

HI-FI CHOICE

THE WORLD'S NUMBER ONE GUIDE TO BUYING HI-FI

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HI-FI CHOICE

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Menu

The other night I was walking down to the local chippy listening to the Door's *Greatest Hits* via one of the CD personals we had for review this month. Nothing very special, you may think. However when you stop and think about it, it's really rather amazing. Nowadays we tend to take music for granted. You can listen to CDs on the train, tune into radio just about anywhere, and when it comes to relaxing at home, you can have an entire symphony orchestra laid out in front of you. Imagine explaining all that to someone who lived more than 100 years ago. In those days a piece of music was written and then, if the composer was lucky, performed. If you were rich enough to attend a performance you heard the music for an hour or so and that was it.

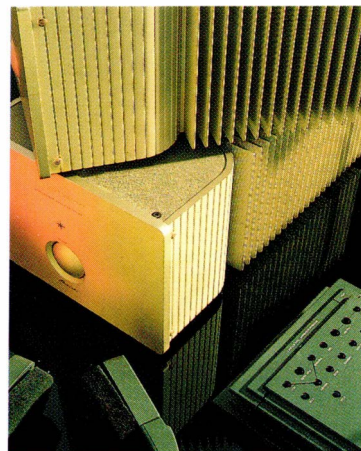
All that changed with the advent of sound recording, but it wasn't really until the Sixties, and the birth of compact cassette that music really became available to the masses. Teenagers up and down the country were able to listen to just about anything they desired in the comfort of their own bedrooms. Still, even in the Sixties the vast majority of people were listening to mono recordings with quite appalling sound quality.

Although many would argue that hi-fi started far earlier, what we are talking about here is hi-fi being readily available to that oft abused character, the man in the street, from that point of view it is only really in the last 20 years or so that it has become an everyday item. And love it or loath it, CD has played an enormous part in opening people's eyes to just what can be achieved. When viewed in that context, it's pretty amazing that I can wander down the chip shop and take Jim along with me.

All of which leads me, via a rather circuitous route, to the point of this month's *Menu* piece. Basically, hi-fi is amazingly good fun. Not only that, but it's also amazing value for money. When the bloke next door comes round to show off his latest gas guzzling executive mobile, I can show him that I've got Joe Satriani round for tea. When the woman on the other side is bragging about her new fitted kitchen I can let her have a quiet listen to Mahler's 2nd. Now I ask you, who is getting the better deal? I've got a system that is going to go on sounding great for years to come and once I've bought the software I can play the discs and albums as often as I like, for free. If people can get excited about cars, washing machines and conservatories, why can't they get just as excited about hi-fi? After all I'd have thought that listening to music is far more interesting than driving to work or washing your clothes.

In real terms hi-fi has never been cheaper, so isn't it about time you really treated yourself. Go on, pop down to your local hi-fi shop and leave buying that microwave oven until you've had a chance to re-explore your album collection.

Andy Benham



Cover photograph by
Chris Richardson.

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Concise information, prices and what we thought of every currently available product ever reviewed in our pages.



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Philips brings forward the launch of CD-I

Industry sources suggest that Philips has brought forward the European launch of CD-I (Compact Disc - Interactive) as a result of the success the format has enjoyed in the USA.

Although Philips would only confirm that an announcement is imminent, it is widely believed that the players will go on sale in London and the South East at the end of April with an announcement being made at this year's International CD-I conference which will be held in London on April 28th and 29th. The equipment will then become available nationally by mid summer. The launch will follow much the same format as America with CD-I demonstration booths being placed in major retail outlets so that would be purchasers can try before they buy.

The first players will probably cost in the region of £600 and are expected to come with at least one and possibly more software titles as part of the package.



Philips will be unleashing CD-I machines like this very soon.

Contrary to earlier reports, the first machines on the European market will not be equipped with FMV (full motion video) facilities, although these will be available as an upgrade at a later date. The first FMV equipped machines are promised for the second half of 1992 with the first FMV software titles following towards the end of the year.

Anyone interested in a sneak preview of the new system can check it at an exhibition entitled

'Into the future with Philips' where you will also be able to see DCC players and 16:9 widescreen televisions along with all the other goodies Philips intends introducing to the market over the coming year. The show is located at the Genius site, Battersea Park, London and will be open between 10am and 6pm over the 10th, 11th and 12th of April.

If you would like complimentary tickets to the show call Freephone 0800 212 643.

Jolly green giant?

Japanese giant Matsushita, one of the largest consumer electronics companies in the world, and parent of such companies as Panasonic and Technics, has announced a new initiative aimed at helping to create a greener world.

The Matsushita Product Assessment Requirement is a test policy which has just been expanded to embrace the company's hi-fi products. The testing is intended to evaluate each product for its use of resources and potential for recycling. 'Matsushita recognises the importance of conducting business in a manner which is kind to the environment,' states the company's press release.

Stop the clock

Deltec has announced the release of a special card which, the company claims, can be fitted to any CD player or transport and when used with one of the company's DELTRAN equipped DACs, significantly reduces jitter leading to improved sound quality.

This facility, which is similar to that provided by Linn in its Karik/ Numeric combination, enables the DAC's master clock to be fed back to the transport ensuring that both units have the same reference, rather than the usual case where both DAC and transport have their own, not necessarily exactly matched, clocks.

The DELTRAN facility is currently available on Deltec's Bigger Bit, PDM1 Series 3, and PDM2 DACs. Deltec reports that sound quality improvements include 'an improved sound stage, dynamics and rhythm, with instruments sounding much more natural, tangible and sweet.'

The price of the card is £395, which includes installation by Deltec or an authorised Deltec dealer. The installation shouldn't take more than two weeks.

High tech concrete creations

Fans of the highly acclaimed Jordan metal drivers may be interested to learn of the **Sonolith 1**, a new loudspeaker from Electrofluidics.

The design uses a Jordan bass unit and tweeter in an unusual looking mineral filled polymer enclosure. This high tech concrete has been specially developed for this application and comes in a number of finishes including gloss black, satin black and black crackle as standard, although Electrofluidics reports that just about any other colour can be supplied to order.

The crossover point between the main driver and tweeter is at a mere 400Hz and twin binding posts are provided to facilitate bi-wiring. The price of the new units is £1,800 per pair and further details can be obtained on (0206) 2475224.





Celestion DSPs the SL600

Celestion has introduced a digital signal processor for its *SL600* loudspeakers. The *DLP 600* is a £350 box of tricks that sits between transport and DAC and tailors the signal in the digital domain, so that it complements the character of *SL600* and *SL600Si* loudspeakers. By equalising the signal in the digital domain Celestion claims that it can adjust amplitude and phase without degrading it in the way that analogue equalisation does.

Processing is apparently accomplished by coding algorithms which take the impulse response and derive the DSP coefficients for the FIR filter. The *DLP 600* has both coaxial and optical (TOSLINK) socketry and accepts the standard CD 44.1kHz sampling frequency, however it cannot equalise for 32 and 48kHz sampling rates. So you can't use it with a DAT machine for instance.

You cannot be Sirius

Helius Designs of Worcestershire has just launched the first two models in its new *Syrius* range of loudspeakers.

The distinctive styling of the *Syrius I* and *II* are a result of what the company describes as 'a radical departure' from conventional loudspeaker design. Unlike other dynamic speakers, the *Syrius* range attempts to reproduce the entire midrange without the phase shifts usually associated with ladder-style crossover networks.

The enclosure design incorporates non parallel sides and a curved top to keep coloration low and reduce standing waves and cabinet resonance. These models are the first two in a projected range of five speakers. The *Syrius I* retails for £2,350 and the *Syrius II* for £1,800, inclusive of VAT.

Helius' radical and attractive departure from speaker design convention.



His master's dirty grooves

As the unstoppable silvery discs continue their relentless spread, audiophiles with large collections of vinyl are investing in serious record cleaning systems to preserve and protect these collections.

Hot on the heels of the Moth *RCM* comes an announcement from KJ West One, the UK distributor for the US range of Nitty Gritty record cleaning machines, of a new price on the *Record Master* cleaner. The *Record Master* is a manual wet scrub/dry vacuum cleaner and reportedly the only one



Clean out the grime in your grooves with a Nitty Gritty.

available which is capable of handling 45s and 78s as well as LPs. It now retails for just under £240. Contact KJ West One.

Technics stands up to be counted

No, it's not a baby robot eager to repair meteorite damage to the hull of your starship. It is in fact Technics' new venture in speaker stand design.

The *HSS370* has a tubular steel construction with a removable plug allowing sand (or, if you're feeling ambitious, lead shot) to be inserted into the centre column for extra stability. Floor spikes and speaker spikes are also provided, both of which can be adjusted by means of lock nuts. The stands are 37cm tall and the top plate is suitable 'for most medium sized box speakers'. The stands retail at just under £80 per pair.

The mighty Technics has moved into speaker stand production, what next?



Recordable CD from Meridian

Despite DCC being pushed as the only digital recording format for the masses, non-tape technology is still alive and kicking with the number of recordable CD machines growing slowly but steadily. The latest entry in the CD-R sweepstakes is Boothroyd Stuart with its Meridian CD-R machine.

This new CD recorder/player is compatible with all brands of recordable Compact Discs in both eight and 12cm formats, provides automatic sensitivity calibration for each recordable disc and allows incremental recording — which means that you can continue adding tracks to your recording until fix-up (when the table of contents is written for the disc). After fix-up the finished disc is fully compatible with domestic CD and can be played back on any CD player. The Meridian CDR retails for £4,950 and is available immediately.

The New THIEL CS2.2

Since 1978, THIEL has carefully developed its *Coherent Source*[®] design technology into a succession of highly acclaimed loudspeakers.

Now, after 6 years of success with the model CS2, the first new THIEL speaker since the introduction of the reference model CS5 is available—the CS2.2.

The CS2.2 provides an extremely high degree of tonal, spatial, transient and dynamic accuracy. We welcome comparison to any speaker at any price.

The baffle is sloped to properly position the drivers for correct time alignment and accurate reproduction of transient musical information. It also incorporates rounded edges to greatly reduce energy diffraction which contributes to very "open" reproduction.

A 50mm thick baffle, 25mm thick cabinet walls and extensive internal bracing greatly increase cabinet stiffness. By reducing unwanted vibration both clarity and imaging performance are improved.

The synthesised first-order acoustic crossover is a 26 element unit implemented with 35 parts. It provides completely phase accurate transitions between drivers to preserve the recording's spatial information and utilises custom-made polystyrene capacitors and low-oxygen copper, air-core inductors for very low distortion.



The same 25mm metal dome tweeter used in the model CS5 eliminates resonances, energy storage and colorations in the audible range. The short coil/long gap, large suspension design provides very low distortion and high dynamic range. The result is high frequency reproduction of unparalleled clarity and realism.

The woofer uses our newly developed double-surface, air-core diaphragm which practically eliminates "cone break-up" and provides exceptionally clear response. A specially shaped magnetic pole greatly reduces distortion, and heavy copper rings maintain an ultra-stable magnetic field. In conjunction with the bass radiator which eliminates the resonances and noise of a bass port, the result is remarkably clean and tonal bass reproduction.

The cabinets are finished in either mirror-matched Amberwood or gloss black lacquer. Custom finishes are available by special order.

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This year's Paris show was held over a rather dreary February weekend in two fairly large exhibition centres in the west of the city, but as usual there was no shortage of goodies to be found. At the Sofitel hotel, smaller specialist brands were displaying and demonstrating their equipment. These included quite a few British brands like Onix which had a range of power amplifiers and at least one preamp on show - how come we never see these over here? Lowther, the horn loudspeaker company, has effectively disappeared in this country but seems to be doing well in France, its distributor had a range of half a dozen models ranging from £1,300 to over £7,000 including some fairly substantial beasts. The same distributor, Magavox (now there's a familiar name), also had a brand new Decca cartridge called the *Supreme*, this looked considerably more substantial than previous models and carried an equally substantial price tag of £900. It was sounding pretty decent on a Michell deck through the aforementioned horns. In the next room I found a prototype Metaxas CD player, this is from the same Australian company that makes glamorous transistor amps and electrostatic loudspeakers, and it too is a very sexy not to say unusual beast. It looks like an upright slab with a disc turntable slotted through it.

The Tannoy distributor had a selection of larger models including the standard *Westminster* and some rather stylishly finished pro models - why doesn't Tannoy UK dare to expose these aspirational models to the public?

More novel was a small speaker from the American company Lineaum whose products I mentioned in the Austrian show report. In Paris its distributor was playing a new model called the *LFX* made out of Corian synthetic stone with the distinctive Lineaum line source driver sitting on top, devoid of baffle. Another interesting American product was the £10k Sutherland preamp. This seriously esoteric looking piece sports a single rotary knob, a subtle array of lights and legends and a discreet but informative LED display. As you might have surmised, the Sutherland *C-1000* as it's known contains at least one microchip and can jump through hoops whilst maintaining a purist approach to signal control.



Le Salon de Haute Fidelite Paris 92

Possibly only slightly more digital was YBA's rather tasty looking CD player, still apparently not in production, and a new CD transport from Audio Alchemy. If there was ever a company that liked splitting things into as many boxes as possible it has to be this one, one box for the transport and another for the controls - what next? Price over there looked like being in the region of £800.

In the same room were a couple of new floorstanding speakers from Genesis, a relatively small cylindrical model called the *Genre* and a substantial five way called *Genesis 3*, if the prices of the stand mounted models are anything to go by, the latter is a big bucks speaker.

My search for new things analogue was not disappointing either, veteran French tube and turntable manufacturer J C Verdier was playing one of its high mass decks or Platine Verdier as they are known. This

particular model uses a magnetic bearing to support its hefty, mat free, metal platter which is driven via a silk cord by an outboard motor. The arm in this instance was an old style 12inch SME fitted with an undoubtedly re-tipped Denon *DL 103* cartridge, a very Japanese style affair, and at £3,500 for the turntable alone, quite a dear one. The same company had a four chassis tube phono stage, acres of glass and chrome all dedicated to the fine pursuit of equalising and amplifying phono signals, the price was undoubtedly discouraging but it sure looked and sounded the business. Mains filter manufacturer Copenhagen Transformers also had an interesting phono stage in prototype form, it's a hybrid dual mono device that looks like retailing for around £4k, the same company also introduced some extra beefy conditioners called *Cosmopolitan* for use with muscle amps.

Top left: The gorgeous Metaxas CD player. Top right: Lineaum's Corian LFX loudspeaker and below, Le Platine Verdier.

As one expects of the French, unusual and distinctive styling was in plentiful supply, there were all manner of wacky speakers including foot or so high three legged eggs and a range of satellites and subwoofers that looked like models from the *Star Wars* set. The latter made by Creations Acoustiques de France, whose brochure bore the legend 'Une autre dimension de kit', which just about says it all. Triangle, the loudspeaker and amplifier company, wasn't to be left out either. It was displaying the *Nemo* integrated amplifier, a £1,000 minimalist sandwich with some chunky knurled knobs sticking out the side.

Whilst in Paris I couldn't resist visiting that veritable Aladdin's cave La Maison de L'Audiophile, the HQ of France's grittiest enthusiast publication. The day I visited they were playing incredibly low powered valve amps built by subscribers. These two and a half, and three watt monoblocks (I kid you not) were making superb sounds through the shop's massive Onken horn speakers, which must be 100dB plus efficient. They were also A/B ing 300B tubes! Comparing £200 a piece antique Western Electrics with modern equivalents - the differences seemed pretty subtle but the tubes would probably have appreciated a bit more than the minute or so to warm up that they got. The turntable there wasn't exactly subtle however, another Verdier model, it had an even bigger platter than the one at the show and two flywheels for extra speed stability!

Back at the Palais des Congres, Marantz was proudly showing off its glitzy DCC machine, Yamaha had a pro CD-R recorder and a completely OTT veneered disc player called *GT-CD1*, and Spirit of St Louis was displaying a large range of rather nice retro radios with cassette slots in their sides. For a change this part of the show wasn't packed to the gills, which though undoubtedly related to the economic climate, was probably something to do with the beginning of the Winter Olympics down in Albertville. Not such great timing, how about having it in the Spring next year?



The Pioneer A400 amplifier.

As recommended
by these
speakers.

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Best Buy Overall.

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Best Buy Amplifier.



 **PIONEER**
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WHAT HI-FI? OCT 1990. "THERE IS SOMETHING INEFFABLY RIGHT ABOUT THE A400." ALVIN GOLD.

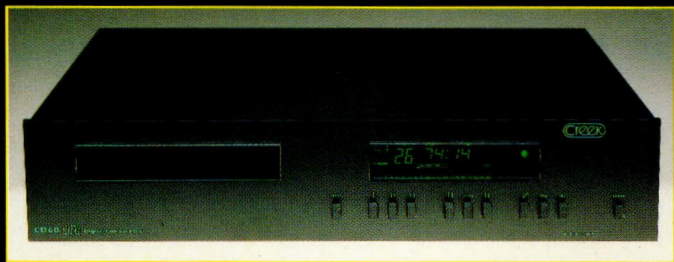
HIGH-FIDELITY. SEPT 1990. "IT LOVES MUSIC, THE A400. IT LOVES IT WITH A VENGEANCE." MARK PAYTON.

AUDIOPHILE. SEPT 1990. "EVEN IF YOUR BUDGET EXTENDS TO £1,000, IT COULD BE EXACTLY WHAT YOU'RE AFTER." JIMMY HUGHES.

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CD players on test

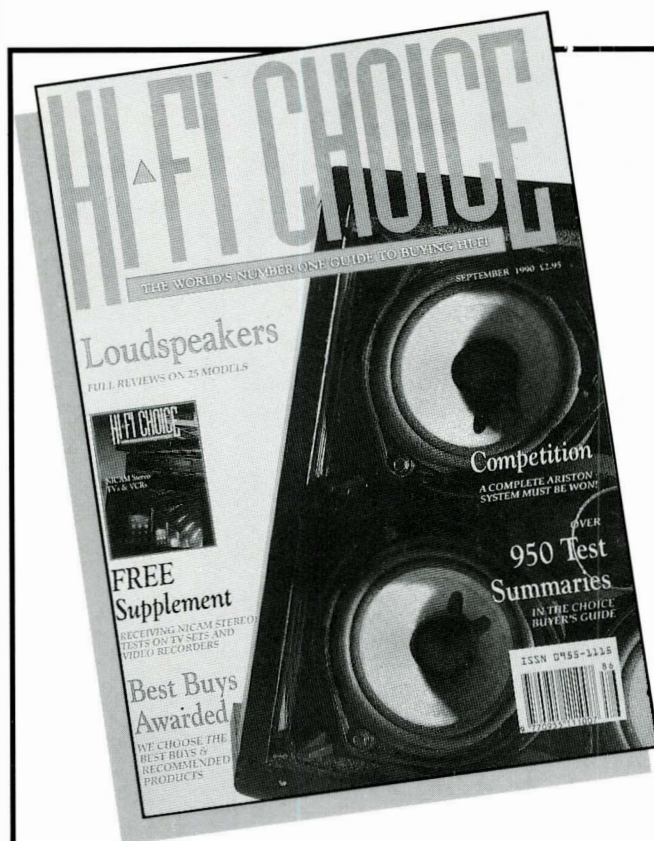
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Tim de Paravicini, founder of EAR and designer of Musical Fidelity amplifiers, among others, is a major figure on the British amplification design scene. Dan Houston has been to see his 'factory'.

Esoteric Audio REVELATIONS

Ask Anthony Michaelson, the boss of Musical Fidelity, about his consultant designer, Tim De Paravicini, and the answer is unequivocal. "He is extraordinary," Michaelson tells you, "he once drew the circuit diagram for the transformer of the *M200* on the back of a cigarette packet right in front of me. That's a 200Watt design which is flat from 20Hz to 30KHz — probably the best of its kind even today. And it took him about 15 minutes; the guy's out on the astral plain.

"I've known a lot of designers," Michaelson continues, "and they couldn't come up with something which is fit to

kiss his boots. The thing about Tim is that he has intuitive insight in design. His circuits appear to be simple but the more you look into them the more complex and yet incredibly logical they are — it's like Mozart's music. He's really out there on his own, and he has a thing about designs being non derivative. You won't find any of his stuff in any text book I can assure you.

"The trouble is he sees himself as a kind of Leonardo character - he knows he's one of the best designers but he doesn't know what that means he's worth. When he sent me the diagram for the *A1* in 1984 I asked him how much he wanted

for it. He suggested some ludicrously pitiful sum and I said, 'What! You must be joking!' And so he said, 'Oh alright, just buy me a bag of groceries'. I couldn't believe he'd undersell himself like that."

Tim de Paravicini's designs have kept Musical Fidelity at the forefront of British and world innovation for the past decade; he's been responsible for all the greats like the *A370* as well as the controversial *B1*. Musical Fidelity is just about to launch a valve hybrid CD player, and an *A1* with a tube preamplification stage which will bring audio exotica into the mainstream. Tim's designs are also wowing the audiophiles with the company's high-end

brand, Michaelson Audio. The two men first met in 1977 when Tim designed the Michaelson Austin range of valve amplifiers - which became Mentmore Electronics and has now changed into Sound Research.

Then, according to Tim, they couldn't speak to each other for three years when he founded Esoteric Audio Research — his own exotic valve amplifier company.

The rift was mended in 1981 when Michaelson acquired Musical Fidelity - which Tim pronounces as 'Musical Fiddle-tee.' "I'm on a retainer to Musical Fiddle-tee," he explains, and he says it in the way a dog might tell you it was on a leash.

Esoteric Audio Research, or EAR, occupies a workshop on an industrial estate in Huntingdon, near Cambridge. To describe the interior as unprepossessing would be a kindness; an outer room is chock full of what looks like scrap machinery with a couple of juke boxes and a pair of one inch analogue studio tape recorders almost lost in the gloom. "You know, the reason the Beatles sound so bad on CD is because they were recorded on one of these," Tim says pointing to his original EMI four track recorder, "but they didn't use one to remaster the tapes; I could have lent them this!"

Under a heavily laden workbench is a Jaguar *E Type* engine block. "I'm keeping that until it's worth something," he says conspiratorially, adding that his main hobby in life is cars. He keeps a Ford Escort with a Daimler engine squeezed under the bonnet, no doubt to surprise Essex man, or Cambridge don, at traffic lights.

His inner workshop is similarly packed with hi-fi and recording detritus, with the incongruous inclusion of a dirty sofa in the middle. His three assistants work under a frosted glass window along a wall of workbenches and appear to have cleared a space for themselves by pushing tools, gadgets and half-finished projects to one side.

Tim, who has been lord of this chaotic domain for the past ten years, is smoking a cigarette and eating a sandwich at the same time, with one hand, while repairing a Sixties valve amp with the other.

His appearance, which at 46 years old seems to borrow heavily from the Catweazle school of dress and groomage, belies the acute mathematical brain which has fired, and partly led, what he now calls the valve renaissance.

Nevertheless he is haughty enough to point out that his family is descended from an Italian nobleman at the English



Wish you were EAR: Tim de Paravicini's work force pursues audio esoterica.

court in the 16th Century, Horatio de Paravicino, whom some think was the model for Hamlet's best friend in Shakespeare's play.

Tim is fond of pointing out that there is nothing new under the sun - and says Sir Isaac Newton discovered digital theory when he proposed that you always need two bits of information for accuracy.

Renaissance man

While he appears to take his lead from the great men of that other Renaissance, he is widely dismissive of current audio standards and innovation. "Data compression is the latest vogue and for what?" he asks cynically. "The digital boys all think 'lets go for DCC and data compression - we'll do it because the floor sweeper at our factory can't hear a difference'."

Needless to say, he is adamant that analogue audio still represents the ultimate in sound reproduction compared to current alternatives. "On vinyl you have a large number of molecules to store information," he says, "whereas on a CD you just don't have much plastic to play with. It's like the film industry still using celluloid rather than video."

His involvement with recording has led to him rebuilding analogue one inch studio tape machines, and making them to his own design. "The mastering machine we make has a 90dB dynamic range but infinitely more resolution in the bottom end than any digital machine. And it goes up to 35kHz."

Why bother with such frequency resolution when the human ear supposedly can't hear it? "Oh you may not hear it as such," Tim says, "but you certainly know it's there. I'm involved with a company making ultra sonic bath scrubbing machines which fire sound at a bath tub to remove the lime scale. They operate at 40kHz and believe me you can feel it when that machine is on. It's a bit uncomfortable on its own.

"A lot of musical instruments such as little brass cymbals or bells have harmonics which do go way up, and some of the old analogue tapes captured them. I redid a 1955 recording of *Daphnis and Chloe* (Ravel) by RCA for the Chesky label where the audio signal was going well beyond 40kHz — with bass resolution down to 20Hz and that was on quarter inch tape. It was one of the first recordings made in

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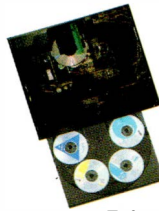
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stereo. With the digital 16-bit standard there is just no way you can retrieve that level of information, all you can do is fool people into thinking it's better with digital sound processing stuff. I have recently been comparing new CD players and DACs with the original Philips machines and they don't sound much better. But most people only compare equipment to what has gone immediately before it."

Tim is known in the recording industry for his work with the specialist labels like Chesky and Altarus, and has made a valve driven cutting lathe for John Dent's specialist mastering operation at The Exchange in Camden, as well as supplying his recorders to a number of fidelity oriented studios.

He is adamant that specialists will have to return to vinyl if they want the best: "The alternative would be to go to 24-bit digital system which would make everybody's CD player redundant," he says. "But analogue can still be improved by using materials like polyethylene. They tried that in the Fifties; it's a harder material with a smaller molecule chain — so you'd get better resolution than with vinyl. You'd lose some information at the pressing stage but you'd get much more on playback."

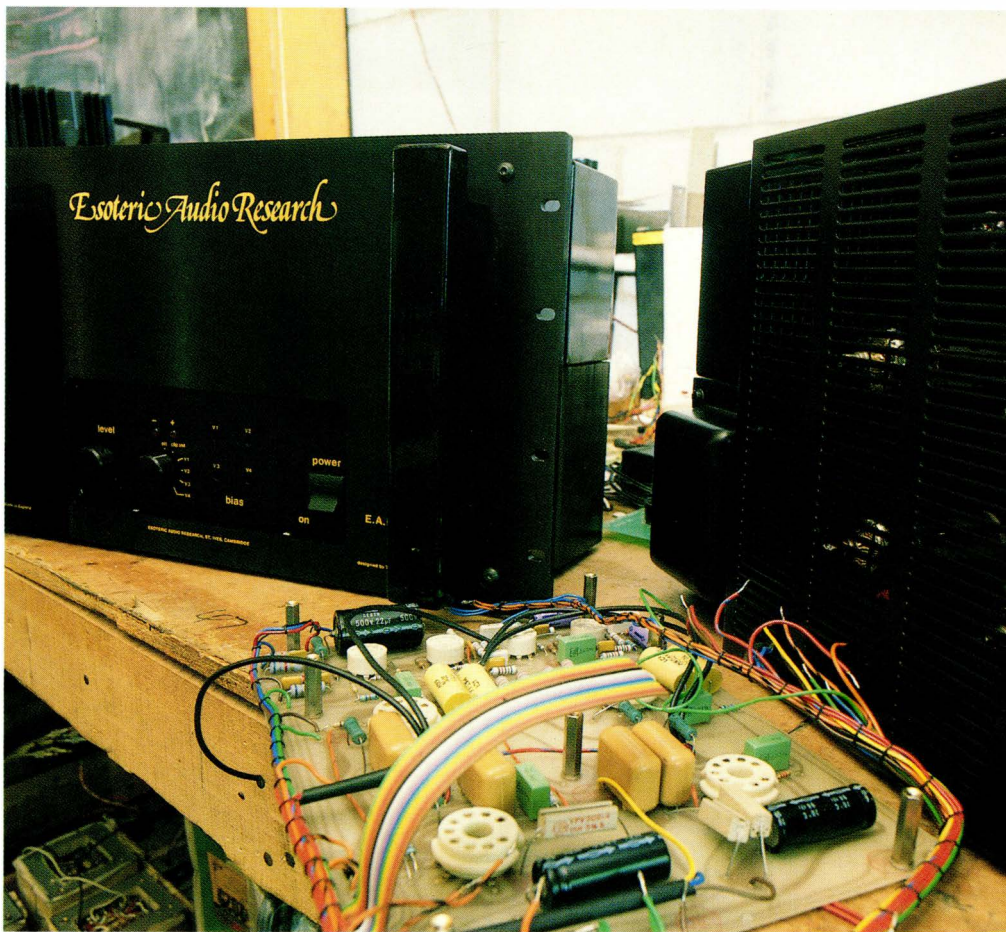
He also sees the traditional cardboard sleeve as a problem, saying that records should be packed like CDs - so that you lift them from a box rather than sliding

"I have recently been comparing new CD players and DACs with the original Philips machines and they don't sound much better . . ."

them out of a sleeve which scratches them.

Tim De Paravicini left Britain in 1966 with an electronics degree to work in South Africa where he found himself "building amps and working in hi-fi shops". While there he met the president of the Lux Corporation and accepted an invitation to go to Japan, designing such transistor amplifiers as the *M4000* and *M6000* between 1972 and 1977.

He describes EAR as a small but pure business and sees himself as a manufacturer of male jewellery. He buys in the parts for his amplifiers which are assembled by himself and his team. Valves come from Yugoslavia but most components, including transformers, are made locally



Chasing rainbows: brilliant colours lurk inside Tim de Paravicini's black boxes.

to his specification. Although his equipment includes an analogue oscilloscope which can measure up to 200 megahertz he eschews modern design tools such as CAD. "When I draw out a printed circuit board design by hand I have good feeling about how it hums," he says, "a computer just doesn't know about things like that."

He sees valve designs as being like oil paintings compared to transistor 'water colours' and says they are merely different rather than better or worse. "With valves there is no clear way forward, but I intend to develop CD players and cassette decks using valves," he says. "They won't just use valves in the output stages either — which has been done by some of the American manufacturers." His cassette player will use a motor designed by himself and take cassette tape through guiding rollers over the head ensuring a stability which current designs have failed to achieve, he claims.

While he recognises the qualities of vacuum tubes, Tim also appreciates the strengths of transistors. He has just completed work on the *Yoshino*, a single ended, class A, 30 watt transistor amplifier. "The transistors we found for this are new and extremely linear so we use very low feedback. There are just two transistors on the output driver per channel. They are pur-

chasable and I've deliberately rubbed the names off because the Japanese are going to want this one. This emulates all the properties of the traditional single ended valve power amplifier design — but if anything it's cleaner. I think it'll get the valve community buzzing." *Yoshino* is named after his wife and will cost £12,000 a pair. He sees it as his final statement on transistor design and contends that for the first time it will allow audiophiles to evaluate the difference between the ultimate solid state and valve amplifiers. *Yoshino* will soon have a sister, using valves in a similar circuit, which will allow such an evaluation.

EAR does produce more down to earth monoblok designs, however. The *509* upgraded to *MKII* now sells for £2,308 while the *802* preamplifier retails at £1,440.

Tim's philosophy argues that mono power amplifiers are the best solution in hi-fi. "You need the power amplifier stage to be close to the speaker — because it's much easier to match the preamp to the power stage. The power amp is seen by the preamplifier as an easy load to deal with and therefore it's easier to control the interconnect cable; loudspeaker cable should be kept short for the same reason. It's a case of taking Mohammed to the mountain rather than the other way round," he says.

EAR, Unit 11, Stukeley Meadows Industrial Estate, Huntingdon, Cambridge, Cambs PE18 6ED. Tel: (0480) 453 791.

Dan Houston visits Alan

Booth, boss of Collins Classics

and an audiophile with an

enviable hi-fi system at work.



Secrets from the **BOARDROOM**

It was a surprise to find a couple of copies of *Hi-Fi Choice* in Alan Booth's magazine shelf; the hi-fi and record industries have mostly separate existences, with very little formal discussion apart from setting standards such as CD, Digital Audio Tape, Digital Compact Cassette and so forth.

But Booth considers himself an audiophile, talks the language of high fidelity, and intends to take Collins Classics into audiophile recordings with — horse's mouth stuff this — all analogue vinyl pressings, 'because they're better, aren't they?'

This month our hi-fi 'in-the-home' feature in fact explores Booth's boardroom where he listens to master tapes copied onto DAT, and the finished CD pressings from his burgeoning catalogue. It's therefore a working system, but also a revealing one, which doesn't subscribe to the music industry's common idea — that one only needs cheap equipment because it's what most people use.

Started in 1989 as part of Collins Harper

publishing, Collins Classics became independent eight months ago and joined the Pinnacle group — the fifth largest distributor of independent labels. Established acts such as Sir Neville Marriner and the Academy of St Martin in the Fields, Maxim Shostakovich or the Violinist Salvatore Accardo have been joined by young luminaries like Jennifer Stinton and Joanna Macgregor to bring the label quickly into the mainstream.

Timing for stalls

"We set out to achieve the concert hall sound," Booth told me. "We want our music to sound as if you're sitting in a very, very good stall seat in front of the orchestra." The label has therefore embraced Nimbus' ambisonic 'lifelike' system of recording. However, chief engineer John Timperley uses the multi-microphone approach while Nimbus believes in the austerity of a simple stereo pair.

"OK, you've only got one pair of ears but there are various subtle textures within an orchestral piece which you cannot ex-

pect to pick up using one pair of microphones," Booth defends. "However in a concert hall, with its bigger acoustic, you would be hearing those. You have to be careful and it's very easy to get it wrong; we don't necessarily have all the mics open but they are there to catch those subtleties."

Recognising that the full benefit of ambisonics would be most apparent to those using two pairs of speakers, Booth nevertheless feels that the simplicity of the system allows better results than some-



thing like Dolby Surround Sound with the normal stereo speaker arrangement. "It's non-gimmicky and gives an extremely natural sound. We've done orchestral recordings at the Barbican Centre, which has a notoriously difficult acoustic, and I felt that we were able to blow that away. What we achieved with ambisonics was almost a visual image of the orchestra on stage in front of you."

With a hi-fi system like this, who needs pot plants?

Another common complaint made by audiophiles concerns editing, extra pieces of note perfect tape being cut into the first complete take, to cover for a flat instrument, say. These can often be heard, sometimes as a cut (which is unforgivable), but more often as a subtle shift in tone. "We try to keep editing to the minimum," Booth explained. "But we are really dependent on artist's comments. There isn't a hard and fast rule, but I do feel you should present an accurate picture of the music and I don't feel you can get away with

mistakes. But of course it's better to find an extremely good orchestra who get it right first take."

Booth considers himself to be 'probably the most critical person about sound quality' and listens to all recordings on the system in the boardroom, next to his office. The room isn't as large as its grand title suggests, and conforms more to the average size of a lounge in a small house. A wall of purpose built shelves contains the current repertoire of 170 CDs with a few LPs — pressed when the label was





Shelf life: Alan Booth's boardroom reference system, plus a sprinkling of software.

first founded. The hi-fi system sits in a black ash cabinet which matches the rest of the furniture, including the table where executives can also sit and listen to the latest product.

The component most used is a Sony 77ES DAT machine. "I check all DAT copies of the master tape, taken straight from our U-Matic. The artists receive a compact cassette at the same time," Booth said. "I check the tapes mostly for sound quality, but also to make sure that they haven't left the bassoon out and for any clicks or noises. But generally the producer has checked that already, so really I'm the long stop for sound quality. I reject very few, I think I've turned down about three in as many years."

The rest of the source equipment used for this arbitration process is a Teac CD transport, Deltec *Bigger Bit* digital to analogue converter and Pioneer *Reference Series F91* tuner. These can be processed through a Mini M Ambisonic decoder (as

yet unused). Amplification is from Quad, with the 66 remote control preamp and 606 stereopower amp. Furukawa speaker cable takes the signal to a pair of Dynaudio *Craft* nearfield monitor loudspeakers. These are the first pair to be sold in the UK, and distribution has only just been set up. The *Craft* is a £2,000 4ohm passive design which boasts enormous power handling — the tweeter can apparently take 2,000 watts! The speaker includes coaxial and XLR plugs as well as the normal banana connections which are used in this system. They sit on a pair of Partington *Dreadnought* stands.

The Ambisonic decoder is not being used because ambisonics hasn't yet been embraced by hi-fi manufacturers. The system is therefore a 'secondary consideration' for Booth. "The rear pair of speakers will, in any case, only be used to enhance the reverberance and ambience of the concert hall," he said, "but using four speakers does bring the musicians slightly

forward and improves the stereo width compared to normal speakers. The Japanese manufacturers have told us that they will be putting switchable ambisonic circuitry in their equipment in the future. So when the hardware becomes available we'll have the software to back it up."

The system is quite similar to the one Booth uses at home. "I've always used Quad amplifiers, although my first amp, purchased in 1972, was a Sansui quadrophonic unit, so I got used to the idea of four speakers a long time ago. I'm using the Arcam *Alpha* CD player with the Teac *DAC* and a pair of B&W *805 Matrix* loudspeakers on *Kudos* stands. I was amazed at the difference when I followed the manufacturer's recommendations and poured sand and lead shot into the stands. The whole bass tightened up and it made an unbelievable difference, even though it was a very analytical system already."

Other life forms

"But I don't just listen to classical music at home," asserts Alan. "My philosophy has always been to listen to other forms of music. You get bogged down if you don't have broad taste." These other forms include rock and disco, with Madonna, Michael Jackson and the 'superb' Lisa Stansfield cited as favourites.

One of the reasons Booth invested in the office system was because he was keen from the start to establish an audiophile label, and needed equipment which could reveal the vagaries of the recording situation as much as the music itself. As such he is considering a second specialist operation pressing onto gold CDs, and also recognises that there could well be a vinyl revival on the way. "Certainly I think analogue recordings of classical music sound better," he says. "It's interesting, we did an experiment where we recorded on analogue reel to reel tape and digital U-Matic. We then played both back with the conductor present and we were all completely bowled over, particularly by the string sound on analogue which had so much more breadth and feeling."

At this point in our conversation Steve Mason, the chairman of Pinnacle Records walked in. He described how, on a recent visit to Japan, he had been consistently asked to provide more music on vinyl. He's a long standing, and often outspoken, vinyl enthusiast. "It's my avowed intention to be the last producer of vinyl in the UK," he says.

Of course, for vinyl pressings to work for audiophiles they have to be recorded and mastered on high quality analogue equipment, ending up as AAA, just as many of the best pressings on digital are DDD. Seeing analogue suffering in the same way that real ale did in the Sixties, Booth's thinking of calling a specialist label the Real Sound Company — perhaps to cater for a real sound campaign!

While he recognises, a bit late for some, that analogue recording offers a higher quality sound source for the purist, Booth is nevertheless committed to Digital Compact Cassette, or DCC, as a replacement for the music cassette.

"We have a bunch of releases being planned," Booth tells me. "I think DCC is infinitely better than the cassette at present — which I think has been a very poor sound carrier in comparison to CD. I'm pleased about DCC on that side of things although I sincerely hope it won't replace DAT (Digital Audio Tape) for mastering, which some people are suggesting. I personally think DAT offered a superior sound to CD, and it's a shame the record industry stopped it being launched. Even the few releases which were produced were difficult to market, at £25 each. Consumers didn't think they were getting value for money."

So what will consumers think about the touted price of DCC, at £12 or £14 a throw?

"I'm worried that it's going to be the same price as a CD," Booth admits candidly. "We haven't made any pressings yet but in marketing DCC we would see it as equivalent to a cassette and wouldn't want to associate it with CD, so that may determine how we price it."

