



# Reflector Audio Square Two

## Active Monitors

These unusual coaxial speakers bring the concept of horn-loaded monitoring into the 21st Century.

JG HARDING

When I decided I to design and build my own set of studio monitors, one thing I picked up pretty quickly is that speaker design is a set of compromises, the most obvious being a triangular plotting of size, low-frequency extension and output level. If it's small, it won't go very low, and if you use EQ to correct for that, it won't go very loud. If it's small and loud, it won't go low, and so on.

Another is that in order to achieve full frequency extension at a reasonable volume and with reasonable bass extension, you'll need more than one driver to cover the whole frequency range. This is a deviation from the theoretically perfect but physically unachievable speaker, known as a 'point source', which radiates all frequencies perfectly from a single point. The necessity for multiple drivers leads to one particularly frustrating issue: imperfect phase correlation between the drivers. A full discussion of all the issues involved with driver integration would not fit into this review, but suffice it to say that manufacturers spend a lot of time trying to align the phase of drivers, using both physical and digital means.

In a design like the Kii Three or the HEDD Type 30, for example, linear phase can be selected as a listening mode. This is achieved using digital signal processing, which keeps phase within roughly a  $\pm 50$ -degree window (generally above 200Hz, though this varies), but it incurs a latency penalty. As a result, such a setting is only useful when you don't mind a delay on your sound output.

Another way to tackle driver phase discrepancy is by using a concentric design, where a tweeter is put either directly in the centre of a woofer, or suspended in front of the woofer cone. Many manufacturers use variations on such a design, including KEF, Tannoy, Genelec, Kali, PreSonus, Equator Audio and Geithain. Like all speaker design choices, this also introduces its own potential issues, which need to be compensated for with other physical and digital design considerations. Now Reflector Audio have approached the concept of a concentric speaker from a different angle. In the Square Two reviewed here, the job of reproducing the low end is split between four separate drivers that exit through individual holes in the baffle, while a mid- and high-frequency driver fires through a horn in the centre. For a quick run-down of the why and how of horn loading, see Phil Ward's review of the Ocean Way HR5 monitors in *SOS* January 2021: [www.soundonsound.com/reviews/ocean-way-hr5](http://www.soundonsound.com/reviews/ocean-way-hr5).

I first encountered Reflector Audio products at NAMM a long time back, where they had some very eye-popping gigantic speakers called the Q1818s. Come Covid, a listening party with these

giant monitors was cancelled, and the designers decided it was time to make a smaller and more generally practical speaker using similar acoustic design principles. Like the Q1818, the Square Two is designed to create a virtual point source using a horn-loaded tweeter surrounded by four woofers. While the Q1818s were very high-end main monitors, the Square Two is more of a midfield to long-nearfield design, and so usable in far more studios.

## Drivers

The distinctive design of the Square Two is mostly a result of its interesting driver setup. Horn design is a bundle of essays on its own, but suffice to say it's relatively uncommon to see horn-loaded compression drivers in studio monitors these days. Very large main monitors are the notable exception (Augsburger are one example), where high levels of projection and volume are essential. Compression drivers are rare outside of 'I need lots of volume' applications, and this is where they tend to be used due to their high efficiency.

Both the tweeter and woofers in the Square Two are Italian: a Faital Pro HF1440 in the horn and four 18 Sound 5W430 woofers surrounding it. The four 5-inch woofers are roughly equivalent to a single 10-inch driver in surface area, but with the workload divided across the four drivers. With the drivers aligned perfectly to work as a single source, the only downsides to such a design are weight and expense. The former is not = much of a problem for this application once you've set them up, but the latter means such a design must inevitably land in a higher price range.

On researching both drivers, I noticed that the high-frequency compression

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**\$6500**

### PROS

- Neutral tone and excellent, lively transient response.
- Very linear phase above 200Hz with no appreciable latency.
- Horn-loaded 'feel' can be really emotive and exciting.
- Narrow dispersion can be a real plus for some rooms and use cases.
- Unique looks and a unique approach to some age-old speaker design considerations.

### CONS

- Narrow dispersion not ideal for all scenarios.
- Some mild amp hiss when on-axis and closer to the monitors.

