ON LOCATION • HARBETH AUDIO • HAYWARDS HEATH, UK

Inspired by the BBC

Harbeth Audio has come a long way since it was founded by Dudley Harwood, 30 years ago. **Steve Harris** visits the company's Sussex factory and talks to owner, designer and enthusiast Alan Shaw about the paths taken to the company's success

Retiring from the BBC Research Department, Dudley Harwood started building his own loudspeakers in 1977. He must have been encouraged by the success of his erstwhile junior colleague, Spencer Hughes, who had left to launch Spendor in 1969. But when choosing a company name, Harwood wisely refrained from using the first syllable of his Christian name as Hughes had done, and called the company Harbeth instead.

Spendor used Bextrene, which Hughes had developed as a cone material while working under Harwood at the BBC. Harwood had continued the BBC's investigation of new materials, and in 1976 had filed a patent for the use of polypropylene in speaker cones.

He claimed that polypropylene had 'the lowest coloration of any known material' as well as higher sensitivity than Bextrene. In his Harbeth HL monitor, Harwood's 8in polypropylene-coned bass/midrange unit was matched to a 1in Son Audax soft-dome tweeter in a ported enclosure of standard BBC proportions and made of damped birch ply panels with a foam filling.

With the HL Mk1, 2 and 3, Harbeth gained an international reputation and triggered the widespread use of polypropylene cones. Then in 1984 Audax of France introduced its 'advanced plastic formulation', called TPX. Harwood recognised the superiority of TPX, sold his polypropylene patent to CBS and switched to an Audax unit for the HL Mk 4.

ABOVE: Alan Shaw outside the Sussex factory with the new 12in RADIAL drive unit for the Monitor 40
RIGHT: The smaller Monitor 30

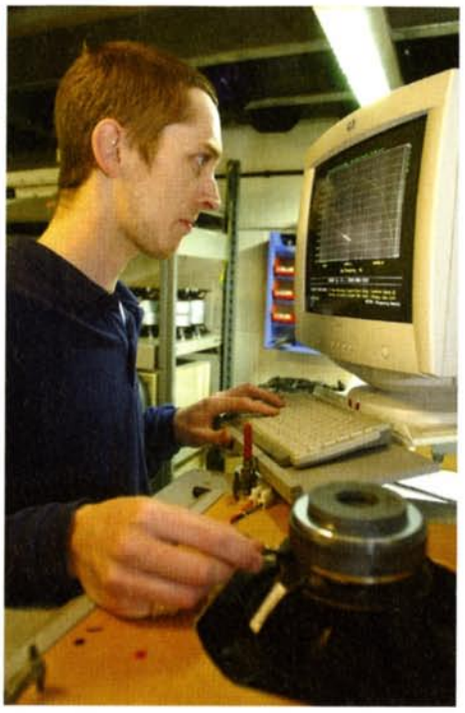
BELOW: The Harbeth HL Mk4 of 1985, with a TPX cone driver replacing the original polypropylene

It was soon after this that Alan Shaw entered the Harbeth story. Alan was then in his late twenties, and had a well-paid job with semiconductor giant NEC. But he had been fascinated by radio and audio from an early age, and he'd also had an unusually early introduction to the workings of the BBC itself.

BELOW: Alan Shaw in 1986, then aged 29 (left), with Dudley Harwood outside the modest Harbeth premises in South Norwood, London. Also shown is a 1977 launch advertisement for Harbeth's HL Monitor

A CALL FROM THE BBC...

'About 1973,' recalls Alan, 'the local station, BBC Brighton as it was then, ran a kids' programme on a Saturday lunchtime, made for and by teenagers. And the appeal went out one week, when I was about 13, "Is there anybody out there, we desperately need some help, if you're interested just turn up next Saturday at 12 o'clock". So I went down there on the train with three or four others, and they said "Right, what can you do?". And I think I was given Tape Reclamation. You remember that? Taking out the short splices from 10in reels of tape and joining the long bits together so that they could be re-used. So suddenly, I was in a BBC control room. And the



first thing that hit me was the dead acoustic. The second thing was the smell of hot tubes, a certain, warm oily sort of electrical smell.

'If you're willing to be a dogsbody, it's not long before you're running cups of tea from the control room and into the studio itself. You're hearing the presenter's voice in the flesh, then going back to the control room, hanging around waiting for the next task, you're hearing his voice over the speaker.

'That's not something that a 13-year-old is normally exposed to.

'Then one day in 1974 or 1975, I came in on a Saturday morning and two or three people were standing around a little box. "What's that, a new speaker?" "Yes, it's called an LS, er 3/5A." Mono, of course, they just had one.

'The chief engineer said, "Oh, I can get the kit version of that, which BBC staff can order from Chartwell". This was the BBC Symphony kit.