"I think it's potentially very dangerous to sell DCC at the same price as CD. Many people have now got hold of the idea that DCC will be replacing CD, which is nonsense and a case of a little knowledge doing great harm. Even small companies like us have invested £5M in recordings on CD. We're hardly going to change just like that."

"It's already detrimental to sales; I know people who still haven't bought a CD player. They think DCC will take over. It's time the hardware and software industries got together as a consortium and decided what to do and then launch to the public. At the end of the day we're all beholden to the consumer and if we don't give him what he wants then we're not going to be here in a few years' time."

Booth recognises that the independents will be the first victims of public atrophy over music; "If we don't get a grip of ourselves then it'll soon just be up to the majors like EMI — there'll be no



Chandos, no Collins and you'll only get Nigel Kennedy doing the Four Seasons or The Three Tenors!"

The system:

Sony 77ES DAT player	£1,000
Teac P500 CD transport	£650
Deltac Bigger Bit DAC	£650
Pioneer F91 tuner	£350
Quad 66 preamplifier	£795
Quad 606 stereo power amplifier	£636
Dynaudio Craft loudspeakers	£2,000
Furukawa speaker cable from:	£12/M
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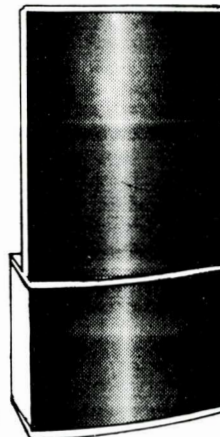


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(Extracts: HI-FI CHOICE)

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The vinyl countdown

Andrew Cartmel looks at the financial viability of changing over to CD and offers an alternative for those on a tight budget.

Here's the situation. You love music. It doesn't matter what genre of music (Count Basie said there are really only two kinds anyway — good and bad). So you love music, be it classical, cajun, techno-dance or grindcore. You love it, you appreciate the difference good hi-fi can make to that music, and you're about to spend some money on a serious system. This system may end up costing anything from five hundred quid to a few thousand, but your financial resources are not limitless.

Now, this is an important purchase and deserves careful consideration. How should you deploy your hard earned money, so as to get the maximum return in music pleasure for every chunky little golden coin? There are all sorts of theories about how you should allocate your funds, with X amount going on the speakers, Y pounds on the amp, etc. I wouldn't presume to comment on these schemes, but I do have one piece of useful advice.

Go for a single source in your system, and at the moment you should seriously consider making that source a record player.

Don't get me wrong. I'm not an old school foam-flecked vinyl die-hard. I'm not going to make any arguments on the basis of sound quality, telling you that vinyl is like relaxing in a warm deep bath while CD is like being held under a cold shower. The medium may not be perfect but I actually like CD. I think that the future is definitely digital. In terms of

This month Andrew Cartmel looks at the second hand record market while, belatedly, Andy Benham has almost been converted to DAT.

durability, ease and flexibility of use the format wins hands down, while the vinyl experience has plenty of intrinsic irritants. Personally I hate hopping up every twenty minutes or so to turn the record over; and the cat, who has just settled in my lap for a good kip, hates it even more.

But at the moment we're in the middle of a recession; you don't have an unlimited budget and the question is how to get the most music pleasure for your money. Which means that you can't afford to ignore the price of software. If you think about it, your music collection is potentially the most expensive part of your



CHOICE SESSIONS

system budget; it's like a component you never stop paying for. And while I believe CD is the wave of the future, at the moment the software is breathtakingly overpriced. This Christmas things went beyond the ludicrous with, for example, the new Tina Turner album being marketed for just under £15.

Combine this insanity with the fact that cheap and secondhand vinyl is now flooding onto the market and you have a situation where a turntable based system makes plenty of sense.

The picture accompanying this article shows seven LPs and a CD. All of the records in this photo were found over the last couple of months, all are in excellent nick, and all of them are wonderful music of some kind. Now, am I going to tell you that these records, all added together, cost less than that single CD? Nope. In fact, they cost exactly 19p more.

Tracking down elusive vinyl

Where do you get cheap records? All the major music chainstores are still including LPs in their sales, and as they shift the last of the vinyl out of their warehouses you're bound to find a few gems among the Jason Donovan overstock. But the real

place for bargains is the secondhand sector. Try jumble sales or your local market. Of course, at the market, you will also find some optimists with boxes of 'rare rock' selling LPs for as much as a fiver. These people will keep trying to charge premium (cf rip-off) prices for old records but frankly they're like King Canute trying to stop an incoming tidal wave of cheap vinyl, as huge sections of the population ditch their collections of LPs. It doesn't take an economist with glinting spectacles to work out that prices can't be kept artificially high in a situation like this. Hunt around and don't pay more than two quid for an LP in excellent condition. If it's not in excellent collection, don't buy it. Inevitably some older albums, even if unscratched, may have acquired a patina of dust and dirt. But with the money you save you can buy your own record cleaning machine. (Moth is currently marketing one for £300, or roughly twenty Tina Turner CDs.)

So if your financial resources are limited and you're on the verge of committing to a major system purchase, don't discount the possibility of buying yourself a good turntable, arm and cartridge and then getting out there to track down a big collection of your favourite music. In five or ten years time things may have changed and you may need to review the situation. CD technology might have moved on significantly (very likely), supplies of cheap vinyl may have dried up (fairly

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likely), and there might have been a quantum downward leap in CD prices (hmm). That would be the time to buy a tasty CD player and start investing in some silver discs. This wouldn't necessarily be an altogether sad situation. My cat, for one, would be delighted.

DAT'S all folks

Ever keen to be the last one to explore a new format, Andy Benham thought it was about time he got to grips with DAT.

Despite the presence of several DAT machines in the office over the last couple of years, I've never been particularly keen to take one home and have a serious play. This is for the simple reason that I'm quite happy with LP and CD and didn't really want to cram another rack of software into my already cramped front room.

A couple of weeks ago a friend, who has his own moderately successful band, asked if I'd mind popping along and doing a bit of recording for a promo. Looking around the office for a suitable tool, I saw Aiwa's baby DAT player and decided that this might be the ideal opportunity to have a play with a DAT machine.

The tiny little unit was soon wired into a stereo feed from a Soundcraft desk and after experimenting a bit with the level, I managed to fill a couple of the digital equivalents of the humble C90.

The sound quality was, it has to be said, exceptionally good, and the lack of background noise was particularly noticeable. So far so good. The problems

"I could quite happily have copied a Dire Straits CD onto tape as many times as my heart desired. What I couldn't do was make even a single copy of my own recording of the band."

started that weekend when we came to do a bit of editing before the tape was sent off. As *Choice* had just finished its cassette deck issue, there was no shortage of DAT decks to play with and pretty soon we had the baby Aiwa wired up to one of its full size cousins. Making a single tape from the two live tapes was no problem and we had the tracks in the right order and just about perfect, so we decided to copy that across to a finished copy.

The common code

Then came my introduction to SCMS, which, for the uninitiated, is the system intended to stop you making multiple copies of the darling record company's precious software. The reason for this timely introduction to the system is that



The Aiwa HD-S100; part of Andy Benham's semi-professional DAT recording setup.

all 'domestic' DAT machines come fitted with the system, and it proved impossible to copy the aforementioned tape or make any alterations. The answer, as it turned out, arrived in the form of a Tascam (Teac) 'semi-professional' unit which wasn't equipped with SCMS and was thus able to record from the Aiwa.

The point here is that I could quite happily have copied a Dire Straits CD onto tape as many times as my heart desired. What I couldn't do was make even a single copy of my own recording of the band.

This obviously begs the question of just where is the line between 'domestic' and 'semi-professional' DAT drawn. I phoned up HHB, which has sold over 12,000 DAT players to date and is widely regarded as London's 'one stop DAT shop' and explained what had happened. Would I, as a fledgling sound engineer be able to buy a non-SCMS machine? The answer was that yes, I probably would, as HHB believes that the price of the Tascam unit (£1,200) allied to the price of blank tapes (£6 or £7) is enough to keep the format out of the hands of tape pirates and that even if someone were to start pirating tapes there is no market for them anyway, as most DAT machines end up

in the professional market. As HHB's Steve Angel pointed out: "We've sold over 12,000 DAT machines and we can't check out every customer. Even though we are pretty sure that every one has ended up in safe hands, you can never be certain."

Recording via the professional inputs of the Tascam, we ended up being able to exploit the DAT format to its full. The Tascam unit lays down time code along with the track itself and this enabled me to move start IDs around with an accuracy of an astonishing 150ms, certainly far better than you can achieve with ear and fingertip alone. Once you've played with this sort of facility for a while you realise just how useful DAT can be and why it has been a success in the professional market. It also makes SCMS look a bit silly, as it destroys a lot of the user friendliness of the format.

The moral of this story? Well if you're thinking about buying a DAT machine and intend to use it for recording non-copyright material which will require subsequent editing, try and get hold of a professional machine like the Tascam.

If, however, you have got an SCMS machine and need to edit your own recordings, help could be at hand. Just as we went to press I received details of a rather clever black box known as the TCD Stripper which removes the SCMS data flags and enables you to by-pass the system. I hope to have a play with this unit in the near future and will report back in a forthcoming issue.



STATEMENTS

*Jason Kennedy in amp land,
Martin Colloms slipping
into a pair of anything-but-
hush Puppies and Paul
Messenger on WR, the
mysteries of the horn loaded
loudspeaker.*

Last August (issue 97) I reviewed a complete Marantz Music Link amplification system consisting of the PH-22 phono stage, SC-22 preamp and MA-22 power amps. At the time Marantz gave me a brochure for the dearer MA-24 monoblok power amps and, as you can imagine, I've been after them ever since.

On paper they look rather special. They cost a cool £2,000 per pair; but perhaps more importantly, they use a low feedback, class A design and produce enough heat to get my living room cooking but put out a modest 30W. If they didn't have MOSFET output devices they would almost have to be tube amps.

Each MA-24 is a very nicely built piece of kit, the aluminium and copper plated chassis is entirely non magnetic to avoid eddy currents and contains a toroidal transformer wound with OFC wire. Each amp weighs a healthy 11kg, but they are quite small as class A amps go. The extruded side panels incorporate substan-

tial heatsinks and the beefy front plate harbours one of the biggest on/off switches in the business, although this could be a bit more solid in use.

Getting the MA-24s up and running proved a little trickier than I had hoped. The plan was to slot them into my system in place of the Audio Note *Neiro* power amp alongside an Audio Note M7 tube preamp. However, the combination of the M7's high output and the MA-24's high input sensitivity wasn't destined for happiness. I ended up inserting a John Shearne preamp between the two, using

the M7 as a phono stage, which seemed to sort things out effectively, though there was still a little bit too much gain in the system. I had about 20 degrees of volume control to play with!

The sonic results, however, were pretty tasty. The first thing that hit me was the grunt factor, or low frequency drive which gave real meaning to many rock records. The *Neiro*, at over three times the price, could take it to the cleaners in most other respects but its seven and a half watts were no match when it came to shaking the floor with Audio Note AN-Es.

It has to be said that there were occasions when LF output became a tad overpowering, but I suspect that judicious speaker placement would have largely overcome this.

Records like *Violent Femmes* which feature an acoustic bass guitar sounded full, even lush with appealingly clean vocals and high frequency resolution. If such a thing exists, this is a class A amp for rock records. It drives them with compelling

dynamics and underpins them with juicy bass. It could be firmer low down, in the style of a powerful class AB beast, but you'd lose the sweetness and possibly the dynamics elsewhere in the band. I compared the 24s with a Shearpe power amp, which, though some £700 cheaper, represents the more popular variety of transistor power amp. It had more low frequency power, but a greater inclination to reveal surface noise and relatively aggressive high frequencies. The openness and warmth of the MA-24s was far more appealing to my ears.

As cool as you please

Though the bass could have been more solid it was still very convincing, some of the excursions on *Rain Tree Crow* being especially pleasing, as was the seductive midband. This album features a wind instrument that sounds like a large oboe. It is used very subtly over a backdrop of heavy synth style breathing and the 24s made a fine job of layering the distinctly synthetic and natural sounds, bringing out the best in both.

John Lee Hooker's superb *Highway 13* from the none too shabby *Mr Lucky* album simply oozed out of the speakers as cool as you please. This track sounds good whatever you play it on but rarely does it sound this liquid.

In absolute terms the MA-24s have a few weaknesses. They could be more fleet of foot and dynamics are a shade restrained, though such factors only really show up in comparison. The only thing that caused any criticism with the unit in general use was a slight aggressiveness, but this should be considered in the context of a tube fanatic's taste and not the most appropriate of partnering preamplification.

I would imagine that in the context of a well matched preamp the MA-24s could be suitably sweet. Classical pieces also tended to show them in a less impressive light, maybe over-exposure to the likes of the *Neiro* has spoiled me in this respect, but strings failed to retain their fine timbre and orchestras as a whole weren't breathing in the way that they can.

Overall, however, the Marantz MA-24s are superbly built and rather tasty sounding amplifiers that are capable of driving a wide variety of reasonably efficient loudspeakers. Obviously some care in selecting partnering preamplification is required, but a good tube amp with the right sort of output level would seem to be a good place to start. If only I could figure out a way of using the MA-24s on the bass and the *Neiro* on the mid and tweeter, nirvana would surely be within my grasp!

Jason Kennedy

Let's face it. You need a pretty juicy carrot to persuade almost the entire complement of UK hi-fi hacks to bestir themselves at five something in the morning, battle to Heathrow and shuttle up to Glasgow for the day. A new range of hexagonal loudspeakers is interesting enough in its way of course, but Tannoy's press liaison department hinted at something more.

"After we've done the *Sixes* presentation, there's a couple of other speakers we make that you might like to hear, but they're a bit big to ship down south." The fact that the couple of models concerned were the biggest, loudest, heaviest and



The Westminster Royals: use them for playing music or entombing the spouse.

most expensive speakers made in the UK outside the PA field turned the trick. Even the most unlikely characters could be spotted at a most implausible hour preparing for the trek north — especially once word had filtered back that the *Westminster Royals* were something very special indeed.

The vital statistics tell their own story. The basic parameters are roughly two orders of magnitude greater than the typical British bookshelf speaker. A metre wide, more than half a metre deep and nearly a metre and a half high, 530 litres of internal volume could hang more clothes than I'm ever likely to use. A price tag the wrong side of thirteen grand and a total weight of 138kg are further evidence of a statement so far outside the norm it leaves an immense credibility gulf. Surely such a leviathan isn't meant to be taken seriously?

The reason it's all so massive is that this speaker is a full range horn, a technique which confers certain rather special advantages, but which involves considerable and highly complex woodwork. Horn theory is significantly more difficult than Schrodinger's wave equations,

which is about where my physics petered out a couple of decades ago, so there's neither the space nor the inclination to go into much detail here. In essence a horn is an acoustic transformer that improves the energy transfer efficiency between the speaker diaphragm and the air in the room.

The conventional direct radiating speaker uses a comparatively heavy cone to try and excite the layer of infinitesimally light air molecules with which it makes contact, which is a lousy way to transfer energy. Put a horn in between and the air in it acts almost like a fluid; the cone now works against the whole mass

of air in the horn, which is much more substantial, and the large horn mouth helps get the energy into the room. A crucial bonus is that the air mass of the horn acts as a rather efficient damper, working directly on the cone surface, and this effectively negates the fundamental mechanical resonance found in box speaker systems.

In fact the *Westminster Royal* uses a combination of three horns. The single giant (15 inch frame) main driver is one of Tannoy's famous dual concentrics, which hide the tweeter down in the magnet assembly and fire it through a horn fabricated into the pole piece and extended by the main cone flare. Said cone's forward output is reinforced by the elaborately shaped baffle, while a large, complex, folded bass horn is energised by the rear of main driver and exits through full length vertical slots that slice off the baffle edges. Bi-wire/-amp terminals feed an elaborate crossover that allows five alternative treble level settings over two independent bands.

The sheer scale of the beasts dictated close to wall placement, and my usual room based measurements delivered some interesting and impressive results. Indeed, the averaged in-room response fell within remarkably good 6dB limits from 20Hz right up to 15kHz. It's distinctly mid forward 200-600Hz, and rather uneven through the treble too, but very respectable low bass extension (-10dB at 20Hz) in conjunction with a very high 'real' sensitivity of around 95dB and a remarkably mild amplifier load represents an astonishing performance envelope by normal standards. In fact it seems

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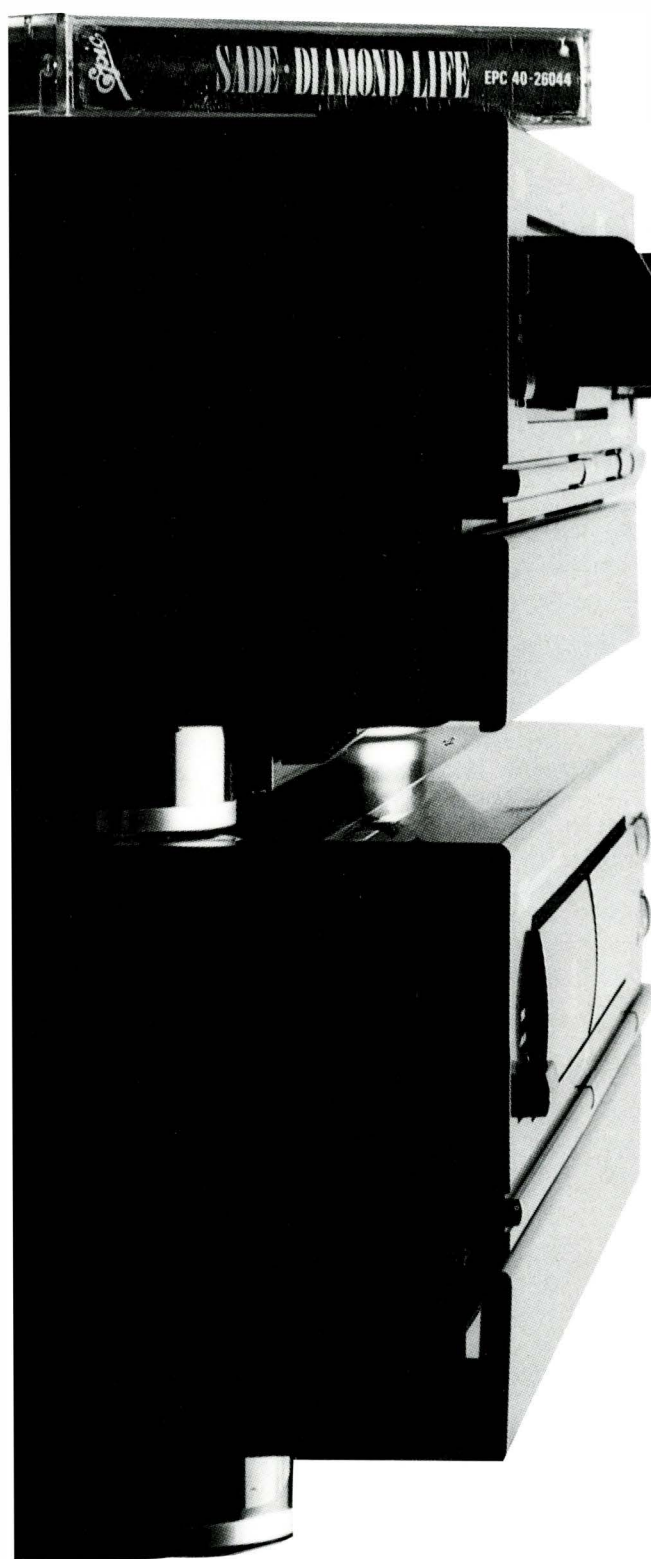
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HiFi WORLD, JANUARY 1992



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HIGH-END UPDATE

somehow more voltage than current-driven, and clearly matches valve amplifiers very well, though the high sensitivity does tend to show up any residual output noise.

The sound is no less sensational, given a little effort tweaking and running them in. First impressions led to some embarrassed shuffling of the feet all round, but by the time we'd removed the thick grille and fixed the monsters properly in position on some upward facing Michell cones (they come with castors and no formal spiking provision), things were really starting to come together.

By the third day I'd fallen in love, and several mouthwatering weeks further down the road I'm still convinced that this is the best loudspeaker I've yet encountered. Its flaws and fundamental character are obvious enough, and the middly balance takes a bit of getting used to. But the perfect loudspeaker doesn't exist, and the *WR* is so exceptional in other respects that it's easy to forgive its cosmetic blemishes.

'Effortless' is the adjective that immediately springs to mind, but it's difficult to convey the sensation involved without undergoing the experience. The speakers have a prodigious dynamic range and can deliver enough loudness to make sure you give up before they do, though in fact the *WR* is happiest at low and medium levels, where it is delicate, dynamically very precise and uncannily transparent. The sound does become more untidy and less coherent the louder you go.

This speaker is an audio/optical illusion. It's so goddamn enormous you expect great gobs of uncontrolled bass, masses of welly and not a lot in the way of subtlety. What you get is quite the reverse. It's actually rather shy and light in the bass, and the whole thing sounds remarkably transparent in the way you hear right through the speaker back to the source and the music. The 'point source' provided by the coaxial driver is a major bonus in creating stereo focus which is first class by any standards, and superb from something so large.

The bass is a bit lacking in weight to be sure, but that's a small price to pay for an utterly refreshing openness and freedom from boom and overhang of any kind. There's plenty of extension and considerable agility too, with an almost uncanny ability to distinguish subtle low frequency textures and tonality, though one might wish for just a little more slam and overall consistency. And, it has to be admitted, when the going gets tough and you start to work them hard, the bass does become rather less convincing and the 'woody' panel colorations more obvious.

In some senses the *WR* is just too good. It provides an uncannily accurate sonic picture of the source from which it is fed, not to mention all the components along the way — an open window onto the manifold audio engineering inadequacies that lesser speakers merely gloss over. It takes no prisoners — if your system isn't properly set up it'll tell you all about it — but is also impressively evenhanded in the way it deals with all the various sources; disc, tape or broadcast, showing no favouritism but merely revealing the strengths and weaknesses of each.

Change the record on the turntable and you'll probably hear a whole different set of flaws from the change of recording and cutting studios. Go over to CD — boring, isn't it! Switch to radio and marvel at the horrid little continuity studios the BBC uses. Turn on the TV and gasp at

And much as I still have a very soft spot for the (with hindsight exceedingly neat and compact!) Naims, I have to admit the Tannoys win comfortably on points, to my ears and preferences anyway. The *DBLs* supply more convincing bass slam and consistency, and hang together considerably better at high levels, but the *WR's* delicacy, subtlety and transparency down even to the very lowest levels is utterly beguiling.

In fact one of its closest performance rivals is probably the other Tannoy monster mentioned in the second paragraph. The *215DMT* is much smaller and the textured sculpted grey MDF much closer to British tastes than the *WR*. The treble horn has a new 'tulip waveguide' for a much smoother HF, and a second 15inch driver helps out in the bass, but there's no bass horn or Alcomax magnet. I've been



the atrocious mangling generated by the clip-on lapel mike. Then a blockbuster movie starts, and it's like being in the best seats at the Odeon Leicester Square — those guys who mix the big movie soundtracks are true artists!

Not only is the sound exceptionally coherent, especially at very low levels, it also seems to make differences that much more obvious — something which not only makes for a highly analytical experience but also provides tremendous insight beyond the source and into the music itself. Even the most ghastly recordings (like Channel 4's recently transmitted Violent Femmes concert) remain unfailingly interesting musically, and are therefore surprisingly tolerable to listen to.

Less comforting perhaps is the unerring way it pinpoints the limitations of the rest of the system, a characteristic that could result in excessively tweaky behaviour patterns, and pose a real threat to any income, disposable or not.

I suspect one reason Tannoy decided to lend me the Westminister *Royals* was that they wanted the opportunity to blow away the Naim *DBLs* I've been using,

trying (unsuccessfully) to borrow a pair for 18 months now, but studio monitors are not sold through the hi-fi trade. (A top Japanese hi-fi journal recently gave the *215DMT* a major award, throwing Tannoy's niche marketing strategy right out of kilter.)

Some sort of domesticated *Prestige* model using the *TW* driver is therefore certainly on the cards, and could prove a sweeter alternative to the *WR's* occasionally unruly treble.

But the *Westminister Royal* is all about celebrating vintage engineering, and my findings only confirm that big Alcomax magnet coaxial drivers and full horn loading still have a great deal to offer. So much in fact that one wonders why the UK market consigned them to the scrap heap of history twenty years ago.

Happily, the perspicacity of Japanese audiophiles saved the species from extinction, enabling these *WRs* to prove that even though hi-fi has got cheaper and smaller over the years, it has also been advancing steadily backwards at the same time.

Paul Messenger

DRS - 610 STEREO CASSETTE DECK

At Denon, we've always lent a keen ear to customers' needs. That's why we've produced the DRS-610.

A cassette deck that offers outstanding value.

With the DRS-610 we've added a twist to the mid-price cassette deck market, with a unique new model featuring an innovative sliding drawer cassette transport.

The styling of the 610 brings a fresh look to cassette decks and matches that of CD players.

Performance has not been sacrificed to style and the DRS-610 incorporates technical advances while delivering excellent musical sound quality.

The horizontal transport incorporates improvements to the transport flywheel mechanism reducing wow and flutter to negligible levels. And if you're easily rattled by the slightest distortion, you'll be delighted to hear we've added a ceramic cassette stabilizer! We've also incorporated a dual power supply, Dolby B and C and HX Pro, and a variable bias control which matches the deck to any kind of tape. Additionally, a linear time counter is provided with remaining time display.

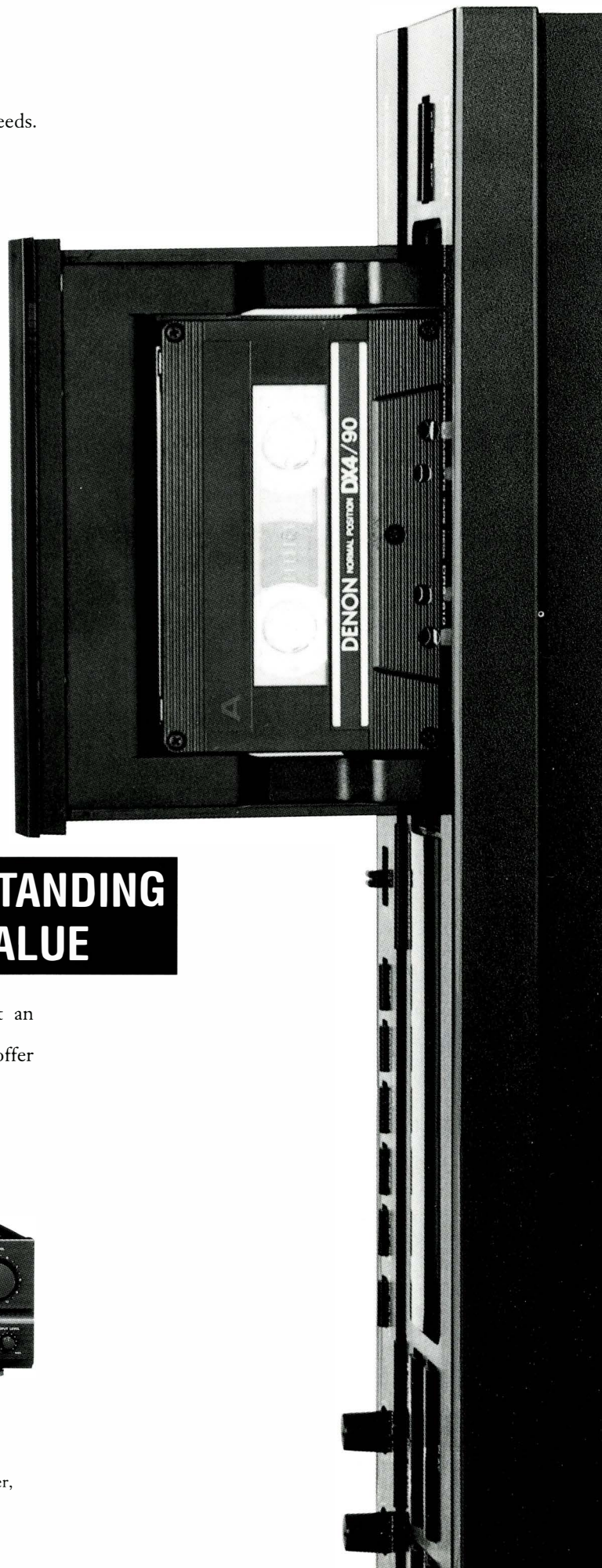
The end result is a highly sophisticated deck but at an affordable price. In fact, the Denon DRS-610 doesn't just offer value for money.

It offers outstanding value for money.



DENON

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**OUTSTANDING
VALUE**

The *WATT* (Wilson Audio Tiny Tot) was originally a nearfield monitor for location recording work, quickly appropriated for domestic use by hi-fi enthusiasts who appreciated the fine focus, transparency, timing and high resolution. The system had some drawbacks, though. The amplifier load was rather cruel and the system sounded rather bass light and thin when away from reflective surfaces like walls or mixing desks. Devices like the *Beard* (an add-on panel which increased the baffle area) and the massive box style *Gibraltar* stand helped, but the current solution is a little woofer based on the *Gibraltar* shape and reprehensibly entitled *Puppy*.

A pair of *Puppies* is readily added to a pair of *WATT Mk3s*, resulting in a relatively straightforward floorstanding, three-way, four-box system. Put thoughts of subwoofers and their many complications out of your mind — this is effectively a full range design.

With an asking price of around twelve grand, serious money is involved, and to do it justice one should contemplate a further twenty thousand pounds for the rest of the system, to include pre and power amps, a turntable plus CD, and last but by no means least, cables (though it could be done for less with some careful mixing and matching).

Sensitivity is a high 91dB/W, allowing high sound levels of up to 110dBA in a typical listening room, though the amplifier loading is a fairly tough 40ohms with a brief 1.75ohms minimum in the lower treble. This allows for realistic reproduction of large scale works. The bass response of the *WATT* alone is limited to 60Hz, the *Puppy* adds a full octave of extension to a little below 30Hz under normal room conditions.

Measurements confirmed that the system possesses a very smooth midrange, an excellently low stored energy performance and also integrates well with a domestic room.

Each massive lower box contains a pair of 220mm bass drivers, giving a driven area equivalent to a 13inch bass unit. These are loaded by a critically tuned semi-labyrinth reflex chamber of excellent transient performance, with small, oval port at the rear.

The bass units are well regarded DynAudio drivers, built on die-cast frames. A Wilson-modified classic paper cone cast chassis SEAS unit covers the *WATT* midrange above 125Hz, crossing over at 2.6kHz or so to a Focal inverted fibreglass resin dome tweeter, again specially adapted.

Encapsulated in resin in a massive alloy box, the crossover uses the finest parts,

but the crowning glory is the *WATT* enclosure. No sides are parallel and the superbly rigid structure is built of 20mm marble loaded acrylic (DuPont *Corian*), further panels braced and selectively loaded with seismically mounted lead blocks. This is not only one of the heaviest and most acoustically inert boxes ever made, it also has a wide dispersion profile. High transparency porous foam grilles which really work are supplied.

Arriving in four heavy crates, these systems are best delivered by your dealer. The price should include installation, which is worth a surprising amount in terms of sound quality if properly done. Perfect levelling is essential or the *WATTs* tend to drift off the *Puppies* because the



Puppy love: the WATT Mk3s plus bass.

adhesive pads between the two do not set rigid.

Initial set-up was quite straightforward; having determined the correct siting, fitting the floorspikes added the final touch of power and precision. First impressions were of an immediate, accessible rightness — an open, communicative and articulate sound full of natural harmonics, subtle textures and immense detail. It did not sound like a typical floorstanding three-way. Power and speed are near breathtaking while the bass appears devoid of unwanted emphases or resonances; it's fast and articulate, plays tunes, has impressive weight and slam, yet above all times well.

Unusually, this a US speaker which displays the kind of rhythmic drive normally associated with the offerings from Naim or Linn, while at the same time plumbing the depths of all but the lowest extremes of the bass. It is also impressively accurate: well worn favourites sounded

familiar, natural and believable — simply better, not different merely for the sake of it, as is too often the case.

The big, full, naturally balanced sound suits both rock and classical programmes, proving highly analytical of the rhythmic potential of source components and the programme itself and delivering a measure of drive, energy and precision which leaves many 'good' hi-fi systems sounding tired and anaemic.

Add to that remarkable stereo focus, a stage depth and transparency bordering on excellent, together with large scale stereo perspectives and you have some idea of what this speaker can do. Dynamics too are very impressive. Like live music, it has the ability to surprise a listener with unexpected sounds

— sudden rim shots and the like. With the exception of perhaps the Naim *DBL*, the biggest Tannoy models and the better studiomonitors, most other systems sound softened and compressed by comparison.

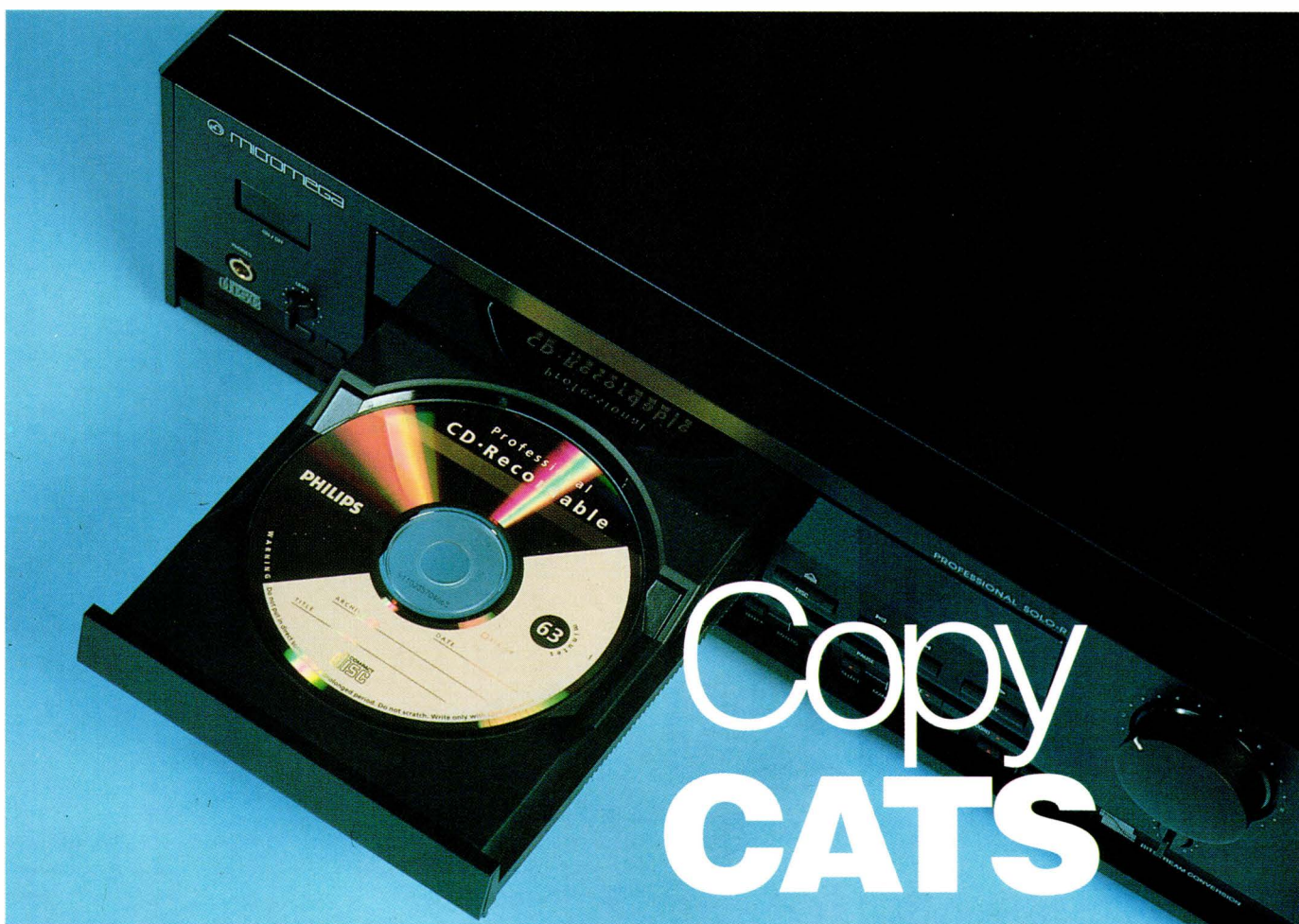
Criticisms are few. In some locations, the system can sound a mite too full in the lower mid-upper bass, still without hampering the rhythmic qualities. There's also a mild 'cone type' nasality in the upper midrange and a slight 'sting' in the extreme treble which is generally inaudible except where the programme has significant treble distortion.

Distortion is low throughout, partly because little power input is needed to give decent sound levels. It can also be driven hard, and up to 200W of undistorted programme power was no problem. The result is a genuinely realistic, large scale 110dBA sound level capability in a typical good sized listening room — most impressive.

Comparing notes, the *WATT3* is smoother, more open and articulate than its excellent *Mk2* predecessor. The *Puppies* lift the *WATT* from the ranks of 'impressive miniatures' to the full range, full power three-way class. The result is one of the best speakers available today. Having owned and enjoyed Apogee *Duetta Signatures* for a couple of years, I found the *W3P* to be a fitting replacement, fine detail and transparency now being matched by substantial improvements in dynamic range, rhythmic ability, bass evenness and precision.

Wholly musical, the *W3P* is playing as I write and I have chosen them as my current reference. Now all I need is the money to pay for them!

Martin Colloms



Record digitally from CD onto CD-R and you could end up with a disc that sounds better than the original. A ridiculous proposition! Or is it? The idea certainly fueled editorial comment in *Hi-Fi Choice* way back in issue 101 when the editor reported on a very favorable public demonstration of CD versus CD-R. Prior to this I had reported subjective improvements from CD-R copies when I tested the very first Kenwood CD recorder nearly two years ago.

So there is precedent, if little objective support, for the concept of 'generation gain'. In this article we will explore what, at first sight, seems a crazy notion. The notion that, in transferring data from one disc to another, you witness improvement rather than deterioration.

Before attempting to explain exactly what is going on, the first thing to do was to assemble the famed *Hi-Fi Choice* listening panel and set about scientific blind listening tests to see if we could reproduce the results that have been noticed elsewhere.

Let the panel decide

We started off by recording a selection of pop, vocal and classical tracks onto Kenwood/Taiyo CD-R blank discs. The discs themselves luxuriate in the name of CD63Q, and are capable of recording around 60 minutes of music. We made the recordings using a prototype Marantz CD-

R recorder fed with a digital signal by a low jitter transport, in our case the Wadia WT3200.

The music was provided by Mary Black, Lisa Stansfield, Tanita Tikaram, Julia Fordham, Marty Paich, Christy Moore, Debussy and Brahms, all tracks that had proved very revealing in past blind sessions.

For replay a Teac P-10 CD transport/Deltec PDM2 combination joined a Rotel RCD-965BX as the two alternative front-ends while Deltec amplification and AudioNote speakers brought up the rear.

Regular panellists, including Guy Sargeant (Audio by Design), Tony Mills (Rotel) and Mike Martindell (Arcam) very kindly loaned their ears for the day.

