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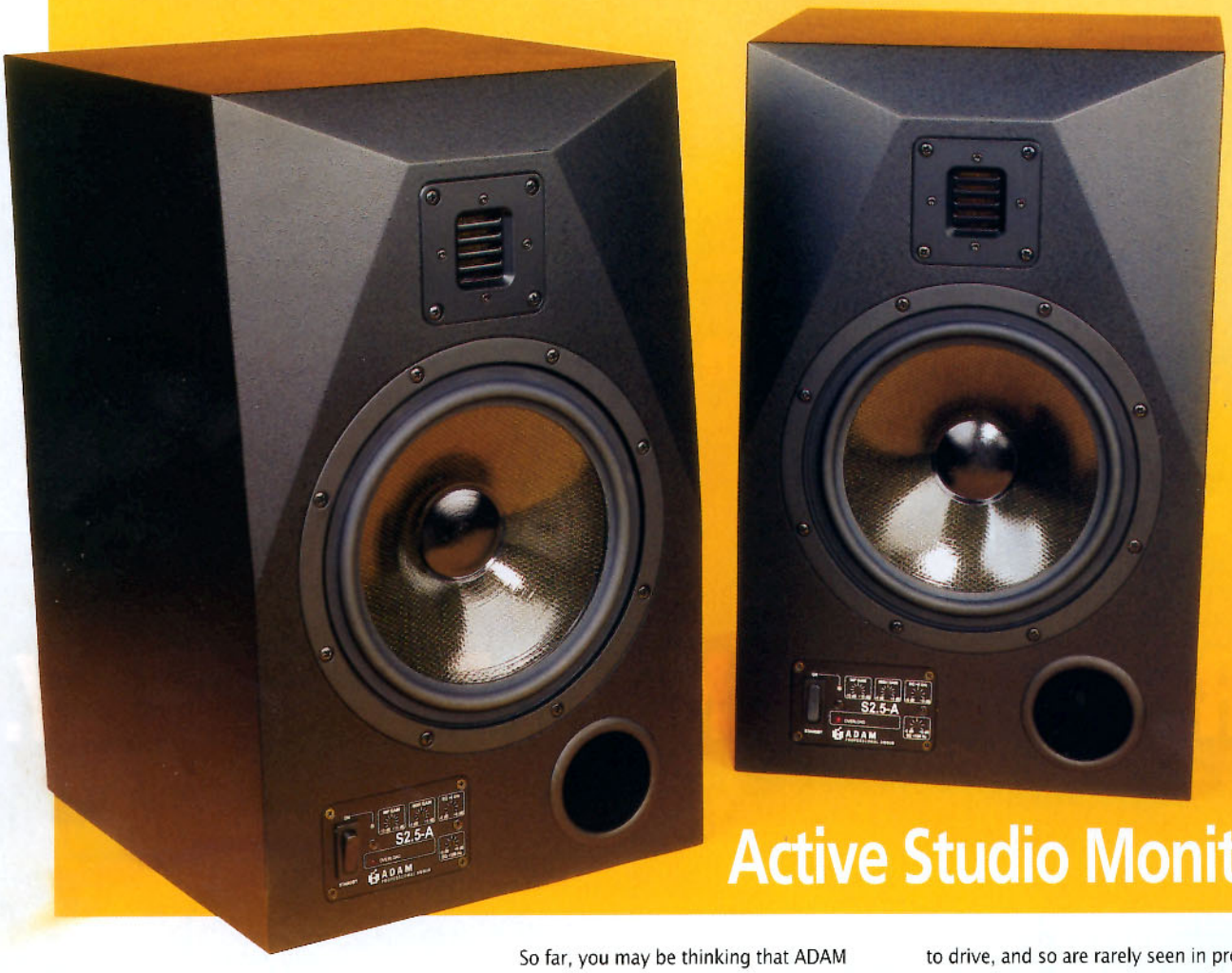
ADAM S2.5A



Photos: Mike Cameron

Active Studio Monitor

Two-way nearfield monitors with cutting-edge ribbon tweeter technology.