### SUMMARY

The Square Two is a high-quality monitor with some unique features, particularly narrow dispersion, linear phase response without the usual latency, and a lively, horn-loaded character.

driver had a fair bit of low-frequency extension, while smaller woofers have the benefit of increased high-frequency extension. In practical terms, extended range is quite desirable as it generally allows you to use lower-order crossover filters, yielding a smoother response.

Computer-aided design tools have allowed speakers to have more and more interesting and outlandish systems for aligning phase and dispersing sound around the room and off the baffle. The interesting physical design of the Square Two baffle and horn helps to phase-align the drivers from around 200Hz upwards. Measurement graphs on the Reflector Audio website show that the phase is linear in use within the same 50-degree window that would be expected of a high-latency DSP-based linearisation



## Enclosure

You'll no doubt have noticed the distinctive looks of the Square Two (how could you not!). In the standard black finish provided for this review they resemble some kind of Giger-esque portal into Eldritch unknowns, but if that isn't to your taste they're also available in all kinds of super-bright custom colours including white, red, blue, orange, pink, green and even gold! The enclosures are very sturdy and hefty, too. They weigh in at a bicep-flexing 19.4kg apiece, and will need some decent stands if you're not locating them on a meter bridge or similar sturdy surface.

The base is designed to rotate, which allows you to block the downward-firing bass ports completely for a closed response.

I'd absolutely love to hear an even smaller version designed explicitly for nearfield use as well, perhaps with a matching sub. Imagine four 2.5- or three-inch high-excursion woofers around a smaller one-inch horn. Reducing the hiss of an efficient horn in such close proximity may be tough, but this really depends on the individual design itself, so the notion shouldn't be written off entirely. Perhaps we will see such a product?

» system, which is impressive. This preoccupation with avoiding DSP latency continues into the crossover design too.

### DSP & Amps

The amp pack in each monitor is a Hypex FusionAmp FA123. Two 125W Class-D amps provide power for the four woofers, while a 100W Class-D amp does the same for the horn. The crossovers are handled in DSP. There are, in effect, two DSP sections in the amp; the first is not user-accessible, and performs driver equalisation and crossover. Once again, Reflector have prioritised minimising latency, so rather than use linear-phase EQ filters to provide the built-in correction, with their attendant latency penalty and pre-ringing artefacts, Reflector have elected to craft a set of FIR filters to linearise frequency response with reasonably low phase shift and no latency penalty.

The second DSP stage is user-accessible and accepts data from the Hypex Filter Designer software for Windows, allowing you to create low-latency room correction profiles that can then be uploaded to the speaker. Measurement can be carried out using the free REW software to

probe the room, or even something like Sonarworks SoundID Reference. To do the latter, you make your measurements and then export the '8-band version for DAD' option and use this as the basis for your filters. When it comes to getting signals in and out of the speakers, there's a full complement of digital and analogue ins and outs (see box).

### Dispersion

Another interesting acoustic choice is the narrow and radially symmetrical dispersion characteristic. Many monitors opt for a very wide horizontal dispersion and a narrow vertical dispersion by

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design, in order to cover a wide area. In some circumstances, though, narrow dispersion is actually a bonus. If you have a longer, narrower room shape, for example, and sit some way down it, such a focused dispersion is a real bonus and works well. If you're looking to cover a wider area with a flat response a different design should be considered.

Measurements given by Reflector show the very narrow dispersion characteristics of the Square Two.

### In Use

I find with nearly all speakers that listening directly on-axis, with the high-frequency driver beaming at the ear, is a bit too bright for my taste, so I turned the speakers out a little and used a little tilt EQ. At 40 I'm still rocking a respectable 17kHz of usable range somehow, so I often soften the highest highs on monitors by choice.

In terms of bass, for normal use the Square Twos go low enough, acting as a point source down to around 40Hz (-5dB) anechoically. In-room response extends, as expected, lower still if the speakers are boundary loaded. If you want to add some correction, you can bring this -5dB point down

significantly at the expense of maximum level. As usual, it's a trade-off, but it's worth considering. I did try them out closely boundary loaded and equalised, and in this circumstance there was usable bass down to 25Hz, though obviously this will depend on your room arrangement, shape and level requirements. Another thing to note is that the base of the

monitor can be rotated to cover up the reflex ports. This reduces the low-frequency output and extension somewhat, as well as reducing the inherent group delay of the port, and is ideal for use with an additional subwoofer or two.

