondered about the adequacy of power, and the Mini Boulder is no different in that respect. I'll expound more on the amplification a few paragraphs in.

Rock Solid

The Mini Boulder's substantial weight and size don't for one moment diminish that robust Unity Audio brand. The monitors weigh in at a not insignificant 22kg each, and to my mind their 40.6 x 26.8 x 35.4 (HWD) dimensions definitely approach midfield rather than nearfield proportions. I breathed in deep when lifting them onto the wall brackets either side of my DAW display, and not just because I have weedy arms. I've had heavier monitors secure on those wall brackets before, but not all that much heavier. Those working in really small spaces and/or with anything other than really beefy stand or bracket arrangements probably ought to look elsewhere for monitoring.

The Mini Boulder's weight arises in part from its Class-A/B amplification, with the necessarily bulky transformer and heatsink, and the significant mass of its bass driver magnet. The cabinet construction contributes too, and this comprises an 18mm-thick birch ply carcass mated to a 30mm-thick moulded Corian front panel. Corian is a manufacturing material developed by DuPont in the late 1960s primarily for 'homeware' applications such as kitchen work surfaces and bathroom basins. It's an amalgam of around 33 percent acrylic resin (polymethyl methacrylate) with 66 percent mineral powder, and can be moulded into complex shapes with thick sections.

Corian's great advantages for use in speaker cabinets are its naturally fine surface finish (depending on the quality of the mould, of course), great strength and rigidity, and the relatively simple and inexpensive tooling and moulding techniques required to create non-rectilinear components. The Mini Boulder takes advantage of that, with its radiused front edges and angled bevel either side of its compound midrange/HF driver. Both features will contribute towards reducing the mid- and high-frequency diffraction and re-radiation that sharp edges and entirely flat panels encourage. The downsides of Corian are that, as discussed, it's not exactly light, it's not inexpensive, and it's not particularly suited to high production throughput. None of these downsides are particularly an issue for a high-end nearfield monitor.

The Corian front panel is finished in a subtle black sparkle and the carcass in a semi-matte black. I was intrigued by the small gloss-black crescent areas around the mid/tweeter driver on the Mini Boulder front panel, until I realised that Unity Audio's Super Rock model appears to employ exactly the same cabinet, with a conventional circular tweeter flange fitted in place of the Mini Boulder's square flanged compound driver. The black crescent areas are, I think, the visual witness of Unity smartly using the same cabinet for two different monitor models.

Per tradition, the rear panel is home to the Mini Boulder's connection, input sensitivity and EQ facilities. Along with the obligatory mains input, the Mini Boulder connection facilities comprise only a balanced XLR input socket. In terms of signal flow, the monitor is analogue all the way through: following the input socket, the signal is routed to the three power amplifier channels via a stepped rotary input sensitivity knob, switched midrange and high-frequency EQ options, and the active crossover filters. The two EQ switches offer a generous ±2.5dB adjustment at 10kHz and ±2dB between 700Hz and 2.5kHz (ie. the entire mid driver band).

The Mini Boulder's power amplification combines conventional 100W Class-A/B modules for the mid- and high-frequency drivers, with a 300W Class-D module for the bass driver. Unity Audio's rationale behind mixing amplifier technologies is that, while the bass driver benefits from the high power that Class-D makes more easily available, the subjective performance of the mid/high driver is improved by the use of traditional amplification technology — not least perhaps because Unity Audio's »

Unity Audio
Mini Boulder **£5988**

PROS

- Bass depth and power.
- Exceptional detail resolution.
- Brilliant stereo imaging.

CONS

- Slightly scooped tonal balance.
- Bass probably a bit too much for smaller rooms.

SUMMARY

The Mini Boulder is a technically interesting and hugely accomplished monitor. It's not inexpensive, but it joins a select group that offer something beyond the ordinary.


UNITY

» Class-A/B amp was designed by noted amplifier guru Tim De Paravicini.

Mini Drivers

I wrote earlier that part of the Unity Audio speaker engineering identity has always been the use of unusual and often hi-tech drivers, and the Mini Boulder, in particular its compound MF/HF unit, very much fits that description. I'll discuss the compound driver shortly, but a couple of sentences on the Mini Boulder bass driver are probably in order first.