Hugh Robjohns

The loudspeakers from German manufacturer ADAM are still a fairly well-kept secret in the UK. For anyone unfamiliar with the wares of this Berlin-based company, it produces a broad range of professional monitoring loudspeakers: five compact two-way nearfield designs, five three-way midfield speakers, a couple of serious soffit-mounted main monitor monsters, and a few subwoofers for use in 5.1 systems. There are also some hi-fi orientated versions, and all are available as either passive or active systems.

So far, you may be thinking that ADAM sounds much like any other professional monitor manufacturer, such as Genelec or PMC for example, but the company's designs have a unique and very interesting design feature. Every monitor in the company's expansive range uses the intriguing ART (Accelerated Ribbon Technology) tweeter, and the larger systems use the ART mid-range driver too. As the name suggests, these devices are fundamentally ribbon drivers, as opposed to the soft fabric or metal domes which are more commonly used for high-frequency and mid-range duties. One of the advantages of using a ribbon is that the diaphragm has a far lower moving mass than any cone or dome driven by a moving coil, and so it can potentially provide a much better transient response, for similar reasons that a condenser mic performs better than a dynamic mic.

However, the simple ribbons used in some monitors (notably the Genelec S30, for example) are notoriously fragile and difficult to drive, and so are rarely seen in professional applications. This is where the innovative design and unique operating principle of the ART design scores, providing increased robustness and efficiency — see the 'ART Driver Design' box for details of how it works.

Near-midfield Monitoring

The S2.5A reviewed here is the latest addition to ADAM's nearfield quintet, and it is also the largest. In fact, it is so large that ADAM are referring to it as a 'near-midfield' monitor since it can be used in either application. This active two-way monitor loudspeaker (there is a passive sibling available too) incorporates a nine-inch (228mm) bass driver in concert with the ART tweeter. The ART tweeter is not the only advanced driver design employed by ADAM. Hexacone bass drivers are used throughout the range, and the unit fitted in the S2.5A is the same as that used in the company's larger S4 midfield speaker. The cone is constructed from a sandwich of Nomex and Kevlar — a honeycomb of Nomex

is reinforced with Kevlar surfaces — and the combination provides a very light but extremely stiff diaphragm which is claimed to perform better than paper, polypropylene and aluminium devices of similar dimensions.

In the S2.5A both the Hexacone bass driver and the ART tweeter are powered by separate 150W amplifiers carried on a chassis built into the rear of the cabinet, enabling the speaker to generate an SPL exceeding 111dB at one metre. More than sufficient for nearfield monitoring, I'd say! *[In fact, ADAM informed us just before we went to press that they are increasing the low-frequency driver's amplifier rating for even greater headroom — Ed.]* The specifications also claim that the total harmonic distortion is kept below 0.5 percent at all frequencies above 80Hz.

The large cabinet is reflex loaded with an internal volume of 18.6 litres and external dimensions of 450 x 280 x 300mm (hwd). The black-painted box weighs 15kg, so you'll need some substantial stands to support these monitors — the desk's meterbridge is unlikely to cope very well! The top half of the enclosure is heavily chamfered to the sides and top, presumably to help with HF dispersion, and the ART tweeter is protected behind a slotted metal grille set flush with the baffle. Both tweeter and bass driver are aligned vertically, and the bottom corners of the cabinet are used to house the reflex port on the right-hand side, and some controls for the low-level crossover on the left. The cylindrical port is a quite large, measuring 60mm in diameter, with very little flaring at the baffle.

Round The Back

The rear of the loudspeaker is largely filled with the amplifier chassis panel, which itself is dominated by a large area of vertical heat-sink fins. There is also an IEC mains inlet socket with an associated power isolator switch, and a single balanced XLR input. There is no provision for unbalanced phono inputs, although I tested the speaker with an unbalanced source using an appropriately wired cable without any problems. The heat sink became moderately warm after extended listening, but nothing to cause concern.

