

Kii Seven

Active Monitors

Kii's impressive new cardioid monitors prove there's still room for innovation in loudspeaker design.



PHIL WARD

It was back in the January 2017 issue that we reviewed the then-new and remarkable Kii Three active cardioid monitor. For a significant number of professional engineers and consumer audiophiles, the Kii Three set the benchmark for what is possible from a pair of loudspeakers. And now, after a somewhat extended gestation period, Kii have launched a smaller sibling: the Kii Seven.

I mentioned both the professional and consumer markets, and that's because Kii have been unusually successful in both sectors with the Three. Kii are one of very few speaker manufacturers who have pulled off that trick. Dynaudio and PMC, for example, have successful

consumer audio product lines alongside their professional monitors, but not with the same speakers. A Kii Three sold as a studio monitor is the same as a Kii Three sold as a consumer hi-fi speaker. Now, this not only demonstrates, as I've always believed, that a good loudspeaker is a good loudspeaker however it's used, it has also impacted on the design of the Kii Seven. Because, while this review is going to concentrate on its performance and suitability for nearfield monitoring, there's a lot about the Seven that is aimed at consumer applications. For a start, it is to be sold in singles, for use as a mono, stand-alone audio player. It's an expensive way of playing Spotify from your kitchen table, but that's never hampered Bang & Olufsen, for example. It's perhaps fortunate that this review will primarily

concern professional applications, because at the time of writing some of the consumer streaming features of the Seven aren't fully implemented. The reasons for this, I suspect, are not so much technical as commercial, because navigating the licence demands required to implement multiple streaming services on the same product is far from trivial. However, Kii say that by the time these words are published, Spotify and Tidal streaming will very likely be available or imminently so, and that Apple Airplay, Qobuz and ROON Ready will follow as soon as the third-party certification processes are complete.

Going Pro

Let's leave all that consumer streaming malarky behind and concentrate on the Kii

Kii Seven £7785

PROS

- Extraordinary combination of bandwidth, low coloration and low distortion.
- Cardioid character means more monitor and less room.
- Reveals mix detail like nothing else.
- Stereo imaging to die for.

CONS

- None (apart from the cost, obviously).

SUMMARY

The Kii Seven might have taken a while to arrive, but it was so worth the wait. It's an extraordinary monitor.

Seven in a studio environment. If you're familiar with the appearance and design of the Kii Three, the look of the Seven won't come as a great surprise. It sports a very similar aesthetic and is the same width as the Three, but it's significantly less tall and less deep. It's dimensionally better suited to compact studio spaces than the Kii Three – especially in its reduced depth. The Seven's enclosure construction is of the same foamed structural polyurethane as the Three, with the same black-finished aluminium trim panels. It comes in either white or dark grey finishes, and Kii say that the custom colour options of the Kii Three will not be available for the Seven.

Like the Three, the Seven has bass drivers located in each side panel, but it does without the Three's additional two rear-panel bass drivers. This perhaps makes for easier installation because, where the Three demands at least 8cm of free space to the rear, the Seven can be used with its rear panel hard up against the wall. In fact, Kii recommend that if a pair of Sevens is to be used in close proximity to a rear wall, they are best located right up against it. The Seven does come with one positioning constraint, though, and that concerns space either side to allow the side-mounted bass driver room to 'breathe'. Kii Designer Bruno Putzeys put it to me this way: "An obstacle should be further away than the size of the Kii Seven or the obstacle, whichever is greatest." This of course means that you might need to avoid additional monitors sharing a shelf with Kii Sevens, but without wishing to spill the beans before getting to the end of the review, considering the

presence of other monitors if you have a pair of Kii Sevens might be a moot point.

