AIAIAI Unit-4

Active Monitors

Danish newcomers AIAIAI make monitoring portable with these compact, battery-powered wireless speakers.

PHIL WARD

As a product of the 1980s UK hi-fi speaker industry, I've been conditioned to believe that British speaker design leads the world. And for a while, in the 1960 and 1970s, there was some truth to that. Companies such as Quad, Tannoy, Celestion, KEF, Wharfedale and Goodmans (and the BBC) begat an entire industry of speaker designers and manufacturers for whom the cutting edge of electro-acoustic product design and engineering was currency. But a look North towards Scandinavia, and Denmark in particular, reveals some not insignificant competition. I write this because the Kombo portable PA I reviewed recently is the product of a Danish audio start-up, and now this review of the AIAIAI Unit-4 falls into the same 'Danish start-up' category. Denmark has produced more than its fair share

of electro-acoustic products over the decades (think Dynaudio, DALI and Bang & Olufsen for a start) and is currently, I think, on a roll.

As far as I'm aware there's nothing else aimed at nearfield monitoring quite like the Unit-4. It's a portable and compact monitoring solution designed for use on desktops and in small studio spaces. Not particularly unusual — but the Unit-4 is also optionally battery powered, with a claimed 20-hour battery life, and wireless, and those two features differentiate it almost entirely from any competition.

Little Boxes

The Unit-4 is really pretty small and decidedly cute. I fell for its looks and feel almost instantly. It comprises an entirely plastic enclosure of roughly 3 litres internal volume, fitted with a nominally 80mm (3.5-inch) bass/mid driver and a 19mm-dome tweeter. Amplification comprises Class-D modules for bass driver and tweeter, rated at 30 Watts continuously but with an 80 Watt peak capability.

The bass/mid driver diaphragm is of coated paper, the tweeter dome is fabric, and the drivers appear conventional in terms of design and engineering. The bass driver roll-surround is generously dimensioned for the diaphragm size,

which suggests that the driver is designed to offer reasonably extended excursion — which may go some way to compensate for its limited diaphragm area. The Unit-4 is a reflex-loaded monitor with an extremely long and tortuously routed port of modest cross-sectional area that terminates in a semi-flared exit on the back panel of the cabinet. Long reflex ports are prone to organ-pipe resonances, and ports without much cross-sectional area tend to become non-linear and compress at modest volume levels because they simply can't pass enough non-turbulent airflow. I'd expect both issues to be apparent in this design, but we'll see when I get to some acoustic measurements later.

The enclosure is usefully wedge-shaped to enable desktop landscape installation with a suitable upward angle, and it's manufactured from post-consumer plastic. AIAIAI make much in their promotional copy about the Unit-4 being easy to dismantle (with screws and no glue) and repairable, and they also offer a full range of spare parts purchasable from the website, along with repair guides and even trade-in options. These are a very positive developments to my mind, and I hope other monitor manufacturers will take note.

Some optional extras include a very smart carry case that takes a pair of

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AIAIAI Unit-4

£700

PROS
- Effective and capable compact monitoring.
- Battery powered and highly portable.
- Optional wireless connectivity.
- Cool and stylish looks.
- Uses recycled plastics and is fully repairable.

CONS
- Slightly challenged by high volume levels.

SUMMARY
The Unit-4 is a very impressive first monitor effort from AIAIAI. It offers a unique set of features that ought to attract a good number of customers.

Unit-4s with space for cables and accessories, a recycled-silicone bumper cover that offers extra protection from the trials of portability, and recycled-silicone angled desk wedges that decouple the monitors and help with their alignment when desk mounted.

An interesting and attractive feature is that the bass/mid driver is surrounded by a ring of white LEDs that displays battery charge state, volume and wireless connection status. And the front panel is finished with a magnetically attached perforated steel grille that protects the drivers and looks pretty cool.