Volume-wise, the Square Twos are capable of more than most will need, with a maximum useful output quoted as 112dB SPL (3% THD 100Hz-10kHz). By this level, distortion at the very low end will be over 10% though, so if you are in a very big room making bass-heavy music and need level like this, it's advisable to add some kind of subwoofer in order to take the pressure of the Square Two's woofers. At



Here you can see the quad woofer arrangement that surrounds the central compression driver/horn combo.

## Amp Pack

The Hypex amp plates house a generous selection of I/O, including balanced analogue XLR in and thru, an unbalanced RCA input, AES in and thru, S/PDIF in and thru, a TosLink input, and a USB port for configuration. The internal DSP allows various control settings, including user-configurable 15-band equalisation, three selectable presets for filters, signal detect and auto shutdown, clip protection and thermal protection.

present there's no specific off-the-shelf solution available, though this may come in the future. I did try using my own modest 10-inch 250W subwoofer, and with such a setup there's absolutely no way I'd use up the available level unless I bought a new gigantic mansion to house a large mix room (donations accepted), and put in some earplugs. My own general listening level is 70-76 dB SPL, so put these figures in perspective.

As well as working on a range of material throughout the review, I decided to play back a whole bunch of mixes I know well. These include some tracks picked specifically for their imbalance, including 'Lost Art Of Keeping A Secret' by Queens Of The Stone Age, with its annoyingly loud hi-hat in the verses, and the low-mid-heavy and almost entirely treble-free 'Please Stay' by Cryin Shames. I also listened to some favourite practically flawless mixes like 'Sound & Colour' by Alabama Shakes and 'Angel'

by Massive Attack. Everything sounded as it should. Dull mixes sounded dull, bright ones bright, and the inimitable rim-shot crack of 'Angel' was incredibly present and 'real' on the Square Two.

### Sound The Horn

The compression drivers are not harsh, and I want to emphasise this point because there is some prejudice against certain technologies. I've no doubt that the high sensitivity of the compression driver has enabled a good deal of subtractive equalisation to be used in flattening the response from stock, while still maintaining high dB sensitivity in the 90s per Watt. I didn't find them to exhibit excess distortion, and nor are they 'shouty', though they do present something of the character of a compression driver and horn combo. Describing sound is difficult, but to me, the powerful transient response of horn-loaded drivers such as these is very 'live' feeling. It can be really involving in a way that traditional tweeters often aren't, which can lend itself well to the control-room environment. If you want to wind things up for the artist, get some air moving and make the record label guy jump about, it can be a bonus! One thing I did notice is that if you sit closer than a metre and a half or so and directly on-axis, you may hear some amplifier hiss, depending on your ears and environment. I think this is a little too



The Hypex amp packs provide a full complement of I/O and access to a full-featured DSP system.

### ALTERNATIVES

The Square Two sits in a competitive market sector and contains plenty of interesting innovation. I'll have to be a little arbitrary in my picks for some alternatives, as there are so many products available. Unlike the Square Two, near-to-midfield competitors with similar price tags are three- to four-way options.

For working at closer distances and lower volumes in smaller spaces, the **Kii Seven** provides plenty of digital wizardry, from cardioid bass response to digitally linearised phase. Expect a *Sound On Sound* review soon. The **Genelec 8351A** offers a similar midfield, point-source monitoring experience to the Square Two and is one of the strongest all-round competitors, with in-depth DSP control. If you're looking for a similarly vibrant horn-loaded design, the **Ocean Way HR4** provides a lively horn-loaded feel, though they lack UK distribution at the time of writing. **Wayne Jones Audio** monitors are also proudly horn-based, while more conventional competitors include the **Mesanovic CDM65**, the **HEDD Audio Type 30 Mk2** and the **Barefoot Sound MicroMain45**.

close for comfort to be honest, though; two metres feels about right.

In conclusion, the Square Two provides detailed and neutral sound that's phase coherent with no appreciable latency, and does so with a unique design and lively character. I'll be honest, at this price point I've yet to hear a bad monitor. Everything I've tried has been excellent at its job, and the selection comes down to individual sonic preference, specific room needs and your own musical styles. The Square Two is no exception, and I'd happily mix on them with no qualms at all. More than a big nearfield, they're sort of a baby main monitor. For a working studio, having such a set of speakers may be a real bonus to get the room going, and as long as the narrow dispersion characteristics suit the space you should audition them. ■■■

**\$** \$6500 per pair.  
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