Having set the listening level panel were played one track from both the original and copied discs in random order. Four passes per piece of music, defined as A-B-C-D, were completed before the panel

Copy CATS

Three months ago we asked Paul Miller to investigate the differences in sound quality that we had noted between original CDs and the copies made using the new recordable CD system (CD-R). He recently emerged from behind the locked door of his lab with comprehensive proof that CD-R can indeed sound better than the originals.

was asked to link any like-sounding tracks. In other words if the blind sequence were Original-Copy-Original-Copy then the link would be A-C and B-D.

Only if the panel were confident of their track pairings were they asked to describe the distinguishing sonic features of each. The panel were not asked to identify copy and original directly, only to declare which pairing was subjectively preferable.

The results we obtained are listed below, along with the music we used.

Mary Black
Columbus

Our listeners correctly distinguished between the original and CD-R versions of the track though confidence was not high. They found the CD-R version preferable via the Teac P-10 where it sounded smoother, more rounded and less strained than the original. Conversely, on the Rotel the CD-R version lacked snap, and

was cooler sounding with less emotion in both the timbre of piano and voice. The original CD simply sounded unhurried and 'easier on the ear'.

Lisa Stansfield *Change*

Once again the CD-R and original versions were distinguished with the original version again being preferred via the Rotel. There was a loss of punchiness, they ventured, but it was less processed, less electronic in timbre. Teac's *P-10* produced the opposite reaction with all favourable comments landing at the feet of the CD-R version!

Christy Moore *Burning Times*

Via the *P-10* tracks A/C/D were correctly, if hesitantly, identified as one and the same (the original in this instance) by

their rawer and slightly grating vocal quality that contrasted with the less dramatic but easier sounding track B (the CD-R copy). Reverting to the Rotel brought a mixed and inconclusive reaction.

Marty Paich *I've never been in love before*

Yet another example where the CD-R copy was identified and placed ahead - well ahead in this instance - of the original using Teac's *P-10*. Our listeners were less confident of the pairing via the Rotel but eventually plumped for the cleaner, better resolved sound of the CD-R version.

Debussy/Uchida *12 Etudes*

Our panel struggled to correctly separate the original from CD-R versions using the Rotel player with only one listener succeeding in the task. By comparison the

results were more clear-cut with the *P-10*, favouring the fuller, more robust and resonant quality of piano realised via CD-R.

Brahms Violin Concerto, 3rd movement

Confidence was moderate-to-low but our listeners correctly associated tracks B and C (the CD-R copy) on the second attempt. Tracks A and D (the original) sounded slightly harsher, more metallic and shrill with both the Rotel and Teac systems. The contrasts were more obvious with the latter, it has to be said.

On the basis of the above results it would appear that there is definitely a difference between the copies and the originals and that with certain CD transports this difference can indeed be perceived as an improvement. However, as

How to squeeze 70-odd minutes of music onto five inches of plastic:

Before you get stuck into the technical explanation of why CD-R can sound better than the original you'll have to understand exactly how the music is put onto a CD in the first place. Hardened digital junkies for whom pits and lands hold no problems can skip straight to the lab tests but for the uninitiated a few words of explanation are in order.

Both CDs and CD-Rs represent the digital data by means of a spiral track composed of reflective (lands) and destructive surfaces (bumps). These are often, and wrongly, referred to as pits. As the laser beam reading the disc passes over one of these bumps the intensity of the reflected light is much reduced, distinguishing the bumps from the flat surfaces that lie in-between.

Contrary to what you might expect, the bumps do not represent digital ones and zeros. Instead, a digital one is represented by any transition from land to bump or bump to land while the flat land and bump surfaces represent digital zeros. The overall length of a bump or land determines the number of digital zeros that are encoded between adjacent digital ones.

Bump and grind

The bump lengths must be an exact multiple of the master clock frequency (T), which is set at 4.3218MHz. In practice it was found that with lengths shorter than 3T the bump-to-land and land-to-bump transitions occur too close to the optical cut-off frequency of the laser to be readable. At the other end of the scale, bumps and lands greater than 11T in length would accumulate jitter as more and more clock pulses were strung together. Thus there are a total of just nine allowable bump or land lengths,

given by 3T, 4T, 5T . . . 10T, 11T.

So how do the discs use combinations of just nine different run-lengths to represent a full 16-bit digital code?

Let's take this from the top. Imagine you've just recorded a piece of music, taking a snapshot 44,100 times a second and then allocating each snapshot a 16-bit number representing its value at that particular moment in time. Using 16-bit code you have 2^{16} (65,536) different combinations of ones and zeros, each 16-digits long, available to describe the amplitude of each snapshot. Inevitably some of these permutations will have strings of consecutive ones or zeros in excess of the ten allowed. So it's impossible to directly accommodate 65,536 permutations of ones and zeros with a selection of just nine different run-lengths.

Overcoming this problem is a complex affair. The first step involves dividing each 16-bit digital sample into two 8-bit symbols running one after the other. This sequence is then scrambled so that consecutive symbols are not placed one after the other on the disc. If they were, scratches, jam, dust and other imperfections could mask whole sequences of data.

Upon replay the 8-bit symbols are placed back in their original order so that a single burst error is scattered (randomised) throughout a wider sequence of data, making correction much easier. OK, so our original 8-bit symbols enter the CIRC encoder in batches of 24 (twelve 8-bit samples for both left and right channels). They emerge thoroughly scrambled and in batches of 32 (called a 'frame') having had eight extra 8-bit symbols, called Parity Symbols, added in-between. One 8-bit Control Symbol is added to each 32-symbol frame to cater for subcode information, bringing the to-

tal to 33 symbols per frame.

Now, each of these 8-bit symbols uses one of 2^8 (256) available permutations of ones and zeros. Each permutation is eight digits long ranging from 00000000 to 11111111. But the smallest bump on our CD must be at least 3T in length, so each one must be followed by at least two zeros for the run-length to be valid. How can this be achieved?

8 to 14 modulation

It just so happens that a 14-bit code, which allows 16,384 different combinations of ones and zeros, contains some 267 permutations where each one is followed by at least two zeros and no more than ten zeros. What luck. So 256 of these 14-bit symbols are used to represent these 8-bit symbols, ensuring there are no bumps or lands smaller than 3T or bigger than 11T. This, then, is the coding used by both CD and CD-R and, naturally enough, it's called Eight-to-Fourteen Modulation (EFM).

Now that you've got all that sorted you may think that's the end of it, but just to make things even more confusing, in practice, these 8-bit symbols are represented not by 14-bit symbols but by 17-bit symbols. These three extra bits, called packing bits, are placed between each successive 14-bit symbol to ensure the 3T/11T rule is upheld. If a 14-bit symbol ends in a one and the next begins with a one, for instance, this would violate the rule with a run-length less than 3T. In this case three zero packing bits are inserted to create a valid 4T bump or land. Finally each frame of 33 17-bit symbols is headed by a 24-bit preamble with its own three packing bits. This gives a total of 588 bits per information frame. Clever, huh?

the results show, the truth of the matter is far from the unqualified statement that 'copies always sound better than originals'. On some machines they do, but on others the results can be turned on their heads.

Test results

Armed with this knowledge it was time to enter the lab and see if there were any measurable parameters which might serve to explain what had occurred during the blind listening tests.

I have already explained in the box on page 31 how the 16-bit digital code is represented by a series of variable-length bumps and lands on the CD or CD-R disc. What the laser 'sees' is a sequence of reflective and non-reflective patches that modulate the returning beam of light. This fluctuation in the reflected beam is detected by photo-diodes within the laser mechanism which respond by producing a fluctuating electrical output. So the signal derived from the laser pick-up is not a stream of ones and zeros but a modulated analogue waveform, like a series of sinewaves, which represents each of the nine available run-lengths.

This analogue waveform is called the EFM or HF eye-pattern. Longer run-lengths produce lower modulating frequencies while the smaller run-lengths produce higher modulating frequencies, hence the apparent complexity of the eye-pattern. For instance, if the disc's constant linear velocity (CLV) is 1.4m/sec and the 3T run-length is 0.972µm then the laser beam will be modulated at about 720kHz. For an 11T run-length the frequency decreases to 196kHz, with 4T, 5T, etc lying at fixed intervals in-between.

In the course of the tests we measured a number of discs and compiled histograms of the results, for example, Fig 1. These histograms do not show frequency vs amplitude, by the way, but frequency 'bins' vs the probability of occurrence in each 'bin'. The horizontal axis is divided into 450 uniform bins that appear as vertical columns on the histogram. Any column that reaches the top of the plot will contain the specified percentage (top LHC) of the total measurement sample.

Theoretically the histogram should contain just the nine frequencies marked 3T, 4T to 11T though, in practice, a maximum of three extra frequencies are found in the accumulated data between pairs of 'real' run-length frequencies. These extra components occur whether the CD mechanism uses a single or three-beam laser system, though whether they are an artifact of the laser, the HF signal processor or even the measurement system is unknown at present. In any case, because these frequencies lie at one-quarter clock intervals

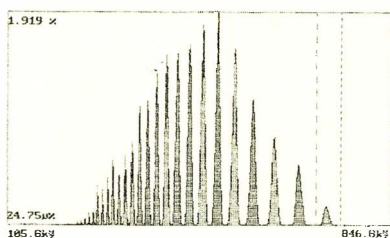


Fig 1

Histogram compiled from original CD played on Teac transport.

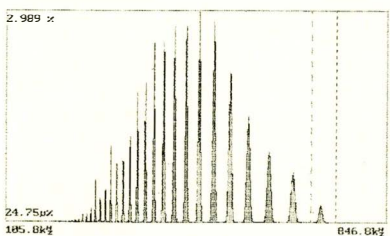


Fig 2

CD-R copy of the disc that produced Fig 1. Note the thinner peaks

their zero-cross transitions will be ignored by the decoder's data-slicer and so play no further role in the datastream.

All other factors being equal, any increase in noise or corruption of the EFM eye-pattern will have a direct influence on the final performance of the player. The proof of this will become evident later. The most obvious source of corruption lies with the integrity of the bumps themselves. If these are damaged, obscured or otherwise poorly defined then the frequency of recovered transitions will deviate from the expected frequencies of 720, 540, 432kHz etc.

The jitter bug

And as the real digital code is recovered by looking at the precise timing of these transitions, any deviation will manifest as jitter. Jitter (see Tech Talk, issue 96) is the bane of all digital systems because it represents an uncertainty in the exact position of digital 'edges', an uncertainty that gives rise to very audible but complex distortions after D/A conversion.

Whole swathes of bumps that are damaged will be corrected or concealed by the decoder. What we are looking at here are minute variations in the size of otherwise wholesome bumps! So, due to the tolerances of manufacture, for instance, some 3T bumps will appear closer to, say, 3.1T or 2.9T even though the vast majority are spot-on 3T.

In a perfect world the nine run-length frequencies would appear as sharp vertical lines on Fig 1. In reality, however, there will be a certain percentage of re-

covered frequencies that lie above and below the mean or expected frequency. So each frequency line is broadened and it's this broadening that eventually transpires as digital jitter.

Now take a look at Fig 2 which is derived from the EFM eye-pattern of the very same track but taken from a CD-R disc played back on the same CD transport (a Teac P-10). There is clearly less divergence from the mean frequency of each run-length. This results in sharper 3T, 4T etc modulation frequencies with a lower Standard Deviation (SD) from each mean frequency. The SD is directly proportional to the amount of jitter associated with each mean run-length frequency. In this instance the SD of the 3T run-length (720kHz) is some 4.91kHz on the original but just 3.37kHz on the copy. A reduction of some 31 per cent!

Using Teac's P-10 transport the EFM eye-pattern of virtually all CD-R discs had a lower SD from each (3T, 4T etc) run-length frequency. Improvements of between 15-40 per cent that emerge as reductions of between one and ten per cent in digital jitter measured in the final S/PDIF digital output. Variations that are matched, I should add, by changes in jitter in the recovered clock of various test DACs (Meridian 203, 606 and Deltec PDM1). Some of the improvements are quite spectacular as Figs 1 and 2 graphically illustrate.

The generation game

But do copies of copies keep on getting better? In practice any measurable 'generation gain' ceases to become important beyond the 3rd copy because error propagation is reduced as progressive eye-patterns are correctly interpreted by the data-slicer and decoder. Otherwise errors would accumulate rather than diminish. However significant variations can occur between 1st and 2nd generation copies.

Fig 3 shows the very elementary EFM eye-pattern of 'Digital Zero -1LSB' taken from a 1st-generation CD-R. The 4T region is expanded on Fig 4 which reveals not one but two principal run-lengths whose mean value falls very close to the predicted frequency of 540.2kHz. On the 2nd-generation CD-R disc, however, this aberration was resolved by the decoder which processed the data from the 1st-generation copy.

The beauty of this test system is that any manner of EFM data may be accumulated over a pre-determined period of time. Consequently it is possible to accrue samples of music data and examine any deviation from the nine expected run-length frequencies.

Once again the Teac P-10 transport reveals reductions of between 9.5 and 35

per cent in the SD of the 3T run-length, reductions that carry over to the S/PDIF digital output and recovered clock data of any partnering DAC.

Figs (5) and (6) highlight obvious differences in the clarity of the EFM eye-pattern taken from original and copied tracks of Marty Paich's *I've Never been in Love Before*. Each histogram represents an accumulation of precisely 10 million samples (nearly four minutes of music). Each track was positioned at the same point on both original and copied discs, using the Teac *P-10* for replay.

Nevertheless, our blind listening tests indicated that CD-R copies are not always superior to the original CD, especially with a Philips-based CD transport in tow. Gratifyingly, these subjective impressions are reinforced by histograms documenting changes in the EFM eye-pattern between different CD players/transports.

For example, the Teac transport always reveals an objective (measured) and subjective improvement in favour of the CD-R copy. But results from the Rotel *RCD-965BX* (which uses a Philips CDM4 mechanism) suggest that only 50 per cent or so of copies would be subjectively preferable to the original. Bear in mind that these are the same 'originals' and 'copies' auditioned with the Teac *P-10* transport!

Once again the majority of copied test signals showed an improvement over the original, showing reductions of between 3 and 24 per cent in SD. However, the ratio of SD between originals and copies does not correspond with the same tracks replayed on the Teac *P-10*.

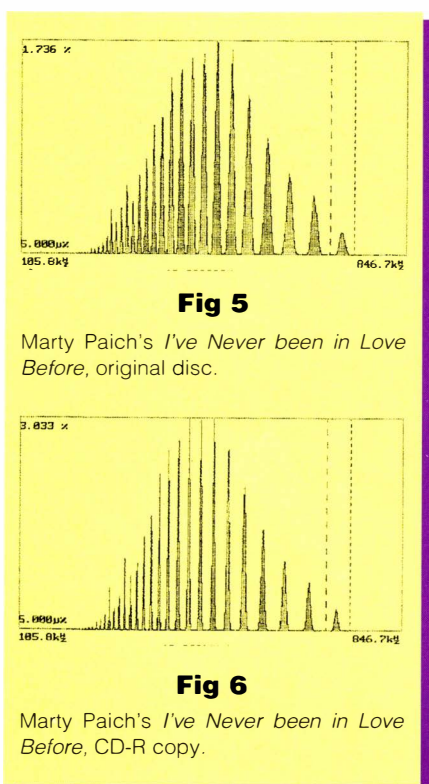
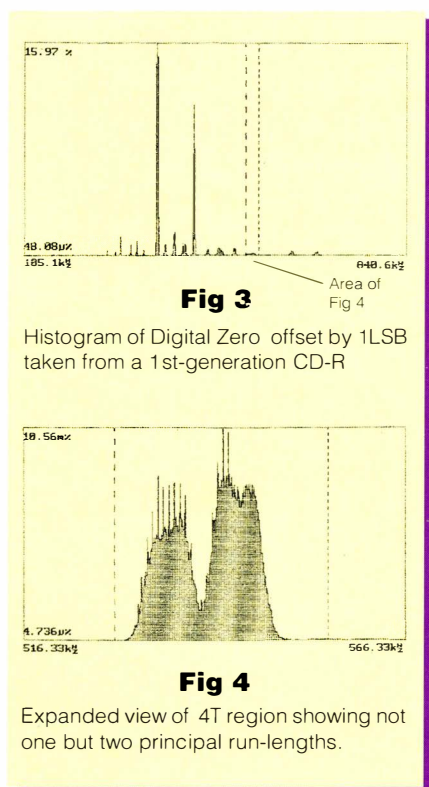
In fact the bump/land structure of the original test discs are rather poorly defined, as evidenced by the high SD of the 3T run-lengths (typically 3.7-5kHz). Accumulating data from the sequence of music CDs, however, reveals their 'average' bump/land definition to be marginally superior.

The eyes have it

Several conclusions may be drawn. Firstly, and most importantly, there is a direct correlation between the quality of the EFM eye-pattern and the eventual sound of the disc. Lower levels of jitter here seem to promote a generally smoother and more natural acoustic, prompting a less artificial or 'processed' rendition of the music.

In support of the listening tests, all copies (both test signals and music) replayed on the *P-10* are lower in recovered jitter than the original disc. Similarly, all copies that witnessed a significant deterioration in the EFM eye-pattern via the Rotel were also deemed to sound worse when auditioned against the original in the very same CD player.

As expected from this trend, those cop-



ies that displayed an improved EFM eye-pattern in the *RCD-965BX* enjoyed greater success in the listening tests.

Just as importantly, when the change in SD between copy and original fell below 10-15 per cent (Christy Moore, Debussy, and Julia Fordham) our listeners failed to confidently distinguish one track from another.

So CD-R copies cannot be relied upon

to sound better than the original because the changes in bump and land structure between CD and CD-R are interpreted differently by different CD transport mechanisms.

Fortunately, by examining the data from the EFM eye-pattern, at the S/PDIF output and at the Master Clock stage in either a DAC or CD player, any improvement or deterioration may be predicted.

Stay sharp

But why is this variation in recovered EFM eye-patterns occurring in the first place? The answer to this lies in the physical differences that exist between CD and CD-R discs. Crucially, the sharpness of transitions from land-to-bump or bump-to-land.

Conventional CDs are injection-moulded against a stamper, revealing a positive copy of the original recorded 'blank' with pits on its surface. However, because the CD is silvered on this top surface and the laser reads from beneath, it 'sees' bumps rather than pits.

Conversely these run-lengths are transferred to a CD-R disc by heating successive spots along a preformed spiral track. The polycarbonate base material melts and deforms an intermediate green-coloured dye layer. So, upon replay the laser 'sees' U-shaped pits rather than bumps, the reflectivity of the track falling from 75-80 per cent on the surface to just 20-25 per cent in the depths of the pit.

Furthermore because these melted 'pits' are clocked onto the CD-R disc with reference to a quartz oscillator their edge-definition is likely to be very consistent. Hence the reduction of jitter in the copied EFM eye-pattern is directly related to the quality of the Master Clock that directs all proceedings within the CD-R machine. Some CD-Recorders will therefore produce better recordings than others.

Conclusion

So there we have it. Clear proof that CD-R copies have the potential to out-perform the original CD 'master' depending on the inherent jitter level of the CD-R recorder and discrimination of the CD transport upon replay. This is no wishy-washy conclusion, however, because the efficacy of the CD player in its response to CD-R discs can be predicted with surprising accuracy before listening even begins!

These are new and powerful measurement techniques that will allow us to explore the digital realm without first side-stepping into the analogue domain via an outboard DAC. Also, and perhaps more importantly, changes in digital data, jitter and wander analysis can be performed *in situ* with music as well as conventional test signals.

ANSWER A FEW SIMPLE QUESTIONS AND WIN A PIONEER A400

Yes folks, it's reader survey time again. On the next couple of pages you'll find a form containing a number of questions both about yourself and how you view *Hi-Fi Choice*.

As well as enabling us to see what you think of the magazine, it also gives you a chance to have a say in how it will develop over the coming months. Filling out the form couldn't be easier, all you've got to do is tick the box that applies to your

answer. If you want to make any other comments we've provided space for this at the end.

Although we ask you to give your name and address, this is only so we know where to send the *A400* if you are lucky enough to be the first one picked out of the bag. Your name and address won't be passed on to anyone else, and, provided you don't mind not being included in the draw, you don't even have to fill in that part of the form.

Please take a little bit of time to fill in

the form and send it to the address below and, you never know, you might be the winner of an *A400*. We even pay the postage when you return the form. What more could you ask for? Send your completed questionnaires to:

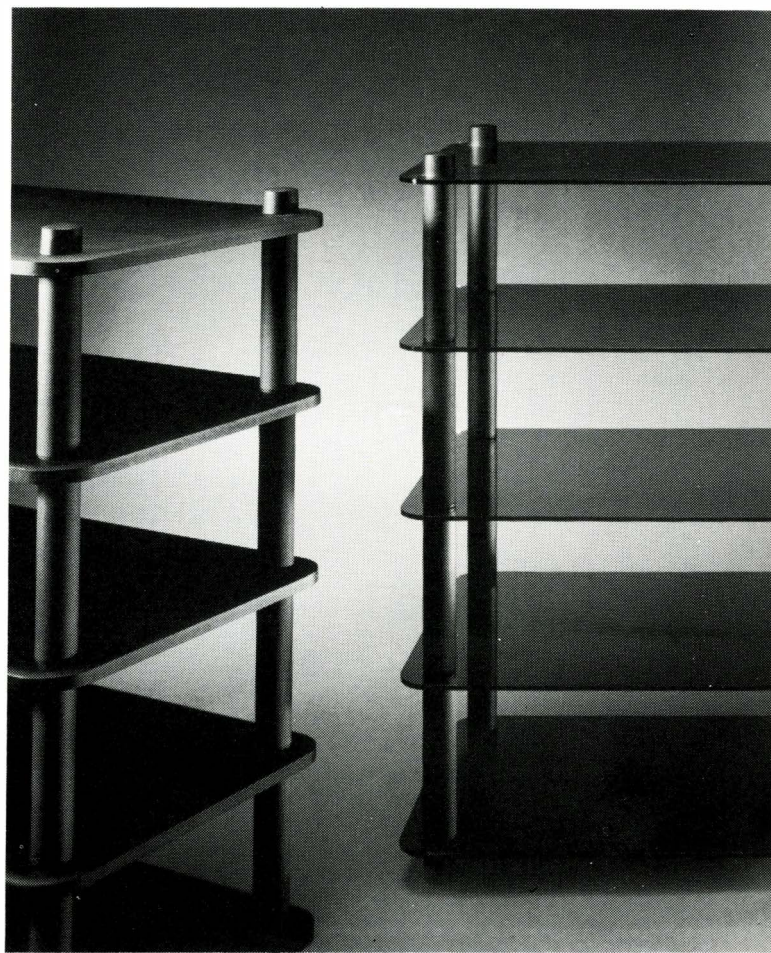
Hi-Fi Choice
Reader Survey
Freeport 7
London
W1E 4EZ



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 Atherton,
 Greater Manchester M29 0QA
 TEL 0942 897308

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CF Lake BUCKS B & B Hi Fi CF Lake	High Wycombe Aylesbury	0494 535910 0296 25119
CHESHIRE Congleton Hi Fi Doug Brady Hi Fi Peter Martin	Congleton Warrington Congleton	0260 297544 0925 828009 0260 273206
CLEVELAND Action Acoustics	Redcar	0642 480723
ESSEX Rayleigh Hi Fi	Rayleigh Chelmsford Southend-on-Sea Witham	0268 779762 0245 265245 0702 435255 0376 501733
Seven Oaks GLOUCESTERSHIRE Seven Oaks Hi Fi	Cheltenham	0242 241171
HERTS CF Lake Radlett Audio Seven Oaks Hi Fi	St Albans Radlett Watford	0628 778611 0923 856497 0923 212736
HUMBERSIDE Fanthorpe	Hull	0482 223096
ISLE OF WIGHT Island Hi Fi	Newport	0983 821646
KENT Canterbury Hi Fi Seven Oaks Hi Fi	Canterbury Beckenham Canterbury Chatham Sevenoaks Tunbridge Wells Welling	0227 765315 081 658 3450 0227 462787 0634 846859 0732 459555 0892 531543 081 304 4622
Volume One LANCASHIRE Cleartone Audio	Bolton Altrincham Wigan Rochdale Manchester Preston Blackpool Preston	0204 31423 061 928 1610 0942 323897 0706 524652 061 832 2081 0772 53057 0253 295661 0772 883958 0524 39657 0253 300599 0282 33464 0539 722645 061 839 8869 0254 886382
Norman Audio	Lancaster Blackpool Burnley Kendal Manchester Rishton	0253 295661 0772 883958 0524 39657 0253 300599 0282 33464 0539 722645 061 839 8869 0254 886382
Practical Hi Fi	Lancaster Blackpool Burnley Kendal Manchester Rishton	0253 295661 0772 883958 0524 39657 0253 300599 0282 33464 0539 722645 061 839 8869 0254 886382
Romers LEICESTERSHIRE Leicestershire Hi Fi Seven Oaks Hi Fi	Leicester Leicester	0533 539753 0533 557518
LONDON Babber Electronics Doug Brady Hi Fi Hi Fi Confidential Hi Fi Experience Kamla Electronics Seven Oaks Hi Fi	West Ealing, W13 Covent Garden, WC2 Victoria, SW1 West End, W1 West End, W1 Woolwich, SE18	081 579 6315 071 379 4010 071 233 0774 071 580 3535 071 323 2747 081 855 8016



Close your eyes and you're there

MERSEYSIDE Beaver Hi Fi Doug Brady Hi Fi P & A Audio	Liverpool Liverpool Crosby Birkdale, Southport Ormskirk	051 709 9898 051 633 6859 051 924 7287 0704 568373 0695 573456
N WALES Electrotrader	Rhos-on-Sea	0492 548932
OXFORDSHIRE Seven Oaks Hi Fi	Oxford	0865 241773
EAST SUSSEX The Power Plant Seven Oaks Hi Fi	Brighton Brighton	0273 775978 0273 733338
WEST SUSSEX Audio Designs Ltd	East Grinstead	0342 314569
SURREY Seven Oaks Hi Fi	Guildford	0483 36666
TYNE & WEAR J G Windows Lintone Audio	Newcastle Upon Tyne Gateshead, Metro Centre Whitley Bay	091 232 1356 091 460 0999 091 252 4665
WARWICKSHIRE Hi Fi Company	Leamington Spa	0926 888644
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Fiveways Hi Fi Mainways	Birmingham Off High St, Bloxwich	021 440 0667 0922 493499
W YORKSHIRE Doug Brady Hi Fi Hi Fi Studios Huddersfield Hi Fi Tape Recorder Centre	Otley Doncaster Huddersfield Halifax	0943 467689 0302 781387 0484 544668 0422 366832
SCOTLAND Audio Suite Holburn Hi Fi Hi Fi Corner	Aberdeen Aberdeen Edinburgh Glasgow Falkirk E Kilbride	0224 625635 0224 585713 031 652 1885 041 248 2840 0324 29011 03552 44145

Readers Write

CHOICE ANSWERS

Count those molecules, lads

I read with great interest the article by Alvin Gold in the February issue of your magazine, entitled, *Choosing and Using Record Players*, in which Mr Gold states, "at their best, records are probably unmatched".

If Mr Gold is correct (and I believe he is), a very interesting question then arises. What is the fundamental reason for the sonic superiority of the vinyl disc, compared to digital media?

My own view is that digital signals are in effect modulated carrier waves, in which the carrier frequency is defined by the system clock and digital word length, and that current systems simply have too low a carrier frequency to adequately define an audio bandwidth signal.

In fact, if a vinyl disc is considered as a digital medium, and each molecule of the disc material as representing a single bit, then the effective carrier frequency is probably thousands of megahertz!

Keith Martin, Somerset.

If there is a fundamental reason why vinyl discs sound better than CDs, DATs etc then it's probably because the bit and sampling rates of digital recording systems are not high enough to be able to



Get access to those molecules with a turntable.

fully define the amount of information required. But this isn't the only reason. There are myriad others, far too technical to indulge in on these pages, and of course there is the premise held by many, due to the proliferation of low quality turntables, that CDs sound better than vinyl!

As for your theory about the digital vinyl disc, in the July '90 issue (no 84) Richard Black explained that the ultimate resolution of an LP is defined by the size of a vinyl molecule, which is about one nanometre. Record grooves can be cut to a maximum modulation of 0.1mm (about

100,000 molecules) so system resolution is one part in 100,000. However, average groove speed (the speed at which the stylus traces the groove) is 0.25m/s so the number of molecules passing the stylus is something like 250 million per second. Ergo a record can be thought of as a sampling system with a rate of 250 million samples per second and a resolution of 16.5 bits. Due to the physical limitations of the system the accessible information content of an LP is 1,400,000 bits/s, CD by comparison has a maximum information content of 705,600 bits/s

Slavic system building

My present system consists of an Aiwa ADF-800 cassette deck, Technics SLP-277A CD player, Pioneer A-400 amplifier and Tannoy M15 loudspeakers. I intend to buy a new CD player and speakers. I have considered the Philips CD850 MkII but I want to know whether it will be suitable for my excellent Pioneer, or should I be looking for something else?

If I buy the Philips I'll have about £300 to spend on speakers, so which do you recommend? My room is 4m by 3.5m and I have Heybrook Point 5 stands and QED 79 Strand Flat cable. Will these stands and cables be suitable for your recommended speakers?

I think I should also buy a good interconnect cable for my new CD player. Which one do you recommend for about £30? G Muol, Beograd, Yugoslavia.

There are several CD player options which would perform better than the CD850 MkII in your system.

The least expensive is NAD's 5425 (£200), other options include the Arcam Alpha (£420), Pioneer PD8700 (£300) and perhaps

most importantly the Rotel RCD 965BX (£300). See if you can listen to some of these in the context of the A-400 and some of the loudspeakers that fit into your budget. You might do worse, however, than to wait until early May when our next bumper CD player review will be on sale (issue 107).

As far as loudspeakers go there are rather a lot of options to choose from, but we'd suggest you try and track down a pair of Epos ES11s (£300), these would work well on your stands and should be at home with your other kit. Listen to, and compare these with some other suitably priced alternatives. Cablewise I'd suggest you have a go with some Isoda HC05 PSR, it costs a bit more than £30 but it's pretty good stuff, as you'll find out!

Isoda
Interconnect
Cable
Winner

Out of the can and into your ears

I recently purchased a pair of Sony MDR-CD3000s which I notice you reviewed in your last round up. At the moment I plug these into the 'phones socket of my Pioneer A-400. This is because until I read your

review I was unaware of what else I could use to drive them with.

Can you suggest how I can get the best from my rather splendid headphones? Where, for example, can I track down a Can Opener?

Unfortunately in this part of the world most people consider Dixons to be a good hi-fi shop. Your

advice therefore would be much appreciated.

Alan Twyford, St Ives, Cornwall.

I could tell you that Can Openers can be ordered from The Den, Keighley, Yorkshire but there would be little point as your cans are not well suited to that particular device. In fact there is little in the way of suitable components for driving high quality headphones like the 3000s. For the purpose of the listening tests I used a preamp with a very low output impedance and made my own headphone jack adaptor. If anyone out there has a good idea for improving headphone sound quality, drop us a line.



More bay window complications

I am currently replacing my aged system piecemeal. Recent steps have been the purchase of an Ariston Maxim CD3 and Audiolab 8000A amplifier and now I want to find some suitable speakers to replace my 18 year old Pioneer CS99AS (big five way boxes), which sound somewhat dull in comparison with friends' more modern speakers a quarter the size.

My room is large with a high ceiling and my budget will stretch to £400. The layout of the room means that one speaker will be hard up against a wall while the other will be in the middle of a bay window. Reading up reviews I find that speakers are designed to work either in free space or against a wall.

How critical is speaker positioning, and what speakers do you suggest I should listen to?

Derek Newall, Bristol.

It's true that loudspeakers are designed to operate either with or without wall assistance. However, the only drawback with using a wall mount speaker in free space is that bass output is reduced, and



The Epos ES11: one of the better sub £500 speakers around.

because of the relatively omnidirectional nature of deep bass it shouldn't cause too much of an imbalance as far as imaging is concerned.

A few models that you

should definitely consider include the SD Acoustics SD3 reviewed in this issue (£399), Heybrook's HB1 S3 (£250) and the ever popular Epos ES11 (£300).

Transductive suggestions

My present system consists of a Cranfield Rock turntable/Linn Basik Plus arm/Satin 18E cartridge, Musical Fidelity B1 amp, Sony APM 20ES speakers, and King Snake II from Esoteric Audio.

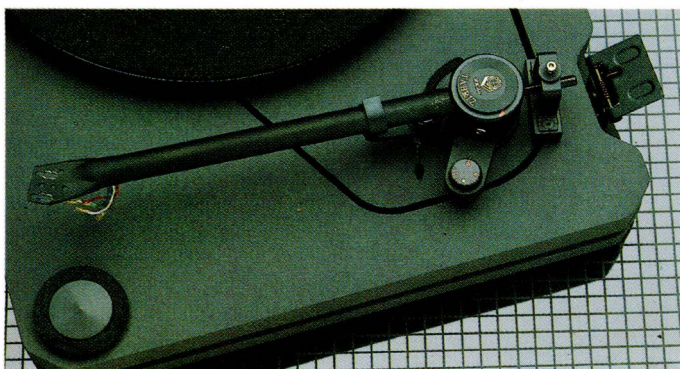
I would like to update the cartridge but with such a wide choice, I am stuck as to what is suitable for the deck/arm setup. My musical taste varies between rock, jazz funk and various

singers. Given a budget of up to £120 what would you suggest I do?

J Radley, Hemel Hempstead.

As well as replacing the cartridge we would suggest you consider saving an extra £95 for a Moth arm, or if you can manage it £150

Roksan's Tabriz arm in its guise, a flexible and sonically competent budget option.



for a Roksan Tabriz which can be adjusted for azimuth, and so will make life easier with your deck.

As far as cartridges go, there are several good options to consider, however, as dealers are reluctant to demonstrate these fiddly little devices you will have to take pot luck to an extent. In these dwindling days of vinyl availability you may not be able to find that many of the models we recommend, so the choice will be limited. Either way the following models should all work well in your system; Denon DL110 (£69), Glanz MFG-310LX (£50) and MFG-610LX (£90), Ortofon 530 (£80) and MC3 Turbo (£100), Rega Elys (£74) and the Roksan Corus Black (£110). If you had to pick one, the cheaper Glanz looks like a bargain and will leave you something to put towards a new arm. However models like the cheaper Ortofon and the Roksan have replaceable styli and therefore will be cheaper to run in the long term.

Muddle killer required

I currently have an Ariston Maxim CD3 and an Exposure XX on a Target TT4 table, and Epos ES11s (bi-wired) on Epos stands, with Furukawa FD11 interconnect and Exposure speaker cable.

I am extremely satisfied with the overall sound which I consider to be crisp, detailed, fast, accurate and powerful. However I find that on occasions, when things are getting busy, the sound can lose its edge slightly, causing it to sound a bit muddled.

With about £400-£500 to spend, can you suggest a few DACs worth a listen to that would work well with the rest of my system.

D P Lane, Bournemouth.

Great DACs for four to five hundred pounds huh? Well, let's see what we've got that would fit the bill. I guess the definitive bargain DAC of the moment has to be the Audio Alchemy DDE which at £376 is something of a steal. Alternatively there's Meridian's rather tasty DAC7 equipped 203 which breaks your budget by a princely £10, but if it's as good as Paul Miller and the Editor reckon, it may well be worth the extra.

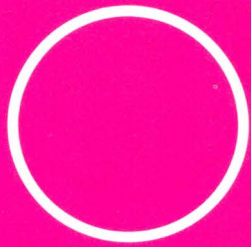
Got the timer

At the present time I am in the process of reading magazine reviews with the intention of upgrading my cassette recorder. I am interested in those with timer facilities as I do quite a bit of unattended recording.

As this facility is not usually mentioned, please could we have a feature in your magazine on timers. I feel that a timer built into a hi-fi system would be much more preferable than grovelling on the floor with time-switches controlled by pull-out pins, etc. R D Sibbald, Southampton.

There are a few examples of such devices on the market. However, one easy way of getting round the problem is to use a hi-fi stereo video recorder.

Not only does this have a timer but it runs for up to four hours and offers sound quality that should be at least on a par with cassette.



GOLDRING
AUDIO
ACCESSORIES

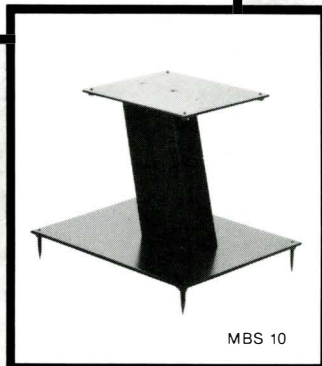
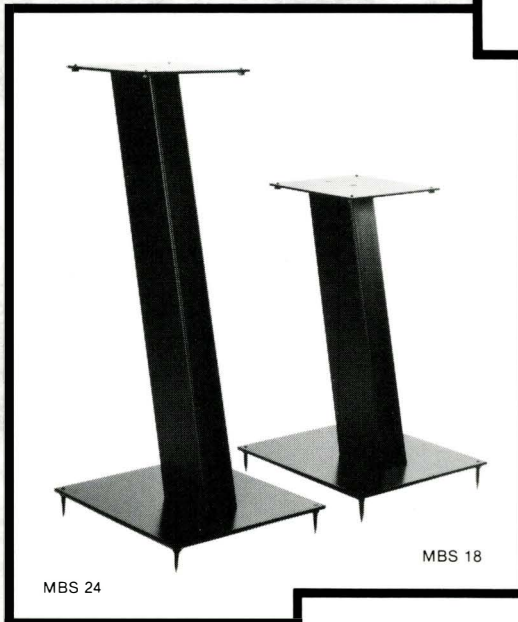
BLACK SATIN

SPEAKER STANDS

The Goldring Open Frame design was primarily developed to reduce acoustic feedback and resonance. Avoidance of such factors helps to ensure optimum performance from loudspeakers.

Adjustable spiked feet both maintain isolation at ground level and allow for perfect levelling. Top spikes are also supplied.

Extremely rigid and attractively finished in black, Goldring Open Frame stands offer superb value for money and combine good looks with an audible improvement in the sound quality of any hi-fi system.



COLUMN SPEAKER STANDS

Goldring high mass stands are true audiophile supports which will enhance both the sonic performance and the visual elegance of any hi-fi system.

They provide a rigidity-weight ratio which allows quality loudspeaker systems to be solidly supported with minimum movement making for clear, un-muddled base response.