As far as signal connection options are concerned, the Unit-4 offers balanced and unbalanced analogue inputs on 6.3mm and 3.5mm jack sockets respectively, and wireless connection via either Bluetooth or AIAIAI's proprietary W+ Link protocol. The W+ Link, say AIAIAI, has advantages over Bluetooth in offering both lossless audio and low latency. Having said that, the 16ms latency specified is well within the range that might negatively affect overdub recording (although it's likely that you'd use a wired connection in that scenario). W+ Link works with the Unit-4 via an AIAIAI transmitter dongle, called an X02, that can be either connected to a USB-C port on your computer or can digitise and transmit analogue audio independently through its own stereo 3.5mm jack line level input. When connected to a host computer, the X02 appears as a USB-powered output device, but when used to transmit from its analogue input it must be separately powered — a USB smartphone charger will do the trick. Pairing Unit-4s to the X02 transmitter, either in stereo pairs or singly, is simply a matter of putting the speakers in wireless pairing mode by pressing and holding the rear panel W+ button and powering-up the X02 transmitter. Bluetooth pairing is similarly simple, and even if you don't use Bluetooth for audio, it's worth taking the time, because there's a Unit-4 smartphone app that provides some enhanced control and configuration functions that aren't

available otherwise: EQ controls and presets, LED display brightness and firmware updates.

Pushing Buttons

The top panel of the monitor offers three push buttons. The left and right buttons enable volume control, and the middle one provides multiple functions such as power off/on, mute and battery check. If two monitors are wirelessly connected as a stereo pair, pressing a button on one of them also controls the other. The previously mentioned LED display ring illuminates in a variety of patterns and modes to provide feedback on button presses and the resulting monitor state, though I found it somewhat difficult to remember and interpret the meaning of the display. Hopefully familiarity would breed more immediate understanding. I've already mentioned the rear-panel wireless mode button that provides pairing and switches between Bluetooth and W+ modes, and there's also a button that assigns left, right or summed mono roles to a monitor.

On the battery power front, each Unit-4 monitor is supplied with its own mains power supply/battery charger device, and the monitors can be used

with this connected or not. The battery is installed internally within the monitors and not accessible. I didn't formally check the claimed 20-hour battery life, but I had the Unit-4s working occasionally on my desk for quite a few days without connection to power so I've no reason to question it.

Measuring Up

Taking a Unit-4 to my acoustic measuring space and launching FuzzMeasure, I first investigated its axial frequency
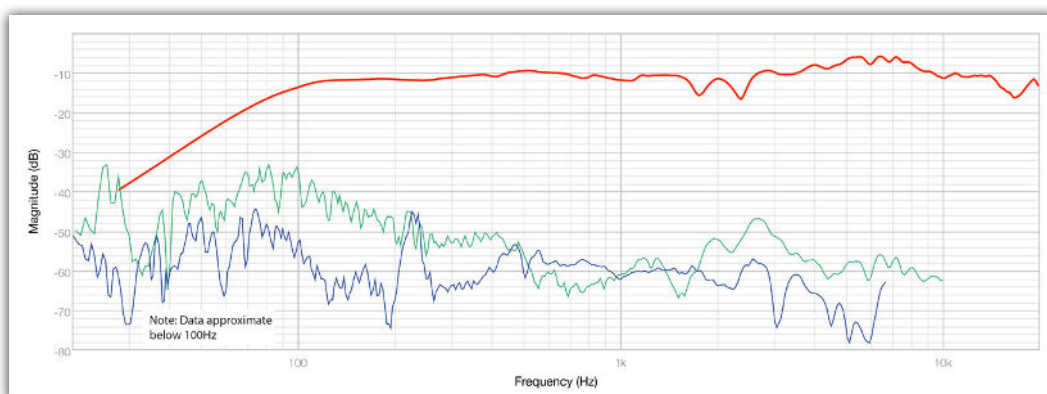
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» response and harmonic distortion, and the result of that can be seen in Diagram 1. The frequency response curve is decently flat, with just a couple of wobbles through the 3kHz crossover region. In the tweeter band, though, there's a conspicuous lift in level between around 3.5 and 9 kHz, and my feeling is that this will result a noticeable emphasis on cymbals, sibilance and generally on the high-frequency elements of programme material. Unit-4 distortion performance, shown in the green and red overlays on Diagram 1, is pretty reasonable, with the third harmonic typically around 40 to 50 dB down in the critical mid band. Considering the sound pressure level for the measurement was 90dB (at 1m), which is relatively loud for such a compact monitor, this is a good performance. The only slight fly in the cliché is the unexplained jump in the third harmonic at just over 200Hz, although I think it's unlikely to cause a specifically audible problem.