The internal active crossover is tuned to 1.8kHz and the system's overall frequency response is claimed to extend between 34Hz and 35kHz, within ±3dB margins, which is impressive for a box of this size. Being an active speaker, there are facilities to adjust some aspects of the tonal balance, to cater for personal taste and to help correct minor room effects. These facilities are adjusted using four slotted rotary controls positioned discreetly on the bottom left-hand corner of the front baffle, and are accompanied by a standby power switch and LEDs for power and overload.

The nominal input sensitivity can be adjusted over a ±10dB range and a pair of filters adjust the frequency extremes over ±6dB ranges below 160Hz and above 6kHz, helping to compensate for room damping and LF loading, respectively. A separate ±4dB high-frequency shelf equaliser adjusts the overall tweeter level relative to the woofer. Apparently, the Hexacone and ART drivers remain linear well beyond the bandwidths over which they are used, which allows ADAM to design the crossover and room EQ filters for the optimal transient response, rather than just having to provide steep out-of-band attenuation, which inherently introduces some ringing artefacts.

Listening Tests

I started off as always with all the EQ controls set to their flat positions, but I had to turn the gain control to its minimum position to enable the volume control on my monitoring system to be set to a sensible part of its range when using the S2.5As. Thus the ADAM speakers can be used with a wide range of input levels, from professional +4dBu feeds down to domestic-level monitor sends.

My first impression was that these speakers were a tad on the bright side — ▶

SOUND ON SOUND

ADAM S2.5A £2192

pros

- ART tweeter transient response and precision.
- Clear, detailed mid-range.
- Comprehensive room equalisation facilities.
- EQ controls on front panel.

cons

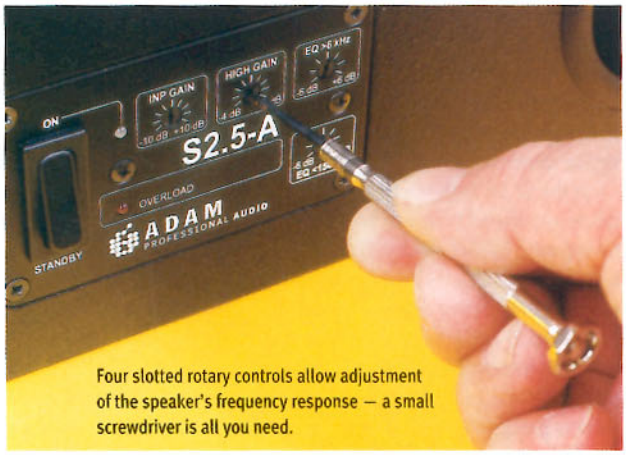
- A tendency to sound overly bright with EQ set flat.
- Deep bass not as potent as the 35Hz claims suggest.

summary

An accurate and detailed two-way active monitor loudspeaker which competes well against the established class leaders at this price level. The innovative ART tweeter is astonishingly fast and precise but seemed slightly overemphasised to my ears. Fortunately, the comprehensive equalisation controls allow fine tonal corrections to be made to suit almost any listening environment and personal preference.

certainly in comparison with my reference PMC three-way IB1s. In their initial state I found the S2.5As tended to overemphasise sibilance slightly, especially on female voices. I was not surprised with this finding, though, partly because my listening room is not as damped as a typical recording studio would be, and also because of the impression I had formed from listening to other ADAM speakers at trade shows in recent years. However, rather than dive straight in and start tweaking the EQ settings, I listened to a wide variety of material over several days to ensure the speakers were fully run in and to try to form a balanced opinion of the system as a whole, in its native state.