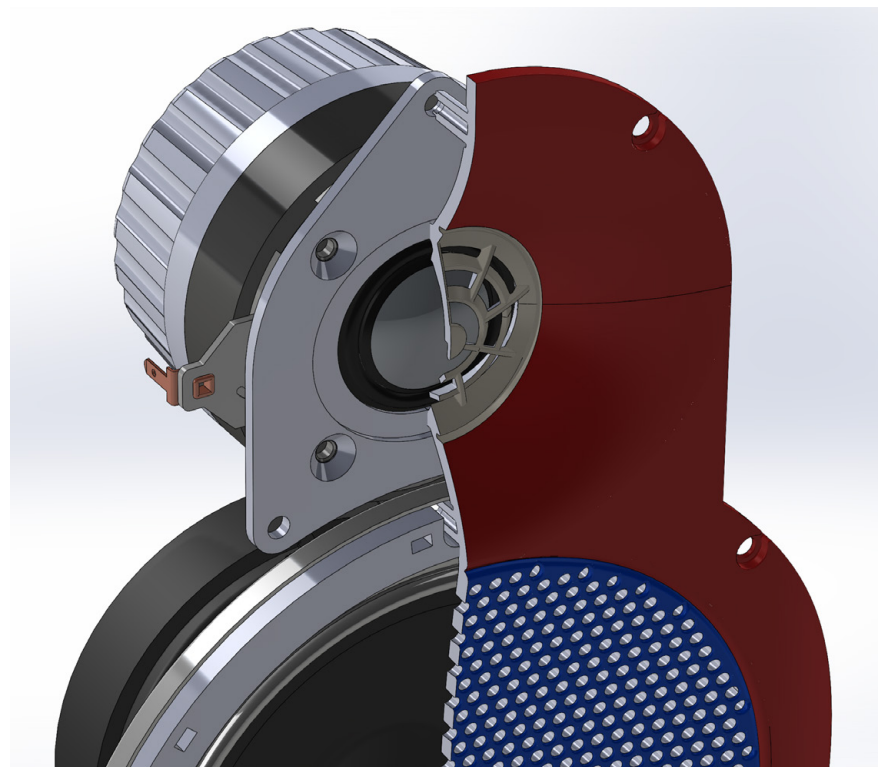
Beam Me Up

The side-panel drivers are nominally 140mm-diameter, aluminium-diaphragm units – the same as those employed in the Kii Three. And while they nominally work in parallel up to around 125Hz, where they hand over to the midrange driver, things aren't quite that simple, because the secondary job of the side-mounted bass drivers is to help create the Seven's cardioid characteristics, by overlapping with output from the midrange driver to modify its directionality. This overlap works all the way up to around 900Hz, where the cardioid character that results from the Kii Seven's enclosure dimensions begins to take effect. In blithely writing that the LF and MF driver outputs "overlap" to yield a cardioid radiation pattern, I've simplified something that's actually been achieved through the combination of deep electro-acoustic understanding and some complex DSP. Kii describe the technique as "beam-forming", and it involves a beam-forming filter fed from the output of the midrange driver's band-pass filter. The filter's output is then routed to the bass driver feed after the

output of its low-pass filter. The bass drivers are consequently employed in the overlap region, in parallel with their low-frequency duties, to manipulate the summed mid and bass driver output to create the cardioid radiation pattern. The schematic of Diagram 1 illustrates the general arrangement of the Kii Seven signal flow and filtering.

In their conventional role, the bass drivers work with closed-box loading up to a fourth-order (24dB/octave) low-pass roll-off at 125Hz. In contrast to the Kii Three, where cardioid radiation extends all the way down to 50Hz thanks to the combination of both rear- and side-firing bass drivers, the Kii Seven displays cardioid radiation only from about 125Hz upwards. This might appear to constitute a compromise, but with Kii Sevens likely to be installed much closer to a rear wall than the Kii Threes, it is in practice probably not a particularly big deal. And anyway, it's the cardioid character in the low midrange, where the musical fundamentals of mix elements such as voices reside, that I think really makes the difference.