I mentioned the Unit-4's grille earlier, and wondered whether it would affect the tweeter frequency response. And the answer, illustrated in Diagram 2, is that it does. Diagram 2 shows the Unit-4 axial frequency response with (red curve) and without (green curve) the grille fitted, and it reveals that the high-frequency lift I mentioned in the previous paragraph is significantly reduced with the grille removed. This difference between grille fitted and removed is audible, and I did all of my critical listening *sans* grille. Now, you might be wondering if I've got the curves the wrong way around — perhaps you wouldn't intuitively imagine that the tweeter level would reduce with the grille removed. What I think is going on is that fitting the grille increases the radiation
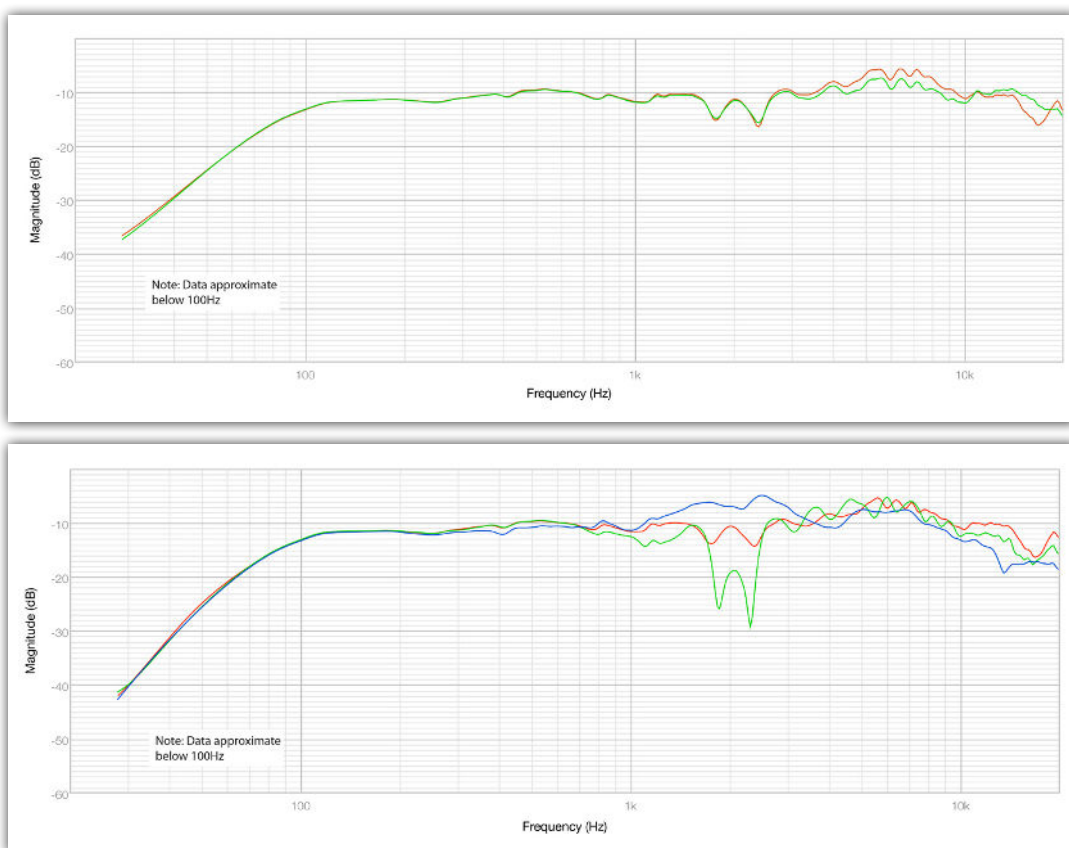
impedance of the air in the vicinity of the tweeter dome, effectively increasing its efficiency.