'So all of us swore we'd scrape the money together and get these kits. In fact I didn't, I got the drive units and made the crossover myself, because I couldn't afford the whole thing.'

This started Alan on his first hi-fi enterprise, selling speaker drive units and other parts for enthusiasts by mail order. Much later, out of his teens and with a degree, he landed the sales job with NEC.

'I was incredibly lucky to get a job with them. The entrance criteria normally included an engineering degree. I had a business degree, but because I had a lifelong interest in electronics and things related, they were prepared to interview me.'

He was also lucky to arrive at NEC at the time of the first personal computer boom. He handled two crucial accounts, Sinclair and Amstrad.

ABOVE LEFT: James Baker bonds a cone assembly to a chassis

ABOVE CENTRE: Here he magnetises a drive unit

ABOVE RIGHT: Andy Sinden checks a drive unit's frequency response against a target response

ONE MAN AND HIS... ELECTRIC FIRE

But Alan was still mad about hi-fi and one day, in South London with time to kill between NEC appointments, he decided to visit Rogers. Putting on his old Sound Box hat – his mail order company name – he asked for a trade price list, but got a rude rebuff.

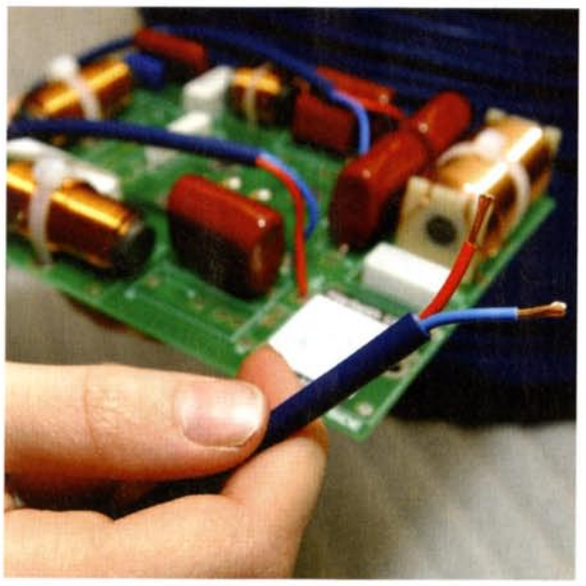
'Had Rogers given me that price list instead of telling me to get lost, I almost certainly wouldn't be here today. I was so irritated at being treated that way that I thought "Well, I'm in Mitcham, who can I go and see now? Ah, Harbeth, they're in Norwood, I can get round there before my next appointment."

'Having read all the technical papers with Harwood's name on them, I had a vision of a really big company. It was such a shock to see that in fact it was one man, sitting by his one-bar electric fire. It just didn't seem possible that someone of that intellect could be running such a small operation. Of course, I was very naive. But I remember coming away from that first meeting and thinking "I can't let this slip away."'

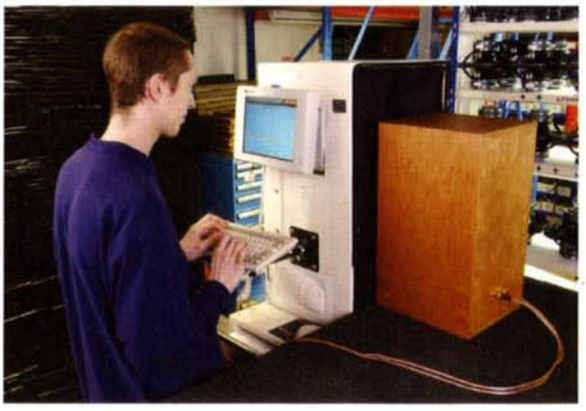
'Harwood wasn't interested in staying on as a consultant, saying he'd rather stay at home and tend his roses'

So, to cut a long story short, he went back to see Harwood again, negotiated a price and on the 30th of October 1986 became the owner of Harbeth Acoustics. Harwood wasn't interested in being retained as a consultant, saying he'd rather stay at home and tend his roses!

'The reason above all others that I thought I could make a go of Harbeth was because Harwood's biggest market was Japan. After spending six or seven years working with the Japanese in semiconductors, where quality is everything. I thought that I could work the ⇨



LEFT: Supple oxygen-free stranded copper cables are used to connect crossovers to drive units, avoiding 'buzzing' within the cabinets



ABOVE LEFT: Out in the bluebell woods, free-field speaker response measurements can be taken as part of the design process

ABOVE RIGHT: Anechoic testing of HL P3ES-2 RIGHT: Every speaker is measured to ensure consistency

formula backwards and gave them a British product with a high quality level. I knew I couldn't compete with the engineering knowledge, though, and I'd have to work hard to bring myself up to speed.'