Said bass driver is manufactured by the very long-established Norwegian specialists SEAS. It's a 220mm-chassis-diameter, aluminium-diaphragm driver specifically intended for bass and low-mid duties. It features a large rubber roll surround that allows generous diaphragm movement, and a 39mm-diameter, four-layer voice coil immersed in a magnet system that, like the roll surround, provides a generous ±7mm of linear displacement. Linear displacement is particularly important with closed-box loading because one of the main benefits of reflex loading is that it significantly reduces the need for the bass driver diaphragm to move very far. Around the port tuning frequency (on nearfield/midfield monitors this is typically somewhere between 30Hz and 60Hz), the port does a lot of the 'heavy lifting' in terms of actually generating the acoustic power. That being the case, closed-box loading asks significantly more of a bass driver than reflex loading; the voice-coil needs to be longer, which means the magnet and expensive metal parts of the driver need to be more substantial. This is one of the main reasons why reflex-loaded monitors have become the rule rather than the exception: a hole and a bit of plastic tube costs a lot less than the alternative of significantly more substantial driver metalwork.

Removing the grille from the mid/high Elac driver reveals its unusual construction. The highs are handled by an AMT tweeter, while the mids are taken care of by a ring-shaped diaphragm around the outside.

Moving upwards from the bass driver we find the notably unusual Elac X-JET compound mid/high driver hidden behind a removable, magnetically secured grille. Now, compound dual-concentric drivers are not so unusual these days, but I'm not aware of any other compound driver configured in quite the same way as the X-JET. Firstly, the high-frequency element, rather than being a dome tweeter, as would typically be found in a compound driver, is a compact AMT (Air Motion Transformer) folded ribbon unit. As I've probably described before, AMT tweeters are created by putting multiple linear concertina folds in a lightweight diaphragm in which electrical conductors are embedded. With some strong neodymium magnets providing a local magnetic field, the amplified signal routed through the conductors results in the concertina diaphragm oscillating and creating acoustic output. The advantages of AMT tweeters include their low diaphragm mass and lack of diaphragm break-up, thanks to being driven across the entire area rather than at just the periphery, as on a dome. Their primary disadvantage is the comparatively narrow and asymmetric dispersion that arises from their relatively large and often rectangular diaphragm dimensions.

If the AMT element of the Mini Boulder's compound driver is unusual, the midrange element is perhaps even more so. It's driven by a conventional magnet and moving voice-coil arrangement, but its diaphragm, rather than taking any conical form, is a gently domed, annular ring of approximately 56mm inner diameter and 96mm outer diameter. It's a truly unusual architecture for a driver, but in acoustic terms, other than having a non-typical diaphragm break-up character (break-up is when the accelerative forces on the diaphragm exceed its mechanical strength, so it stops moving as a whole) it probably won't radiate acoustic energy in a fundamentally different way compared to a conventional conical diaphragm — at least not over the midrange bandwidth of interest. What it will have, though, as a conventional diaphragm would, is a different dispersion character compared to that of the central AMT driver.

A conventional dual-concentric driver, where the tweeter dome is located at the apex of the midrange cone, has the benefit of the cone acting as a waveguide for the dome and defining its dispersion. The Mini Boulder's X-JET driver, while benefiting from the basic dual-coincident advantage of locating both drivers at effectively the same point is space, doesn't result in compound dispersion. Each element will do its own thing.

I wrote earlier that the Mini Boulder's midrange driver bandwidth stretches from 700Hz to 2.5kHz, and while that upper figure is pretty typical, the lower figure is higher than is usually found in three-way speakers: an octave lower would be more normal. The bass-to-midrange crossover is located higher on the Mini Boulder because, fundamentally as a result of its »

DSP Option

Like a number of other Unity Audio monitors, the Mini Boulder is available in two flavours: the all-analogue model, reviewed here, and a DSP version. The latter type features 24-bit/96kHz A-D conversion, and digital processing facilities including an eight-band EQ, high-resolution gain adjustment and preset saving and recall. The Mini Boulder DSP also adds a post-processing XLR output, for feeding a sub, as well as a Cat5 connector for hooking up to the Mac/PC control software. The DSP version of the Mini Boulder is naturally priced slightly higher than the analogue version, at £6468 per pair.