The likelihood of Sevens being used in close proximity to room boundaries has resulted in Kii including some boundary EQ options within the setup menus of the »



■ A cutaway render of the tweeter waveguide and lens. The lens broadens the tweeter's directivity at the top end of its frequency range, while the waveguide narrows it at the lower end.



— A touch panel on the rear allows for input selection, LF and HF EQ setting, and phase compensation mode selection.

» Kii Control hardware (which I'll describe further down the page). The boundary EQ operates simply through bass driver gain adjustment, and is set to -6dB by default. This means that when you first switch on and listen to a pair of Kii Sevens, if they're not located close to the wall, chances are they'll sound bass-light.

Like the Kii Three, the Seven employs a dynamic, look-ahead bass driver protection algorithm that dials back the bass level should the programme material and volume ask too much of the drivers. The protection-sensing algorithm of the Kii Seven is, according to Kii, much improved on that used on the Three.

Move On Up

The Seven's midrange driver is the same as the one fitted to the Kii Three. It's a 150mm paper-diaphragm driver that covers the band from 125Hz to 2kHz, with fourth-order filters at either end. With its relatively low high-pass crossover filter, the Kii Seven actually works its midrange driver relatively vigorously (more so than in the Kii Three), but with its role likely being nearfield monitoring in relatively smaller spaces, this is unlikely ever to become an issue in practice.

One area in which the Kii Seven offers a significant advance on the Three is in its tweeter technology. The Kii Three employs a tweeter that is fundamentally

an off-the-shelf OEM unit, and while the guts (magnet, voice-coil and aluminium/magnesium dome) of the Seven tweeter are the same, it differs significantly in a couple of respects. Firstly, the Seven tweeter employs ferrofluid in the magnet gap for higher power handling

“Listening to the Kii Seven is an experience genuinely unlike any other...”

and lower thermal compression, and secondly and most importantly, it employs in-house-developed waveguide and 'lens' components. Designer Bruno Putzeys kindly provided us with a CAD cutaway render of the tweeter waveguide and lens (co-developed by himself and Lars Risbo).

The waveguide and lens work in tandem to overcome an inherent weakness of tweeter waveguides working alone. While waveguides usefully narrow tweeter dispersion at the lower end of the band so that it better matches dispersion at the top end of the mid band (and simultaneously increase tweeter sensitivity), they do nothing to aid the less desirable narrowing of tweeter dispersion at higher frequencies (above, say, 8kHz). So the aim of the Kii Seven tweeter lens is to pre-condition the tweeter radiation

wavefront so that, while the waveguide narrows its dispersion at lower frequencies, the lens widens dispersion at higher frequencies. The result is constant tweeter dispersion right up to 15kHz. Bruno Putzeys believes that “the extremely engaging sound of the Seven owes a lot to this innovation.”

Amps

Leaving drivers behind, the Kii Seven amplification comprises Putzeys-designed Purifi Eigentakt Class-D amplifiers for the midrange driver and tweeter, with Pascal S-PRO2 amplifier modules for the bass drivers. The total amplification power available is 600W, shared among the drivers. A neat amplification trick of the Kii Three, one that I really like, is repeated on the Kii Seven. The trick is known as 'current drive' and it's one I'm continually surprised other active monitor manufacturers don't embrace (I only know for certain of one other major manufacturer regularly using it).

Current drive was first proposed by Dr Malcolm Hawksford of Essex University in a paper presented to the Audio Engineering Society in 1989.

The technique involves placing a small resistor in series with the driver and using the voltage measured across it (which will be proportional to the current flowing through

the voice coil) as a feedback signal. In a conventional amplification system, the amplifier output voltage follows the input voltage and delivers current simply depending on the instantaneous driver impedance. A current-drive amplifier, by contrast, will compare its input voltage with the measured voice-coil current and adjust the output voltage gain such that they track. So now, the voice-coil current depends on the input voltage and not

— The Kii Control unit adds additional inputs to the Kii Seven (coaxial and optical S/PDIF, USB and Bluetooth), and also provides more detailed control over the speaker EQ options. It can also perform some monitor control functions, such as mono summing and Mid-Sides auditioning.