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Beaconsfield	Homevision	0494 677220
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Birkenhead	Peters Hi-Fi	051 647 5626
Blackburn	Practical Hi-Fi	0254 691104
Blackburn	Romers Hi-Fi Centre	0254 887799
Blackpool	Practical Hi-Fi	0253 300599
Bristol	Hi-Fi Exchange	0272 664930
Burnley	Practical Hi-Fi	0282 33464
Chandlers Ford	TASS	0703 262916
Chelmsford	Thomsons Radio and TV	0245 71465
Cheltenham	Sevenoaks Hi-Fi	0242 241171
Christchurch	HATV	0202 473901
Colchester	D. T. Wicks & Son	0206 47503
Cromer	J. R. Gyton Ltd	0283 513746
Doncaster	Sound With Style	0302 321421
Dunstable	Wentworth Audio	0582 663383
Farnborough	Farnborough Hi-Fi	0252 520146
Folkestone	V. J. Hi-Fi	0303 56860
Farnham	Hemmings Hi-Fi	0252 715534
Gainsborough	Sight & Sound	0427 810526
Gosport	Christavision	0705 510250
Great Yarmouth	Hughes TV & Audio	0493 656381
Harlow	Essex Discount	0279 426155
Hereford	English Audio	0432 355081
Hitchin	David Orton	0462 452248
Hull	Bamfords	0482 898980
Ipswich	Avalon Audio Vision	0473 281922
Ipswich	Bennetts	0473 610801
Ipswich	C. E. Mathews Ltd	0473 216121
Kendal	Practical Hi-Fi	0539 722645
Lancaster	Practical Hi-Fi	0524 39657
Leatherhead	Tru-Fi	0372 378780
Leicester	Leicester Hi-Fi	0533 539753
Lincoln	Eastern Tapes Ltd	0522 525132
London	Analog Audio	081 445 1443
London	H. C. Wheatland	081 994 2464
London	Robert Tausig Co.	081 289 0998
London	South London Hi-Fi	081 674 4433
London	Studio 99	071 624 8855
London	The Listening Rooms	071 244 7759
London	Trade Centre	081 852 9510
Luton	Hobbs Components	0582 20907
Manchester	Practical Hi-Fi	061 839 8869
Newark	Peter Ellis Audio	0636 704571
Norwich	Bennetts	0603 630311
Pinner	Homevision	081 866 2474
Plymouth	The Hi-Fi Attic	0752 669511
Plymouth	Panasonic Technics Centre	0752 250571
Portsmouth	Hopkins Hi-Fi	0705 822155
Preston	Practical Hi-Fi	0772 883958
Redditch	Swanston	0527 62087
Reigate	Hi-Tech Audio	0737 242197
Romford	Essex Discount	0708 746600
Rotherham	Moorgate Acoustics	0709 370666
Rushden	D. F. Clarke	0933 56651
Sheffield	Audio Vision Ltd	0246 416416
Sheffield	Moorgate Acoustics	0742 756048
Sheffield	Sheffield Sound Centre	0742 583507
Sheffield	Sound With Style	0742 737893
Slough	C. F. Lake	0753 38288
Southend on Sea	Classic Sound and Vision	0702 461634
Torquay	Chelston Hi-Fi	0803 606863
West Thurrock	Twenty-Two Audio	0708 891818
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Yeovil	Mike Manning Audio	0935 79361

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Write on . . .

What do you think about the way things are shaping up in the ever broadening world of audio entertainment? We want to know your views and ideas, so send 'em in and each month we'll award a record token (that should just about cover the price of a CD) to the writer of the most witty or interesting contribution.

Indulge tweaks at your peril

Does the 'Bermuda Triangle' exist? Was God an astronaut? Do any tweaks really work? Is Andrew Cartmel human? I suppose the latter can be confirmed, but he must be of that very rare breed whose perceptions are not prone to suggestion. Otherwise he'd have listened to his collection of tweaks last month under test conditions, wouldn't he?

During happier moments I read a lot in the hi-fi press about peoples' ears hearing things, but very little about what their brains are doing at the same time. It's been argued that even if a tweak's effectiveness is all in the mind, folk should be free to indulge in them if they so wish. But wouldn't it be better to inform people about their psychological foibles, and thus offer a measure of protection from themselves and unscrupulous exploiters? Heaven knows how many tweaks are bought by enthusiasts 'just to see if they really work' and then get forgotten. How many people bother to report negative evidence? Many just feel a bit foolish and would rather lay low.

So how about some firm results for a change? An electronics engineer in the states, Fred



CD tweaks get the green light?

Davis, tested the 'Green Pen' theory by increasing the reflected light in a CD using a laser. This would make the sound worse, if we are to believe that ink absorbs such reflections and therefore improves the sound.

Unfortunately, his results showed no measurable difference and he heard no deterioration in sound quality (*The Skeptical Inquirer*, vol 16). People (especially your Gold subscribers?) deserve to have such evidence.

I think we indulge in tweak products at our peril.

Richard Ward,
London SE13.

We take your point about 'firm' results, however the problem has always been how to measure this sort of thing in the first place.

As a result of the research Paul Miller has done into CD-R it looks as though we might now have a viable method — watch this space.

compilation, for example, has an impressive playlist, but acoustically is a real dog.

Readers looking for Sixties/Seventies/Eighties compilations would do well to try the 'Connoisseur Collection' which are consistently as good as you'll get and they're mid price. They're about the only company which does not attempt to 'improve' the sound in any way. They just get good quality masters to start with.

**D J Reynolds,
Kingswinford, West Midlands.**

I'm backing DCC

Like Mr Malin (Readers Write, March 1992), I am also a consumer. Yet, while I respect his opinion, I do not share his pessimism. In fact I confidently predict that the new Digital Compact Cassette (DCC) format will be a winner for both the manufacturers and the consumers alike.

It is the consensus of opinion that it was only the legal wrangles between the manufacturers and the phonographic industry that prevented Digital Audio Tape (DAT) from taking off. These problems have, apparently been sorted out and DCC has the advantage over DAT that it is coming onto a more favourable, digital ready market than DAT.

The prospect of in-car DCC players being manufactured in the very near future means that car manufacturers will want to have them in their thousands — with the associated economies of scale making the price even lower.

As for the domestic market — what better format to record the likes of radio programmes? The length of tape duration again has the advantage over the present maximum one hour of the compact cassette which means that it will be easier to record, for example, the whole of a Radio 3 concert with the ability to dub over compact cassette that part to be kept, and with no drop in audio quality.

As for the price of tapes, I think Mr Malin does not appreciate the fact that we are all now used to the high price of Compact Discs.

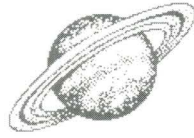
I think DCC will be a winner and will run in conjunction with compact cassette until such time as all radio/cassette combinations are equipped with the new digital electronics.
*RD Sibbald,
Southampton.*

Digital lunacy in the green age

The hi-fi press reported some time ago that the physical cost of making a CD has now fallen to slightly less than that of making an LP (79p from memory) and since CDs in this area are now nudging the £15 barrier it is getting close to the point where it will be cheaper to import your own from the US retail outlets. I'm told that the dollar equivalent of £8 is the going rate across the Atlantic, so even with import duty and VAT on top, the UK retailers are pushing their luck.

In our supposedly green age, what lunacy makes it possible to ship product across the Atlantic twice, and have it cheaper than buying direct? Personally I haven't bought a full price CD since they passed the £10 mark.

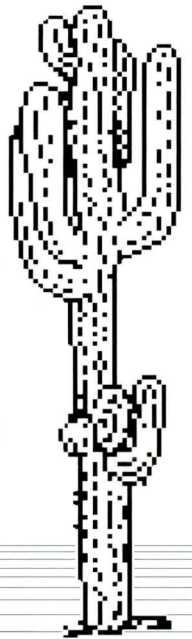
The inflated price of CDs would be more acceptable if the standard of recording quality was as good as the reproduction quality of the media. Am I alone in taking CDs back which are acoustically poor? The latest Paul Young



Why? drEam

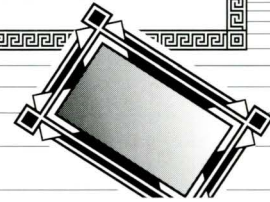
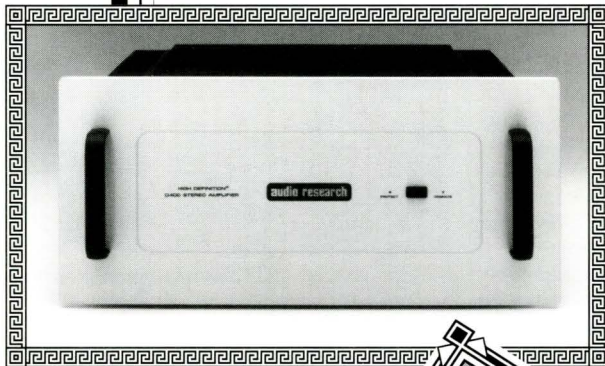


LS2 Line-stage preamplifier



OWNERSHIP of one of these remarkable amplification components need not be a dream. Audio Research amplifiers are known the world over for outstanding musicality. ♦ The LS2 is a complete redesign of the line-stage only LS1 preamplifier. With balanced outputs the LS2 has been specially created to breathe life into any line source system. Coupled with the PH1 phono preamplifier the LS2 makes a devastating front-end for both digital and analogue signals. Hear for yourself: "...the LS2 is something of a champion. The soundstage is wider, deeper, more open and more focused." (Hi-Fi News December 1991) ♦ The D240 High Definition Stereo Power Amplifier offers the stirring musicality of an Audio Research vacuum-tube amplifier with solid-state convenience. This potent 120 watt design (into 8ohm), is now in MkII form offering yet higher resolution and further improved dynamics. The compact yet powerful D240MkII will change the way you think about solid-state amplification. Existing D240 users should call about upgrades. ♦ Audio Research is about to change the solid-state hierarchy with its introduction of the D400 stereo power amplifier. Massive energy reserves mean the D400 – rated 200 watts (into 8ohm) – will drive your favourite speakers to the peak. With the tonal purity of a valve hybrid and the shocking bass power of a solid state amplifier the D400 takes an unshakable grip on the power amplifier high ground. ♦ The Classic 120 vacuum-tube monobloc power amplifiers redefine the concept of reference amplification. Truly neutral performance across a wide bandwidth is not commonly heard. The Classic 120 delivers all the virtues of classic vacuum-tube sound but with the low colouration and detail that has sometimes been missed. The Classic 120 will tell the truth about your music. ♦ There is an Audio Research component to enrich every system. The exceptional value, LS1 line-preamplifier, the Classic 30 and 60 valve power amplifiers and the SP9 and SP14 analogue preamplifiers satisfy the most demanding music lover. Contact your dealer or Absolute Sounds for full details of this exceptional range. ♦ The introduction of Audio Research amplification into your system can be an unexpectedly cost-effective solution. Put aside unnecessary upgrades. Aim high and bring the dream to life. ♦

D400 stereo power amplifier



Classic 120 vacuum-tube monobloc power amplifier



The world of high-end hi-fi equipment is crowded with questionable components. However, within this realm there exists a valid sonic hierarchy. It is difficult, without expert assistance, for the music lover to make selections from the electronic jungle: Absolute Sounds was created for the purpose of making your choice a wise one.



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Another satisfied customer

After reading the letters in your March issue, I have come to the conclusion that to become a 'Roksan interconnect' winner one has to observe two procedural criteria, namely, a) be wrong in what you are saying, and b) be sycophantic as well. The *What* price DCC winner spoils an otherwise excellent letter with his PS, a) by being as (b) above, and b) anyone who pays £2.95 for *Choice* deserves to pay £11.99 for DCC because, as a two year subscription "*Choice* addict", I only pay half that.

So, with apologies for that subtle 'addict' ploy, I refuse to use phrases like 'magnificent publication' but I will say that *Choice* is most certainly provocative and makes me want to put paper to typewriter every month.

Andy Benham's March *Menu* gave me a sinking feeling that no amount of Bovril would cure. In fact, I began to get a cloudy vision of some future scene in

which, sitting in the lounge one evening, I press a button on the arm of my chair and one whole wall shows the Vienna Philharmonic in 3D and they begin to play Beethoven's fifth in

multistereo Surround Sound. The Mini Disc for this I had selected and started from the same remote control. But . . . she who must be obeyed says "must we have that on so loud?" So I slip off to my den and listen to what I like through my strictly single-purpose separates system, the point of all this being that I hope manufacturers remember this in the future when they are producing what they think the public wants, as they are today.

Next, on the Lasaway green pen. May I correct one thing that Andrew Cartmel said about this stuff being permanent. It is readily soluble in water when fresh, so I decided to see if it would still

wash off a non-favourite CD that I treated months ago. A test inch gradually began to shift but it was going to take ages. So I carefully tried thinners which remove the paint immediately without harming the now repainted CD. Incidentally, I am puzzled that the AT6079 green rings don't affect the sound quality as they must alter the distance from the playing face to the laser, but perhaps this distance is not that crucial? L G Neville, Surrey.

Re: winners always being wrong in what they say. CDs are supported at the centre, so the rings don't alter the lens to disc distance. Have a record token!



Just some of the colourful things you can do with your CDs.

**Record
Token
Winner**

Plummeting music spending

Won't someone give Paul Messenger a break? He's been 'temporarily living with a £1,000 system' for at least two years. He's beginning to sound like a (heaven forbid!) stuck record.

With regard to your interesting editorials on CD and, now, DCC prices. I think we are all familiar with the news that CDs cost roughly the same to make as records, therefore the cost of CDs represents about 100 per cent increase on the price of what is after all 'an album'; for no apparent reason other than the whim of the record companies.

I like Compact Discs. The convenience of the format, random play; programming, remote control — I like it all, on top of the very good sound.

So how come I am now spending less on music than I used to?

If CDs were £7 each and there was a comprehensive selection of music available, I would be spending £20 a week on music. As it is I don't want to spend even £20 a month on CDs because of the price; and I can't even spend £20 a month on vinyl because it's just not there.

So, whatever the philosophy behind the record companies' pricing and distribution policies, they are definitely losing money on me.

As for DCC, it seems to be a non-starter in the real hi-fi/music lover world. And indeed it is aimed at people who now listen to pre-recorded cassettes.

However, it may well be a non-starter there also. Will people who now listen to pre-recorded cassettes be prepared to pay the price purely for an increase in sound quality? If they were, would they now be listening to pre-recorded cassettes as their main source? No. If they are interested in sound quality they would already have a decent system at home and be making good recordings on tapes that cost a pound or thereabouts, thereby having their favourite music at home and on the road.

For a DCC player and a hundred blank DCC tapes (at, I believe, £5 each) you could have a hundred AR-90s and a good hi-fi system, including a damn good cassette deck.

Mark Wilson, Bristol.

A mirror image of perfection

I recently read with interest an article in another hi-fi magazine (Barry Fox in January's *Hi-Fi News*) which debated how, assuming they do, green marker pens improve CD sound quality. The article argued that the makers of the pen must be wrong in saying that the green ink acts as the complimentary colour, and thus as black to the player's scanning laser, as CD players now use infra red, rather than visible red light.

There is, however, a much more obvious objection to the makers' theory. They claim that the green ink absorbs light that would otherwise be reflected back into the disc by its edges, but the user applied ink is applied to the outside of the disc and so by definition can only absorb light that has already escaped from it. The ink

can, therefore, only absorb light which would otherwise only be reflected back into the CD by the player's transport mechanism. If I paint over the front of a mirror I can no longer see my reflection, but if I paint over the back of the mirror it has no effect whatsoever. Likewise, if CD edges are degrading sound quality by acting as inward facing mirrors, painting their outside faces is not going to have much effect.

If the green pen makers are still half right and the ink really is having its effect by absorbing the small amount of light that would otherwise reflect back into the discs from the player, then there should be a potential for much more dramatic effects if the CD manufacturers could be persuaded to dye the outer few millimetres of the

disc itself green so that optically it no longer has an edge. Otherwise another explanation must be sought. David Woolliscroft, Manchester.

PS: There has been a lot of controversy lately over the pricing of DCC, with people proclaiming the likely launch price far too high. Personally I welcome the price, although I would prefer it very much higher. DCCs (and preferably CDs as well) should be at least £50 each. That way no one would buy them and we could have our records back.

Secondly, if CD-R really does sound better than commercial discs, hadn't the manufacturers better find out why so that they can improve the standard of the discs we are stuck with buying?



WIN AN ARISTON MAXIM CD PLAYER

This month the absurdly generous competition elves at Hi-Fi Choice are giving you five chances to win Ariston's new Maxim CD3 CD player. The Maxim retails for over £400 but could be yours for the price of a stamp. Complete with remote control and all the facilities you would expect of a player at this price point, the Maxim could be just the up-grade you've been waiting for.

The Prizes

The first five correct entries drawn from our mailbag after the closing date will each win an Ariston *Maxim CD3* CD player (£429.95). So clip that coupon.

The Questions

Please write your answers in the space provided on the entry form.

1. Which loudspeakers would you find in the *Collins Classics*' boardroom?
2. What does EAR stand for?
3. Who makes a speaker called the *Puppy*?
4. Marantz makes a 30 watt class A monoblock amplifier. What is it called?
5. Who is the boss of Musical Fidelity?
6. Which speaker was designed by Steen Doessing?

Entry Form

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ADDRESS: 9631 PARK AVENUE,
GILLINGHAM, KENT.

POSTCODE: - TEL: -

HFC/MAY/92

Closing date: Monday, 1st June, 1992

Your answers:

1. DYNAUDIO CRAFT
2. ESOTERIC AUDIO RESEARCH
3. WILSON AUDIO
4. MA 24
5. ANTHONY MICHAELSON
6. SD ACOUSTICS SD3 MKII

COMPETITION RULES

- 1) All entries must be on the entry forms provided. Photocopies will not be accepted. Incomplete forms will not be considered.
- 2) There is no cash or other alternative to the prizes.
- 3) Employees of Dennis Publishing Ltd and associated companies, the manufacturers and suppliers of the prizes, their agents and relatives, are not eligible to enter the competition.
- 4) The competition is not open to readers living outside the United Kingdom.
- 5) The prizes will be awarded to the first sets of correct answers opened after the closing date. No correspondence whatsoever will be entered into regarding the competition. The Editor's decision is final and binding.
- 6) The winners will be notified by post and the results will be published in *Hi-Fi Choice*.
- 7) Please notify us if you do not wish to be informed of any special offers and promotions.

Send your completed forms to:
**Ariston Competition, Hi-Fi Choice,
Computer Mailing Services, PO Box
249, London WC2H 0HS.**

HOW TO ENTER

Our simple hi-fi quiz requires six answers which must be written on the entry form provided. Fill in the form, remembering to include your name and address. (Don't be like those occasional poor souls who get all the answers right but leave the name and address section blank.) Then send it to the address shown in bold type at the bottom of the form. Mark your envelope **Ariston Competition**.

THE 1992 HiFi DESIGNERS SHOW

Listen to the Equipment and Exchange Views with the Designers
The Chesterfield Hotel, Malkin Street, Chesterfield, Derbyshire, Tel (0246) 200096
Sunday 3rd and Monday 4th May (Bank Holiday) from 10.00am to 6.00pm each day. Free Entry.
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- **AVONDALE AUDIO** - Les Wolstenholme. Unveiling of the radically improved Linn LP12. Demonstrations of upgraded Naim Audio and Quad Amplifiers, also Avondale Reference Music Systems, including the Genesis Turntable and range of RMS Metal Speakers.
- **CONCORDANT** - Doug Dunlop will be giving lectures and demonstrations using the Exquisite Valve Pre-Amp for both LP and CD and he will be introducing "Big Bertha", a 50 wpc Valve Power Amplifier. Speakers by Daverline Acoustics and Supports by Something Solid.
- **R.A.T.A.** - Russ Andrews. An exhibition of the extensive R.A.T.A. range of high quality Self-Build Equipment proving that there's no substitute for watts and cubic inches!
- **LYNWOOD ELECTRONICS** - David Rusby. The glass-fronted Opal and Ruby line-level amplifiers will be on demonstration. The Opal Integrated Amplifier has a unique pre-out facility and may be combined with the Ruby Power Amplifier thus allowing separate amplification for bass and treble. Partnering equipment will include the Avondale Genesis Turntable and RMS Speakers.
- **NOTTINGHAM ANALOGUE** - Tom Fletcher believes in the superior reproduction available from the LP and is bringing his full range horns; Mentor and Mentor Reference Turntables; Space Deck; Space Arms and Mentor Arms. NEW this year is the Hyperspace Deck. Valve amplification by Croft.
- **SONIC LINK** - Graham Nalty will be exhibiting the Sonic Link range of Cables and Amplifiers. Graham will be on hand to offer advice to his army of DIY followers regarding his Audlokits range.
- **WILMSLOW AUDIO** - will be launching their "Ideal Active System" called COSTE. Various speaker kits and components will be available for inspection and sale.
- **PENTACHORD** - Dr. Brooke has been very busy during the winter. The "A" Miniature and the "B" Bass Speaker will be demonstrated with an active crossover. The production version of the Pentacolumn is now ready and so is a very special shelf-mountable subwoofer.
- **REL-ACOUSTICS** - Richard Lord will be using a system comprised of Magnum Power Amplifiers and Avondale RMS Speakers to demonstrate the efficiency of The REL Subwoofer and in particular, its ability to integrate with high quality systems.

THERE WILL BE A BRING AND BUY STALL, please ring for details.

HIFI WORLD AND AUDIO CONVERSIONS MAGAZINES WILL HAVE STAFF AVAILABLE FOR ADVICE AND DISCUSSION.

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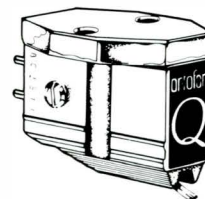
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21st Century Fox

More on that vexed question of DCC pricing. If Polygram and the rest of the record industry risk legal action and act as a cartel to set the price of re-recorded DCCs as high as premium CDs, surely the public will just buy a CD and tape it onto a blank DCC, costing around £5, for portable and car use? No, says Polygram, two benefits are lost — the text facility, and table of contents for fast access.

The table of contents will let a DCC player search out tracks quickly, by switching sectors to find the shortest fast wind route to the selected track point. The text mode will provide track and artist identification, and later karaoke.

Polygram says, and Philips has now confirmed, that when a digital copy is made of a duplicated cassette, neither the text code nor the table of contents will copy across with the music.

Future formats are the subject and Barry Fox is your guide. This month's key acronyms include DCC, TOC, CD-I, and MPEG. FAB, BF.

To the best of my knowledge this very important point has never been brought out. The copy-proof nature of the table of contents came as news to many people inside Philips.

The first DCC players will have a 12 character display on the front panel. Future players will have a video output to let a TV display 21 lines of 40 characters. Most interesting is the intermediate plan for a remote control, like a VCR remote, with LCD panel which displays two 40 character lines. This can be used to identify tracks or display karaoke lyrics.

Polygram is also now looking at the possibility of using the extra running time on a cassette, over CD, to add a few tracks and so make the DCC a desirable purchase.

Also there will be at least seven DCC duplicating plants on stream by the end of this year, to support the launch. All are majors. Cinram of Canada will produce in the USA and JVC in Japan. Sonopress and Polygram will cover Europe, with at least three other major players soon to be announced. This contrasts with CD, where launch support by the majors was slow. So even with minimum production capacity in each plant there will initially be over capacity, again contrasting with the launch of CD ten years ago. So the launch of budget DCC labels, eg of reissued and repackaged material, should be much faster than the launch of budget CDs in the Eighties.

But as one industry figure put it. 'Low prices would kick start DCC. And if it is going to fail, let it fail quickly.'

Video crystal gazing

The last time I wrote a story with the words 'I have seen the future', it was about the first of Sony's Video 8 equipment to go on sale in Japan. I reckoned that the small cassette, long playing time, digital audio and excellent picture quality would make it a winner in

the long run. Despite bitter opposition from the VHS camp, and failure of V8 as a table-top format, sales of VHS and Video 8 camcorders are now 50/50 and more and more VHS manufacturers are selling V8, too. Now I reckon I have seen the future again.

Computer firm Microsoft sponsored a dull-sounding International Conference and Exposition on Multimedia and CD-ROM in San Francisco recently. It opened with a 'keynote' speech by Microsoft boss Bill Gates, in which he played guru with a muddled string of non-sequiturs on digital HDTV which proved he has very little grip on the subject. Commodore then gave a more-of-the-same talk on CDTV, admitting with glorious understatement that sales had not gone as well as expected. The marketing boss of Tandy, who I am sure has a string of Masters Degrees in Marketing, then showed enough pointless pie charts to put him high in the running for most inconsequential speech of 1992. The chap next to me went to sleep.

But he sure woke up when Gaston Bastiaens, head of the division in Philips responsible for CD-I, came on. Bastiaens spoke briefly and showed some excerpts from CD-I games which are under development at the Philips/Polygram production centre in Los Angeles. These use a new, and very clever, technique which blends live action with a static background. Any CD-I player will be able to run them.

Bastiaens then gave the first working demonstration of Full Screen Full Motion Video, with accompanying stereo sound, sourced from a 12cm CD and decoded in 'real time' by finished microchips made to the recently agreed MPEG (Motion Picture Experts Group) standard.

Afterwards, hardened cynics from all round the world could only splutter two words, 'staggering' and 'unbelievable'.

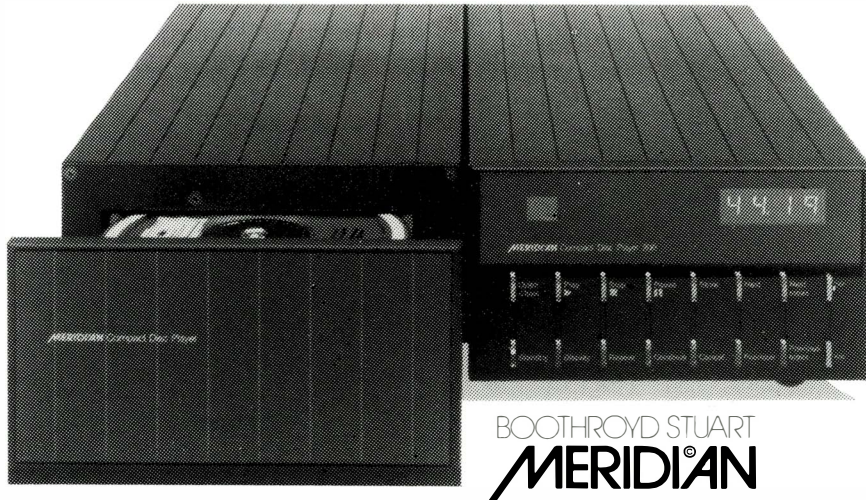
I reckon Philips has re-written the rules of home video entertainment.

Last year Gaston Bastiaens had predicted that the then-new MPEG standard for FMV would let a 12cm CD play over an hour of moving colour video from a CD with quality 'as good or better than VHS tape', with stereo sound of quality 'as good as CD'. Few people believed him. And some very poor demonstrations of MPEG video given by Sony at San Francisco prior to Philips' scheduled showing seemed to confirm this disbelief. The pictures smeared and collapsed in mosaic patterns, to the accompaniment of some pretty weedy sound.

With little ceremony, Philips used a video projector to beam excerpts from the Three Tenors operatic video recording and the James Bond film *Licence to Kill* onto a large screen. Picture quality was better than VHS and the sound was a close match with CD. This is because the MPEG standard for sound uses something very similar to the PASC coding used for DCC.

Says Gaston Bastiaens: "I am convinced that 12cm CD-I is the ideal carrier for music videos".

Currently record companies must pay \$8 to press a 30cm analogue laser video disc and \$2 to duplicate a VHS video tape. But they can press a 12cm CD for 60 US cents. With MPEG coding this can now store over an hour of digital video and audio.



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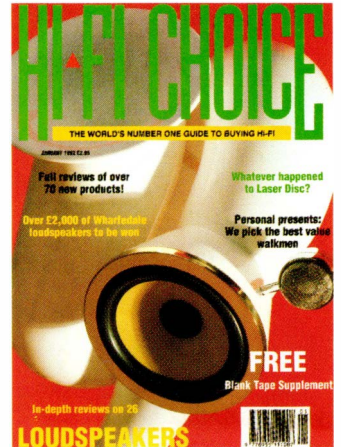
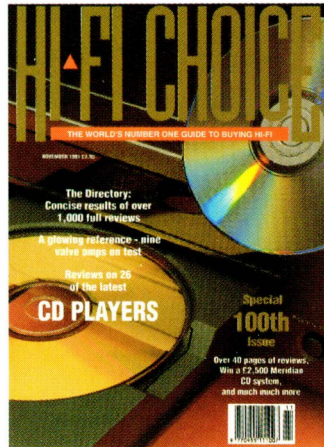
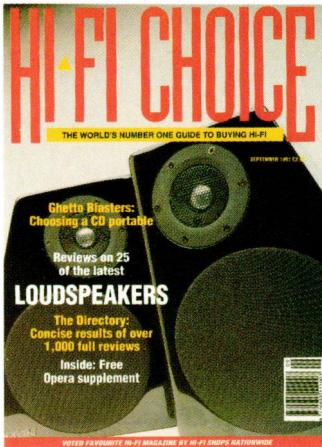
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THE AUDIO NOTE OTO & THE UK-MADE RANGE OF INTEGRATED AMPLIFIERS & AMPLIFIER SEPARATES

Over the next 6 to 12 months, Audio Note Co. UK will launch a full range of valve amplifiers using valves as diverse as the EL84 pentode and UV211 directly heated triode.

The range will start at £899.00 for a line integrated and reach about £4,999.00 for the ANKORU 211 integrated, dubbed the "mini-ONGAKU".

There will be two basic formats to the range, the integrated amplifier, consisting of phono and line level versions, and separate pre-amplifier and power amplifiers, based on the individual parts of the integrated amps.

This "breakdown" of the integrated amplifiers' two parts, pre- and power sections, is made possible by a somewhat different approach to the fundamental design of all our new integrated amplifiers. They are in fact a separate pre- and power amplifier in one box, with completely separate power supplies.

This design philosophy has several advantages, which has less to do with the fact that you can make them into individual amplifiers, and more to do with sonic quality. By keeping the higher gain sections of the pre-amplifier part supplied from its own power supply, its behaviour improves considerably, both electrically and sonically. The power amplifier section also displays similar improvements.

The advantage of the integrated amplifier concept is that it makes possible the very best interfacing of the pre- and power sections, due to the known and pre-determined impedance relationships between the two parts of the amplifier.

The integrated amplifier also has considerable advantages in terms of cost and space requirements, plus the fact that you do not need to spend money on an interconnecting cable.

The first of our UK-made integrated amplifiers to be

introduced is the OTO (means sound in Japanese). It is, as will be the other forthcoming models be, a no-nonsense and straightforward design, with the emphasis put on the highest possible sound quality, reliability and long term value, rather than power output and specifications. All our integrated amplifiers are conceived as complete amplifiers, with carefully calculated interstage impedances, optimising the circuits' time constants and dynamic transfer characteristics, these being aspects which receive little attention in most other amplifier designs, valve or transistor.

The OTO has the deceptively low power output of 12 watt pure Class A, and therefore requires a reasonably efficient speaker, preferably with a better than 88dB/1 watt/1 meter efficiency, however the OTO's dynamic capabilities make it champion amongst amplifiers with this kind of power rating.

The OTO Phono version has fully shunt regulated push-pull gain stages, with a passive equalizer, high quality passive components on a double sided, fully through-plated circuit board of 2.4mms thickness. A full compliment of inputs, including tape-loops. The OTO retails for £1,250,000.

The Line version basically is a line-power amplifier version of the above, with phono input giving way to a second CD-input. The OTO Line costs £899.00, and represents excellent value for CD-only users.

M1 Pre-amplifier

By the time this is read the M1 pre-amplifier should just about have reached the market together with its matching power amplifier, the P1. Apart from an active line stage the P1 Phono version is the same as in the OTO integrated. The line stage is an anode follower with about 10dB of gain and is offered as a stand-alone line

pre-amplifier.

The Audio Note M1 Phono pre-amplifier will cost £699.00. The Audio Note M1 Line pre-amplifier will cost £499.00

P1 Power Amplifier

Of 12 watts Class A output as the OTO parent, the P1 features two inputs, one which is unattenuated and one with a volume control, this affords maximum flexibility in terms of choice of pre-amplifier, or just running a CD-player straight in.

The Audio Note P1 power amplifier will cost £699.00.

During the course of writing this advert I received the latest HiFi Choice, which features a rather good review of the Audio Note NEIRO single-ended triode power amplifier and it struck me what a paradox it is that the realisation of the potential of this 70 year old technology is only just beginning to emerge.

When the ONGAKU was first presented to me in Japan, its sonic beauty and musical clarity made me realise that amplification still has a long way to go before it reaches anything like perfection. Noel Keywood touched upon this in his Kaleidoscope piece in HiFi World in the February issue. Noel basically contends that "perfection" in amplification has been available for some time now, but that upon listening to the ONGAKU Nephthys prototypes (more of these later, as I am involved in those as well!), he strongly doubts the claims of "perfection" and contends that the subject needs further study.

Over the next year or so, several amplifiers will appear on the market which utilize the no-feedback, single-ended, directly heated triode technology.

Not all at extremely high prices, our own Audio Note P4 stereo power amplifier will cost about £2,499,000 and feature UV211 in single-ended mode yielding some 15 watts, it will offer much of the kind of

sound quality that is so highly praised in the ONGAKU and NEIRO, although there will still be a considerable gap.

The central issue however, is why this type of amplifier sounds so vastly different from accepted references, and can still be considered better in absolute terms. This poses some very fundamental questions regarding the direction, quality and understanding of amplifier development over the past three/four decades.

These questions are:

- 1) How can amplifiers like the ONGAKU/NEIRO sound so different to recognised existing "state of the art" amplification, and generally still be considered "better"?
- 2) Where does the ONGAKU/NEIRO leave current measurement techniques?
- 3) Why was the technology that ONGAKU is based on forgotten for over 4 decades?

The fundamental nature of these questions will be creating controversies that are only just emerging, but these discussions are necessarily in order to resolve and progress the advancements in High Fidelity as an art and science.

Outside of small pockets around the world, primarily in Japan, where these discussions have been going on for some considerable time, the technology has been completely ignored by the community at large, and forgotten by the Audio Industry in general. Focus has been on less fundamental, more marketing related issues.

I have to leave the second chapter of my criticisms of signal regeneration until next month, which I am sure not many of you will mind!

Peter Qvortrup

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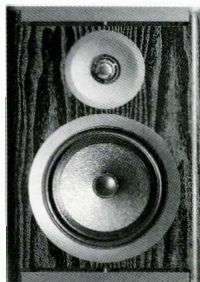
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Choosing and Using . . . Loudspeakers

The first step on the road to choosing your loudspeakers is to specify your personal and particular requirements. It is possible to do this on a basic level checking the price, size and intended location. But there are real benefits for those prepared to take a little more trouble. With a little care, the assistance of the data in this issue, and (hopefully) the cooperation of a skilled retailer, the end result can be that much more worthwhile.

Those buying just loudspeakers will have a pretty good idea of the money they have available, which as ever is the fundamental bottom line of any purchasing decision. But there is - and always has been - controversy over the proportion of a budget that should be devoted to loudspeakers, vis a vis that spent on the other components.

Thinking of buying some speakers but don't know where to start? Let Paul Messenger guide you through the maze of loudspeaker selection.

When setting the loudspeaker budget, it is vital to allow sufficient funds for a decent stand or support, and good quality connecting wire. From £200, for example, one should probably allocate £140 for the speaker itself, £50 or so for stands, and maybe a tenner for the cables.

While a magazine can assist in presenting the alternatives that are available, it is only through skilled demonstration that an individual can be confronted with the different but equally valid options to make an educated choice for himself. At the time of writing I am temporarily living with a £1,000 system which suits me very well, but which certainly represents one extreme. It consists of a £600 turntable with £200 amplifier and £80 loudspeakers on £100 stands. At the other extreme, another audiophile could enjoyably combine a £500 remote control multisource midi system with £500 worth of high performance, low coloration loudspeakers and stands. But unless one actually has the opportunity to hear the difference between these two very distinct approaches, how can one possibly have any basis for making a choice?

The site chosen for loudspeakers is often as influential as the choice of loudspeakers themselves. Over the years I have used open stand locations, both with conventional box speakers and panel types, and also stand-mounted wallbacked designs. Each has its own strengths and weaknesses and imposes its own characteristics on the sound, so again personal preference enters into the equation.

Having chosen the siting, one may then choose the loudspeakers and stands to suit. Alternatively, choose the speakers you like in the shop and then move them around at home until they sound to your taste.

The end result comes from a complex interaction between the loudspeaker, its support, its site, the

acoustics of the room, and the general characteristics of the driving system. That is rarely entirely predictable. For those intending to spend a fair amount of money, it is not unreasonable to expect the luxury of a home demonstration, and/or the option to return and change a pair which do not suit after a day or two.

For any given budget there is an obvious choice between large or small loudspeakers. One instinctive reaction is to favour the big one, particularly if it has lots of drive units, but others will plump for a miniature or compact on aesthetic grounds. In fact the differences and trade-offs are more far reaching.

Bass extension

Fundamentally, the larger the box the more extended the bass is for the same specific loudness. Ultimately a good big'un is going to beat a good littl'un on loudness and bass extension, hands down. But it is also going to cost a great deal more. The large enclosed volume remains the route to extended bass, and this in turn adds 'weight' and 'scale' to the sound. But it can also reveal the low frequency inadequacies of the sources, be they the equipment or the recordings themselves.

Big speakers suffer from several innate disadvantages. Large box enclosures are expensive to build and ship, and represent an undesirably large surface area of unwanted radiation, which can colour the sound and blur stereo precision. Extra drive units do increase power handling, but bring problems of crossover complexity and unit integration.

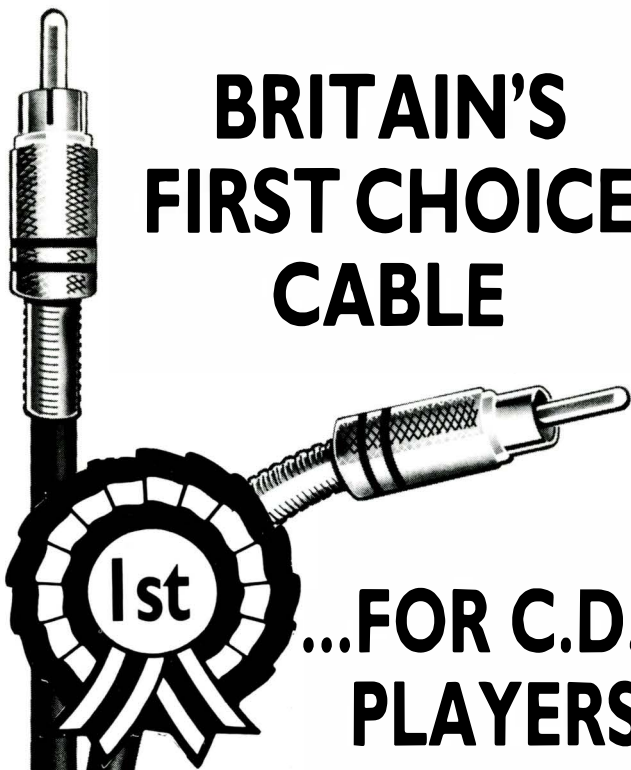
Little speakers can prove more fragile if used for the occasional party, and are certainly not at their best when trying to recreate the power and drama of rock or a full concert hall acoustic.

Given the excessive number of different models competing for attention, manufacturers are inclined to make much of the uniqueness of their particular brew. As a result the industry has become riddled with buzz words to describe any single type of engineering solution, and this leads to the sort of stereotyping which entirely misses the point of loudspeaker engineering.

Examples are legion, from the extreme bass/midrange cones of the early Seventies through to the latest metal dome tweeters which are currently springing up everywhere. The result is that people talk of a 'metal dome sound' as something desirable (or not) per se, whereas in fact there will be a whole range of different metal dome sounds, in all probability some distinctly more 'equal' than others.

The underlying axiom is that great loudspeakers are not created by adopting a quick technological 'fix'. Indeed, history has often shown that the 'radical innovation' is a mere flash in the pan, with benefits in one area more than offset by unforeseen penalties elsewhere. Technology has steadily improved the performance of loudspeakers over the years, and some innovations have proved decidedly worthwhile. But the whole is much greater than the apparent sum of the parts, and the buyer would do well to bear this in mind.

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Allison MS200

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East coast US speaker manufacturer Allison is something of a stereotype for the Massachusetts school of design philosophy, the eponymous founder heading up the Acoustic Research engineering department for many years prior to setting up his own company more than a decade ago. Sealed-box loading and careful wall-mount room matching are the two fundamental design tenets that apply to most Allison models, and both are found in the £220 MS200.