» architecture, the midrange element of the X-JET compound driver is comparatively limited in terms of both diaphragm area and displacement (the two factors that define how loud and how low it can play). For example, its radiating area is around 48cm squared, whereas a fully radial diaphragm of the same outer diameter would offer approximately 72cm squared. And where a conventional midrange driver of the same diaphragm diameter might offer ±3mm diaphragm displacement, the X-JET midrange diaphragm, because of its reduced surround flexibility, is able to move significantly less. All this means that the Mini Boulder's bass driver is required to play further into the midrange.

This is not necessarily a problem in itself: the spec sheet for the SEAS driver shows that it is perfectly capable of working up to around 1kHz. However, with the bass-to-mid crossover at 700Hz and the two drivers spaced about 18cm apart, an off-axis vertical dispersion discontinuity is potentially likely to arise. So, ironically, the mid/high-frequency dispersion discontinuity eliminated by the use of a dual-concentric driver could potentially be reintroduced by the mid driver not being able to manage quite enough low-frequency bandwidth. Speaker design is a complex nest of compromise and balance. Make an improvement to one element, and a consequent issue often pops up somewhere else.

Measuring Up

I think I've pretty much exhausted all the possibilities for description and discourse that the Mini Boulder provides, but before I cut to the listening chase I'll illustrate a few areas of interest with some FuzzMeasure analysis. Diagram 1 illustrates the frequency response of the Mini Boulder from 200Hz to 20kHz, captured with the measuring microphone aligned on the central axis at a point halfway between the bass driver and the compound mid/tweeter. The diagram also shows the effect of the midrange and high-frequency EQ switches. The basic response shape is reasonably flat and tidy, but with a dip and rising character above 5kHz.

Diagram 2 shows the neutral EQ axial response again along with responses taken with the microphone moved ±15 degrees vertically. As expected, the vertically off axis curves show the beginnings of directionality from the tweeter as its response begins to fall away, and in the case of the blue (15 degrees below) curve, the first hint of a dip

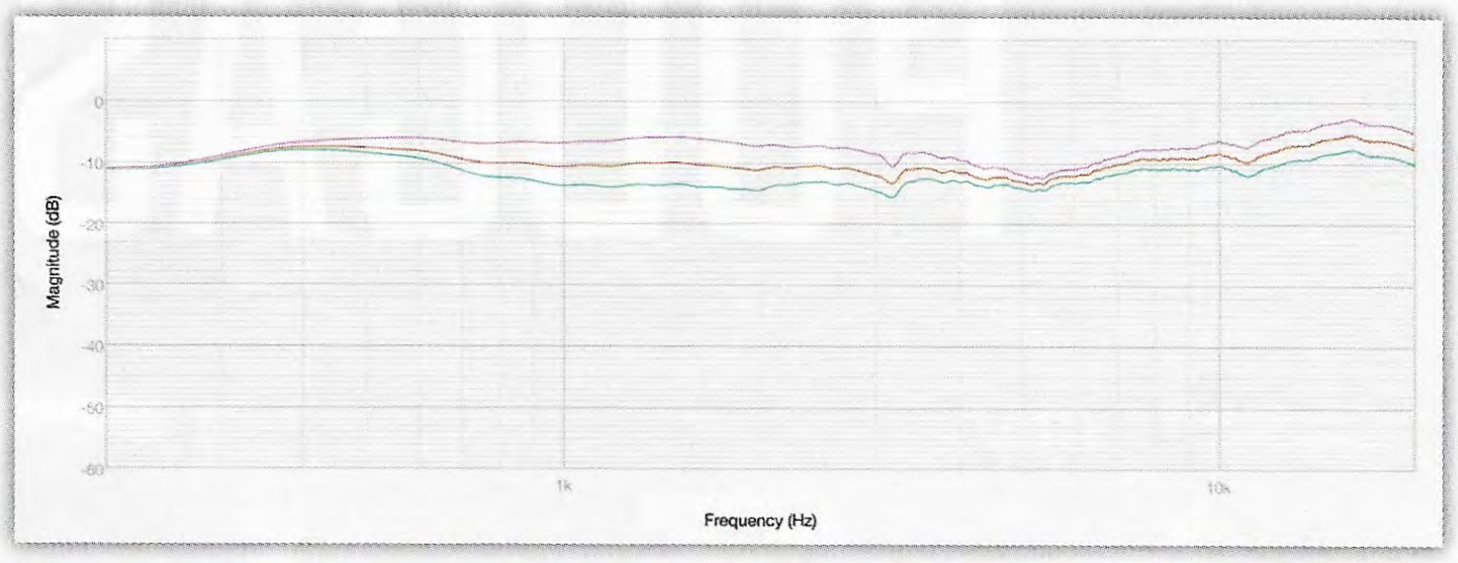

Diagram 1: This graph shows the effect of the EQ options. The red line shows the Mini Boulder in its 'flat' setting. The green trace shows the effect of cutting the mid and high bands, and the purple trace shows both bands in their boost mode.