Moving on, Diagram 3 shows the ±15-degree vertical (or horizontal if a Unit-4 is used in landscape mode) off-axis frequency response overlaid on the axial. The off-axis responses show the typical variation found in multi-way speakers as the driver phase changes through the region where their outputs overlap. However, if I were using a pair of Unit-4s in landscape mode on a desk I'd try to ensure that they were angled inwards towards the listening position, because off-axis in either direction results in some potentially significant response variations. Portrait orientation with the speakers raised to ear height or angled back would probably a better option — the Unit-4s consume less desk space that way too.

Diagram 4 illustrates some of the EQ presets available through the Unit-4 app. I've chosen to illustrate just the -3dB and -12dB desk options, and those numbers seem to refer to the maximum attenuation that is produced; at 100Hz, the -12dB curve actually only produces around -6dB attenuation. Along with the desk EQ presets, the Unit-4 app also

offers a five-band graphic EQ module. Low bass, bass, mid, upper-mid and high-frequency bands can each be adjusted between -12dB and +3dB. Without wishing to give the game away on what I thought of the Unit-4 when it came to listening, I found the EQ and presets generally useful in terms of tweaking the subjective tonal balance to suit a variety of desk-mount installations — although I can't imagine anybody needing to use the LF -12dB preset. The LF attenuation of the desk presets is also valuable in enabling the Unit-4 to play louder, as it effectively increases amplifier, driver and reflex port headroom.

Diagram 5 shows the close mic frequency response of the Unit-4 reflex port output, measured at two drive levels (equivalent to 80dB and 90dB at 1m) and three things are apparent. Firstly, a port organ-pipe resonance was confirmed. In fact the fundamental and second harmonic of the resonance are easily identifiable at just over 400Hz and 800Hz, and I'd expect the port resonance to introduce some subtly audible coloration. The second phenomenon

is significant low-frequency compression when the Unit-4 is working hard. The cause of the compression is likely to be partly down to the reflex port losing linearity, but I'd also expect the Unit-4 to include some compression engineered into its signal processing in order to protect the bass driver from over-excursion. The Unit-4 simply doesn't have the diaphragm area, excursion capability or amplifier power necessary to generate 90dB SPL at, say, 50Hz, so something has to give. And the 105dB maximum level claimed on the Unit-4 spec? AIAIAI don't specify the measurement distance or frequency band for a good reason, because it's pretty unlikely, I think, that a Unit-4 will manage 105dB at 1m. Lastly on Diagram 5, the port tuning frequency is revealed to be around 50Hz, and that means the Unit-4 is unlikely to be able to generate much output below that frequency.

Listening In

The measured performance of the Unit-4 suggest a well designed and engineered, but very small, monitor. And in use, that's pretty much what it sounds like. At modest volume levels, for very nearfield listening, the Unit-4 performs admirably and reveals itself to be a genuinely capable and engaging proposition. It fundamentally reaches the kind of performance level that would make reliable composition and mix decisions perfectly feasible. And that's quite an achievement, and perhaps the most important thing. The Unit-4 doesn't quite, to my ears, have the detail-resolving power of serious high-end nearfield monitoring, and it has a hint of boxy subjective character in the midrange,

but its bass performance, at least at modest volume levels, is remarkable given its size (although doesn't sound quite as extended as the 40Hz spec might suggest). The Unit-4 tonal balance is slightly bright to my ears, especially with the grille fitted, but its app EQ can do an effective adjustment job on that. If there's a down side to the Unit-4 it's that it can audibly run out of port linearity, amp power and bass driver excursion, so very high volume levels aren't really in its comfort zone; I feel it begins to sound compressed and choked when pushed, perhaps as some driver protection begins to kick in. Having said that, it's not really reasonable to expect such a small monitor to do high volumes without some evidence that it's working hard. The laws of physics are immutable, but if I were travelling and needed a simple, reliable and portable monitoring solution, I'd be very, very happy with a pair of Unit-4s.