» on the driver impedance. The amplifier delivers any voltage required to make the voice-coil current track the input voltage, which is significant because a driver's acoustic output is proportional to the current flowing in its voice coil, not the voltage across its terminals.

The primary advantage of current drive is reduced distortion, especially that caused by hysteresis nonlinearities in a driver's magnet system. But it also fixes thermal compression, because the increase in impedance (and loss of output level) that results from a rise in voice-coil temperature is 'seen' by the current feedback as an error that results in correction by increasing the output voltage.

Panel Show

On the rear panel, along the lower edge, are mains power, audio input, control and network sockets. The audio inputs comprise an analogue combi socket for XLR or jack, and an XLR for AES digital. The control sockets comprise in and thru RJ45 sockets for connection to the Kii Control hardware. The in socket connects to the Kii Control itself and the thru connects to the second speaker of the pair (Kii Sevens can be further daisy-chained for multi-channel systems). Above the control sockets are twin network sockets for connection of Kii Sevens to a Dante or AES67 audio-over-IP network.

Above the connection is a touch control panel that offers input selection, standby, low- and high-frequency EQ, reset, and latency options. The latency

ALTERNATIVES

Exceptional as it is, the Kii Seven is not the only game in town in terms of very high-performance monitoring in a similar price ball park. If I were considering the Kii Seven I'd also want to hear monitors such as the **Telegrapher Gorilla**, **Dutch & Dutch 8C**, **Genelec 8361**, **Mesanovic CDM65**, **PMC 6-2** and **PSI A23-M**.

options engage or disengage the Kii Seven's wide-band phase compensation. With Optimum latency engaged, the Kii Seven is minimum-phase compensated over the entire audible band, resulting in around 70ms of overall latency. With phase compensation disengaged, latency falls to around 7ms. The argument for phase compensation is that it corrects for the various phenomena within both the electronic and electro-acoustic domains of speakers that result in time-domain errors, and as time is a vitally important element of the way we perceive sound, a speaker that's free of such errors ought to offer subjective benefits.

Kii Control

I've referred to the Kii Control hardware a couple of times now, so it's probably about time I described it more fully. The Kii Control is a USB bus-powered compact desktop device that primarily offers input selection and volume control for connected Kii monitors. It also itself provides S/PDIF, digital optical, USB and Bluetooth inputs. As described earlier, the Kii Control connects to Kii monitors via an Ethernet-like RJ45-terminated cable. In addition to its volume and input functions,

the Kii Control provides access to far more comprehensive setup and configuration options than are available from the Kii Seven's rear-panel buttons. For example, the simple LF and HF EQ control of the rear panel is extended to include turnover frequencies, and an additional advanced EQ option offers a further eight bands of parametric EQ. The boundary EQ described earlier can also be adjusted using the Kii Control setup menu.

Additional options include the ability to set a reference level, configure and save setup presets, adjust lip sync delay, perform mono or Mid/Sides auditioning, indicate limiter action and set the standby behaviour. While it's perfectly possible to install and use a pair of Kii Sevens without a Kii Control, its extra cost is relatively modest, and my feeling is that the additional configuration facilities provided make it all but obligatory, particularly for professional monitoring applications.