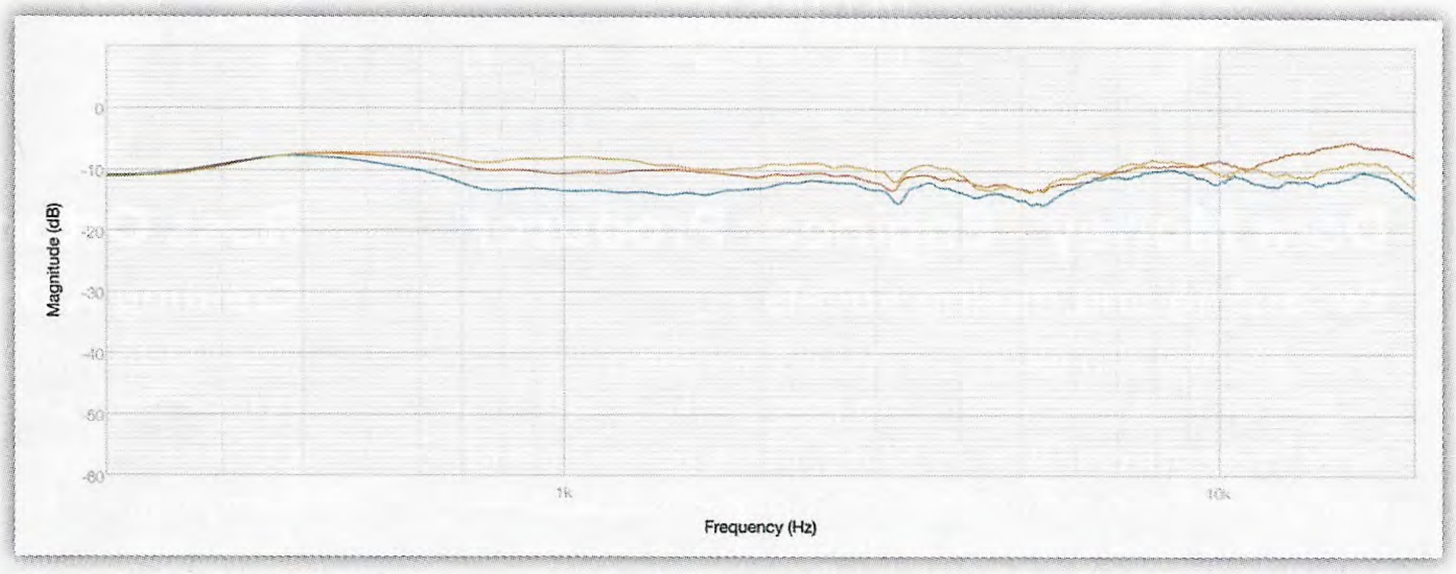

Diagram 2: The 200Hz-20kHz response of the Mini Boulder on-axis (red), and 15 degrees above and below (orange and blue lines, respectively).