Finally, before I wrap up with a conclusion, the Unit-4 wireless functionality works well and is easy to set up, but I did find myself wondering just how relevant or useful wireless monitoring is in a recording and mixing context. Maybe I'm just too traditional and tied to the cable paradigm, but certainly
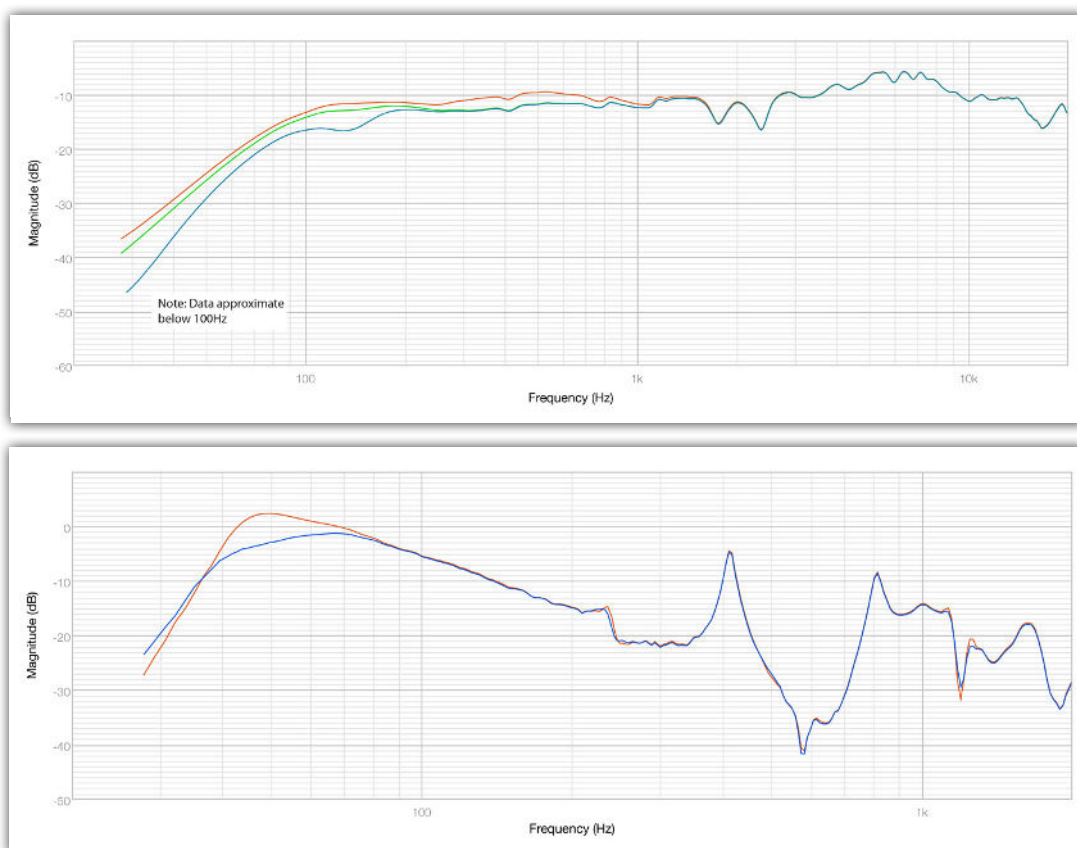
if I were writing on the road rather than just mixing in the box and had a DAW interface to consider along with my Unit-4 monitors, I suspect I'd most likely go with the setup simplicity of wired connections. I just don't quite see what the benefits of wireless monitoring would bring, other than the need for fewer cables. Your mileage may vary however.

The Unit-4 is a very competently designed and engineered product that does what it sets out to do extremely well. It's limited in some respects, but the limitations are fundamentally a result of its small size, modest amp power and driver dimensions — and it wouldn't be so portable (or cute) if it were bigger. Come to the Unit-4 expecting full-size monitor performance and maybe you'll be a bit underwhelmed. But come to the Unit-4 needing a really compact, portable, and, it has to be said, achingly cool-looking pair of monitors for a tiny work space or on the road, and I think you'll have struck gold. As I said, Denmark is on a roll. ▰▰▰

£ £700 per pair including VAT.
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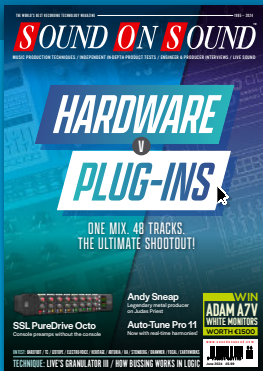Engineer, producer, mixer, Grammy Award winner (Lana Del Rey, Hozier, Jay-Z).

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