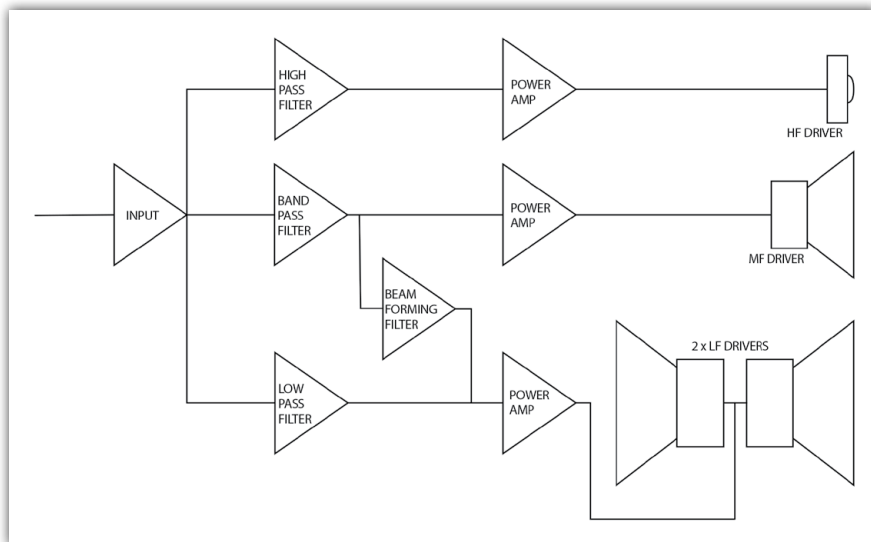
Graphic Detail

Since I tested the Kii Three back in 2017, I've found a new and much more effective speaker measuring space, so I was very much looking forward to measuring the Kii Seven there. Diagrams 2 and 3 illustrate the axial frequency response and harmonic distortion at 80dB and 90dB (at 1m) SPL. The first thing to note about the axial response is that the default -6dB boundary compensation is obviously apparent. The second thing to note is that the amplitude response is generally nicely flat and that the harmonic distortion performance is, as expected, exceptional. At 80dB SPL the third harmonic effectively bumps along the measurement noise floor, at around -65dB from a couple of hundred Hertz upwards. Now, -65dB is equivalent to about 0.05%, and for a speaker, that's extraordinarily low. At 90dB SPL the distortion clearly rises a little, but it's still remarkably low.

Diagram 4 illustrates where the Kii Seven differs from the majority of monitors, and that's in its horizontal dispersion. The curves illustrate the axial frequency response again, along with overlays for 20, 40 and 60 degrees off-axis. The cardioid nature of the Kii Seven, from not much above 100Hz, is clearly apparent.

Seventh Heaven

Listening to the Kii Seven is an experience genuinely unlike any other, except for listening to the Kii Three perhaps. I write

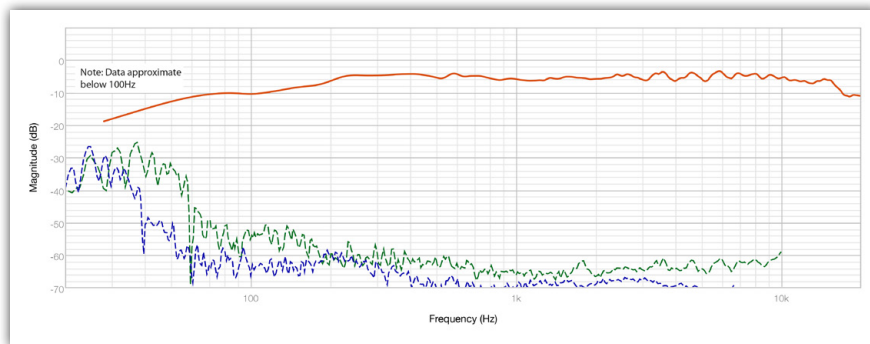


■ Diagram 1: A signal flow diagram of the crossover network and beam-forming filter. Note that the beam-forming signal is derived from the mid band, but sent to the LF drivers.