HARBETH'S VERSION OF THE LS3/5A

Over the next few years, that was exactly what he did. But initially, to smooth the transition, the Japanese invented the story that Alan had worked for years as Harwood's apprentice before taking over.

Alan continued with Harwood's HL4 design but soon introduced a smaller model, the HL Compact. Sales in Japan boomed, as did sales to broadcasters, including the BBC. Harbeth started building the BBC LS3/5A speaker in 1988, when the computer-optimised '11ohm' version was introduced, but less than two years later came up with its own 'LS3/5A replacement'. As Alan explained in a *Hi-Fi News* article ('Inside story of the LS3/5A legend', November 2004), his HL-P3 was intended not to woo domestic LS3/5A listeners, but to overcome one of the LS3/5A's practical disadvantages in broadcast use, its lack of magnetic shielding.

'After a while we started to understand what was going on acoustically inside the plastics'

By that time, Alan wanted to progress further with drive unit design and, above all, did not want to be dependent on a single supplier. So in 1990 Harbeth embarked on an ambitious three-year research programme, supported by the Science and Engineering Research Council (SERC).

'We had three graduate engineers here, half funded by the government and half funded by us, who looked at the whole mysterious business of the acoustical properties of loudspeaker cones. It was an enormous project, and part of the ongoing process was to invent a material, make a number of samples of it and then from that, calculate its density and acoustic properties and so on.

'We plotted the mechanical properties of the materials versus frequency, and started to understand what was going on acoustically inside the plastics.

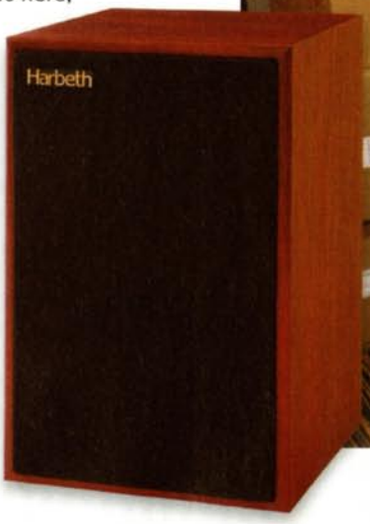
'Eventually we realised that what we wanted was something that was very stiff in one frequency band and had certain characteristics, and yet had different characteristics in another band and yet other characteristics in yet another frequency band!

'So we got into the business of blending different materials whereby we could optimise the frequency response and the acoustic quality according to the ratio of different materials we had combined in the blend. At the end of it we came up with an injection-moulded material which we called RADIAL (from Research and Development In Advanced Loudspeakers).'

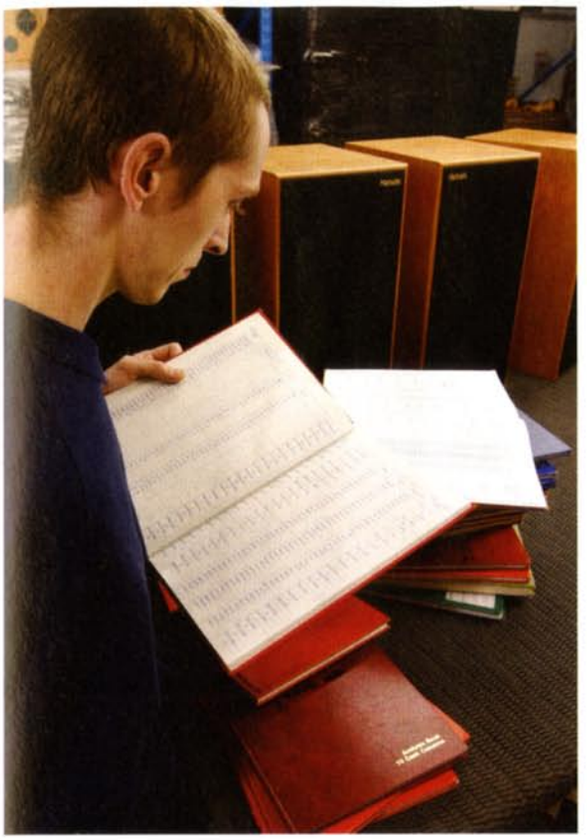
It would have been very hard, anyway, to get a supplier to make suitably small quantities of a custom-blend as sheet material for vacuum forming. Injection-moulding overcame this problem and gave a huge performance benefit as well.