There are other similarities to its stablemates too, but in one important respect the 200 is strikingly different. It's micro-miniature in size, substantially smaller than the typical British one hundred pound bookshelf baby, tinier even than the tiddly Monitor Audio model included in this test group (see page 75), and surely too small to be considered a serious hi-fi speaker — maybe.

The 200 in fact comprises the two satellite units that are also bundled with a subwoofer to make up the MS205 three box speaker system I reviewed in issue 105. Allison's UK agent suggested I tried the satellites on their own, and I was sufficiently impressed with the results to draft them into this group test, and run them up against larger and cheaper rivals.

However, this doesn't look or feel anything like a budget speaker; though only half the size, it somehow reminds me more of the BBC LS3/5A or Linn Kan than anything common, garden or inexpensive. It's shaped like a brick — and built like one too, packing the same weight as a Goodmans Maxim 3 into barely half the volume.

Finish is smart but strictly utilitarian black paintwork, while postformed baffle edges help relieve the boxy appearance, as does

the curved perforated plastic grille.

Given the highish pricetag, the engineering is disappointingly utilitarian too. 'Neath the cover lurks Allison's proprietary 'nipple' tweeter alongside a pressed-frame main driver which features a tiny 70mm paper cone and foam surround driven by a pretty substantial magnet and tag connected to a simple high power crossover.

The woodscrews holding the drivers to the 16mm MDF baffle were pretty tight. The enclosure is well filled with wadding, and the 13mm MDF sides provide ample rigidity.

One practical problem that did arise was the difficulty of properly mounting a unit that has such a tiny footprint, from both performance and aesthetic standpoints; a matching wall bracket would probably be the best solution.

Test report

A 1kHz spot measurement could give a close-to-average sensitivity rating, though 85dB is a more realistic figure averaged across a broader band, and is further compromised by the 4ohm impedance characteristic.

Given the tiny enclosed volume and main driver, plus the sealed box loading, the relative lack of bass and lower-mid output below 200Hz comes as no real surprise, though the output above 200Hz is impressively flat, give or take the odd reflection effect, and slight upper-mid prominence.

Close-to-wall siting provides worthwhile midbass fill-in 50Hz-150Hz, while the sealed-box loading confers a gentle -6dB/octave roll-off below the c100Hz system resonance — which explains why even something this small can still create worthwhile (-16dB) output in-room right down at 20Hz.

Sound quality

The balance anomalies and bass constraints were bound to leave the cards stacked against the 200 for the blind listening tests, and certainly left some panellists unimpressed. Others warmed to its virtues, however, so the end result was no disgrace, especially in context.

The 'forward' presentation with lack of bass weight and warmth was the inevitable constant criticism. The sound is certainly a bit cold and thin — even a mite tizzy and splattery — but it's also impressively coherent and quite communicative with pretty good timing, while the lack of boomy effects ensures good agility and speed.

Some wall coloration is certainly audible, but the enclosures themselves make little contribution, and stereo images are well formed with little boxiness. Loudness is of course limited, but the 200 hangs together and even seems to relish being driven hard, and delivers a surprising sense of scale despite the lack of weight.

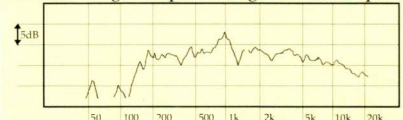
Conclusion

The MS200 is sufficiently endearing to make it easy to tolerate and even forgive its fundamental limitations. It's perhaps a little too expensive for formal Recommendation, but is certainly well worth considering if physical minimalism is high on the want list.

TEST RESULTS

Size (h x w x d)	25.5 x 15 x 13.5cm
Weight	3kg
Recommended amplifier power	20-60W
Recommended placement	close to wall
In room averaged response limits (50Hz-10kHz)	±7dB
Large room/space LF roll-off (-6dB ref midband)	130Hz
Large room/wall LF roll-off (-6dB ref midband)	50Hz
Large room output at 20Hz (ref midband)	-16dB
Estimated midrange sensitivity (ref 2.83V, 1m)	85dB
Impedance characteristic (ease of drive)	current hungry
Typical price per pair (inc VAT)	£220

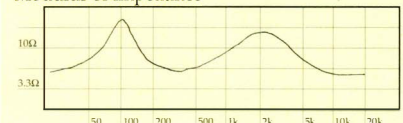
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



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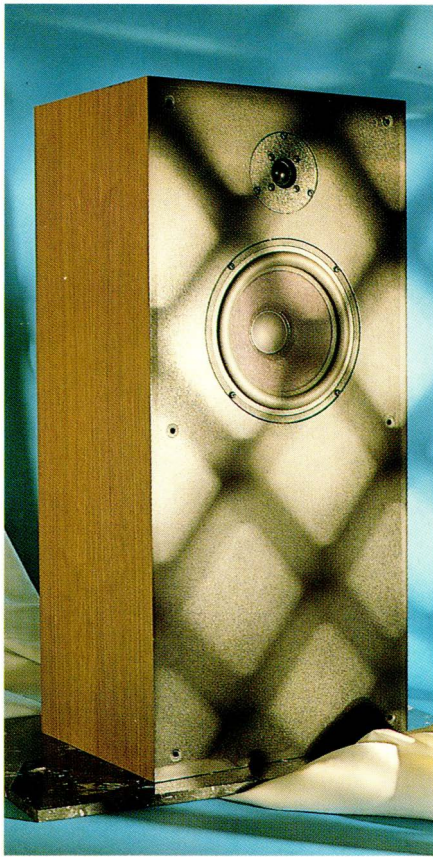
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Audio Note AN-E

Audio Note, Unit 11, Back Road Mews, 74-76 Dyke Road, Brighton, BN1 3JD. Tel: (0273) 821 371



The politics behind both this brand and this range of loudspeakers are complex to the point of impenetrability. Audio Note is a Japanese brand primarily known for its (very) high end valve amplifiers and cartridges, and strong advocacy of silver wiring.

AN's UK-based European distributor, Audio Note UK, has already started building *lo* cartridges under license, and has now introduced a range of AN-branded loudspeakers. These bear a striking resemblance to the Snell loudspeakers said distributor used to import from the US, prior to a serious falling out between the two parties.

I'm taking no sides on this, but do know that AN UK wanted to sell the original Snell models, designed by the late Peter Snell a decade or more ago, whereas Snell Acoustics had long since introduced new models with much more up to date presentation.

Though now entirely manufactured in the UK with newly sourced components, these Audio Note speakers are definitely something of a throwback designwise. Indeed, the £1,300 *AN-E* that is the subject of this review is possibly the ugliest speaker I've ever seen. There's something decidedly uncompromising about a baffle this wide, tall and black, perched on 30cm stands and needing to be kept well clear of walls.

Completely contradicting the almost universal modern view that a narrow baffle is a good thing *per se*, this shape is considered an essential ingredient in controlling the forward radiation, while the rather gloomy textured front and back finish also apparently makes an important contribution to the net sound quality.

At least the wrap is a nice real wood veneer, available in various finishes, and judging by the fixing lugs on the nude pair supplied, I suspect there may be a full size grille somewhere in the pipeline too, though its use is clearly not encouraged. (There's also a *Silver* variation on the *AN-E* theme, with internal silver wiring and a hefty extra £300 on the pricetag.)

Flouting convention again, the driver screws were only finger tight, and apparently largely cosmetic, the drivers being firmly masticked (or mastic? — Ed) into place. Not wishing to cause damage, I forewent the usual internal examination. For the record, bi-wire terminals and a large port are fitted on the rear, the tweeter has a 25mm doped fabric dome with short horn flare, and the main driver a cast frame and 150mm paper cone and foam surround.

As I understand it, the box itself is quite lightly constructed and damped, with strategic bracing to control — even harness — the panel vibrations as part of the total sound output. This 'if you can't beat them, join them' approach is philosophically rather interesting, though I bet it's a bitch to develop and manufacture consistently.

Test report

The measured performance envelope is most impressive, delivering serious in-room output right down to 20Hz (-6dB), alongside a high 90-91dB sensitivity. This most unusual combination should be a fine match for limited power valve amps, though the lowish LF impedance is less ideally matched to these devices' preference for voltage rather than current delivery.

One reason for the fine bass extension is that the large port is tuned to a lowish 33Hz. This may not be perfectly matched to the driver/box 55Hz natural resonance from a power handling perspective, but does ensure good scale while avoiding over-exciting the program-rich midbass region (60-120Hz). Rather heavy in the low bass even well clear of walls, the overall balance elsewhere is very well judged, though a shade forward and uneven in the midband.

Sound quality

Clearly the outstanding performer in the blind listening tests, the panellists gave the *AN-E* a universal thumbs up, with widespread praise for the fine timing, excellent scale, enervating dynamics and effortless articulation.

The bass is certainly not shy in coming forward, and the overall sound is a shade heavy and chesty, but still drives along with fine pace. Though some unwanted paper cone and box colour is audible, it's easily forgiven since voices have a rare realism and coherence; the message simply cuts through the medium.

Best auditioned from a distance of at least 3m, the 'hot seat' listener will find image focusing of a standard normally only associated with electrostatic speakers. Despite the high sensitivity and prodigious bass, this is not a headbanger's speaker. The speakers are delightfully effortless at low and medium levels, but an extended high level session of *The Jamms* leaves them a shade breathless, as the colorations become more, and the low level delicacy less noticeable.

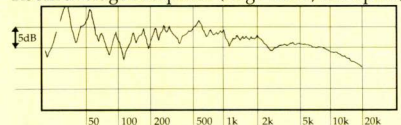
Conclusion

Ugly as they come, by no means inexpensive and not obviously good perceived value for money, the *AN-E* turns out to be a confidently Recommended bargain from a sound quality perspective. As for value, having assessed several hundred speakers of all shapes and sizes these past few years, the *AN-E* just happens to be the least expensive model I could happily live with.

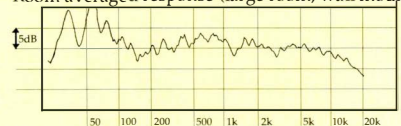
TEST RESULTS

Size (hxwx d)	80x36x28cm
Weight	18.5kg
Recommended amplifier power	10-80W
Recommended placement	low stands well clear of walls
In room averaged response limits (50Hz-10kHz)	±5dB
Large room/space LF roll-off (-6dB ref midband)	20Hz
Large room/wall LF roll-off (-6dB ref midband)	20Hz
Large room output at 20Hz (ref midband)	-6dB
Estimated midrange sensitivity (ref 2.83V, 1m)	90-91dB
Impedance characteristic (ease of drive)	quite demanding
Typical price per pair (inc VAT)	£1,300

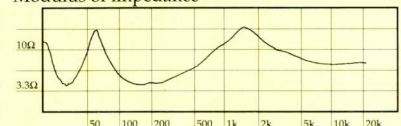
Room averaged response (large room, free space)

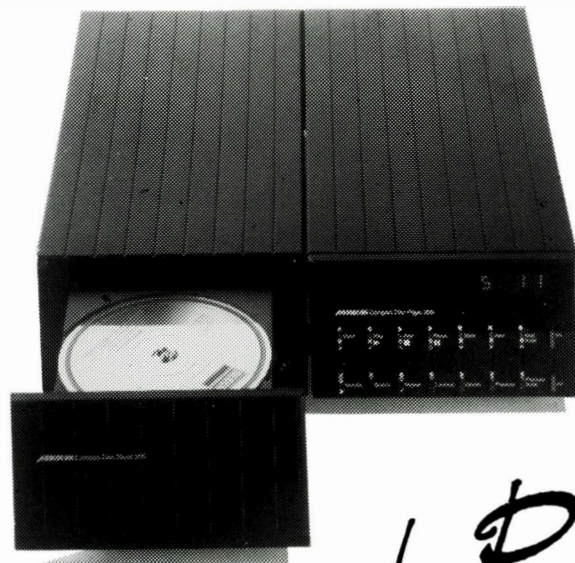


Room averaged response (large room, wall mount)



Modulus of impedance





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From the photograph one wouldn't recognise this as a loudspeaker at all. Given that the stereotype loudspeaker is amongst the ugliest objects a household has to put up with, the urn-like *Endymion* has a real head start — assuming of course that a rococo gilded black pot is to your taste. The question for this review must be whether such an advantage can be sustained against a £395 price-tag, a new brand name with no track record, and the idiosyncracies of omni-directional operation.

Knowing nothing of Brinkman prior to receipt, telephone conversations made it abundantly clear that this is a serious and carefully researched project. Painstaking experimentation lies behind the selection of materials, the ceramic mix and firing temperature and other subtleties. The enclosure feels impressively 'dead' to the knuckle test — unlike another ceramic I once encountered.

The lid is supported some 9cm above the urn proper, a small but beautifully finished spun brass flying saucer nestling within the gap. This is the reflector, for upward facing main driver and downward pointing tweeter. It's very carefully profiled, and mounted symmetrically on the axis of both drivers so the output is truly omni-directional in the lateral plane (in contrast to the off-centre lens approach adopted by Canon in its *S-50* model).

Omnis remain a subject of great controversy. Some believe they are inherently more natural than forward facing loudspeakers, a claim with which I have some sympathy. But there's also no question that the use of reflectors, and the much stronger interaction with the listening environment introduces other difficulties.

I made no serious attempt to dismantle

this device, for fear of disastrous consequences. All seems to be very well put together and solidly built, though far from space-efficient, the shape and pedestal base leaving only a very small volume behind the 120mm plastic cone main driver. An observation which is confirmed by the system fundamental resonance close to a highish 100Hz. Ultimate extension is quite respectable, thanks to sealed box loading, but the paradox of this design is that it needs wall reinforcement to get a reasonable bass-to-mid balance, but because it's an omni, said wall introduces a series of reflection cancellation effects that upset the broad midband.

Test report

When well clear of reflective surfaces, the mid-to-treble range 200Hz-5kHz is very well balanced, apart from an 800Hz spike that probably relates to the reflector, and a degree of treble raggedness presumably from the same source (shades of the Canon *S-50* here), while the ultimate treble roll-off is gentle but a bit premature.

The sensitivity is respectable enough in the context of the small enclosure and easy amplifier load, the 2dB window reflecting the significant influence of wall reflections across the midband.

Sound quality

Experience has shown that it's impossible to go from a conventional forward-radiating model to an omni in blind listening tests without upsetting the panel somewhat. Chuck in the balance anomalies, season with the odd resonance and the recipe is rather unpalatable, initially at least.

However, the this speaker did grow on me during more extended hands-on listen-

ing. Given time to adjust to the lack of bass weight and warmth and a rather shut-in treble, other rather impressive qualities begin to shine through. The sonic cosmetics remain a bit wierd, with out-to-lunch stereo image and more than a touch of mid nasality. But the sound nonetheless possesses fine coherence and good solidity, with a fine capacity to boogie and to get down into the dynamics and realism.

Boxiness is banished and voices have a believability that punches through the peculiar presentation, giving a good scale despite the lack of weight.

Conclusion

The *Endymion* is nothing if not a brave effort to boldly go etc. The aesthetics may (or may not) be their own reward, depending on taste and decor; if the cap fits, the pricetag is by no means unreasonable.

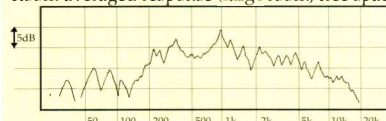
Despite certain positive qualities that I believe derive from the omni mode of operation, the sound is really too flawed in both bandwidth and coloration for formal *Choice* Recommendation.

The bass enclosure is too small to work as a sealed box without wall reinforcement, and the upper treble also needs a helping hand (perhaps a super tweeter could be substituted for that rather silly little brass topknot?).

TEST RESULTS

Size (hxwx d)	48x29 (diam)cm
Weight	8kg
Recommended amplifier power	15-70W
Recommended placement	1ft from absorbent wall
In room averaged response limits (50Hz-10kHz)	±6dB
Large room/space LF roll-off (-6dB ref midband)	150Hz
Large room/wall LF roll-off (-6dB ref midband)	48Hz
Large room output at 20Hz (ref midband)	-18dB
Estimated midrange sensitivity (ref 2.83V, 1m)	85-87dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£395

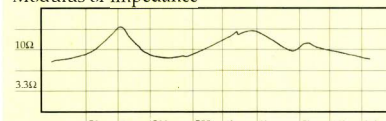
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



Conrad-Johnson Synthesis LM210

Audiofreaks, 15 Linkway, Ham, Surrey TW10 7QT.
Tel: (081) 948 4153



A new name to this reviewer, and I daresay most readers, Synthesis is a relatively new American brand created by leading high-end protagonist Conrad-Johnson, with the brief to provide a relatively affordable range of loudspeakers with more than just a touch of class.

Relative affordability inevitably suffers from the transatlantic passage, and this smallest and least expensive Synthesis still carries a £900 pricetag. Which may be far from cheap, but isn't particularly expensive considering the attractive presentation.

A compact floorstander, it uses a two-way (European) driver line up that is typical of many bookshelf models. The key to this design is clearly in the elaborate reflex-ported enclosure, which is both elegant and purposeful. Our samples were finished in stereotypically American heavily figured oak with dark grain, the postformed edges going in all different directions providing a quite dramatic effect. (For the fainthearted, a more sober alternative is available.)

All edges are given the heavy postforming treatment, creating a pleasingly soft impres-

sion, and presumably reducing baffle edge diffraction once the stupid thick-framed grille has been discarded. Another distinctive feature is the slanting baffle, which helps to time-align the acoustic centres of the drivers, as the leaflet points out, but which should also assist structural rigidity and stability and help this quite low enclosure fill the height of a normal room.

The box is built from substantial 20mm MDF, with plenty of additional internal edge bracing, a heavy foam lining and light fibre fill. A couple of slats across the base provide a rather short (19cm) footprint for some quite spindly floorspikes, but at least the centre of gravity is quite low. The terminal sockets are hidden down in the base, leaving the cable plugs to fight the law of gravity, though I understand more conventional rear terminals may be fitted for UK models.

The tiny twin ports are fitted right next to the drivers, a 25mm soft fabric dome tweeter and a 120mm shallow flare plastic cone main driver with pressed steel frame and a generous magnet. These are secured by some pretty silly little woodscrews, which were at least reasonably tight, and hard-wired to the crossover network using heavy cable.

Test report

Sensitivity is somewhat below average, but by tuning the ports to a lowish 35Hz, Synthesis has achieved very respectable bass extension without compromising the amplifier load, albeit at some cost in low frequency power handling.

The in-room frequency balance holds within impressively tight limits above 150Hz, though the midband shows a fair amount of local unevenness and some prominence, and the initial treble roll-off is a little early. The low frequency alignment seems slightly less well judged: in free space it is somewhat lean 60-200Hz, though this was felt preferable to the fat 40-80Hz octave created when placed close against a wall.

Sound quality

With one exception (and I have the luxury of being able to revise my opinion after the event), the *LM210* received a warm welcome from the listening panel, with widespread praise for the pleasant and relaxing overall balance, the open and out-of-box character with fine stereo imaging, the good overall coherence and the invigorating dynamics.

The bass alignment difficulties remain something of a problem, leading to some thickening and chestiness and robbing the system of some low frequency resolution and scale, but the speaker is fundamentally

quick and communicative, and boogies pretty well too. The midband is particularly informative, rendering voices with some conviction and reality despite a range of audible but minor colorations — some cuppy and slight pinched, nasal and quacky effects.

It appreciates being driven hard, and holds together well enough to decent levels, retaining good dynamics and avoiding compression. However, at the end of the day this a small(ish) speaker with a small main driver, and therefore it makes a rather small sound.

Serious loudness, genuine welly and authority are definitely not on the menu.

Conclusion

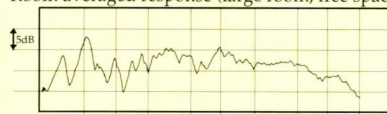
Despite the bass room-matching difficulties, the *LM210* is a fundamentally enjoyable experience that goes a long way towards vindicating the elaborate and expensive enclosure engineering. It's far from perfect, and remains at heart a rather small loudspeaker with a limited performance envelope, but within those constraints, and despite the highish price, it's so goddam listenable that *Choice* Recommendation seems unavoidable.



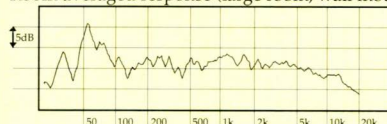
TEST RESULTS

Size (h x w x d)	90 x 26 x 27 cm
Weight	15 kg
Recommended amplifier power	15-100 W
Recommended placement	clear of walls
In room averaged response limits (50Hz-10kHz)	±6 dB
Large room/space LF roll-off (-6dB ref midband)	28 Hz
Large room/wall LF roll-off (-6dB ref midband)	26 Hz
Large room output at 20Hz (ref midband)	-11 dB
Estimated midrange sensitivity (ref 2.83V, 1m)	86 dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£895

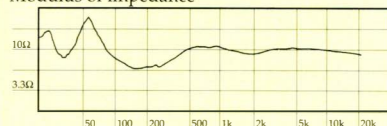
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



Diamond Acoustics Reference III

Reference Imports, Pineridge, Theobalds Green, Sandy Cross, Heathfield, East Sussex TN21 8BS. Tel: (0435) 868 004



Diamond Acoustics is the loudspeaker brand that works under the Reference Imports banner, an umbrella operation which brings together a number of (usually expensive) components from small companies making valve amplifiers and other audiophile exotica.

Of the three Diamond Acoustics loudspeakers, the £895 *Reference III* that is the subject of this review is by far the most conventional, and also the least expensive by a comfortable margin. A compact and elegant floorstander, it's very solidly built with most attractive and elaborate cabinet-work that makes the asking price seem extremely reasonable.

The review pair came in a beautifully finished though not strongly figured reddish mahogany real wood veneer, but a number of alternatives are also available. The enclosure consists of the box proper, with the back and sides taken down to floor level and cut away to form an integral plinth, and it comes equipped with three exceedingly purposeful looking spikes — the footprint is on the small side, but the low centre of gravity ensures good stability.

The cabinetwork is very complicated on

the inside too. The walls are (deliberately, to minimise energy storage) only 15mm thick, but good stiffness and damping is ensured by internal bracing that goes every which way, and bituminous damping pads hither and thither. A complex cocktail of longhair wool and artificial fibre is some evidence of the care taken to fine-tune the performance.

Each of the two bass units operates in its own separately reflex ported half of the total enclosure (wadding plugs to block either or both ports if preferred were supplied). All drivers are fixed using decent machinehead bolts into T-nuts, and were acceptably tight. Three pairs of classed terminals are fitted on the rear, two providing bi-wiring and the third allowing the relative tweeter output to be adjusted by substituting a bridging resistor. The hardwired crossover feeds the drivers with classed internal cables.

The bass only unit has a 140mm plastic cone, pressed steel basket and modest magnet. The main driver, operating over the whole bass and midrange, has a larger magnet and 150mm plastic cone, and a phase compensator plug protruding from the polepiece. The tweeter uses an unusually large 32mm soft fabric dome.

Test report

Sensitivity is a high 90dB, which is very appropriate to a speaker likely to partner valve amplifiers, though the distinctly current hungry impedance could also cause problems with the less powerful of the breed.

The balance, or more specifically the bass alignment, is this model's weakness. The wretched thing booms at 100Hz, no matter what you try and do with the ports. (Port opening or blocking in fact provides adjustment of 3-6dB at frequencies below 75Hz, but leaves 100Hz unaffected.)

That problem aside, the balance is pretty good, albeit with some loss of energy around 350Hz and a gentle downtilt through the presence. Note also the early ultimate roll-off of the large diameter tweeter (-3dB at 13kHz).

Sound quality

Given the frequency balance anomalies, the rather mixed panel reaction — three strongly in favour, two equivocal and one outright hostile — comes as no particular surprise. The low frequency alignment problems were universally criticised, but very real strengths in the midband in particular were considered more than ample compensation by its supporters.

Undeniably midbass heavy and lacking real extension, the *Reference III* also sounds very quick indeed. The sound is very solid

and coherent with excellent timing and unusually realistic dynamics — all of which made the subsequent hands-on sessions a very pleasurable experience. I found myself inadvertently listening to the music not the loudspeaker, digging out old favourites to see what new insights were on offer.

The speaker is particularly good at sorting out complex rhythms, and retains impressive consistency and coherence across a very wide dynamic range. Entirely capable of getting on down when the occasion demands, it remains communicative and informative even down at the very lowest listening levels.

Conclusion

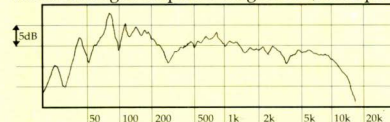
Flawed by balance problems at low frequencies, the *Reference III* is something of a triumph in other respects, with timing, solidity and dynamic capabilities that set it well ahead of the pack.

It's a genuine audiophile product, yet is also delightfully presented and very fair material value for money, so may be confidently Recommended to those who feel they can live with the rather warm and cuddly balance.

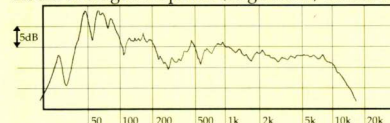
TEST RESULTS

Size (hwxwd)	87x27.5x28cm
Weight	20.5kg
Recommended amplifier power	15-120W
Recommended placement	well clear of walls
In room averaged response limits (50Hz-10kHz)	±6dB
Large room/space LF roll-off (-6dB ref midband)	30Hz
Large room/wall LF roll-off (-6dB ref midband)	30Hz
Large room output at 20Hz (ref midband)	-16dB
Estimated midrange sensitivity (ref 2.83V, 1m)	90dB
Impedance characteristic (ease of drive)	current hungry
Typical price per pair (inc VAT)	£895

Room averaged response (large room, free space)

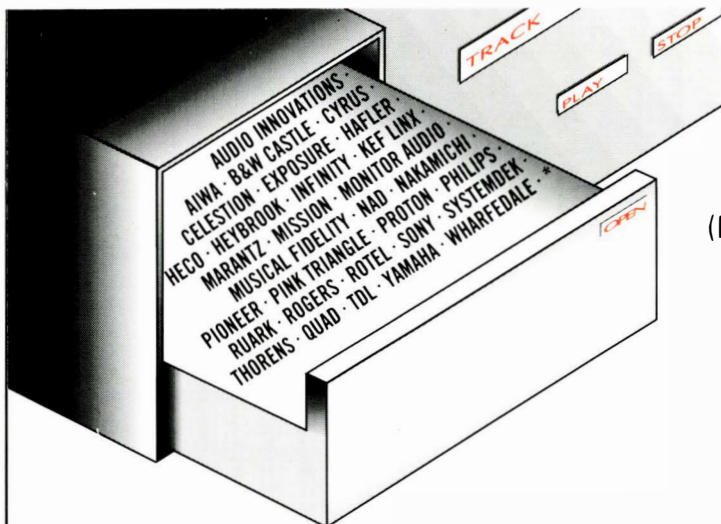


Room averaged response (large room, wall mount)



Modulus of impedance





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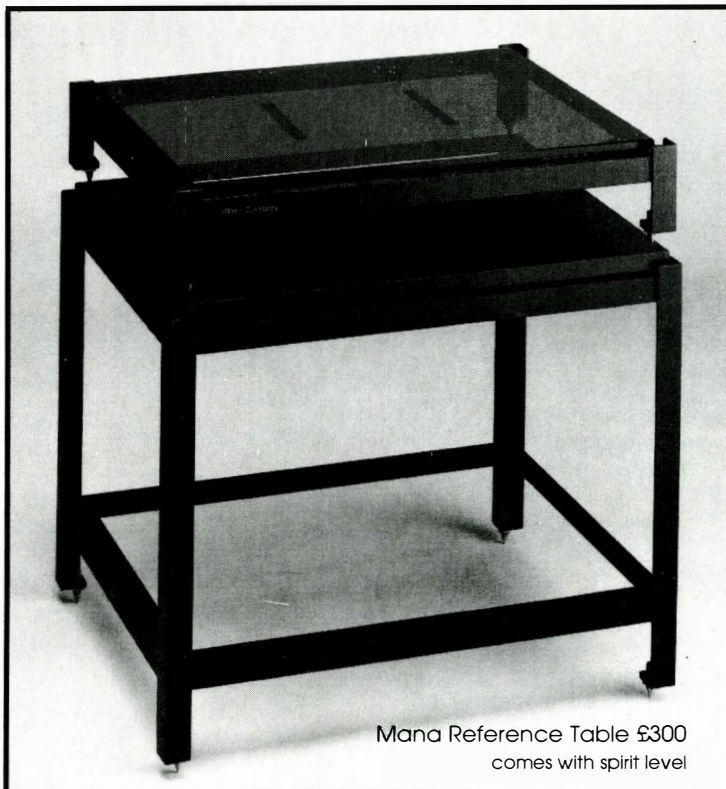
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Alan Sircom, Hi-Fi World, July '91

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Goodmans Maxim 3

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Goodmans hit the jackpot when it first revived the famous *Maxim* concept back in 1986. Costing comfortably less than £100, said *Maxim 2* was an obvious Best Buy, both in the original review and after a revisit in issue 59. It was also a notable commercial success, not just in being among the UK's best sellers, but in sustaining those high sales over a much longer model lifespan than its rivals.

In point of fact, the *Maxim 3* was expected to appear about a year ago, utilising Goodmans' ICT (inductively coupled transducer) driver technology. Something of a cross between a coaxial and a full range driver, ICT units are already enjoying success in TV and in-car applications, and would have been the obvious choice for the *Maxim 3*, if only to keep costs down.

But when it came to the crunch, Goodmans decided (probably wisely) to play it safe, sent the ICT variant back for further development work, and has now rather belatedly brought out a rather more conventional update on the original theme. One consequence is that the price has crept up to and over the magic £100 mark: the £110 *Maxim 3* no longer enjoys a worthwhile price advantage over its keenest rivals.

It has precisely the same box dimensions as the *M2*, but there are notable differences in nearly all the details. The cabinet wrap has been slimmed down from 15mm to 12mm, for example, but is now reinforced by a figure-8 brace. The main driver now uses a plastic cone, again 90mm in diameter, while the new tweeter has a metal dome, again with phase compensator.

I'm not sure quite what happens if you cook one of the drivers through overexuberant use of your Roland synthesiser. The drivers are screwed into

the MDF baffle from the front, but I've no idea how well they're tightened or how you change one, because fibreboard trim has been glued onto the baffle proper to cover up the driver frames and make everything look neat and tidy.

Test report

Small main driver and box plus easy amplifier load means, just as night follows day, limited bass extension and lowish sensitivity — even though a peak around 1kHz here will tend to inflate the comparatively meaningless spot frequency figures which are sometimes quoted.

You could use the *M3* out in free space, but I wouldn't recommend it: the upper mid peak will be all too obvious and exposed, and the bass distinctly lacking. Place it back against the wall and you immediately get a near textbook budget wall-mount response, rolling off quite rapidly below the 65Hz fundamental resonance of the port but showing an extremely impressive ± 3 dB overall balance all the way up to 10kHz. There's still a bit of a peak around 1kHz, beyond which the treble output fades gently with rising frequency, but the crossover is virtually seamless and the broad bass-to-mid balance very good indeed.

A quick comparison with the *Maxim 2* showed very close similarities between the old and the new, and with all the advantages in favour of the new model, most significantly in better control of the 1kHz upper mid peak.

Sound quality

Considering its modest size and aspirations, the *Maxim 3* did quite well in the blind listening tests. Not a stand out success — 'perfectly average' was one panellist's sum-

mary — it nevertheless comfortably delivered more performance than expected for the price.

The fundamentally good balance is its main strength, the bass alignment works well with the room to give a good impression of weight even if resolution and genuine extension remain suspect. The small enclosure keeps boxiness under control and helps generate a convincing stereo soundstage, though enough energy is generated to make the result quite stand-sensitive.

Obviously coloured but quite coherent and fast in its way, the *M3* bounces nicely, but also sounds distinctly shut in and dynamically a bit squashed in midband. And when I brought out a pair of old *Maxim 2*s for comparison, I have to say I found the new model rather less enjoyable. It's smoother and cleaner, but also more congested and rather tame, lacking a little of its predecessor's cheeky charm.

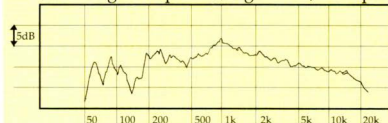
Conclusion

The *Maxim 3* is certainly more civilised than its predecessor, and in objective terms it should be considered an improvement. But the listening experience is somehow rather less involving and exciting. It's still sufficiently good value at its new higher price to merit Recommendation, though I don't believe it's quite such a bargain as the 2.

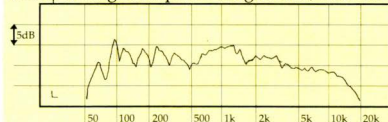
TEST RESULTS

Size (hwxwd)	26x17x21cm
Weight	3kg
Recommended amplifier power	20-60W
Recommended placement	close to wall
In room averaged response limits (50Hz-10kHz)	± 5 dB
Large room/space LF roll-off (-6dB ref midband)	50Hz
Large room/wall LF roll-off (-6dB ref midband)	50Hz
Large room output at 20Hz (ref midband)	below -20dB
Estimated midrange sensitivity (ref 2.83V, 1m)	85dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£110

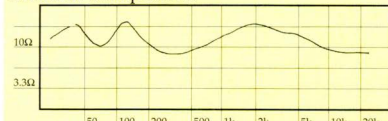
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance





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Dick Olsher, Stereophile. Vol.14 No.11 November 1991

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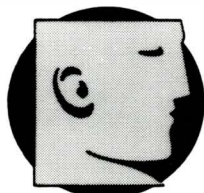
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West German brand Heco is a major European speaker specialist with an enormous range of nearly twenty different models, subdivided into different groups depending upon size and standards of presentation and finish.

The *Superiors* currently consist of six luxury finish models which have recently undergone a complete redesign, adding worthwhile extra value as well as several more syllables to already overlong names. *Choice* reviewed a £600 *Superior 740* a couple of years ago in issue 78, and the new *Superior Presto 750* comes in at the same price while offering significantly more content, inflation notwithstanding.

Indeed, the old *740* has effectively become the new, less expensive *550*, while the earlier *840* package is now updated and offered as the *750* at the old *740* price. Regrettably, we never reviewed the *840*, so only the previous *740* data is relevant and available to help put the new model into perspective.

The enclosure is taller, wider and deeper than before, attractively slim and finished in

real wood veneers (choice of four), decorated at the front by a wooden panel beneath a three-quarter length grille, but still arguably rather tall for a smallish footprint and highish centre of gravity. No floorspikes are provided, though a £30 *Brute* spiked frame is available from Heco UK.

There's an extra drive unit here too, a dedicated midrange unit with 75mm plastic cone operating in its own decent size internal tube, while the 19mm metal dome tweeter has been moved down from its previous (rather high) position at the top of the cabinet to a (rather low) position just above the halfway mark, which is immediately beneath the mid driver, an arrangement which ensures coherent stereo along and above the tweeter axis.

Either side of the mid and treble are two 125mm plastic cone bass drivers, each operating into a sealed box half the total enclosure volume. Rather misleadingly described as an 'integrated subwoofer system' (ISS), this is not the best way to maximise extension for a given box volume, but the resultant 'spaced array' does help to minimise room boundary reinforcement effects and consequently gives a smoother measured bass response.

However, I suspect the consequent dispersion discontinuity may have other less desirable subjective side effects, and certainly means the *Superior Presto 750* is likely to sound best from 3m or so listening distance.

The 19mm MDF cabinet is very nicely finished, lightly filled with absorbent fibre and braced internally both by the central partition and along the baffle edges. However, the black-flocked baffle is recessed slightly behind the sides, which doesn't seem particularly sensible aesthetically or acoustically (especially since the drivers are rebated), and this felony is compounded by a very thick grille frame. Also rather disappointing are the silly little coarse pitch woodscrews that are used to secure (I use the term advisedly) the drivers onto the baffle.

Test Report

Sighted clear of walls, the *Superior Presto 750* delivers a remarkably flat in-room response, holding within tight $\pm 3\text{dB}$ limits above 100Hz, and pretty good below that too, which would seem to vindicate the claim for the distributed woofer arrangement.

Though well balanced, the trend is certainly a little midbass rich, presumably under the influence of the 50Hz bass resonance. And it has to be said that the combination of bass extension and sensitivity alongside the current hungry impedance characteristic is a shade disappointing for what is really quite a large loudspeaker.

Sound quality

Despite the fine balance, the *SP750* found little favour with the listening panel. The good scale was liked well enough, but there was consistent complaint against mid/upper bass thickening and chesty coloration, alongside some sibilant detachment.

The midband is clear and inviting, if a shade pinched, and the soundstage is quite open and unboxy, focusing well at 2m or more away. The balance stays consistent and together up to useful loudness levels, with pretty impressive low frequency punch.

But there's a lack of genuine coherence between bass, mid and treble, and consequently true transparency is not attained, dynamics seem softened and stop/start transients become imprecise, robbing the listener of many of the subtler cues to musicianship and tonal textures.

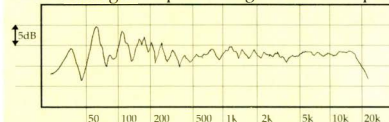
Conclusion

Musically neither presto nor superior, the strength of the *SP750* is to deliver a very even and smooth balance, well suited to the easy listening experience. However, the slight thickening of balance and smearing of transients ultimately makes for rather bland and uncommunicative listening, especially when it comes to the subtler nuances of musical reproduction.

TEST RESULTS

Size (hwxwd)	95x24x27cm
Weight	17.5kg
Recommended amplifier power	15-150W
Recommended placement	clear of walls
In room averaged response limits (50Hz-10kHz)	$\pm 5\text{dB}$
Large room/space LF roll-off (-6dB ref midband)	22Hz
Large room/wall LF roll-off (-6dB ref midband)	22Hz
Large room output at 20Hz (ref midband)	-7dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87dB
Impedance characteristic (ease of drive)	current hungry
Typical price per pair (inc VAT)	£600

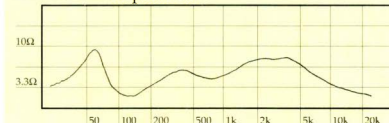
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)

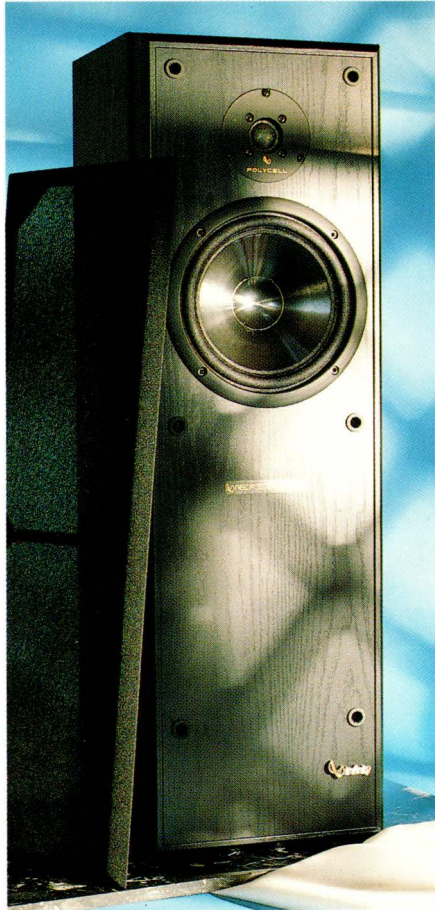


Modulus of impedance



Infinity Reference 30

Infinity Ltd, Gamepath, 25 Heathfield, Stacey Bushes, Milton Keynes MK12 6HR. Tel: (0908) 317707



A major and well established US brand, Infinity was less well known in the UK until Gamepath took over the distribution a few years back, whereupon it became a natural loudspeaking partner to Gamepath's successful Rotel electronics.