The transient detail is impressive — these are very fast speakers — with lots of attack which really brings percussion and brass instruments to life. The stereo imaging is solid and stable, although I had to work a little harder than usual with positioning and toe angles to optimise this aspect of the speaker's performance. However, once I had found the best locations in my room (the speakers ended up aiming slightly behind my listening position, about 1.0m from the side walls, and 0.7 metres from the rear wall) I obtained a stereo image which was wide and deep, with a very natural depth dimension and nice open spaces between instruments. Some choral recordings made with a Soundfield mic were portrayed with superb spatial precision and a wonderfully natural envelope of reverberation. However, there was still that slightly troubling overemphasis of sibilance.



Four slotted rotary controls allow adjustment of the speaker's frequency response — a small screwdriver is all you need.

The mid-range was very clean, clear and articulate, free of any obvious colorations and not obscured by the bottom end as it so easily can be in ported two-way designs. The speakers also seemed quite well extended in the LF department, but with more energy afforded to the first overtone of deep bass instruments, rather than the fundamentals, making the system sound a little lightweight in comparison to my reference PMCs — although that is hardly surprising given their relative dimensions.

However, this perceived lack of depth and weight could have been a psychoacoustic effect rather than a true tonal imbalance, because of the slightly over-enthusiastic top end. Apparently, when the PMC engineers are asked to investigate 'faulty' bass drivers in their big studio monitors they nearly always end up replacing the tweeters instead — so easily is the ear fooled over subtle tonal balance issues. With that in mind, I finally set to with my screwdriver to adjust the high filter and tweeter gain controls on the S2.5As.

Frequency Response Adjustments

After much experimentation with small incremental tweaks, I eventually arrived at a setting which involved about -1.5dB for the

ART Driver Design

Most loudspeakers employ tweeters constructed from soft fabric or metal domes. Inevitably, the dome and voice-coil assembly has a relatively high mass in comparison to the air it is required to move. This limits the upper extent of the frequency range over which the device can operate, and issues concerning the varying stiffness of the dome at different frequencies also have an audible effect on the sound.

One way to reduce the moving mass is to use a ribbon tweeter — which is similar in principle to a ribbon microphone, with an aluminium ribbon suspended between the poles of a very strong magnet. However, although this solution has an extremely low moving mass, it also has very low impedance, making it difficult to drive. Furthermore, it has a low efficiency and restricted dynamic range, can usually only be used for frequencies above 5kHz (restricting its use to three-way systems), and is easily damaged. A refinement of the basic ribbon technology — the magnetostatic ribbon — improves on the efficiency and provides an easier load to drive, but the other restrictions remain, so very few professional monitoring loudspeakers have successfully employed ribbons. They are, however, quite popular in some high-end hi-fi designs.

The Accelerated Ribbon Technology (ART) used in all the ADAM speakers for the tweeters (and also the mid-range units in the larger three- and four-way systems), while still a ribbon design at heart, is fundamentally different in its operating principle and is claimed to overcome all the limitations of previous ribbon designs. The ART tweeter is based upon ground-breaking research by Dr Oskar Heil, dating back to the early '70s, which resulted in a sound driver he called the Air Motion Transformer, and ADAM has refined and 'productionised' this concept to produce the ART tweeter and mid-range units employed in all their monitor designs.

While a ribbon tweeter driver is usually constructed from a small piece of metal foil, the ART diaphragm is constructed from a type of plastic, with a metal coating to make it conductive — this helps make the construction more robust. The coated plastic is folded like a concertina and placed between the poles of a very strong magnet. It is engineered in such a way that when a current is passed through the ribbon the individual folds move to squeeze or pump the air in and out, instead of simply pushing the air like a piston, which is what virtually every other loudspeaker design tries to do, whether by using cones, domes, or flat panels.

The impedance of this ART ribbon is a comfortable 3.2Ω over the entire frequency band, making it a fairly straightforward load to drive, and the design can handle two or three times the thermal power of a conventional one-inch dome tweeter, which enables it to be used confidently in high-powered professional monitor loudspeakers. With conventional loudspeaker technology, the diaphragm acts on the surrounding air like a simple piston, moving air in a straightforward 1:1 velocity ratio. In other words, the speed of the diaphragm movement is the same as that of the air it displaces. This is not terribly efficient given that the mass of the diaphragm is many times more than that of the air it is moving.