'Because it's injection-moulded, the lines of stress are radial, hence the name. If you look at a conventional vacuum-formed material under polarised light, it is a calendered material, so the acoustic properties across ⟳

BELOW: Sam Heeler attaches labels to a pair of P3 ES2 cabinets in cherry wood veneers



RIGHT: The P3 ES2 is the third iteration of the P3, which Harbeth introduced in 1990 as its own replacement for the LS3/5A



ABOVE: Andy with one of the log-books that record the details of every Harbeth speaker ever produced

the grain are entirely different from along the grain. So in polypropylene, the sound fights itself. The best way to describe the sonic properties of this dreadful material is that it sounds [putting cupped hands over mouth] like *that*. And that's the difference. It just hasn't got the micro-detail. As the soprano's voice dies away in the hall, that micro-detail is converted into heat and it never gets out of the cone. Whereas the RADIAL material will actually radiate it as sound.

'Some designers know this, or they are aware of it subconsciously, and they try to compensate by raising the tweeter level. They get the harmonics of the missing 1k to 2kHz bit (say 2k to 6kHz) which does compensate to some extent, but you're left with a speaker that sounds unbalanced and rather hard.

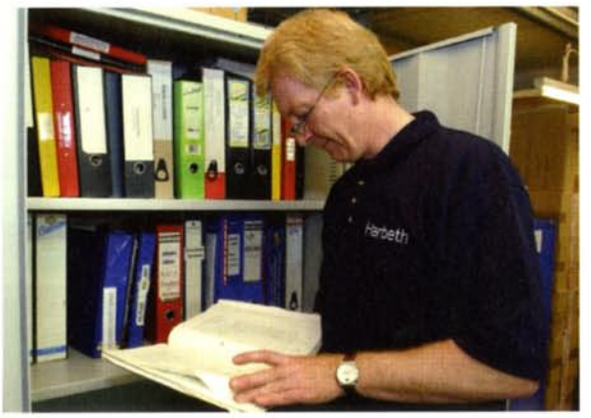
THE HARBETH SOUND

'So the Harbeth sound, since 1994 or 1995, is the sound of our RADIAL material. And if you like this experience, then there is nothing else on the market that will satisfy you. If you have never heard it, and you've been living with polypropylene, you probably wouldn't wake up in the morning thinking "I've got to get some new speakers!" until you'd experienced it. Then you think, "God, what I've been missing for all these years!"

'But we don't have the resources, the time, the energy, to evangelise. We have to wait until the consumer has made this comparison for himself.

'Which is fine. Because there are enough people every day, that do have that experience, to keep us alive.'

LEFT: The Super HL 5 is the sixth generation of Harbeth's first-ever monitor design



ABOVE: Alan Shaw with the shelf-full of data from the three-year research project which produced RADIAL

Harbeth's cabinet design still follows BBC principles, even though this makes them more expensive to build.

'The backs of all Harbeth speakers except the P3 are removable. A bell, cast with no cracks: hit it and it rings for ever. Introduce even a hairline crack into the bell, and it resists resonating. And that's exactly the same principle. The sound waves have to work through the less-than-perfect joint. It's a BBC idea. If you were to take the same box, remove the front and back, and then PVA them back on, you'd get a totally different sound.

'Let's accept that we cannot dispose of all that energy. Instead let's steer it from where it's acoustically objectionable – the mid frequencies – down to where it's not objectionable – the very low frequencies – and make the box thin, and manipulate those resonances by adding mass and damping to the panels, and pull it all down to the bottom. So you've got this extremely clean midband and this sort of warm, involving low end, which is ideal for some music. But maybe not all! It's in fact ideal for anything which does not have electronic bass.'

Harbeth has produced more rock-oriented pro speakers (like the Xpression! models of 1997, which were soon licensed to HHB) but the Monitor 20, 30 and 40 and the Active 40 are well established as drop-in replacements for the LS3/5A, LS5/9 and LS8 at the BBC.

Alan remains as devoted as ever to the ideals of the gone-forever centre of speaker engineering excellence that was the BBC Research department in the 1960s, ideals which are still expressed in the Harbeth Super HL5.

'This is the sixth generation of Harwood's original design, and this has a sort of legendary following,' he says. 'There still seems to be something about a two-cubic-foot British box, there's something rather wonderful about it.'

ABOVE: Latest shipments to leave the factory carry Harbeth's red-and-gold 30th anniversary label

hi-fi news TIMELINE

1977
Harbeth founded by ex-BBC engineer Dudley Harwood, with his wife Elizabeth ('Beth')

1977
Harbeth launches HL Monitor speaker, using patented polypropylene cone

1986
Alan Shaw buys Harbeth business

1987
Harbeth becomes launch supplier for revised '11 ohm' LS3/5A

1988
HL Compact launched

1990
Start of three-year cone material research project

1994
Supplier for BBC LS5/12, the last BBC in-house designed monitor

1995
HL Compact 7, HL-P3ES and HL5ES

1997
Xpression! range

1998
Monitor 20, 30 and 40 launched as 'drop-in' replacements for BBC designs

2001
Super HL5 with Radial drive unit

2007
HL-Compact 7ES-3 launched