The current range of popularly priced *Reference* series loudspeakers were introduced towards the end of 1991, a total of six quite closely related models priced from £160 up to £700, built in the US of A but designed very much with European tastes in mind.

Choice has assessed three of these so far (issues 98 and 102), with rather mixed results that singled out the smallest as the favourite. The object under scrutiny here is the £330 *Reference 30*, the third model up the ladder. It's closely related to both the £220 *20* and the £550 *50*, combining the former's driver complement in the latter's floorstanding enclosure.

What this amounts to in practice is that the extra £110 over the bookshelf *20* can be financed from the saving made on a stand, which is no longer necessary, while low frequency performance should benefit from nearly twice the box volume. The equation isn't quite that straightforward, however,

since the smaller enclosure will add less of its own coloration, and the stand usually provides a more stable footprint than this enclosure's 17cm.

Noteworthy technical features include an injection moulded main driver cone, a technique which allows the thickness to be varied in order to maximise the stiffness/weight ratio. Infinity also uses foamed plastics, both for the main driver surround and the tweeter dome.

The enclosure is tall and quite shallow, and the edge of the baffle is attractively chamfered. Part rebated drivers keep the styling looking smart and clean, whether or not the unpropitious moulded-frame grille is used.

Adequate spikes supply decent mechanical connection to the outside world, though in other respects the engineering content is rather dubious, and distinctly econobox. The small and coarse-pitch driver woodscrews were not particularly tight and bite only into the 19mm chipboard baffle, while the mechanical connection between the wrap and the baffle and back looks rather weak, in spite of a couple of small edge bracing strips.

The main driver's 155mm plastic cone is mounted on a pressed steel frame with decorative plastic edge trim, and fitted with a decidedly small magnet. At 27mm, the 'Polycell' foam tweeter diaphragm is a little larger than most, and further boosted by a short horn flare. The box is well stuffed with wadding and a simple terminal block and PCB crossover is tag connected to the drivers.

Test report

Confirming the commonality of the components, the *30*'s measured performance is very similar indeed to that of the *20*. Differences are confined to the effect of the larger enclosure on the low frequency behaviour, moving the system resonance down from 70Hz to 60Hz and increasing output over the lower couple of octaves by 2-4dB.

Sensitivity is a generous enough 88dB, and bass extension quite impressive too (-8dB at 20Hz in-room), though the price is paid in a current hungry 4ohm impedance at low frequencies. The room balance is pretty impressive overall, providing the *30* is kept well clear of walls to minimise midbass reinforcement, though the response is not particularly smooth, the region around 800Hz being notably exposed, while high frequencies roll off quite early.

Sound quality

The *Reference 30* did very well in the blind listening tests, though I suspect its performance was somewhat flattered because it was presented immediately after something rather wierd and unbalanced.

The overall balance here is undoubtedly very good, if a little warm and midbass heavy, and the similarly impressive bass extension confers a fine sense of scale and a fundamental neutrality which is impressive considering the modest price. However, a fair amount of midband unevenness and consequent coloration acts as a bar to true transparency, and longer exposure under hands-on conditions left this reviewer rather less impressed than had the short blind presentation.

The bass is not particularly agile, and somehow lacks solidity and substance, with restricted powers of dynamic analysis and little real punch or resolution. At the end of the day the speaker is a bit flabby and fails to create convincing musical tension. Vocal subtlety and delicacy tends to get lost somewhere along the way.

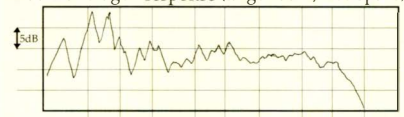
Conclusion

The good bass extension and balance which so impressed the listening panel makes Recommendation mandatory at the comparatively modest £330 asking price. However, the engineering compromises inherent in meeting this competitive price are reflected in some lack of subtlety and insight that enthusiasts might find rather frustrating.

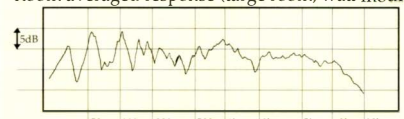
TEST RESULTS

Size (hwxwd)	85x26.5x25cm
Weight	13.5kg
Recommended amplifier power	15-100W
Recommended placement	clear of walls
In room averaged response limits (50Hz-10kHz)	±6dB
Large room/space LF roll-off (-6dB ref midband)	25Hz
Large room/wall LF roll-off (-6dB ref midband)	25Hz
Large room output at 20Hz (ref midband)	-8dB
Estimated midrange sensitivity (ref 2.83V, 1m)	88dB
Impedance characteristic (ease of drive)	quite demanding
Typical price per pair (inc VAT)	£330

Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



Jordan Watts JH400

Jordan Watts Acoustics Ltd, 201 Mare Street, Cyntra Place, London E8 3QE. Tel: (081) 985 1646



The story behind this loudspeaker is as complicated as the speaker itself is simple. And since the speaker is as simple as can be — just a single driver operating in a sealed box — the full exposition will have to wait for another occasion.

The abbreviated version is that this latest realisation of Ted Jordan's full range metal diaphragm driver technology has twenty odd years of development and refinement behind it, housed in the enclosure he always felt it deserved.

Indeed, the delicious shiny black piano lacquer finish, the unusual shape and orientation and neat little plinth all give the *JH400* a strong claim to being the most attractive and distinctive luxury miniature around, bar none, which at least helps to mollify the shock of a £500 pricetag.

It's hexagonal in plan, though quite different in shape and purpose from the current Tannoy models. This hexagon is more of a playing card diamond, with the sharper points flattened off and aimed directly towards (and away from) the listening area. Constructed as mirror-imaged pairs, the drivers are on the inside/forward faces of the diamonds, so their directional axes cross well in front of the listener.

Well favoured by enthusiasts, this 'over-angling inwards' technique tends to create an attractively 'out-of-box' stereo soundstage across a wider area of the room than usual. Trouble is, the normal rectangular box set at 45 degrees or so looks pretty daft; in contrast the little JWs look decidedly cute — especially on the supplied slightly modified Axhorn *Delta* stands (cf£200), which make an excellent aesthetic/geometric match.

The one and only driver is a little 90mm metal cone device, complete with an unorthodox rear spider operating via a pin on the

centre of the cone. The mounting baffle is set a few millimeters behind the enclosure proper, which acts as a picture frame around a little inset grille. Strange mounting screws prevented access to the internals, though I'm informed (and the substantial weight would seem to confirm) that the box is built from 18mm MDF, internal surfaces are lined in 4mm bituminous damping pads, then foam absorption, and finally a loose fill.

Test report

The impedance trend presents the simplest load most amplifiers are ever likely to encounter, the only notable feature being the system fundamental resonance, well damped and at around 80Hz. The gentle rise towards high frequencies is simply due to the self-inductance of the driver, confirming that no equalisation is being used.

One consequence is a bit of a rollercoaster ride of a frequency response, leaving the low 83dB sensitivity rating very much an averaged approximation. Despite the small driver and box and 80Hz fundamental resonance, sealed box loading ensures good in-room low frequency extension, and in fact output is more linear than most across the main three-octave bass/midrange span 50-400Hz. However, it's 2-4dB too strong over the next two octaves, and drops into a -7dB notch at 5kHz before some rather strongly focused mid treble recovery.

Sound quality

Given the unusual frequency balance, it's hardly surprising the *JH400* did relatively poorly in the blind listening sessions. In point of fact only one panellist took a strong dislike, the remainder finding a number of strengths to compensate for the undoubtedly odd tonal presentation, commenting

that it was 'difficult to sum up'.

Every time I asked these baby Jordans to perform, I encountered the same 'little bit of heaven, little bit of hell' syndrome. The initial reaction is all shock and horror at the quite severe balance-derived colorations. However, after maybe twenty minutes the ear seems to make an adjustment. The coloration is still there, but it somehow seems much more tolerable, and the fine timing, speed and coherence are more than ample recompense.

Best results were in fact obtained with Slate Audio stands a foot or so away from the wall. There's little boxiness and the fine dynamics create a surprisingly good impression of scale, albeit lacking warmth and drive. The upper treble beaming can be irritating, while the sheer exuberance and clarity makes the limited loudness capabilities all the more frustrating.

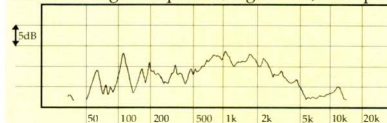
Conclusions

Definitely not for the fainthearted, the *JH400* is fascinating, flawed and hellishly difficult to evaluate. The balance anomalies are real, serious and quite distracting, and the performance envelope is puny at any price, never mind £500. But the strengths are real and quite special from an audiophile perspective, so a carefully qualified Recommendation seems appropriate.

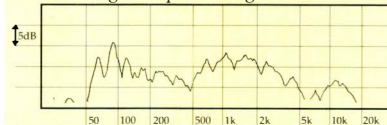
TEST RESULTS

Size (hwxwd)	33x24x30.5cm
Weight	6.5kg
Recommended amplifier power	20-60W
Recommended placement	1ft from wall
In room averaged response limits (50Hz-10kHz)	±8dB
Large room/space LF rolloff (-6dB ref midband)	50Hz
Large room/wall LF rolloff (-6dB ref midband)	48Hz
Large room output at 20Hz (ref midband)	-16dB
Estimated midrange sensitivity (ref 2.83V, 1m)	83dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£504

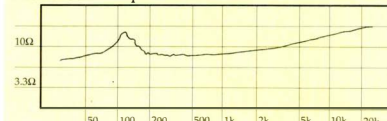
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance





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JPW AP2

JPW Loudspeakers Ltd, Unit 2, Ocean Quay, Richmond Walk, Plymouth, Devon PL1 4LL. Tel: (0752) 607 000



It's more than four years since *Choice* originally reviewed JPW's bookshelf-size AP2 (issue 53), and the fact that this virtually unchanged model is still going strong is firm evidence of its timeless qualities and continuing appeal. The cabinet is now MDF throughout, and the crossover has separated arms and bi-wire terminals, but the overall package remains much as before.

One question this review should therefore be addressing is whether its performance remains competitive in today's market context, after some rival manufacturers have changed ranges not once but twice. Another question is whether it justifies a £45 price premium over the *P1 Vinyl* which rated a Best Buy in our last speaker group test (issue 102).

The two models are very closely related, the £180 AP2 incorporating a number of refinements to enhance both appearance and performance. The outside is covered by a real wood veneer — strictly economy grade stuff, but still a lot nicer than vinyl — and twin terminal blocks are fitted to provide a bi-wire option (for those prepared to remove one block and sever the internal links).

JPW makes it a rule to provide seriously good engineering value for money, and the AP2 fully maintains the tradition, with a combination of ingredients that could easily command a £250 pricetag. The wood veneer is laminated onto hefty 16mm MDF throughout, with internal panels mass-loaded and damped by additional bituminous pads. The main driver has a cast frame, and both are secured by proper T-nuts and bolts (which could have been tighter).

Less inspiring perhaps is the somewhat puny magnet that drives the rather flat 155mm doped paper cone, and the pretty

utilitarian crossover components, though all is hardwired and well built. The tweeter is a 19mm plastic dome device with short horn flare.

The surface mount drivers and black grille mounting lugs did rather detract from the attractive lighter shade of pale veneer on our supplied samples. The chamfered MDF grille is certainly useable, though it does detract from the sound a little.

Test report

Given that the AP2 and P1V have so much in common, one would expect a near identical measured performance, yet for reasons I'm quite unable to fathom, small but significant differences were quite noticeable.

The penchants are actually quite close above 1kHz, and the AP2 is certainly a little smoother overall, but the output from the AP2 main drivers is clearly 1-2dB less across most of its range, and also shows a distinct tendency to over-emphasise the midbass when sited in free space.

The net result is an overall balance which is respectable enough — and indeed somewhat smoother than its cheaper stablemate — but which also shows rather more of a 'three humped' effect, with separate and distinct emphases in bass, mid and treble. Sensitivity is a little below average and bass extension is a shade disappointing considering the enclosure size and sealed box loading (the 80Hz system fundamental resonance is quite high), though the load presented to the amplifier is easy to drive.

Sound quality

The AP2 gave an average result in the blind listening, spread very evenly across all panellists, which is pretty good for a sub-£200 model. There's some thickening and too

much midbass weight, made somewhat more obvious by the lack of energy in the lower mid, but the bass remains quite agile, and gives an agreeable (if not entirely accurate) impression of weight.

Stereo images are well formed, conveying a good depth impression, while the midrange is well focused, if a shade spotlighted towards the top of this band. Both presence and treble are a bit obvious and scrappy, causing some nasal coloration and sibilant splatter on voices, the treble in particular somehow not fully integrating coherently with the bass and midrange.

One consequence, highlighted in subsequent hands on sessions, is that the AP2 sounds open, detailed and rather inviting at low listening levels, but is inclined to harden up and become rather aggressive if the volume is pumped up.

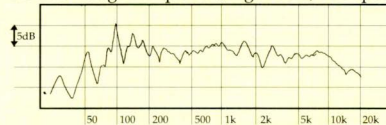
Conclusion

Undoubtedly good material value for money, the AP2 is subjectively broadly competent rather than particularly inspired. Although somewhat cleaner than the P1V through the midband, this makes the limitations elsewhere a shade more obvious, so the net benefit is marginalised. Clearly still deserving Recommendation, I can't help feeling that this design is now beginning to show its age, especially in terms of the drivers.

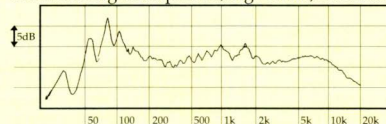
TEST RESULTS

Size (hwxwd)	43.5x25.5x26cm
Weight	8.5kg
Recommended amplifier power	15-80W
Recommended placement	1-2ft from wall
In room averaged response limits (50Hz-10kHz)	±7dB
Large room/space LF roll-off (-6dB ref midband)	45Hz
Large room/wall LF roll-off (-6dB ref midband)	30Hz
Large room output at 20Hz (ref midband)	-13dB
Estimated midrange sensitivity (ref 2.83V, 1m)	86dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£180

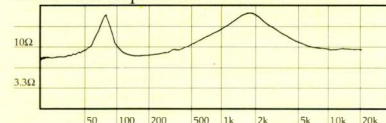
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



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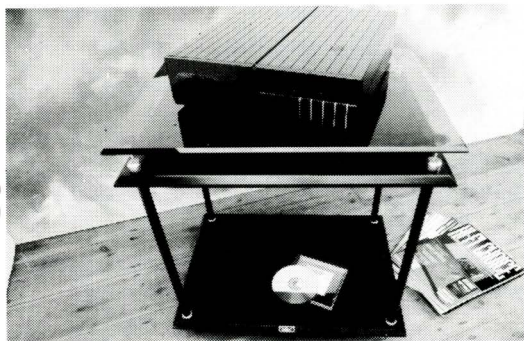
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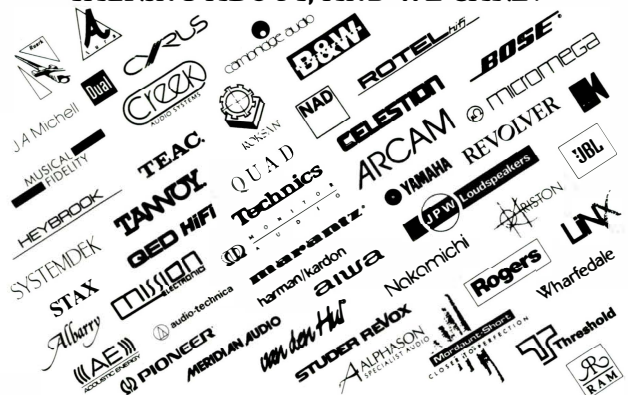
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KEF K120

KEF Electronics Ltd, Eccleston Road, Tovil, Maidstone, Kent ME15 6QP. Tel: (0622) 762 261



Least expensive of the new KEF range introduced at the end of 1991, the *K120* nevertheless costs £160, which makes it somewhat more expensive than the leader models offered by most other mass market brands. One obvious reason is that this is rather larger than most leader models: it's the effective replacement for the £150 *C25* rather than the baby *C15*, and the extra tenner on the price in fact helps pay for a 30 per cent increase in enclosure volume, thanks to extra depth.

In current KEF speak, *K* is for conventional, inasmuch as these three junior models have a standard main-plus-tweeter two-way driver lineup, whereas the more upmarket *Q*-series models have the special Uni-Q driver (see next review).

The package looks a pretty straightforward compact bookshelf model, wrapped in the almost inevitable black woodgrain vinyl but enlivened by one or two nice touches, like the attractive louvred baffle trim and neatly moulded grille frame.

The styling is particularly clever, managing to be both discrete yet very contemporary at the same time, whether or not the grille is used. Perhaps there's too much emphasis on the cosmetics, however, because beneath a trim ring the main driver is only secured by three woodscrews, one of which had stripped its threading in the chip-board baffle which is only 12mm thick, though structurally well stiffened by a moulded plastic sub-baffle. The wrap is 15mm stock.

The sealed box (which, thanks to the crossover, is not quite the simple straight-forward variety) is lightly filled with wadding and contains a complex PCB crossover with good quality components, hardwired to the drivers, a tweeter with a large 28mm soft

doped fabric dome, and a main driver with small magnet, pressed steel frame and 120mm doped paper cone.

Test report

Though this is indeed a sealed box system, you wouldn't have deduced that from the impedance characteristic or the low frequency roll-off behaviour, which are more like those of a ported system. They're also very similar to the earlier *C25*, though the *120* is a rather easier amplifier load in the midband.

There are close similarities to its predecessor in a number of other respects, though there's no question that this newcomer is rather more refined, especially in the crossover integration and trebles smoothness, but also in the midbass control and upper mid/presence smoothness.

KEF claims that this design has been aligned for optimum balance when placed close to a wall. It's better than the *C25* was in this respect, and wall-siting is certainly feasible, but our measurements do show that free space can give a much smoother midrange, which some will probably find preferable. Although some midbass wall reinforcement is certainly worth pursuing, there's some potential for boominess if placed too close, so I'd suggest experimenting at about a foot away for starters.

Sound quality

Fairy Nuff in the context of its modest price and pretensions, the *K120* didn't particularly excite our panel of listeners, nor for that matter yours truly in the subsequent hands-on work. The balance is good and pleasantly open, and coloration is well controlled, but the overall effect is nevertheless rather lazy and bland, adjectives like 'flat' and 'unin-

spired' mingling with 'smooth' and 'inoffensive' on the report sheets.

Although clean and well controlled, delivering a convincing stereo soundstage with respectable depth and impressive midrange detail and clarity, dynamics are somehow squashed and tonal contrasts seem a bit smudged. The bass is slightly thumpy — not so much slow as lacking poise and agility — while vocals are a bit dark, with consonants and sibilants mildly smeared.

The *K120* has its good points, and sounds quite pleasant on undemanding material, but is not truly time-coherent, so that the bass, mid and treble seem to stand out separately from each other, and the net result somehow lacks charm. Decent sensitivity and good control allow highish levels to be achieved without distress.

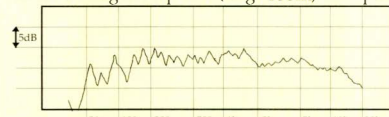
Conclusion

Even though the new model represents a worthwhile improvement in a number of respects, the overall findings for the *K120* are surprisingly similar to those obtained with its *C25* predecessor. Though undoubtedly very competent and well balanced, and therefore a thoroughly safe option in the budget sector of the market, there's also a degree of blandness that does little to help convey the excitement and emotion of music making at its best.

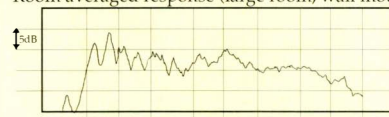
TEST RESULTS

Size (hwxwd)	34x20.5x26cm
Weight	5.5kg
Recommended amplifier power	15-80W
Recommended placement	1ft from wall
In room averaged response limits (50Hz-10kHz)	±5dB
Large room/space LF roll-off (-6dB ref midband)	48Hz
Large room/wall LF roll-off (-6dB ref midband)	45Hz
Large room output at 20Hz (ref midband)	below -20dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87dB
Impedance characteristic (ease of drive)	good
Typical price per pair (inc VAT)	£160

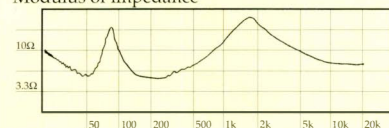
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



KEF Q80

KEF Electronics Ltd, Eccleston Road, Tovil,
Maidstone, Kent ME15 6QP. Tel: (0622) 762 261



KEF's comparatively new mainstream models consist of two distinct ranges, the conventional *K*-series, including the *K120* covered on the previous page, and the more technically advanced and upmarket *Q*-series, such as the £499 *Q80* which is the subject of this report.

This model is one rung up the ladder from, and shares some components with the £350 *Q60* that was covered in issue 102. By the same token the floorstanding *80* can be regarded as a replacement for the (much less expensive) *C75* as far as driver configuration is concerned, though the box dimensions are closer to the (slightly more expensive) *C85*.

The full technical story centres on the main (and only) Uni-Q drive unit, a two-way driver system that mounts a tiny tweeter on the end of the polepiece in the middle of the main cone, achieving sufficient tweeter output by using a very powerful rare earth magnet.

This technique helps create the theoretically desirable 'point source', and in fact goes one stage beyond coaxial to achieve true acoustic coincidence, which should make the task of integrating the driver out-

puts through the crossover region much simpler.

An additional feature introduced with the *Q*-series is a carefully decoupled magnet system, that greatly reduces the mechanical reaction forces that are communicated through to the frame and thence into the enclosure. It's a variation on the driver-decoupling technique that KEF used on its *R*-series models a number of years ago, and it represents an interesting mechanical compromise, trading (probably vain) attempts to achieve genuine stator stability for reduced cabinet, floor and (where appropriate) stand excitation.

What looks like a second driver underneath the Uni-Q is actually just an ABR (auxiliary bass radiator), an undriven 'drone cone' that is essentially a classy form of reflex port. The main driver magnet is nice and big, and both cones are 155mm diameter plastics with thin lossy surrounds, built into rather cunningly shaped pressed steel baskets.

Each is fitted to a square plastic sub-baffle by six rather feeble and coarse-threaded but reasonably tight screws, and said sub-baffle is then glued and screwed onto the box proper. With soft plastic trim covering up the mounting screws for those who prefer their speakers nude, the sub-baffles stick out ahead of the enclosure a bit, giving a slightly top heavy appearance, but providing a neat support platform for a moulded frame grille that should offer little acoustic impediment.

The box is built from 18mm vinyl chip-board covered with a vinyl woodprint, and has adjustable floorspikes with a limited (17cm) footprint. Gold-plated bi-wire terminals feed a complex PCB crossover, while the enclosure is lightly filled immediately behind the driver/ABR and then well stuffed with foam down in the base of the box.

Test report

Sensitivity is a solid 87-88dB, uncompromised by a relatively mild impedance characteristic. However, bass extension rolls off quite sharply below the ABR's 45Hz resonance, (much more so than did the smaller *Q60*), so the bandwidth is smaller than the box size implies.

The response traces show that the *Q80* should be kept well clear of walls to avoid unwanted midbass reinforcement, and when so sited delivers an unusually even in-room response 40Hz-1.5kHz.

The crossover region is well handled (as one would expect from the geometric coincidence) and the decade thereafter (1.5-15kHz) is also pretty flat. However, it is depressed by about 4dB on our far-field measurement, which may be at least partly a function of the limited off-axis distribution of the coaxial treble unit.

Sound quality

The KEF *Q80* received a rather mixed response from the *Choice* listening panel, well liked by two members yet roundly dismissed by two others. Acting as the adjudicator, I have to say I found it a bit of a mixed bag, which might help to explain the rather variable reaction.

The fine midband detail and transparency is most appealing, giving clear diction and fine focus and clarity here. By comparison the bass seems something of an afterthought, sounding dynamically sluggish and a little short of genuine scale even though it remains quite well timed. It's a bit dark and shut-in tonally, which could be interpreted as pleasantly laid-back, depending on your point of view.

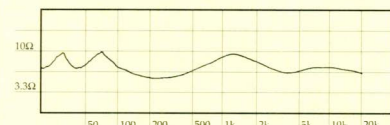
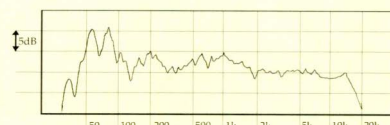
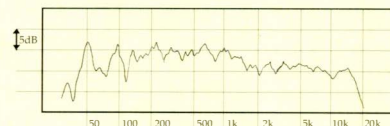
The end result is somehow a little insubstantial, even though everything hangs together well and the system can be driven quite loud.

Conclusion

Although the midband of the KEF *Q80* is very beguiling and seductive, the bass performance failed to achieve comparable subjective favour from our panel, and paradoxically offers significantly less measured in-room extension than the smaller and less expensive *Q60*.

TEST RESULTS

Size (h x w x d)	85x24.5x26.5cm
Weight	12.5kg
Recommended amplifier power	15-150W
Recommended placement	well clear of walls
In room averaged response limits (50Hz-10kHz)	±4dB
Large room/space LF roll-off (-6dB ref midband)	45Hz
Large room/wall LF roll-off (-6dB ref midband)	40Hz
Large room output at 20Hz (ref midband)	below -20dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87-88dB
Impedance characteristic (ease of drive)	good
Typical price per pair (inc VAT)	£499



Kenwood LS-770E

Trio-Kenwood UK Ltd, Kenwood House, Dwight Road, Watford, Herts WD1 8EB. Tel: (0923) 816 444



There was some puzzlement when Kenwood announced its intention to submit some loudspeakers for this latest review project, and even more when we discovered the pair concerned sold in the UK for a not inconsiderable £260, putting them firmly into the specialist sector of the market.

Was this part of a bold new marketing initiative to add speakers to the long roster of electronics components the company already sells so successfully? A 'phone call made it clear that nothing so grand was planned. The *LS-770E* design has actually been around for quite a while, and is really only brought into the UK to satisfy the demand from customers who want to see the same badge on all their hi-fi equipment (and presumably have St Michael written in all their clothes).

However, the purpose of this review is not to assess the street cred of a particular brand, rather to see how the product itself stacks up in a marketplace context, and it's here the Kenwood managed to spring a few surprises.

It's a conventional enough two-way speaker housed in a large bookshelf size enclosure that's fitted with a rear port. It's also very attractively presented, the generous baffle edge postforming and more highly polished finish than the UK norm both sure signs of the system's Japanese origins. Part-rebated drivers make the grille-off option aesthetically acceptable, though the latter has a sensibly shaped moulded plastic frame, so its use should pose no problems.

Build is solid and substantial, but clearly quite subtle with it. The box is built from 19mm chipboard, reinforced in the base by some edge bracing and a glued on disc of wood (from the main driver cutout?). Damp-

ing is light and also fairly subtle, with a cocktail of different materials, mainly lining the surfaces.

The main driver has a 145mm plastic cone with wide surround, mounted in a pressed steel frame and driven from a rather modest magnet. It's securely fitted using tight and massive machinehead woodscrews. The tweeter is a 25mm soft fabric dome, slightly less impressively mounted. A single terminal pair feeds a quite complex crossover, hardwired with carefully spaced components, but tag connected to the drivers and terminals.

Test report

Sensitivity is a quite high 89-90dB, and the bass extension is pretty useful too for a bookshelf size model, registering -9dB at 20Hz in-room, thanks to a port that's tuned to a low 28Hz. Under the circumstances it is hardly surprising to find a current hungry, 40hm impedance characteristic.

Although smoothness is not its forte, the *770E* delivers an impressively well balanced overall response if kept well clear of walls, holding between tighter limits than most speakers of this size and type. There's some unevenness and loss of energy through the presence and lower treble (1-5kHz), some peakiness in the mid treble and early ultimate roll-off. Output is a trifle strong in the upper bass, around 150Hz, but the low frequency alignment should still allow a little wall reinforcement to be used with discretion if preferred.

Sound quality

Confounding collective prejudices and expectations, the *770E* proved quite a hit with the panel on the first day of listening tests. Worried that a marked contrast with the

model that had preceded it might have flattered to deceive, the speaker was later re-presented to a different panel — only to repeat the same trick again.

Even my (undoubtedly prejudiced) hands-on experiences only served to confirm that this speaker is indeed rather good. The balance is certainly a bit thick and heavy, adding some chestiness to male voice in particular, but the sound really boogies and times well, and there's enough bass extension to give a good impression of scale.

The slightly dulled presence is a pity, while the subsequent brightness might be a bit too revealing of inadequate sources, but neither shortcoming detracts seriously from the fact that this speaker has good communication skills and is fundamentally lively and dynamic.

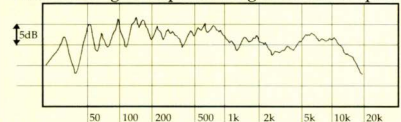
Conclusion

Though I doubt it'll do anything to enhance my personal street cred, there's no question this Kenwood is an attractive and very competitive loudspeaker, fully deserving confident Recommendation and only falling a smidgeon short of the standards required for Best Buy status at the price. All of which serves to underline the relative lack of prejudice inherent in our elaborate review procedures: a good speaker is a good speaker, whatever badge it's wearing.

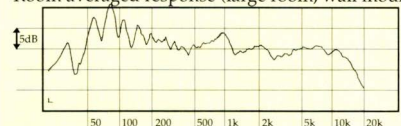
TEST RESULTS

Size (hwxwd)	48x27x25cm
Weight	9.5kg
Recommended amplifier power	10-100W
Recommended placement	clear of walls
In room averaged response limits (50Hz-10kHz)	±5dB
Larger room/space LF roll-off (-6dB ref midband)	25Hz
Larger room/wall LF roll-off (-6dB ref midband)	25Hz
Large room output at 20Hz (ref midband)	-9dB
Estimated midrange sensitivity (ref 2.83V, 1m)	89dB
Impedance characteristic (ease of drive)	current hungry
Typical price per pair (inc VAT)	£260

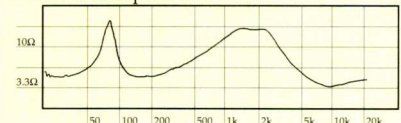
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



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Monitor Audio Monitor One

Monitor Audio Ltd, 34 Clifton Road, Cambridge CB1 4ZW.
Tel: (0223) 246 344



Mo has gone minimalist. Surely this isn't a serious hi-fi loudspeaker; it's far too small... isn't it? MA's new baby *Monitor One* speaker is little more than half the size of the stereotype budget miniature. It might well have qualified as the world's smallest serious wood-built hi-fi speaker, had it not been for the even tinier Allison included in this group.

Like the Allison, this model is pitched a couple of margins above the bargain basement. Ours came in a very respectable real rosewood veneer, which made them look classy as well as cute, but also imposed a £180 pricetag.

£40 of this can be saved by opting for the more common or painted MDF variation, so in like-for-like terms the MA is significantly cheaper than the Allison. It is also more conventionally proportioned, which certainly helps the cuteness rating, though the little rear-ported enclosure doesn't feel anywhere near as solid.

In fact it's built throughout from MDF only 10mm thick, though the small size of the panels should still ensure fair rigidity. Other engineering ingredients are more positive.

The little main driver has a proper cast frame and decent magnet, driving a small 75mm doped paper cone with rubber surround. The tweeter appears to be a 19mm version of MA's familiar anodised metal dome, protected by a mesh cover. Both drivers are secured with decent bolts and T-nuts, though these were regrettably far from tight.

The inside of the box is lined in foam, and the very small port is fitted into the rear panel. A several element hardwired crossover is soldered to the drivers via decent grade wiring.

Test report

The small main driver, port and enclosure, plus a very straightforward 8ohm impedance characteristic inevitably lead to a combination of rather low sensitivity and limited low frequency extension. However, under these size constraints 85/6dB and 55Hz (with wall assistance) is very respectable, though in practice the bass cuts off pretty sharply below 75Hz in our largish test room. Sensibly, this just happens to be the frequency to which the port is tuned, which will also help control the 100Hz main driver/box resonance. (A smaller room might give the 50-70Hz range a useful bit of extra boost.)

The pen charts confirm just how well the *One* has been balanced overall, while also emphasising that close-to-wall placement is definitely preferable, helping to balance a tendency to upper-mid prominence 700Hz-1.5kHz. The net result remains rather lean across the broad midband, 250-700Hz, and is a little focused in the mid treble, 6-8kHz, prior to a fairly early HF roll-off. The latter could be considered grounds for criticism in absolute terms, but in practice is probably a good thing, helping to balance out subjectively the rather limited bass extension.

Sound quality

It's often the case that at least one tiny and relatively inexpensive speaker turns in a giant killing performance in the panel tests, and on this occasion David turned out to be the little *Monitor One*, which the panel voted well into the top ten overall.

It's not that the speaker doesn't have flaws and limitations, nor that these went undiscovered; it's rather that it makes the most of its strengths and does a very effective job of disguising its weaknesses (aided and abetted by the fact that the blind listen-

ing tests don't attempt to explore loudness capabilities).

Yes, the sound is a little small and shut-in, and could certainly do with more grunt and welly. But the overall balance is nonetheless remarkably effective subjectively, and the sound is refreshingly open, well integrated and free from boxiness, giving fine stereo imaging, especially from a wall-mount.

On the down side, dynamics and loudness are inevitably constrained, there's some hyping of midband detail, some smear and detachment on sibilants, while the bass is a bit chesty and resonant in nature, lacking genuine information and resolution. It's all a bit polite and lazy, lacking incisiveness and urgency, but also very easy on the ears, sonically matching the self-effacing presence of the speaker itself.

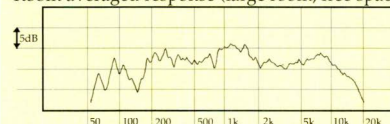
Conclusion

Certainly not a loudspeaker for all reasons, the *Monitor One* doesn't deliver the passion to set the senses aflame, and does betray its minimalism if asked to do too much. But for smallish rooms and modest levels, it delivers a sound that's as prettily balanced as the speaker itself. It also gets away so cleverly with an enclosure that in all honesty is too small for serious hi-fi work, that formal Recommendation is mandatory.

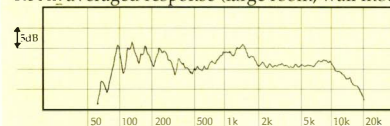
TEST RESULTS

Size (h x w x d)	24x15x16cm
Weight	2kg
Recommended amplifier power	20-60W
Recommended placement	close to wall
In room averaged response limits (50Hz-10kHz)	±6dB
Large room/space LF roll-off (-6dB ref midband)	55Hz
Large room/wall LF roll-off (-6dB ref midband)	55Hz
Large room output at 20Hz (ref midband)	below -20dB
Estimated midrange sensitivity (ref 2.83V, 1m)	85dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£140-£180

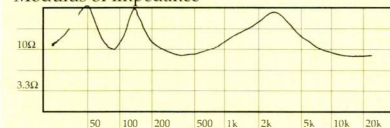
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



Mordaunt-Short 5.30

Mordaunt-Short Ltd, Unit A1 Hazelton Industrial Park, Horndean, Hampshire, PO8 9JU. Tel: 0705 597 722



Mordaunt-Short has grown steadily over the past 20 years, to the point where it is now one of Britain's biggest specialist speaker brands, helped in no small part by the success of the 3-series with its radical moulded plastic baffles.

The recent introduction of a brand new 5-series is therefore an important event, the new models having attractively individual new styling and going further down the structural plastic mouldings road. Both back and baffle are now plastic panels, moulded with metal screw-thread inserts, and the main cone is now injection moulded, so that its thickness may be varied to maximise the stiffness/mass ratio. An additional feature is that the magnets are now screened to avoid stray magnetism, which is handy if you envisage placing the speakers nearer than a foot or so from a television set.

The first of the 5-series to come in for scrutiny is the £200 5.30, a largish bookshelf size model that replaces the 3.30 reviewed back in issue 78. The new model follows much the same overall configuration as its predecessor, though the shape is a little stubbier than before and the reflex loading port is now fitted to the rear rather than the front.

Appearancewise the most unusual feature of the new range lies in the grille treatment, which successfully hides the drivers but doesn't disguise the fact that they're there, since each is covered by its own separate circular mask. The drivers are recessed slightly so that the covers lie flush with the baffle surface (the tweeter frame being shaped to overcome the abrupt edge that would otherwise be formed). This gives the speakers very clean lines and makes the grilles mandatory from an aesthetic point of view.

The plastic baffle and back are both very thin but are stiffened by a web of ribs, a technique which maximises the internal volume of the enclosure, hopefully without compromising its mechanical integrity. The box wrap is 17mm vinyl clad chipboard, and the front and back panels are clamped against this by four tapped metal tie rods.

The main driver is an impressive piece of engineering for a £200 speaker, with a generous magnet and cast frame, which was securely fixed to the baffle by tight heavy machinehead bolts. The cone is 145mm in diameter, with some upper range phase compensation provided by a protruberant fixed polepiece. The 25mm metal dome tweeter has additional mesh protection over and beyond the soft grille cloth, and is pretty well fixed, albeit by light self-tappers into the plastic. The simple PCB crossover (with thermistor tweeter protection) is hardwired to the drivers and fed from bi-wire terminals set in a recess which is rather deep for easy spade connection.

Test report

Comparison with earlier data shows that the 5.30 has successfully solved several of the difficulties encountered with the 3.30. The overall sensitivity is down a shade from before, but bass extension shows a worthwhile improvement, and the main driver is now much smoother and better balanced at the top of its range.

However, although the tweeter output is pretty flat 2-10kHz, there's now a significant (3-5dB) step down from mid to treble at around 2kHz, instead of the very gradual downturn of the earlier model. Interestingly, the 5.30 is clearly aligned for free space siting, whereas the 3.30 benefitted from some midbass wall reinforcement.

Sound quality

Notwithstanding the good measurements, the listening panel gave the 5.30 an emphatic thumbs down, and on this occasion at least I can find no reason to modify these findings, despite trying a number of alternative ancillaries.

With widespread use of adjectives like dark and bland, the main and virtually universal complaints were of the dull overall balance, coupled with a rather thick, heavy and opaque bottom end.

On a more positive note, the midband is well balanced, clear and pleasantly free of boxiness, stereo images are well focused and the overall character remains impressively consistent when driving it hard. But there remains a notable lack of genuine transparency, as the bass drones on and on.

Conclusion

Perhaps it's M-S' deliberate strategy to develop a loudspeaker that is first and foremost polite and inoffensive. Certainly the 5.30 is an appropriate candidate for taming the more unruly excesses of budget hi-fi equipment, which might prove a positive advantage under some circumstances. But on the other side of that coin is an overall blandness that does little to promote subjective satisfaction or enhance musical communication.