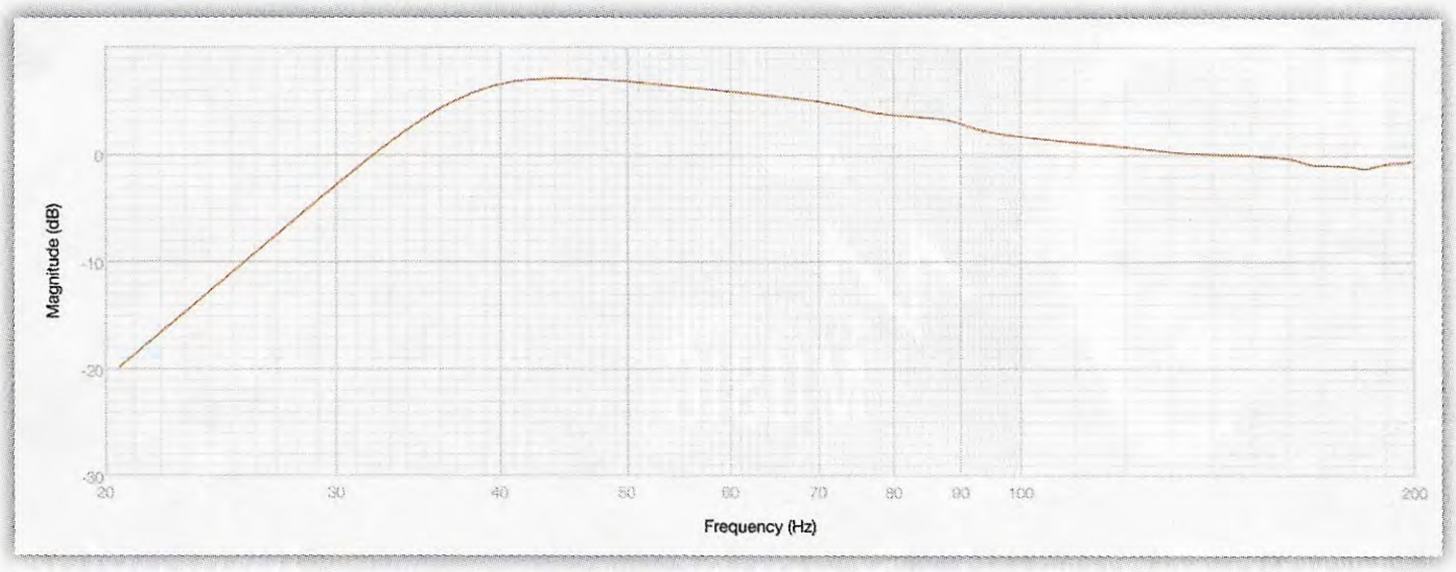

Diagram 3: A close-mic measurement of the Mini Boulder's LF response.

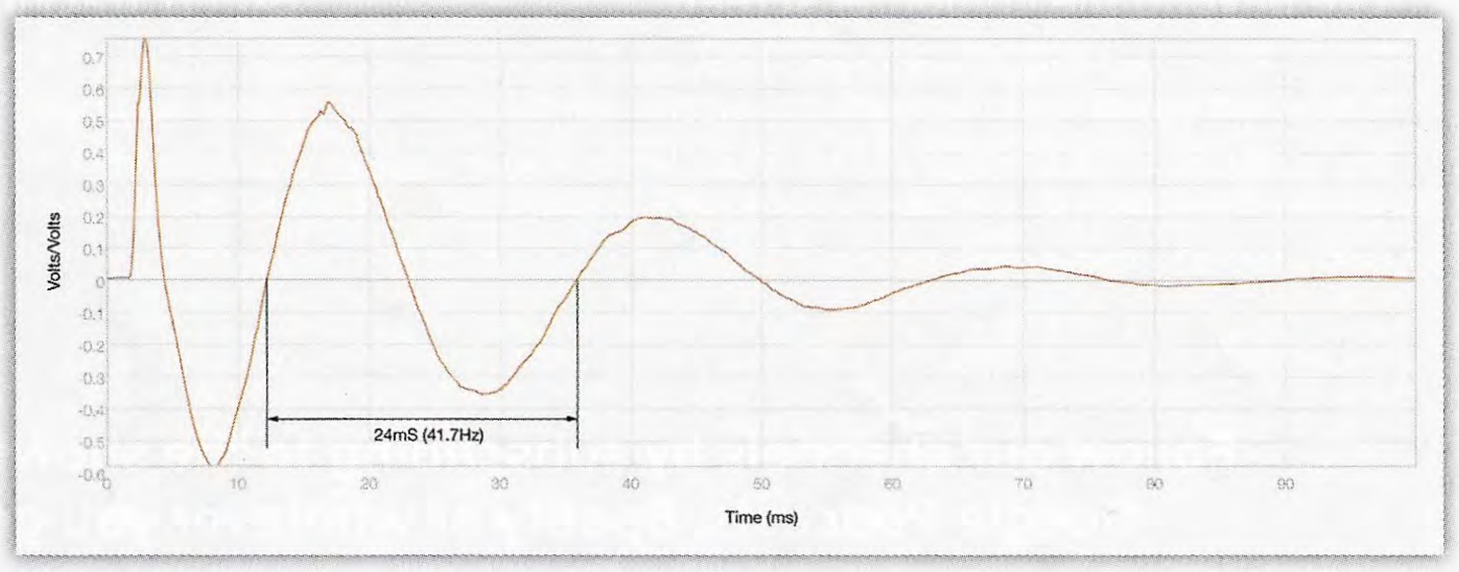

Diagram 4: A close-mic step response measurement.