The pumping action of the ART design is far more efficient and achieves a 4:1 velocity ratio (3.5:1 for the mid-range version), meaning that it moves the air four times faster than the movement of the folds in the ribbon itself. The advantage is much better impedance matching between the mass of the diaphragm and that of the moving air, resulting in greater transient accuracy than more familiar transducers. It also makes the driver very efficient — typically around 93dB/W/m. Furthermore, the folded nature of the diaphragm neatly side-steps the problem of breakup which afflicts cones and domes at the upper frequencies of their bandwidths. As the wavelength of sound becomes small relative to the size of the diaphragm, cones and domes tend to lose their stiffness and no longer act like perfect pistons, limiting their dynamic ability.

Another interesting aspect of the ART design is that, because the diaphragm is three-dimensional (thanks to its folds), the actual surface area is around 25 times larger than the baffle space it occupies. The ART tweeter has a total diaphragm area of around 71 square centimetres, for example, and the mid-range unit has a total diaphragm area of 213 square centimetres. This means that for the same physical excursion as a conventional driver the ART design moves substantially more air, and can therefore produce higher SPLs. In terms of its useful bandwidth, the ART tweeter can be used to handle frequencies above about 1.8kHz, extending to around 35kHz. The mid-range ART unit is typically used between about 600Hz and 3kHz.

tweeter gain setting, and a decibel taken off with the high filter. The bass equaliser remained in its flat position. These tweaks seemed to take some of the hard edge and overemphasis off the top end, making voices sound more natural, yet without sacrificing any of the transient detail and overall clarity. As I half expected, the by-product of taming the top end was to create a small but worthwhile increase in the apparent weight and depth of bass, producing a more balanced sound overall. The ear is easily fooled, as I have often said before, but returning to the system with fresh ears the following day confirmed that my tweaking had been valid in that room, producing a more balanced and natural sound which could be auditioned for many hours without fatigue.

Although these speakers are specified as extending down to 35Hz, I think that is a little optimistic, as there was little energy available at such low frequencies. A moderate amount of room correction can be introduced with the LF equaliser, though, which seems to peak the energy content in the 40-60Hz region. A lot of the LF energy comes courtesy of the port, which pumps a remarkable amount of air. However, its large diameter helps to minimise any audible turbulence or chuffing and there was no obvious overhang or upper bass 'bulge' which are very common faults with ported designs. The woofer is a decent size too, so power handling is not really an issue — these speakers can deliver soloed kick drums without worry — and the excellent transient attack and mid-range detail of kick drums and electric basses more than compensates for raw LF power.

As a tool for mixing, I found the ADAM S2.5A was very revealing and detailed, allowing me to hear precisely what was going on in my mixes. The mid-range was very clean and clear, which made adjusting EQ and dynamics on drums and bass guitars unambiguous — although I often felt the first overtone of bass instruments was stronger than the fundamentals. Voices were portrayed well, with an almost enhanced precision which made plosives and lip noises very obvious — minor faults were made glaringly obvious, which is what a decent monitor should do, of course. The effect of moving a vocal mic up or down a few inches in front of a vocalist was very obvious, as was the sonic difference between range-topping AKG and Sennheiser condenser mics on a recordings of a grand piano.

The S2.5As were also able to provide dynamic realism, with no obvious compression effects except at ludicrously high levels. If used in a nearfield situation these speakers will easily provide all the level and dynamics you could wish for. In a more midfield situation they may be found wanting by the real head-bangers out there, but that is hardly a fair criticism.

I think these monitors represent good value for money and add to the short list of worthy contenders for two-way active monitors at this UK price level. The ART technology is certainly an impressive alternative to more conventional tweeter designs, and ADAM have combined it masterfully with the Hexacone woofer to produce a true monitor-class loudspeaker. SOS

information

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