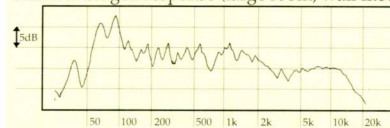
TEST RESULTS

Size (hxwx d)	42.5x25x28cm
Weight	8.5kg
Recommended amplifier power	15-100W
Recommended placement	well clear of walls
In room averaged response limits (50Hz-10kHz)	±6dB
Large room/space LF roll-off (-6dB ref midband)	28Hz
Large room/wall LF roll-off (-6dB ref midband)	28Hz
Large room output at 20Hz (ref midband)	-12dB
Estimated midrange sensitivity (ref 2.83V, 1m)	86/87dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£200

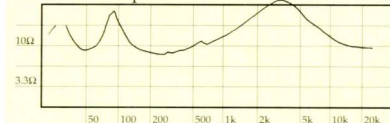
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



Origin Live OL1

Origin Live, 87 Chessel Crescent, Britterne, Southampton
SO2 4BT. Tel: (0703) 442 183



O rigin Live is a small Southampton based operation that has hitherto been mainly known for its stands, supports and cables. Turntables have also featured on the menu, but this is the first time a loudspeaker has appeared wearing the triangular logo.

What we have here is a classic seven litre sealed box two-way miniature, all clearly put together with painstaking care and using some of the finest ingredients, but selling for a far from inconsiderable £500.

I must have had half a dozen similarly small and equally expensive miniatures through my hands in the past year or three, and always find myself jolted by the apparently poor perceived value. It's an unfortunate prejudice that doesn't really square with real world economics, but it's also a prejudice that's shared by at least 99 per cent of the population, and that includes nearly everyone buying hi-fi equipment.

In fact size is a fairly small component in determining the final price of a loudspeaker. Production volumes and consequent economies of scale play a far more important role, and here the small specialist brand is at an inevitable disadvantage. The obvious strategy is to find a niche and do a better job than the competition — and luxury miniatures are one obvious niche.

This is indeed a very nicely and intelligently presented little box, built from tough 19mm panels of real wood veneered MDF. There's a sensible chamfered-frame grille for those that prefer, but the main driver is rebated and the baffle veneered so it looks good without. The (sealed) box is foam-lined, with light additional fill, and a complex crossover fed from bi-wire terminals is hardwired to the drivers with fancy cables.

The unusual Morel main driver was tightly

bolted to the baffle, the inside of which had been chamfered to improve airflow from driver to enclosure. The unit has a very large diameter (75mm) voice coil driving a 100mm plastic cone, mounted on a pressed frame with ventilated 'double magnet'. The 27mm soft dome tweeter has a metal faceplate, secured by tight but feeble woodscrews.

Matching stands and cables were both supplied. The latter were used, the former were returned to their packaging at the request of the manufacturer. Blu-tack coupling to pillar stands was recommended and followed.

Test report

It seems quite remarkable that such a small device can deliver an in-room averaged frequency response within tight $\pm 3\text{dB}$ limits from below 50Hz to above 10kHz — and generate 20Hz output that's only 10dB below the midband datum.

The price of achieving such an impressive bandwidth from so little is a sensitivity that's unusually low, so you'll have to use a pretty lusty amplifier to generate decent levels, and serious loudness is definitely not on the agenda, even though the main driver's large voice coil offers good power handling.

Though the overall balance is very good, it's not particularly smooth (due in part to the quite light internal damping I suspect). Some wall reinforcement (try 15-30cm away for starters) is helpful in bringing up the bass to the midband level, but the basic bass alignment seems very well judged, and positioning is fairly uncritical.

Sound quality

The *OL1* received a rather mixed reception from the panellists, which averaged out

suggests it's good for its size, rather less so for its price.

The combination of a fine overall balance and respectable bass extension alongside the lack of boxiness and stereo advantages of a miniature enclosure is itself an impressive package, giving a clear, open and fundamentally neutral sound.

However, the debit side included complaints of constricted dynamics and a degree of bass congestion and sibilant emphasis.

Hands-on experimentation with different stands and cables confirmed *OL1*'s recommendations and achieved some worthwhile fine-tuning, such that the end result could be exceedingly pleasant — yet just a shade too easily ignored. Timing is not entirely convincing, and some lack of brio and excitement doesn't help the communication process either.

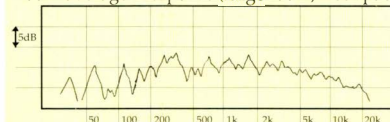
Conclusion

This interesting and in many ways impressive newcomer delivers a remarkably flat and extended bandwidth from a tiny and very nicely presented enclosure, though sensitivity is low and loudness limited. The soundstage is open, neutral and generous, but musical dynamics are a bit constricted and congested, making the overall effect slightly lazy.

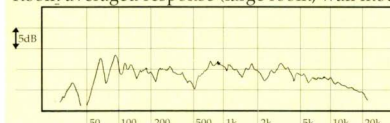
TEST RESULTS

Size (hwxwd)	30.5x19x21cm
Weight	5.5kg
Recommended amplifier power	20-120W
Recommended placement	close to wall
In room averaged response limits (50Hz-10kHz)	$\pm 4\text{dB}$
Large room/space LF roll-off (-6dB ref midband)	25Hz
Large room/wall LF roll-off (-6dB ref midband)	25Hz
Large room output at 20Hz (ref midband)	-10dB
Estimated midrange sensitivity (ref 2.83V, 1m)	82dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£499

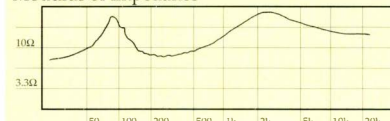
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance





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HIGHLIGHTS OF THIS ISSUE

Statements	Loudspeakers	
EAR Amplifiers (Tim de Paravicini) Pink Triangle Anniversary Marantz MA24 monoblocks and many other high-end-products	Diamond Acoustics Infinity JPW	Rogers Tannoy Wharfedale plus the best of those not covered in this issue

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Rogers LS2a/2

Swisstone Electronics Ltd, 310 Commonsides East, Mitcham, Surrey. Tel: (081) 640 2172



With a tradition deeply rooted in the BBC school of loudspeaker design, Rogers has been manufacturing low coloration professional monitors of all shapes and sizes for at least two decades, and adapting many of the principles to less expensive domestic models for nearly as long.

Despite a conservative image, not to mention a somewhat lukewarm review from yours truly back in issue 82, the company found itself with a major volume seller when the under-£200 *LS2a* was introduced a few years back.

Late 1991 saw the arrival of its replacement, the £209 *LS2a/2*. This nearly made it into issue 102, but was held over until this edition in order to cover the all-new floor-standing *8a*. It nearly missed this project too, because a new design engineer Andy Whittle (ex-everybody and sometime *Choice* panellist) joined the company at the beginning of this year, and decided his first job was to tweak the *2a/2*'s crossover a little. There's no point in reviewing a product that's about to be changed, and a pair of *LS6a/2s* was standing by, but the latest production samples of this commercially much more significant model turned up just in time for inclusion.

Though smaller than its stablemates, it carries the usual conservative and traditional hallmarks of a Rogers design, though the 'picture frame' edge around the grille has at last disappeared, to be replaced by a slight chamfer. It now looks better than before with grille removed, though the translucent white plastic main driver cone still looks odd, and the tweeter is surface mounted. (The grille itself is has an intelligently chamfered frame, but is still better abandoned.)

As before, the shape is a little undersquare, the port now fitted into the rear panel which is inset to help brace the 17mm chipboard wrap. The baffle is 16mm MDF, to which the drivers were secured by impressively tight woodscrews. The inside is lined in acoustic foam, and a quite simple but generously rated crossover is hard-wired to the drivers with heavy cables.

The tweeter uses a 19mm metal dome, much as before, though the main driver now has nearly twice the (tiny) cone area of its predecessor. A 123mm plastic cone and soft surround is driven by a very generous magnet, mounted on a pressed steel frame.

Test report

The box shape may have stayed much the same, but the *2A/2* shows marked differences from its predecessor in a number of important respects. Sensitivity is down 3dB to a below average 85dB, but by way of compensation the bass extension is significantly improved: with the port tuned to 45Hz instead of 60Hz, in-room output is now some 10dB better at 30Hz.

Whereas the *2a* benefitted from a little wall reinforcement, the *2A/2* is clearly a free space design, whereupon it delivers an impressively even balance, albeit a little on the warm and rich side of neutral. There's sufficient unevenness to add some character, and the treble starts fading quite rapidly above 10kHz, but the relative flatness 400Hz-10kHz is very impressive, with an effectively seamless crossover.

Sound quality

Even though it was inadvertently presented among significantly more expensive models, the listening panel was mightily impressed by the *2A/2*, forgiving its slightly

heavy and overblown bass and thoroughly enjoying the delightfully open balance, the fine mid-to-treble coherence and the natural vocal qualities.

The balance may confer a relaxed, slightly lazy and laid-back presentation, with a touch of chestiness and thickening, but the *2A/2* handles complex rhythms well, staying quite nimble, agile and light on its feet.

Given the modest size, some lack of genuine extension and scale is inevitable, and ultimate loudness is limited, but the sweet balance and good control are a positive encouragement to explore its capabilities. It makes a particularly good match with Heybrook *HBS1* stands, both aesthetically and sonically.

Conclusion

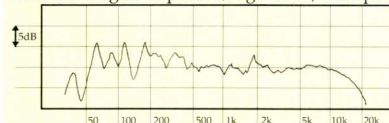
Though one can't expect miracles for £209, this new Rogers gets a lot closer than most, and is an obvious Best Buy. It may be a little smaller than some of its price rivals, but it's not significantly lighter, which is evidence of the unwillingness to compromise — witness that magnet.

Close examination clearly reveals the painstaking attention to detail and the careful way the engineering has been balanced to give an exceptionally cost effective result — one that works very well across a wide range of program material.

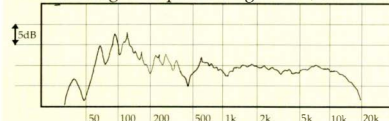
TEST RESULTS

Size (hwxwd)	35.5x23x22cm
Weight	6.5kg
Recommended amplifier power	20-80W
Recommended placement	well clear of walls
In room averaged response limits (50Hz-10kHz)	±5dB
Large room/space LF roll-off (-6dB ref midband)	30Hz
Large room/wall LF roll-off (-6dB ref midband)	30Hz
Large room output at 20Hz (ref midband)	below -15dB
Estimated midrange sensitivity (ref 2.83V, 1m)	84-85dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£209

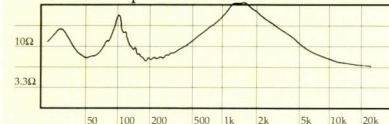
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



The Reference Review

WHAT'S NEW

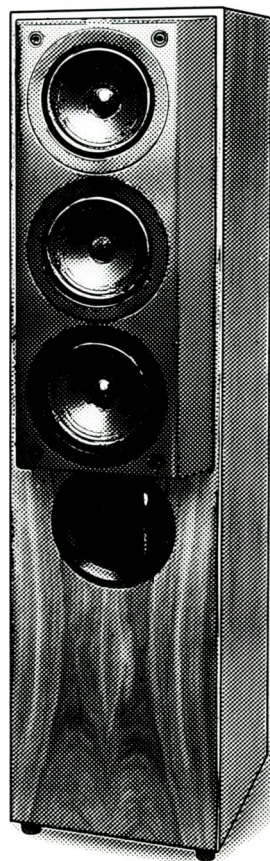
Audiolab 8000DAC is now available for demonstration. Based on Philips own Bitstream but with Audiolabs own application, this particular DAC must be heard to be fully appreciated. Automatic sensing of all normal digital outputs with two phase lock loops for the master clock, phase inversion and two analogue outputs.

Quad at last have released the new and long awaited Quad FM 6 Tuner. This unit is part of the 600 system and offer remote operation via Quad's own 66 remote.

Exposure As a newly appointed Exposure agent, we are happy to announce that the Exposure range is now available for demonstration. Prices start from around £500 for the Exposure 20 integrated amplifier.

GREAT DANES

DynAudio have a simple design philosophy – it has always been better to avoid faults at source than to try to rectify them afterwards. The Danish company have now launched their own range of speakers to a expectant UK market. Typical design of DynAudio speakers takes years not months, with emphasis on low cabinet colouration. Drivers are capable of huge dynamics, in some cases 2000 watt transients soft dome tweeters deliver superior high frequency performance. Leaving nothing to chance they even design and manufacture their own speaker cable. This is no ordinary cable and the only one we know to give flat characteristic impedance across the full frequency of the speaker.



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BLACK & GOLD

Have you noticed an alarming decline in vinyl available in the High Street? At the Reference Rooms you will find a growing stock of high quality pressings from Sheffield Labs, Wilson, Opus 3, and Chesky. Also available are Audiophile quality CD's. Available from those already mentioned together, are Narada and 24 Carat Gold Mobile Fidelity, Gold Diggers this way please.

TRANSPORT

The Silver Disc or CD has recently undergone a tune up with some heavy modifications. Teac have produced special dia cast components and a revolutionary new clamp system called VRDS which improves stability and laser tracking allowing for higher resolution. A more emotional musical event are the results of TEAC's latest innovation.

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SD Acoustics SD3 MkII

SD Acoustics, Unit F, 179-183 Riverside Business Centre, Bendon Valley, London SW18 4LZ. Tel: (081) 877 9714



This pretty little luxury compact was reviewed — and Recommended — some eighteen months ago in issue 86, since when the basic box and name have stayed the same, but the details have changed more than once, and the price has gradually crept up from £350 to £400.

Notable recent changes include a new main driver, and the enclosure has sprouted a rear port so that it is now a reflex-loaded system, both sufficiently radical alterations to make reappraisal mandatory. Meanwhile, Ortofon UK has taken over the UK distribution, leaving designer Steen Doessing to concentrate on the technical side.

I must admit I was apprehensive about the port: the sealed-box loading was one of the strengths of the original *SD3*, distinguishing it from ported commercial rivals like the Epos *ES11* and Arcam *Delta 2*. When the well used review samples arrived, the ports were there all right — but wooden plugs were also supplied to convert the speaker back into a sealed box system if preferred, should this happen to suit the listening room better.

Disregarding such flexibility (or indecisiveness) for the moment, the speaker itself is roughly medium bookshelf in size, but not shape. It uses a smallish main driver and has been built as narrow as possible, but is also quite deep, clearly emphasising the need for proper stand support.

The wrap is clad in a real wood veneer and has been beefed up to 25mm thickness, while the baffle is now 22mm MDF. Assuming the sight of naked cavorting drive unit diaphragms doesn't bring on an attack of the collywobles, the grilles should be immediately discarded.

The inside is lined in foam absorption (it might be worth trying a little extra fill if

operating as a sealed box). Bi-wire terminals feed a very simple hardwired crossover — in fact the main driver is driven directly, with no additional upper range roll-off.

This is an unusual device manufactured by Morel, with a 'double' (but not particularly heavy) magnet, unusual pressed steel frame and a very large 72mm voice coil driving a smallish (115mm) plastic cone. The tweeter uses a quite large (30mm) soft doped fabric dome, and both drivers are secured by (rather feeble but fine-pitch) machinehead bolts into T-nuts. These were encouragingly tight (especially on the bass driver).

Test report

Irrespective of the change in main driver, the new port-loading is clearly an unmitigated disaster, a factor that was subjectively obvious long before measurement revealed the full awfulness of the situation (10-15dB of isolated midbass boost). The *SD3* was thereafter left as nature had surely intended, with the bung firmly in place.

In sealed box mode, the new model is significantly smoother and better balanced than before, with improved low frequency extension and damping.

The crossover region is now well integrated and the treble itself is very smooth and well judged, though the broad upper-mid prominence centred on 900Hz is perhaps a little more exposed than before. Sensitivity remains low, but extension is very good considering the box size and mild impedance characteristics (i.e. the bass is still a bit under-damped).

Sound quality

This new *SD3* was warmly received by the listening panel, with solidly above average marks from all participants, and general

praise for the open and smooth balance and good dynamic impression. The upper-mid forwardness does tend to exaggerate detail and enhance perceived clarity at the expense of depth resolution, but it's a trade-off that most accepted with equanimity.

Though a bit lean, lightweight and lacking in body, the *SD3* is fundamentally quite lively, solid and coherent, trucking along nicely with good basic rhythmic integrity and timing, bar some mild chestiness and time-smear. Low sensitivity restricts loudness capabilities, but it holds together well under the punishment regime, and delivers very decent scale and weight for the size.

Conclusion

This substantially redesigned *SD3* does represent a worthwhile improvement over its predecessor, sufficient to retain Recommendation and justify the steady upward price creep.

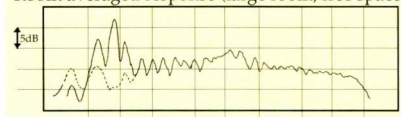
The balance and bass are both a little hyped, and lowish sensitivity is a further limitation, but the design has a fundamental charm that makes its flaws easy to forgive. In a very real sense it retains the sprightly agility that makes little seven litre miniature loudspeakers such a popular choice in the marketplace, this slightly larger and less sensitive package adding worthwhile extra low end extension and scale.

TEST RESULTS

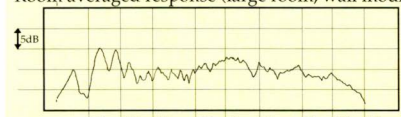
Size (hwxwd)	38x19.5x29cm
Weight	8.5kg
Recommended amplifier power	20-70W
Recommended placement	port blocked, 1ft from wall
In room averaged response limits (50Hz-10kHz)	±4dB*
Large room/space LF roll-off (-6dB ref midband)	25Hz*
Large room/wall LF roll-off (-6dB ref midband)	25Hz*
Large room output at 20Hz (ref midband)	-9dB*
Estimated midrange sensitivity (ref 2.83V, 1m)	83dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£400

* port blocked

Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



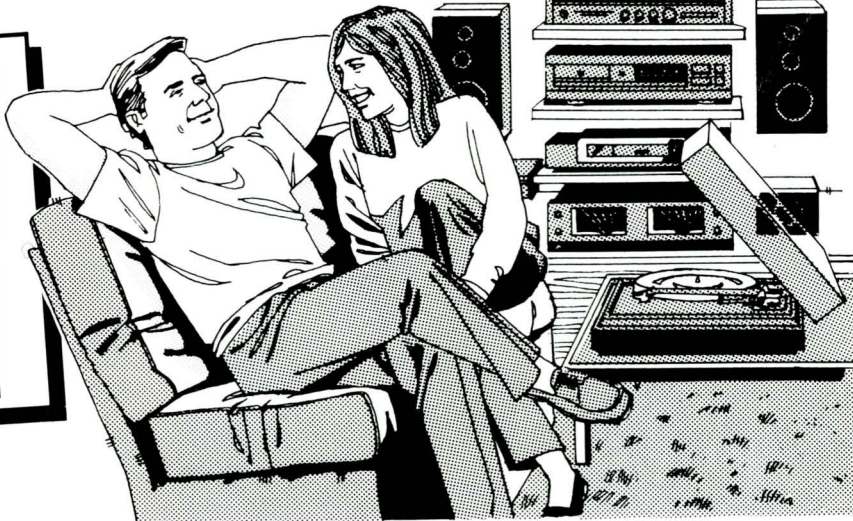
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Tannoy 605

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This is the third of Tannoy's hexagonal *Sixes* to come under *Choice* scrutiny. Second model up the range, the bookshelf size *605* is a conventional main-driver-plus-tweeter that sells for a pretty competitive £150.

The unusual cabinet shape is the most striking feature of this range. It not only looks interestingly different, but also improves the mutual rigidity of the panels and avoids the concentration of horizontal standing waves and reflections.

A six-panel wrap makes up baffle, back and sides, while top and bottom plastic mouldings are then added to tidy — and pretty — everything up, the top having an attractive chameleon tortoiseshell laminate. The enthusiastic may get around to adding mass loading (lead shot and/or sand) to the hollow base. One practical difficulty lies in finding a stand which matches the speaker aesthetically and mechanically. Tannoy supplies one, which we used, but the choice of alternatives is rather limited.

Injection moulding forms the main driver's 120mm plastic cone, allowing thickness to be varied to optimise mass/stiffness. The tweeter is the familiar Tannoy 25mm metal dome. Barely adequately tight machinehead woodscrews secured the drivers to the 16mm chipboard vinyl woodprint wrap, but the generous main unit magnet is seated against an internal top-to-bottom vertical brace via a lump of lossy gunk. The bi-wire terminal block feeds a decent quality crossover, tag connected to the drivers.

Test report

I was surprised that the *605* didn't show rather more common ground with the *603* than proved to be the case. The sensitivity

is a similarly below average 85dB, though the amplifier load here is even less demanding, the bass extension is much improved, and the close-to-wall balance much more acceptable.

1-2ft out from the wall should give the best results, though siting is much less critical than with the *603*, partly because of the bigger box, but also because the rear port has been tuned to a much lower 35Hz, which isn't much help in limiting cone excursion but provides useful extension that is much less influenced by boundaries.

Wherever placed, the *605* delivers an impressively even balance overall, albeit with some unevenness and a slightly depressed output above 2kHz. Crossover integration is good and the treble well maintained up to 14kHz, though the subsequent roll-off is a trifle abrupt.

Sound quality

I tried out the *605s* when they first arrived and was impressed by what I heard, so the rather indifferent response of the blind listening panel (self included) was disappointing. Had the panel got it wrong, or had I fooled myself in the first place?

Neither, as it turned out after a couple of hours of hands-on experimentation. What let the *605* down in the listening tests turned out to be the stand on which it was used — specifically a variation on Tannoy's matching heavily damped central-pillar design, which somehow slowed and time-smearred the pace and the bass.

I should have figured it out earlier. This model's predecessor was the *Mercury*, a fine and very successful but also unusually stand-sensitive design, so it's hardly surprising that this new model shows a similar characteristic — exaggerated here by the

physical difficulty of using the hexagonal moulded base on other stands.

Blu-tacked onto its own stand the sound was dull, box-bound and altogether too smooth, lacking in life and dynamic contrast. Resting on top of a pair of Slate Audios, the speakers themselves seemed almost to disappear, and the positive qualities of the cabinet shape became obvious in the impressively generous scale and unconstrained soundstage.

The balance remains a shade dull and shut in, but timing and agility are very respectable, and the temptation to pump up the volume becomes difficult to resist. The *605* is not very sensitive, and the mis-tuned port brings excursion limitations before serious loudness can be achieved. But it stays so clean and together up until that point, I frequently found myself having to back off the volume control.

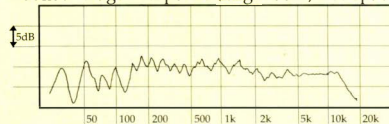
Conclusion

Assessed as a loudspeaker operating under carefully optimised conditions, the *605* is really rather good, and deserves to carry a Recommended flash. That it looks attractively different and is good material value for money only makes the case even more positive, but the real world of practical stand compatibility does pose problems which prospective purchasers should bear in mind.

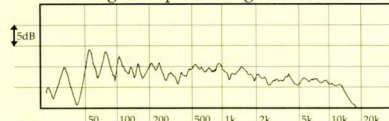
TEST RESULTS

Size (h x w x d)	40x27.5x18cm
Weight	7kg
Recommended amplifier power	20-80W
Recommended placement	1-2ft from wall
In room averaged response limits (50Hz-10kHz)	±4dB
Large room/space LF roll-off (-6dB ref midband)	25Hz
Large room/wall LF roll-off (-6dB ref midband)	25Hz
Large room output at 20Hz (ref midband)	-12dB
Estimated midrange sensitivity (ref 2.83V, 1m)	85dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£150

Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance





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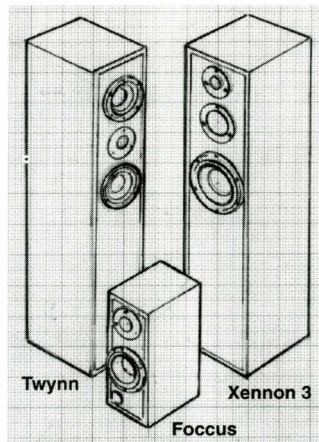
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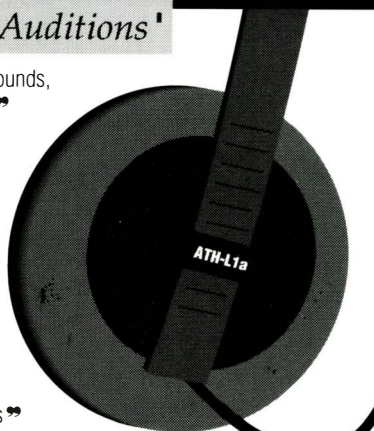


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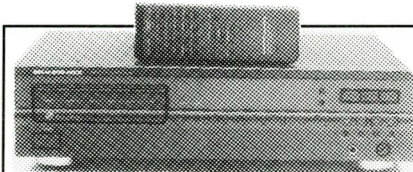
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A few months back (issue 98) *Choice* assessed a chunky Wharfedale bookshelf size loudspeaker that cost £260. Now another pair of chunky bookshelf size £260 Wharfedale speakers has come out of the familiar red overprinted carton. How many chunky £260 bookshelf size loudspeakers can one manufacturer (Wharfedale perhaps) produce without being accused of self-plagiarism? I think we should be told.

What looks suspiciously like a devious niche marketing plot turns out to have a perfectly rational explanation. Wharfedale's *505* and *505.2* have been major sellers since around the time that Hadrian took up brick-laying, so changing the £200 *505.2* would be foolish and risky. Instead the company dressed it up as the £260 *505.2M* in a lovely mahogany real wood veneer, and this is model we reviewed and recommended eight months back.

However, time marches on. Dry stone-walling gives way to bricks and mortar, and the basic *505.2* constituents start to look a little long in the tooth. The research and development people come up with a brand new tweeter design with a ceramic coated diaphragm, and this in turn deserves a more up to date main driver. Hey presto, the *515* is born, with all the new hi-tech goodies in a (quite classy) vinyl clad box, selling at the same £260 as the mahogany veneered *505.2*.

The *515* box isn't quite the same size or shape as the *505.2*, but I wouldn't like to try and distinguish them at ten paces. The new model's grille has a nicely flared frame, though it still sounds better without. It's held by horizontal slots at the top and bottom of the baffle, which is arguably prettier than the usual mounting lugs. Rebated

drivers and post-formed baffle edges provide further incentives to leave the covers in the carton, though the horizontal plastic trim strips that finish the top and bottom of the baffle do look a bit incongruous.

Aside from the hi-tech trimmings, the fundamental engineering looks very promising. A victim of the inconvenience of its special tool, Wharfedale's bayonet driver fixing has given way to more conventional woodscrews, the main driver cast chassis being well held by six properly tightened examples. A generous magnet drives a 145mm plastic cone with wide, soft surround. The tweeter has a 25mm ceramic dome, and both are hardwired using rather thin cable to a quite complex PCB crossover, fed from bi-wire terminals.

The sealed and exceedingly well stuffed enclosure is built from substantial MDF, 22mm thick for the baffle and 18mm for the wrap, with further internal stiffening provided by an O-ring brace.

Test report

Sensitivity is rather below average, and a couple of dB down on the *505.2*, though the bass extension is commensurately improved. The *515* supplies useful in-room output down to 30Hz, which is worthwhile, though nothing special considering the various system parameters, presumably due to the highish (70Hz) system Fr, and/or the low frequency alignment in the network.

Showing a worthwhile improvement over the *505.2*, especially in the treble, the frequency balance is impressively flat and relatively smooth from 150Hz upwards, barring a slight loss of output and notchiness around the crossover region. The bass alignment in our room is less promising: clear of walls the 60-120Hz octave is short of output; this fills

in back against the wall, but 50Hz is then much too strong.

Sound quality

The *515* did pretty well in the blind listening tests, showing good consistency on two separate presentations, and attracting general approbation rather than any wild enthusiasm (or censure).

The fundamentally neutral balance is a good starting point, and the sound is refreshingly open and free of boxiness — relaxing, undemanding yet also quite lively and informative, though hardly the last word in dynamic drive, solidity, scale and drama.

Coloration is pretty well controlled, though the bass can get a bit thumpy and adds a touch of chestiness. The midband is slightly nasal, and treble is also a shade obvious, a degree of overall time-smear tending to bring out a slight 'three-humped' character that becomes more obvious at high levels.

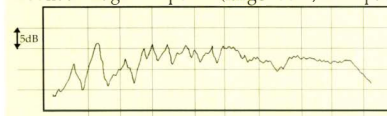
Conclusion

Headbangers may disagree on grounds of lowish sensitivity, but in every other respect the *515* is clearly a very successful design that deserves Recommendation. It's notably vice-free and builds worthwhile improvements in bandwidth and smoothness on top of the firm foundations the *505* established so many years ago.

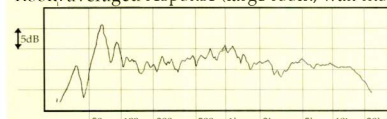
TEST RESULTS

Size (h x w x d)	40x25.5x30cm
Weight	10kg
Recommended amplifier power	20-80W
Recommended placement	clear of walls
In room averaged response limits (50Hz-10kHz)	±5dB
Large room/space LF roll-off (-6dB ref midband)	28Hz
Large room/wall LF roll-off (-6dB ref midband)	28Hz
Large room output at 20Hz (ref midband)	-12dB
Estimated midrange sensitivity (ref 2.83V, 1m)	85dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£260

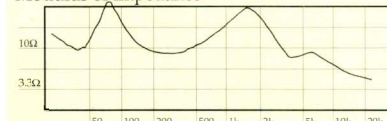
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



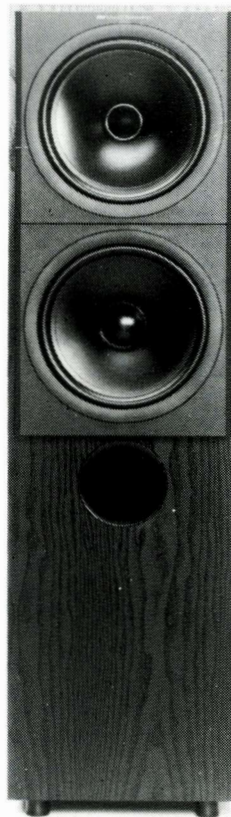
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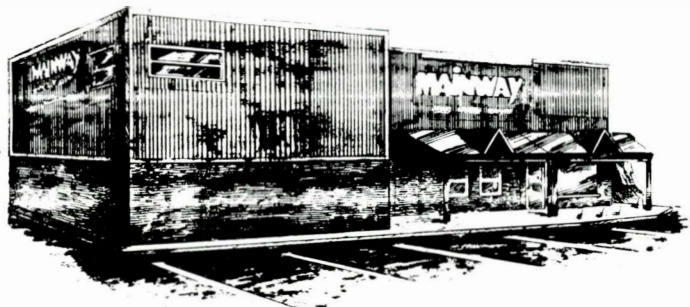
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Tech Talk

These days the *Choice* loudspeaker test schedule involves almost continuous appraisal of batches of around 20 models, which are published thrice a year, alongside occasional one-offs and smaller groups of niche models.

'One-site' testing is the only sane and sensible way of handling the logistics, even though it does leave my home inundated by black vinyl and cardboard for many months of the year.

The main listening room therein is used for the 'blind' panel and subsequent hands-on listening, and also for the test measurements, which does help provide correlation between the two, but which inevitably means said room will exert a major influence on results. Which may not be ideal, but which is probably unavoidable.

The 'blind' tests on this occasion lasted three days with about five listeners, making up around 30 sepa-

Paul Messenger explains how the speaker listening tests and measurements were performed, and outlines what the findings reveal about the products.

rate presentations of about half an hour each. Split evenly between vinyl and Compact Disc, the programme covers as broad a range of music as possible.

Choice of ancillary components inevitably influences the type of sound, possibly as much as the room itself, and is one potential source of prejudice I know no way of avoiding. The main drive system comprises Naim amplification (*NAC52*, *NAP250* and *NAP135*), backed up by Audio Innovations *Second Audio* valve power amps. Sources included Linn *Sondek* and Voyd *The Voyd* turntables with Naim *ARO* tonearm and Linn *Troika* cartridge for vinyl disc, Naim *CDS*, Micromega *Logic* and Meridian *200/203* CD players, all mounted on Mana tables.

Bookshelf models were mainly used on Linn *Kan*, Foundation *Designer*, Heybrook *HBSI* and Slate Audio stands, with others brought in for hands-on work. Most of the work was done with a single run of Audio Note *Silver* cable (horrendously expensive but very good), backed up by heavy multi-strand Naim *NACA5* and others as appropriate.

My particular thanks go to Jason Kennedy for all his hard work as operator on the blind listening tests, and also to panelists: Ken Weller (Tannoy), Andy Whittle (Rogers), Neil Truckle (Mordaunt-Short), David Inman (KEF), John Jeffries (Diamond Acoustics/Reference Imports), Julian Angel (Heco UK), Peter Qvortrup (Audio by Design/AudioNote), Tom Barron (Rotel UK).

The test programme is based on two separate sets of room measurements, one taken with the speaker placed close against a rear wall (but more than a metre from side walls), the other a metre out into the room; intermediate positions produce more or less intermediate results.

A conventional pen recorder/mike set-up (Neutrik) is used to carry out sequential sinewave sweeps (high pen and paper speeds) for a succession of microphone positions. Experiment has shown that seven such plots are ample to define the averaged response in the listening area.

A perfectly flat straight line is not a realistic target. Low frequencies are heavily modified by the main room modes - most notably the c10dB boost at 30Hz (or 10dB suckout at 42Hz if you prefer). Room reflections also create interference well up into the midband, especially when the speaker is close to the wall.

Nevertheless, comparison with listening findings and established references suggests that the ideal balance should be as flat and smooth as possible. Gentle variations are preferable to sharp discontinuities, and prominences tend to be more irritating than dips, while a gentle high frequency roll-off above c5kHz usually sounds perfectly acceptable.

Sensitivity differences have as much to do with impedance variations as with conversion efficiencies, which is one reason why the impedance has also been plotted and presented. Halve the impedance value and a speaker will suck twice the current and therefore twice the power for the same amplifier volume setting. By adopting 4ohms rather than 8ohms impedance, 'current hungry' designs therefore 'pinch' 3dB of extra sensitivity. Few amplifiers have the capability to deliver this extra 3dB in full, most settling for 1.5-2dB, so an apparent sensitivity advantage may well be largely negated in practice.

The listening room

The speaker and microphone sites parallel the listening tests, giving a measuring distance of 3-4m. The room itself is a sturdily built, sparsely furnished 4.3 x 5.5 x 2.6m, with wooden floor. Painted plaster walls and ceiling are broken up by wooden beams, while the open fireplace, alcove doorway and large semicircular bay help distribute standing waves.

One consequence of the room-based testing is that the low frequency extension is defined as much by the room as the loudspeaker. Low frequency roll-off is traditionally expressed as the -6dB (sometimes -3dB) point referred to the sensitivity. Such a technique can be applied with room measurements, but the results tend to be strongly modified (even modulated) by the main room modes.

Probably more useful is to specify the relative level of 20Hz with reference to the midband sensitivity. However, this has the drawback that a good percentage of speakers don't go down much below 50Hz, never mind 20Hz. Until I can figure out a better approach, I am quoting the -6dB points for free space and wall mount conditions, plus the 20Hz level.

The *Directory* 'bass from' entries for the reviews carried out using room measurement techniques therefore refer to the best position -6dB point for the speakers concerned, and cannot be compared directly with earlier 'anechoic' entries, though each has its own internal consistency.

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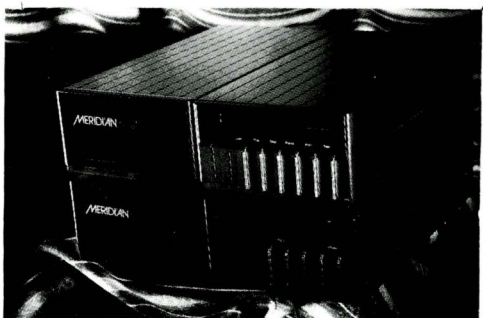
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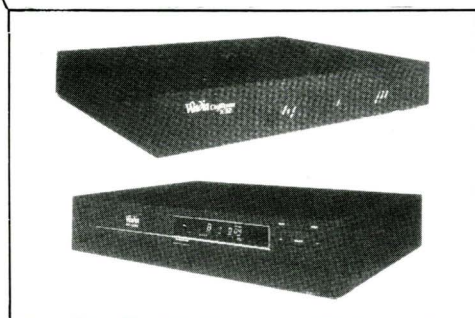
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Conclusions, Best Buys & Recommendations

I've picked thirteen models for Recommendation, from a slightly smaller total than usual, which is a rather higher hit ratio than the norm. It's an interesting group too — and not just because of unique devices like the omnidirectional Brinkman, and the single driver Jordan Watts.

Most surprising perhaps is the relatively small number of wall-mount models: only a handful all told, and just two Recommended. Wall-mount loudspeakers seem to have made much of the running over the past few years, but the decent number of free space Recommendations in this (and the last) project does much to redress the balance.

Reviewing twenty speakers at a time is an invaluable way of putting each model into a market context,

Our resident loudspeaker guru Paul Messenger serves up the cream of the crop from this month's review section.

but an even more useful perspective comes from having put more than 150 models through the same test programme over the past two and a half years.

Several of the latest reviews cover updated versions of the same or equivalent models of a year or two ago, and it's interesting to note the worthwhile advances that have occurred in practically every case. Crossover integration has improved substantially, and the tweeters are getting better too, the isolated bump now being the exception rather than the rule. It's all pretty solid evidence that loudspeakers are slowly but surely getting better.

Best Buys

Just one model made the Best Buy ranks, the delightful £209 **Rogers LS2a/2**. A heavily revised version of an established favourite, the larger main driver adds welcome extra authority and drive. Balance is a little warm and rich, but the midband is particularly natural and coherent.

Recommended

Least expensive Recommended model is another updated favourite, the £109 **Goodmans Maxim 3**. Less obviously a steal at its new higher price point, the new *Maxim* still retains much of the magic of the *M2*, and is a significantly smoother performer too, if perhaps a little less exhilarating.

The medium bookshelf size £150 **Tannoy 605** makes good use of its hexagonal cabinet to create a pleasant freedom from boxiness and good coherence under optimum conditions, though it's very stand sensitive, and full potential is not easily achieved.

Similar in many ways to its Best Buy £140 *P1V* stablemate, the £180 **JPW AP2** has an improved cabinet with damping and real wood veneer, but not

necessarily a better overall balance, though it's fine material value for money.

The same cannot be said of the cute little **Monitor Audio Monitor One**, £180 in the real wood finish of our samples, though available for less in plain board. Arguably the smallest speaker able to give a passable imitation of hi-fi reproduction, it makes up for limited performance by considerable charm.

The £260 **Wharfedale 515** is very much an update of the successful, longstanding (and continuing) *505* concept. The new model features Wharfedale's ceramic tweeter, plus improved bass extension and a more even midrange, alongside the familiar open and relaxing spaciousness.

I doubt that the £260 Kenwood **LS-770E** will be found in all the shops that stock the brand's popular electronics, but this impressive large bookshelf size model deserves respect. The balance is a shade heavy, but pace is lively and dynamics invigorating.

The **Infinity Reference 30** costs £330, but doesn't need a stand, so in practice is cheaper than the previous two entries. This 'budget floorstander' is very well balanced and offers extra bass weight and extension, though at some cost in poise and vigour.

The £400 **SD Acoustics SD3** is yet another substantial redesign of a familiar model. The new ported enclosure is a disaster, though fortunately avoidable. As a sealed box it's smoother and better balanced than its predecessor, combining much of the charm of a miniature with a little more useful bass extension, though sensitivity is quite low.

The £504 **Jordan Watts JH400** is a very mixed bag, with serious balance colorations but exceptional midband life and coherence. It's also unusually stylish and fabulously finished — but do listen before you buy, because the sound won't be to every taste.