caused by the relatively high bass to mid crossover. In the grand scheme of things, however, the vertical dispersion character is impressively consistent.

Diagram 3 confirms the Mini Boulder's impressive low-frequency bandwidth, being -3dB at around 35Hz, as claimed in the published specification. The step response of Diagram 4 suggests that the Mini Boulder's extended low-frequency bandwidth is accompanied by a degree of 41Hz overhang, ie. the bass driver keeps

bouncing after the signal has stopped, which is slightly surprising considering the closed-box loading. The near 30dB/octave low-frequency roll-off illustrated in Diagram 3 suggests that the Mini Boulder includes a high-pass filter to provide some driver protection against very low frequencies, and so I wonder if the filter is responsible for the overhang.

Listening In

Even just a little FuzzMeasure analysis begins to illustrate that the Mini Boulder, in electro-acoustic terms, is a well engineered monitor, but of course that doesn't tell us what it sounds like. For that, there's no alternative to listening, and the first listening characteristic to report is silence. I've experienced a couple of active monitors recently that have displayed background hiss levels just on the wrong side of comfortable. Not the Mini Boulder, however; it was all but silent when idling.

The second characteristic to report was that the impressively extended low-frequency bandwidth revealed by the FuzzMeasure analysis was very apparent to the ear. In fact, in my 4 x 5m room, bass from the Mini Boulder was somewhat over-cooked subjectively. Two tweaks helped. Firsty, I engaged the Mini Boulder's midrange EQ option to make its overall balance a little more mid-prominent, and secondly I fired up Sonarworks Reference 4 to calibrate the Mini Boulders for my room and to perform its surgically targeted EQ trick. Sonarworks did indeed reveal that the Mini Boulder was exciting a standing wave at around 43Hz (very close to the LF overhang mentioned earlier, so in my room the two phenomena perhaps joined forces), and once it was equalised, the bass was subjectively far better controlled and usable. Indeed, it was much more than just usable. The Mini Boulder's bass has huge reserves of bandwidth and transient impact, and given a big and properly bass-trapped control room, would be addictive.

Disabling Sonarworks for a moment, and playing some less bass-heavy material to concentrate on the Mini Boulder's mids and highs, I was immediately struck by the fine image focus and startling ability to resolve mix details. Levels of mid coloration were very low, and the high-frequency detail and tonal character from the AMT tweeter were exemplary. Moreover, the Mini Boulder has that precious ability to take a mix apart and somehow present its elements individually so that it's more possible to concentrate on each one, and more easily understand how it fits, or doesn't fit, in the overall sonic picture. It's one of those relatively rare high-end monitors for which the review process morphed into a journey through half-forgotten CDs and Pro Tools sessions to hear what new details (or mix mistakes) would become apparent. Beyond the importance of a 'flat' response, I think it's this kind of ability from a monitor that represents the difference between the merely good and really exceptional. But speaking of a flat frequency response, without Sonarworks doing its thing, I was occasionally conscious that the Mini Boulder displayed a hint of a tonally scooped character and slightly emphasised upper-mid presence. For example, female voices were occasionally a little reedy and male voices sometimes lacked a little body. These are characteristics that would soon become familiar, however, and it's not as if the world isn't full of hugely successful monitors that aren't the last word in BBC-style tonal accuracy.

The Mini Boulder's combination of low-frequency extension and dynamic character, with the exceptional clarity and imaging of its unique compound mid/tweeter, is a winning one. It's a hugely capable mix tool, and a genuinely enjoyable listen too. If you have the space and the budget, the Unity Audio Mini Boulder really ought to be on your shortlist. ■■■

The rear panel houses the XLR input, stepped gain control, and switches for the high and mid EQ options.

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