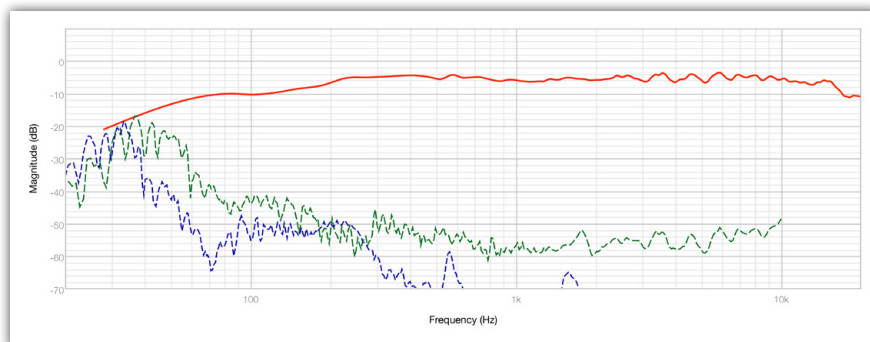
this not just because, by any subjective assessment, it is an extraordinarily impressive monitoring tool, but because its cardioid nature drives the listening space differently. As a result, its subjective character is inherently unlike that of a conventional monitor. Specifically, the Kii Seven pushes the transition in the room from the nearfield to the reverberant field further back. So, if you're using the Kii Seven as a nearfield monitor, at a typical nearfield monitoring listening distance, you hear rather less room and rather more monitor. In particular, significantly less rear- and side-wall reflection energy arrives at the listening position. And the implications of that for critical monitoring are that you have a better chance of hearing midrange details further down into the mix, because they are less confused and masked by the delayed arrival of side- and rear-wall reflections. At least, that's what I think is going on.

So a significant element of Kii Seven's performance derives from the fact that it is less coloured by the room, but that could be a double-edged sword, because it means that if the Sevens were at all flawed, there'd be nowhere to hide. Luckily (actually, I suspect no luck at all was involved) the Kii Seven is very far from flawed. I listened almost exclusively in minimum phase mode (I found it added a little extra focus to stereo imaging), and from the first moment of listening to the first track ('Inside Out' from Athena Andreadis' first album) the Kii Seven revealed itself to be extraordinary. The midrange sings with a beautifully neutral and explicit clarity, high frequencies are unimaginably detailed yet completely natural, and the bass is far more extended than the enclosure size would suggest, yet simultaneously dynamic and accurately pitched. And all this is available at pretty much any sensible volume level from quiet to very loud. Stereo imaging, and the resolution of depth within it, is perhaps the best I've ever heard in my own listening space (this is undoubtedly aided by the lack of room influence). I was particularly struck for example by how well very fine details, right on the edge of audibility, retained their image focus and position. Presenting layers of detail deep, deep into a mix is a Kii Seven speciality and it's an incredibly useful quality for a monitoring tool.

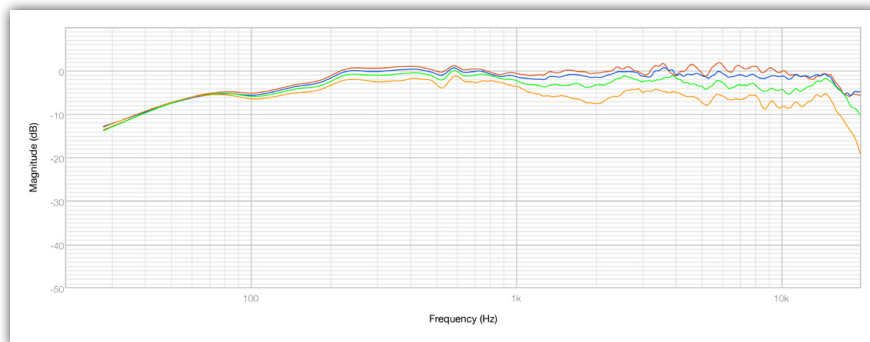
So the Kii Seven delivers all that I hoped it would, but there are a couple of minor subjective head-scratches.



■ Diagram 2: The axial frequency response of the Kii Seven at 80dB SPL at 1m (red trace). Second- and third-harmonic distortion are shown in green and blue, respectively.



■ Diagram 3: As Diagram 2, but measured at 90dB SPL.



■ Diagram 4: Comparing the on-axis frequency response (red trace) with measurements taken 20, 40, 60 and 80 degrees horizontally off axis (blue, green and orange traces, respectively). The divergence of the traces above around 100Hz is a direct result of the Kii Seven's cardioid response.

Firstly, further out into the room, in the reverberant field, I felt the very low end of the Kii Seven was a little overcooked. This of course is likely to be a room-dependent phenomenon, and it could quite possibly be fixed using the EQ facilities of the Kii Control, but it was something I've not encountered in my room before to the same degree. It didn't impact on the Seven's primary job of nearfield monitoring, so is more intriguing than significant. Secondly, I initially found the default balance of the Kii Seven to benefit from a broad (Q=0.7) 1.5dB or so boost in the 200Hz region, just to warm the low midrange a little, and an HF cut of 1dB or so from 3kHz up (I found the default balance just a little bright).

I suspect my low-mid boost preference might well be a result of less side- and rear-wall energy arriving at the nearfield listening position than I am used to. However, if I had started mixing from cold on the Kii Seven, their default balance might potentially have led me astray a little.

I guess, though, with all monitors there's a period of acclimatisation to go through; it just might take a little bit longer with the Kii Seven. But to be honest, any time spent listening to the Kii Seven is time well spent. ■■■

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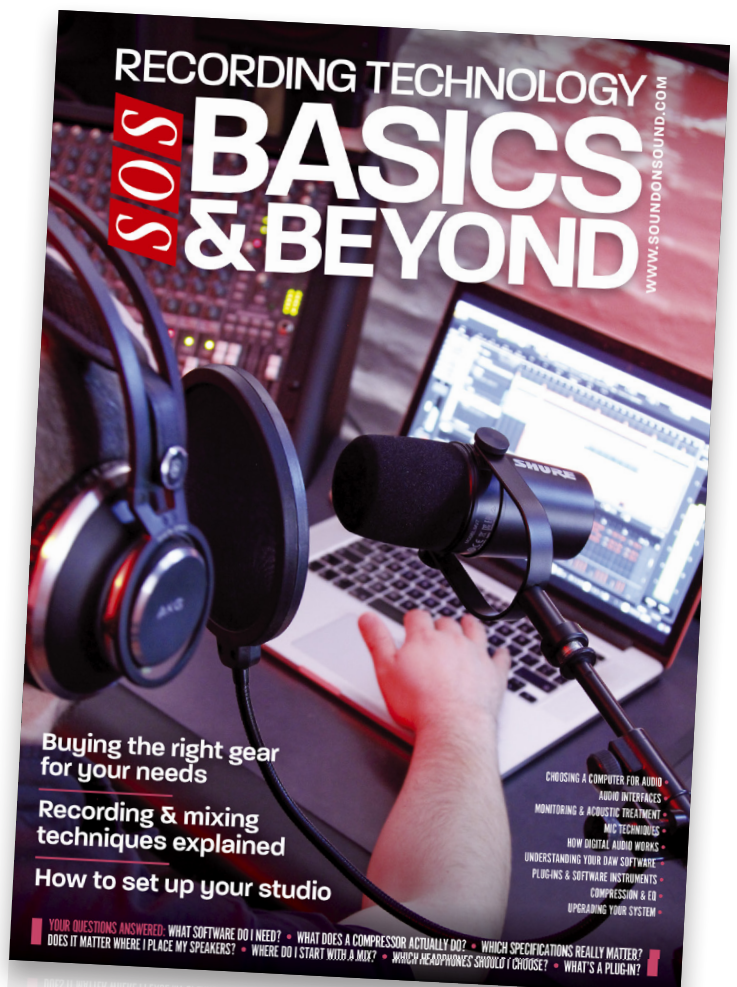
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