The £895 **Synthesis LM210** is a compact free-space floorstander from the USA, the decent sized, beautifully shaped and finished enclosure giving the small main driver plenty of room to breathe. The result is lively, coherent and engaging, if a shade laid back and short of drama and drive.

At the same £895 price, the **Diamond Acoustics Reference III** is another beautifully finished free-space floorstander, but a total contrast sonically. It's flawed by low frequency balance/alignment problems, but remains fast and informative nonetheless, with the sort of transient definition and timing that makes extended listening extremely pleasurable.

Even at £1,300 the **AudioNote AN-E** represents a real sonic bargain, though it isn't the prettiest package around, and you'll have to find some extra money for the stands (and check out the silver-wired version!). The large ported enclosure and powerful main driver give high sensitivity with genuinely extended bass, impressive overall balance and a rare midband coherence, transparency and dynamic realism.



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Rotel RA820AX	324.95	336.95	356.95	368.95	388.95	404.95	444.95
Marantz PM30	299.95	312.95	332.95	344.95	364.95	379.95	419.95
Kenwood KA3020	308.95	319.95	339.95	352.95	372.95	388.95	428.95
Pioneer A300	324.95	336.95	356.95	368.95	388.95	404.95	444.95
Rotel RA930AX	324.95	336.95	356.95	368.95	388.95	404.95	444.95
Harman HK6100	336.95	348.95	372.95	384.95	404.95	416.95	456.95
Sony TAF440E	339.95	352.95	372.95	384.95	404.95	419.95	459.95
Sony TAF540E	379.95	392.95	412.95	424.95	444.95	459.95	499.95
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NAD 3240	356.95	368.95	388.95	404.95	416.95	436.95	476.95
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Marantz CD72
Nad 5420
Nad 5425
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- Philips CD604
Philips CD610i
Philips CD618
Philips CD624
Philips CD634
Philips CD850 MkII
Pioneer PD4700
Pioneer PD5700
Pioneer PD6700
Pioneer PD7700
Pioneer PD8700
Rotel RCD95AX
Rotel RCD950AK
Technics SLPG400AK
Technics SLP6500AK
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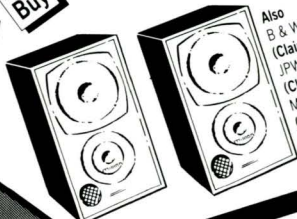
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You may be interested to know that we will be holding a series of musical evenings at the Clarendon Hotel, Blackheath, SE3. The first of which will be with Linn Products. In the Westcombe Park Suite you will have the opportunity to listen to the exciting new Karik/Numerik C.D. player, Kremlin tuner, Keltik Activ loudspeakers along with further developments from the dedicated Linn team. The evening will commence with an introductory talk from the manufacturer with musical demonstrations and refreshments to follow. The evening will conclude with an open forum for discussion. As the event is likely to be popular please reserve your free ticket by contacting Ian Ridge on the telephone numbers below.



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Choosing and Using . . . CD personals

It may have been 20 years ago today that Sergeant Pepper taught the band to play, but it was only exactly a year ago that the *Hi-Fi Choice* team last surveyed the state of the art in personal digital music technology. Since our May 1991 review project we've noticed certain definite trends developing in this field.

One of the major flaws with personal CD players a year ago was what might be called the 'joggability factor', or the degree of sensitivity exhibited by these digital disc driving mechanisms when shaken or stirred.

With ears still ringing of KLF and limbs shattered from the famous 'escalator test', the Choice team brings you full reviews on eight of the latest personal CD players.

Occasionally one encounters a player which can actually be used on the move, imperturbably purveying music regardless of the inevitable, intermittent vibration. But, unfortunately, it's more often the case that personal CD players respond to the merest jolt by freaking out; all music is suspended for an instant until the mechanism regains its composure and resumes playing at the point where it left off. All very sophisticated, but far from ideal when what you're really after is an uninterrupted hour or so of music as you amble along.

So how do things look a year later? Well, judging by the models reviewed this month, things have changed very little. Perfect for a train or plane journey, or while sitting around waiting, these miniature CD players almost all had nervous breakdowns when being carried around on even the shortest journey in the real world.

If you like fragmented experimental musical collages, fine. If you want a steady stream of soothing or toe-tapping music, forget it. The better the quality of musical reproduction (and with some of these players it was very good indeed), the more irritating this tendency was. Some players respond to repeated jogging by stacking up the time-out intervals and extending the period of silence until you begin to wish that you'd brought along the second and third volumes of *Lord of the Rings* to read while you're waiting.

The other bête noire of the personal Compact Disc user is battery consumption. There are a lot of advantages that personal CD players have over personal tape machines, including sound quality and ease of access — none of that tedious (and battery draining) fast forward or rewind to take you to your favourite tracks. But there's also no denying that, as a breed,

these little beasts are power hungry, getting through rechargeable batteries at a considerably faster rate than comparable tape players. And unlike susceptibility to vibration, battery consumption seemed to vary considerably between machines in this test. The playing time you'll get from your rechargeables is certainly an important factor to consider when choosing which player you may want to buy. It's worth noting that battery life will inevitably be longer when the player not used on the move.

Of course, if you intend to use a personal in the context of a domestic system, as a small but perfectly formed CD player, then such issues as stability in motion and battery longevity are about as important to you as peasant welfare to Louis XIV. With this in mind, we've subjected all the models reviewed here to a rigorous home test at Jason Kennedy's abode, jostling the terrified miniature players into the company of his squillion pound steam driven valve system.

For the purpose of assessing each player's sonic potential in the context of a domestic system player we dragged them back to the listening room, powered them up with their mains adaptors and hooked them up with one of the standard supplied leads to the system.

The reference system comprised the following components, preamplification courtesy of a John Shearne unit, power amplification supplied by the rather too good Audio Note *Neiro* and transduction carried out by the stalwart Audio Note *AN-Es*.

A selection of discs were used, including classical and rock music, though the majority were of the latter variety and included old favourites like *Never Mind* by Nirvana, Zappa's *Best Band you never heard*, Laurie Anderson's *Mister Heartbreak*, and The KLF's *The White Room*.





Aiwa XP-6

Aiwa (UK) Ltd, Unit 5, Heathrow Summit Centre, Skyport Drive, West Drayton, Middlesex, UB7 0LY. Tel: 081 897 7000



The Aiwa XP-6 is a solid, elegant looking player which has been rather stripped down on the features front. There is an AC adaptor included but no rechargeable batteries and, unusually, the in-ear headphones don't come with a remote control attached to the lead. Instead there is a wafer thin remote control handset which is only intended for use in a domestic setting, with the player running off the mains.

The control layout on the player itself is straightforward and uncluttered but there are some less than wonderful design decisions. The shared play/pause button can be a pain when you can't see the player to work out which mode it's in. Buried in your pocket it's anybody's guess whether you have paused the CD, reached the end of play, or drained your batteries. All the user knows is that the flow of music has ceased. And burying the XP-6 in a pocket isn't as easy as it might be; the volume control and the headphone jack are positioned on the widest side of the machine so as to require the biggest sized pocket available (nobody uses those pouchy things, Aiwa). Of course the size of the disc limits how compact the player can be, but Aiwa could do better on the ergonomics than this.

Facilities

For your money the XP-6 gives you a two setting sound enhancement system called DSL. This works well, providing a lot more immediacy and bounce to the music and you might as well leave it on full all the time.

All the usual CD trickery is also provided, with random playback and the ability to repeat tracks, plus the rather handy hold/resume facility. This allows you to switch

the player off temporarily, and then resume play at the point where it stopped. A nice idea, but along with all the controls, it is difficult to operate on the move without a remote control on the headphone cable. Programmed play is also provided, along with a facility to insert four second blank gaps between tracks when you're recording the CD onto a cassette, presumably so you can listen to it on your more user friendly personal tape player.

The best aspects of the player in terms of facilities are the battery adapter, which allows use of either ordinary 1.5 volt batteries or rectangular rechargeables, and that desirable remote control handset.

On the move

Putting on my gold baseball cap backwards and setting out on the street I found the XP-6 to be a fundamentally very nice machine sprinkled with some unnecessarily annoying features. For example, the headphones are of the instant spaghetti variety and the length of time it takes you to disentangle them is about the same as the battery life on the machine. Once you do get the phones sorted out you find that they provide a good big steady sound and suddenly the player is doing its job. You're immersed in some well reproduced music and city commuting has become immediately more agreeable. You're humming, walking along, and smiling like a dolt.

But then, just as you're getting into some raunchy blues by Betty White, you give your coat pocket a slight jolt and the music is chopped off by a robot meat cleaver within the mechanism. This player is neurotically sensitive to vibration and even gentle han-

dling of the player, as when trying to manipulate the volume control, results in the beast panicking and terminating the music with sizzling sounds like a crazed metallic insect stinging your brain.

The XP-6 afforded me a great deal of listening pleasure when I was sitting down on trains, or on benches waiting for trains, but in its current guise it can't really be used on the move. Aiwa is far from alone in this and at least the inclusion of a domestic style remote control is recognition of this, not to mention being one of the groovier accessories in the test.

In a system context

The XP6 came out towards the top of the bunch when plugged into the main system, it had a lively punchy sound that made the most of the discs I played on it, and not just the lively ones either. *La Wally* from the *Diva* soundtrack sounded open and sweet. It could have been more natural and HF extension greater, but overall the effect was quite enjoyable. With a Yello track it made a good effort at reproducing the wall of sound effect that its creators are so fond of. Depth was also quite convincing and I felt some of the impact that's lurking on this disc.

The reference NAD 5425 managed to extract a lot more in the way of low level detail and presented a far more open sound stage, but the XP6 held its own on the listenability front. I managed nearly a whole track off of Rush's rather hard sounding *Hold your fire* album which says something for the Aiwa's low level of distortion.

I also tried the optical output with a Micromega Duo DAC and an Audioquest cable. The result was a considerable improvement on the lone XP6; discs played through the combo had greater substance and were substantially more natural sounding, though they didn't really approach the sort of results that are available with a domestic player used as a transport. Not bad sound quality then, and at £150 certainly enough to justify a Recommendation

SPECIFICATIONS

Supplied Accessories

AC adaptor, remote control, soft case, headphones, battery adapter, minijack to twin phono interconnect.

Size (wxhxd)	125x25x150
Outputs	line + TOSLINK
Battery life	n/a
DAC type	1-bit
Weight	350g with batteries
Headphone type	intra aural
Remote control	infra-red
Bass boost	yes
Power supply	9V
Price	£150

Philips AZ6819

Philips Electrical Ltd, City House, 420-430 London Road, Croydon, Surrey CR9 3QR. Tel: (081) 689 2166



The last time we looked at CD personals, back in issue 94, I remember describing the Philips AZ6897 as the strangest looking machine in the entire bunch. This is obviously an image that Philips is keen to hang onto because, boy, is this one different looking CD personal. The unit itself is just one part of the overall package that greets you when you open the stylish clamshell type box.

As well as the player itself, you will find a tray and tower arrangement which is actually a stand for a full size remote control and a set of headphones with no leads attached. The lack of a lead is explained by the fact that the headphones are radio frequency devices which receive a signal transmitted by the CD personal by means of its attached telescopic aerial.

When not in use, the headphones sit on top of the tower and are recharged from a power supply built into the stylish plinth. The plinth also serves to recharge the portable unit when it is placed in the base tray. The overall effect is most impressive and everyone who saw the headphone/player/plinth combination commented favourably on its visual appearance.

Free range cans

The headphones are reported to have a range of around 150 feet in free space and, don't worry, because if the Joneses get themselves a pair as well, you can change the frequency to prevent having to listen to your neighbour's choice of music. Changing frequencies can also help to overcome any intrusions from your local Taxi company or fridge freezer.

From the legal point of view, Philips has

submitted the unit to the DTI for Type Approval but at the time of writing this was still pending, although a Philips spokesperson assured *Choice* that the system meets all the relevant standards.

The aforementioned cans come with their own volume control and power switch, and run off their own rechargeable battery. Sound quality is best described as adequate, certainly when used in this way the combination is not going to set the world on fire, but that is the price you have to pay for the convenience of being able to roam around without having to carry the player with you.

Interference isn't too much of a problem, although the compressor on my fridge did cause the odd hiccup and the unit isn't too happy near computers.

By now I'm sure you'll have got the idea that the Philips AZ6819 is about as far from your every day run of the mill CD personal as it is possible to get.

Leaving aside the high tech fripperies for a moment and concentrating on the player itself, what you get is a fairly standard sized unit, albeit one whose sharp edges are enough to put anyone off the idea of slipping it into an inside pocket for an outing on the tube. Moreover, for some reason the remote control doesn't work unless the CD player is plugged into the mains. Both fairly obvious reasons for treating this as a static unit rather than trying to use it on the move.

Facilities

All the controls are on the stepped, art deco style top panel, no fewer than 16 tiny little buttons being arranged in three rows. As each little stud is inset into its own pit and they all look much the same, a novice user

will have quite a battle figuring out which button does what. Along with the buttons you will find an informative, rectangular display panel which, unusually, gives a matrix readout showing the tracks on the disc.

Alongside the more conventional transport controls there are a number of basic DSP functions labelled Jazz, Pop, Classic and Ambience which try, and fail miserably, to add something desirable to the music being played.

Rather surprisingly this is the first personal we have come across to feature a Bit Stream DAC. I say rather surprisingly because Bit Stream was originally developed for the portable market, and it was only when Philips realised just how good it sounded that it became earmarked for more conventional units. Anyway the 6897 comes equipped with not one, but two, Bit Stream DACS so the technology has finally made it into the sort of product it was intended for in the first place.

In the system

The choice of DACs may or may not be the deciding factor in the sound quality of this player, but whatever the reason it turned out to be easily the best sounding player in the bunch. Quite simply, it managed what none of the others could, it opened up the sound stage. It also proved that personal CD players need not have a two dimensional, flat sound.

Clarity, dynamics, imaging and tonal shading were all very convincing, it even compared well with the NAD 5425 that was on hand as a reference. The latter was possibly a bit more subtle and substantial but there wasn't a lot in it.

The overall sound quality ensures a Best Buy rating and the cordless headphones can be treated as a fun toy that is bound to impress the neighbours, as will the very stylish design.

SPECIFICATIONS

Supplied Accessories

AC adaptor, remote control, radio frequency headphones, minijack to twin phono interconnect, two rechargeable batteries (one in headphones one in CD player).

Size (wxhxd)	150x26x155
Outputs	line
Battery life	4hrs (player) 6hrs (cans)
DAC type	Bit Stream
Weight	346g with batteries
Headphone type	supra aural
Remote control	infra red
Bass boost	sort of
Power supply	4.5V
Price	£300

Samsung MY-CD2

Samsung Electronics, Samsung House, Hook Rise South, Surbiton, Surrey, KT6 7LD. Tel: (081) 391 0168



Amere £110 for a CD personal, you cannot be serious! Oh well, perhaps you can and you shouldn't start into these things with a prejudiced attitude.

Starting from the top of the *CD2*, the small, thin control keys are neatly grouped on the face plate and give you control over play, pause, stop and the like. The front plate carries small push buttons to control the memory functions. An LCD screen is situated on the front of the player, which makes it easy to see on the move, while there is also a neatly placed top window for those who like seeing their discs spin.

One of the reason's Samsung can market this player with such an attractive price tag is that, unlike most of the other units in this group, this model doesn't feature any type of remote control. There is also a marked lack of rechargeable batteries, and with the player having to take four standard cells at a go, battery operation could turn out to be quite costly.

Facilities

Apart from the normal control functions there isn't really much else on offer. The personal doesn't feature any of the sophisticated gadgets that you will find on a full size CD player, with track programming being perhaps the most sorely missed.

The functions that are featured include AMS, search and three types of repeat — one track, all tracks and random. The search lets you see the elapsed time and find a certain part of a song, while the AMS takes care of normal playing.

The variety of repeat functions add a nice touch, with the ability to hear your favourite track over and over again. One of the few

drawbacks on the personal is the LCD screen, which for some reason is slanting backwards, and under certain lighting conditions it is almost impossible to see exactly what is going on.

The hold function disables the controls during playback and a locking slide switch is provided to ensure that the lid doesn't spring open inside your pocket.

A pair of headphones is supplied but leaves more than a little to be desired as said unit is small and very flimsy. All things considered, however, and taking into account the range of functions available, this player was extremely easy to use.

On the move

At first I was doubtful whether the *MY-CD2* was going to be any good on the move but after a considerable amount of walking it actually turned out to be quite reasonable.

With the size and weight of the player it was very difficult to find a coat that had a pocket big enough to hold it, and although the Samsung came with a carrying case I felt it was best tested in a coat pocket.

In the end I gave up trying to use the headphones supplied with the unit, as not only did they produce a really dreadful sound they were extremely flimsy to boot, so sound quality assessments, via a decent set of cans, will have to be inferred from the comments later on when the player was used in a reference system.

The player started off quite well, proving to be extremely shock resistant, indeed the only time the disc jumped was when the personal was slightly knocked. I found the position of the main controls to be very hard to get to, and feel they would be better

placed on the front, next to the display screen, facing the user.

Via the reference system

I listened to these machines before finding out their exact prices, but it came as no surprise to find that this is the least expensive beastie in the bunch. It was characteristically (of the breed rather than the brand) compressed in most respects and particularly in terms of dynamics.

As with many of its contemporaries, it seemed incapable of instilling life into music without turning the volume right up, and even then it's not the same as having an innate sense of drive in the first place.

Otherwise the Samsung boogied along in the usual droll manner, stopping occasionally to suggest a change of disc so that the listener maintained a degree of interest. However, after a while I noticed a certain insidious fatiguing element which discouraged further listening. Obviously combining a £110 personal CD player with a £10k system isn't entirely standard procedure but you don't expect to get a headache.

One way of improving it is to use batteries instead of the mains adaptor, this cleans things up a bit and actually improves aspects like timing and dynamics. However, it'll take a bit more than that to put the Samsung name up there in high fidelity lights.

Conclusion

OK, said unit is by far and away the cheapest CD player in the test but, by the time you've added a decent set of rechargeable batteries and the associated charger, the price has begun to rise quite considerably, at least in percentage terms.

You'll also have to fork out on a decent set of cans and even then the sound quality will leave more than a little to be desired. The Samsung is really a machine for those on a strictly limited budget who can't afford the extra money but really must have a CD personal.

SPECIFICATIONS

Supplied Accessories

AC adaptor, soft case, headphones, minijack to twin phono interconnect,

Size (w x h x d) 136 x 38 x 148

Outputs line

Battery life n/a

DAC type 16-bit

Weight 550g without batteries

Headphone type intra aural

Remote control no

Bass boost no

Power supply 9V

Price £110

Sony D11

Sony UK Ltd, Sony House, South Street, Staines, Middlesex. Tel: (0784) 467000



In the dim and distant past CD personals were rather large black boxes, far too large to fit into the average jacket pocket and came with only the bare minimum of facilities. Rather like the Sony *D-11*. However with a price tag of a mere £135, this machine is the bottom marker of Sony's massive CD personal range and the £135 price point isn't exactly known for the application of innovative design skills.

Inside the over large, and distinctly plasticky black box, you'll find few facilities. The now obligatory bass boost (aka Mega Bass) is present and indeed relatively correct, and sits alongside fairly rudimentary programming facilities, accessed by means of a pair of small push buttons on the front panel.

Music on hold

Alongside these you'll find a hold facility which usefully includes a resume setting so you don't have to go back to the start of the disc every time play is interrupted.

The top panel of the machine includes a lip at the front which provides space for both the display window and the control keys while the hinged section that provides access to the disc itself has a tinted plastic window for those of you that like to watch discs spinning round.

The transport controls themselves are fairly large buttons with a positive action and there should be no problem finding them on the move, although the player was too large to be tried inside a jacket pocket.

In addition to the hold facility, which locks out the controls themselves, there is also a lock button which makes sure that you can't accidentally open the lid of the

machine while the player is in use, although this is a manual device rather than the automatic version fitted on some of the more up-market machines.

The facilities list is completed by minijacks for both headphones and line out and a 9V DC feed. Not exactly the best endowed player in the bunch then, but what can you expect for a mere £135?

Rather surprisingly, there are no rechargeable batteries on offer with this machine, portable power being provided by four AA cells housed in a battery compartment situated inside the player itself and accessed by removing the disc to reveal the battery compartment cover. Not surprisingly, changing batteries on the train or whatever can be a bit of a pain.

Banded headphones are provided with the player, although these are a simplified form of the cans provided with the other Sony players in this test. Unfortunately the cans provided with the bigger players cannot be connected to this unit because they have a remote control lug attached to the minijack plug, thus you can't upgrade this model to remote control by swapping the headphones.

On the move

I tried out this machine with the KLF's *White Room* CD and immediately encountered problems because the machine won't play a disc protected by an Audio-Technica green ring, which we used throughout the test. (More because they make handling the discs easier than because of any sonic improvements likely to be gained.)

With a naked disc the player got down to making music. With the Mega Bass facility

switched off the sound was decidedly thin and nasty, but improved quite considerably when the bass boost was set to the middle setting, which even seemed to smooth the treble out a bit, albeit at the cost of more bass than was strictly called for. Resolution isn't really the strong point of this player and bass lines tended to disappear into the mix, which ended sounding rather like an overdriven disco PA system on occasion, although for some users I suppose this could be a plus point.

Shock resistance was moderate, although the player's size meant that it couldn't be subjected to the same test as the rest of players and had to be used on a carrying strap instead. Not one to go jogging with but a brisk walk only caused the occasional skip.

In the main system

When used in the reference system the Sony proved to sound a bit like it feels; lightweight. Unlike the other uninspiring models this one has a character of sorts, it creates a hazy high frequency blur that tends to make a mess of cymbals and adds a form of airiness which can, on occasion, actually improve matters. In some instances it sounds like very high frequencies and gives an impression of openness, however closer audio inspection reveals the same effect whatever the material being played.

Otherwise it's a pretty average machine with limited dynamic range, a rather flat presentation that robs music of drive, and limited bass weight.

Conclusion

At the end of the day the *D11* is probably as good as you're going to get at the price, if the music is good then it won't disguise the fact, but a dearer machine will make it more obvious. Basically for £135 you can't expect very much in terms of sound quality so the best advice has to be to spend a little more if you can afford it, but consider the *D11* if your budget will stretch no further than the £135 asking price.

SPECIFICATIONS

Supplied Accessories

Headphones, minijack to twin phono interconnect, AC adaptor, hand strap.

Size (wxhxd) mm 138x40x152

Outputs line

Battery life na

DAC type 16-bit 4 times

Weight 535g with batteries

Headphone type banded intra-aural

Remote control no

Bass boost Yes

Power supply 9V

Price £135



Sony D-202

Sony UK Ltd, Sony House, South Street, Staines, Middlesex. Tel: (0784) 467000



Sony's *D-202* is the middle player in the trio submitted for this test and is a plastic variation on the theme of the more expensive, and metal, *D-303*.

The unit looks quite attractive with a sloping front panel and nicely rounded edges which make getting it in and out of pockets a relatively risk free occupation.

The main display is situated on the sloping front panel and as such is accessible while the unit is used on the move. The main controls are fairly easy to use even when the unit is inside a pocket and the main keypads have a nice, positive action.

Below the display window and the main controls is a pair of sliders, one of which locks up the machine's keys when it is used inside a pocket or whatever and the other controlling the level of bass boost you wish applied to your music, off, mid and max being the proffered options.

Round the side you'll find a line out socket, a volume control and a headphone socket, complete with that weird looking tongue that lets you plug in phones with an integral remote control. A 6V DC inlet round the back completes the list of facilities.

Power is provided courtesy of a rather unusual looking 650mAh rechargeable battery which looks rather like a pair of conventional cells bonded together. This battery compartment will also accept a pair of conventional AA cells in place of the battery pack if you need a longer playing time. Unfortunately Sony has stuck with its habit of requiring the user to press a key before the recharging process begins so it's quite easy to plug the machine into the mains only to return the next morning to find the batteries are still as flat as a pancake.

A quick one hour charge will give around 90 minutes of playing time and a full charge (three hours) will push this up to around the two hour mark although battery life is reduced if the player is used on the move.

In control

Although the facilities on the machine itself are rather basic, you get a decent set of headphones complete with a remote control situated in the headphone lead.

Although fairly simple, this does at least give you control over the volume level, play, stop and track skip. This proved to be extremely useful, particularly the track skip facility, as being able to miss out a track without having to remove the player from your pocket proved to be a real bonus.

The headphones themselves come on a folding band and sit just outside the ears rather than being pushed right into them. They are moderately comfortable to use although the ear pieces are perhaps a little large.

Although the headphones take up quite a lot of room when folded, the headband means that you can just leave them dangling around your neck when not in use, which not only makes them easy to find but also prevents the cord becoming the tangled mess that is so often the case with the basic in-ear types.

On the move

The *D-202* is also quite a walkable machine. Listening on the move is definitely possible but when placed in a flapping denim pocket the machine was wont to skip the odd beat or too. When used in a hip pouch the player performed quite well but the famous run up

the escalators at Tottenham Court Road tube station test proved to be asking just that little bit too much.

Sound quality, when auditioned via the supplied headphones, proved to be a little thin and tinny. Indeed this was one of the few personal CD players in this test that actually benefited from a judicious application of the bass boost facility. With the bass boost on the middle setting the sound lost a little of that sharp edge and the bass notes took on a little more solidity.

Via the system

When used in the reference system the *202* proved to be a listenable machine, its sound quality, though only a little above par, is good enough to encourage further listening. I wouldn't go so far as to say it's inspiring in the way that the Technics *900* and Philips are, but it won't offend and manages to retrieve most of the fundamental info on the disc.

As with most of these players, the *202* lacks the drive to give a solid, dynamic sound, you tend to keep turning up the volume in the hope that it will start to boogie, but somehow it never really happens. However, as this is an almost universal panacea one can't be too harsh. The player does manage to resolve the timing aspects of discs and makes a fair stab at image height and width.

I ended up listening to the whole of the Laurie Anderson track (*Sharkey's day*), which may not sound like much, but this was about the sixth or seventh time I'd listened to it that day.

I hate to damn with faint praise but this CD player can fairly be described as average. The sound quality on the move is good but not earth shattering, it is relatively portable and when used via a system it rates as marginally better than average. Just about grounds from a grudging Recommendation.

SPECIFICATIONS

Supplied Accessories

Car adaptor, in-line remote control, headphones, minijack to twin phono interconnect, rechargeable battery, AC adaptor.

Size (wxhxd) mm	132x26.8x150
Outputs	line
Battery life	2hrs
DAC type	16-bit 8 times
Weight	320g with batteries
Headphone type	banded intra-aural
Remote control	in headphone lead
Bass boost	Yes
Power supply	6V
Price	£160

Sony D-303

Sony UK Ltd, Sony House, South Street, Staines, Middlesex. Tel: (0784) 467000



For a mere £280 you can be the proud owner of the Sony *D-303*, which, although not quite the pinnacle of Sony's massive range of Walkmen is certainly close enough to the summit to have snow on its lower slopes during winter.

This is one serious CD personal, the styling is more functional than fashion victimised and it is easily the heaviest in our group, thanks mainly to an extremely sturdy metal casing.

The main controls are to be found on the hinged top cover along with a rather small display window giving you basic information such as track number and timing. Alongside the transport keys themselves you get three tiny little push buttons marked remain/enter, play mode and index, which, when used in conjunction with the transport keys, give you access to much the same array of programming facilities that you are likely to find on any decent standalone unit.

The unit is a bit of a throwback, coming finished in the now decidedly untrendy black and standing out from the almost uniform greyness of the other players in this group.

Facilities

On the front panel, and falling easily to hand when the player is used in a pocket, are a pair of sliders and the volume control. One slider gives you access to three degrees of bass boost, including off, and the other slider lets you engage resume mode whereby the player starts playing from wherever it was when last turned off rather than starting from the beginning again. Resume is a surprisingly useful feature, and by the end of the test was left just about permanently engaged.

On one side of the machine you'll find a headphone socket, with provision for connecting cans with a remote control built into the lead, while on the other a minijack socket is provided should you decide on a separate, wired, remote control. Next to the remote socket there is provision to connect a TOSLINK type optical cable, but more of that later. The socket count is completed by a 9V DC power socket and a line out minijack on the rear of the machine.

Power is provided courtesy of a 600mAh internal battery pack which charges remarkably quickly and gives around 90 minutes usage on the move.

The player comes with the same headphones as its *202* stablemate and the same comments about the usefulness of the remote control facility apply. The phones give you a reassuring little beep whenever you press a key on the remote control set, and this is quite useful when it comes to skipping backward and forwards across a CD, as you know exactly how many tracks you have skipped.

On the move

When used with these cans this was one of the best of the bunch, if not the best, only the Technics *SL-XPS900* coming anywhere near this sort of performance. The KLF's marvellous *White Room* album actually picked up a sense of weight, and the bass notes in particular had a nice sense of scale. The resolution was also good with the complicated electronic mix being pulled apart and showing up all the individual components in a manner which is beyond the grasp of most personals.

Although not exactly as solid as a rock,

the transport is stable enough to enable the machine to be walked, although the odd flight of stairs caused it to have the occasional problem.

Via the reference system

When used in the reference system, the *303* was the nicest sounding Sony in the bunch, and for that matter one of the more enjoyable players overall.

The *303* provided an open and relaxed sound that stayed enjoyable over an unusually long period of time, yep, despite my better judgement, I found myself listening to more than the obligatory test tracks. It also seemed a lot more adept than most at resolving high frequencies.

Though it couldn't match the domestic machine for depth, substance and dynamics, it made as good a stab as any of the competition. For a very pleasant change I felt no compulsion to turn up the volume to get the impression of drive and life in music.

The sound produced by the *303* was also pleasantly clean and relatively free from the subtle distortions that cause listener fatigue, which makes a big difference in the long run.

Hooking up its optical output to the Mircromega *Duo* DAC improved matters further and resulted in one of the more confident combos in the bunch. There was a good sense of space and even better extended and more natural high frequencies. To be frank I preferred the sound of this combo to that produced using the full size, and distinctly non-portable, Ariston Maxim as a transport, it wasn't more 'fi' but it had that certain something that makes music, er, musical.

Although £280 is a lot to pay for a CD personal, the Sony *303* will give excellent results when used in a main system and is moderately walkable. For those reasons it deserves Best Buy status.

SPECIFICATIONS

Supplied Accessories

Car adaptor plate, in-line remote control, headphones, minijack to twin phono interconnect, rechargeable battery AC adaptor.

Size (WxHxD) mm	126x27x135
Outputs	Optical TOSLINK + line
Battery life	2 hours
DAC type	one bit
Weight	440g with batteries
Headphone type	banded intra-aural
Remote control	in headphone lead
Bass boost	Yes
Power supply	9V
Price	£280

Technics SL-XP505

Panasonic UK, Willoughby Road, Bracknell, Berks, RG12 4FP.
Tel: (0344) 862 444



Technics' CD personal line up has grown quite a bit recently, with the addition of various players aimed at slightly different segments of the market. The *SL-XP505* is tilted slightly towards in-car use, although it can be used in exactly the same way as the other units in this test if you so desire. In fact, if you were to judge solely by its shape then there is little to tell you that this is anything other than a fairly standard Technics CD portable.

The shape will be vaguely familiar to anyone who has seen either the *700* or *900* models, although it is a little bit deeper. The unit employs the same, attractive, sloping front fascia and radiused corners. On the right you'll find the play and stop keys, both of which are a decent size and easy to find even when the unit is used inside a pocket. On the left are five smaller buttons which open the case, take care of the programming functions and give you access to the skip facilities.

In-between the two banks of controls is a fairly large and detailed display window, the hinged lid also includes a window so that you can tell whether the disc is spinning.

Facilities

Round the side, along with the minijack for the headphones and its associated volume control, you'll find a couple of sliders, one marked ASC/S-XBS and the other live. The first switches in either a bass boost facility (S-XBS) or Technics' Amenity Sound Control which cuts the high frequencies to make the unit less sonically intrusive to anyone in the immediate vicinity. The live switch, on the other hand, is reported to 'make vocal music with extended reverberation', which,

if I understand the Japanglish correctly, means that you get a bit of an echo effect.

So why did I start off describing this as a unit suited to in-car use? Well apart from the beefed up suspension, which I'll come to later, you also get a rather nifty remote control unit. As with the Technics *SL-XP900* reviewed on the facing page, you have to insert a little infra-red receiver unit into a minijack socket on the side of the unit before it can receive the remote control command, but once this is done the whole thing works rather well.

The remote unit itself controls level, basic operations and some degree of programming and is a very nicely designed unit that easily fits into the palm, your other hand is free to control the steering wheel, gears and so on (so on! - you'd never guess the editor didn't drive - Dep. Ed.).

The player boasts of being the proud possessor of a 'double floating mechanism', whatever that is, but I suppose I shouldn't mock because whatever it is, it gives the *505* a degree of shock isolation that none of the competition can begin to match. This was the only player to pass the dreaded 'run up the escalators at Tottenham Court Road tube station test', and seeing as we moved offices shortly after this review was written, will probably be the last CD personal ever to do so. Anyway, shock resistance is first rate and this is certainly a player that relishes being used on the move. The down side, unfortunately, is that it doesn't sound that good when so auditioned.

When I first came to use it, I thought this might be a fault of the headphones themselves but even changing over to a pair which I knew to be good didn't improve the

sound quality that much. Adjectives such as sharp, thin and brash spring to mind, and even my attempt to rectify things with a bit of bass boost only served to muddle the picture even further. Oh well, perhaps that's the price you have to pay for a machine with such good shock resistance, although I have to say that the same company's *SL-XP1* would tend to suggest otherwise.

Via the main system

The *SL-XP505* is a fairly average player in the domestic context; it doesn't come out well when compared with similarly priced mains bound machines like the reference NAD, but it doesn't make any serious mistakes either. It's dynamically rather compressed in the same fashion as much of the competition, you're never going to be surprised by sudden changes in level, there aren't any. Although this may seem a desirable thing from the headphone user's point of view, it's a severe limitation if you want to be convinced that a musical event has been recorded onto your discs.

It also sounds a bit thin and lacking in substance, subsequently imaging, though of average width and height, has little in the way of depth. This factor also contributes to the rather limited welly factor mentioned above. Nevertheless discs don't sound bad and the *505* is capable of delivering some enjoyable performances with the right material, ie, that which doesn't have a tendency to grate, steer clear of the Rush and Zappa (though I guess some of you don't need the warning).

Conclusion

This unit's major plus point is its immunity from vibration, but the price you pay is a decrease in sound quality when compared to equivalently priced, but less stable, units. If shock resistance is your main reason for buying a portable CD player, then this could be the unit for you.

SPECIFICATIONS

Supplied Accessories

AC adaptor, infra-red remote control, remote sensor unit, headphones (with remote control), minijack to twin phono interconnect, two rechargeable batteries, battery for remote control.

Size (wxhxd) mm	128x29.7x148
Outputs	line
Battery life	150mins
DAC type	18-bit 8 times
Weight	345g with batteries
Headphone type	intra-aural
Remote control	infra red
Bass boost	yes
Power supply	4.5V
Price	£180



Technics SL-XPS900

Panasonic UK, Willoughby Road, Bracknell, Berks, RG12 4FP.
Tel: (0344) 862 444



Although the spec claims that this model is even thinner than Technics' previous slimmest player, the 700, in practice you won't be able to notice any difference as the 0.4mm saving is only going to impress marketing types.

The main controls are large, round, push buttons situated on the top plate which take care of functions such as play, pause, stop, skip and search. Smaller studs look after the memory functions and a selection of sliders on the radiused front panel take care of the rest. The display is situated on a raised area of the top plate which also contains a window giving visual access to the disc itself.

The SL-XPS900 is really a bit of a hybrid machine and is not intended entirely for use on the move. As if the position of the display window were not evidence enough, the provision of a credit card sized remote control unit puts the unit firmly in the dual usage category. The idea is that you can cart it around with you on the tube or bus, but when you get home you can connect it up to your main system and have full infra-red remote control at your finger tips.

To enable the remote to talk to the unit you have to plug in a little infra red receiver module which comes attached to a mini-jack plug which locates on the side of the player. This knobby little protrusion rather ruins the player's lines and I have my doubts about how robust it would prove if inadvertently left in place while the unit was used on the move.

Facilities

As well as a full numeric key pad, the remote also offers control of level, the various programming facilities, the transport, and intro

scan, this latter facility not being duplicated on the player itself. Despite the remote's small size, the buttons are fairly large and have a firm action making the unit as whole extremely easy to use.

In terms of facilities the 900 has got most of the programming flexibility available on a full size machine, including A-B repeat and 24 track program play. Signal processing is provided in three forms: S-XBS, a bass boost facility; ASC, Technics proprietary Amenity Sound Control which is meant to prevent high frequency leakage annoying your fellow travellers and a button marked 'live' which is reported to add extra reverberation with a view to recreating something of the ambience of a live performance.

The unit comes complete with a pair of 600mAh rechargeable batteries and a battery pack which enables you to attach a pair of standard batteries in an outboard case. The package is completed by a pair of headphones which include a basic remote control facility in the lead. This allows you to alter the volume and activate the hold facility without having to access the player.

On the move

Although the general design hints at the player being intended for static rather than go anywhere use, the actual performance underlines this fact in red. Quite simply the 900 just doesn't work on the move.

Pop the unit into an inside pocket, head off for a walk down Oxford Street and you are likely to get from one end to the other without hearing a single note. It's fine on tube trains and the like and the sound quality is very good via the supplied headphones, but walkable it ain't.

The bass boost facility makes the sound slightly muffled and thumpy and, in my view, is best avoided, as is the AMS facility which simply suppresses the high frequencies. When used in normal mode the sound is relatively open with a decent weight to the bass. The top end is detailed but well controlled which makes prolonged listening a distinct possibility.

The logo proudly boost 'Ten hours of playing time', which might just about be possible with the unit placed on a shelf and driven at very low volume levels, but in normal use I was hard pushed to get more than 150 minutes or so off the rechargeables, although adding the conventional battery pack can prolong the playing time quite considerably.

In a system context

This unit really comes up trumps when auditioned via a conventional hi-fi system and was one of the few in this test to really stand out. It creates dynamic drive and power, and you don't have to keep jacking up the volume to get the impression that you are listening to a rock record. It is also quite a subtle little player, detail retrieval and the sense of body to notes was very nice, even convincing, and I ended up listening to far more of the Frank Zappa disc than I had time for.

I tried the optical output with a Micro-mega Duo DAC, and found that there was little advantage to be had from the hook up, although perhaps this reflects the limitations of the TOSLINK optical transmission system as much as the quality of Technics' MASH DAC.

The 900 earns a hearty Recommendation because of its excellent sound quality when used in either a home system or on the tube, however those in search of the ideal jogging companion should look elsewhere.

SPECIFICATIONS

Supplied Accessories

AC adaptor, remote control, remote sensor unit, headphones, minijack to twin phono interconnect, two rechargeable batteries, lithium battery, soft case, battery case.

Size (wxhxd)mm	128x17.5x128
Outputs	Optical TOSLINK + line
Battery life	Up to 10 hrs
DAC type	1bit MASH
Weight	346g with batteries
Headphone type	intra-aural
Remote control	infra red
Bass boost	yes
Power supply	4.5V
Price	£280

Choice Offers

Our Mail Order Section this month features, among the old favourites such as Furakawa interconnects, some great new accessories to help improve the performance of your system. We've been reviewing some new and interesting products and have selected some that we thought you should know about.

Goldring Magic Record Cleaner

This is a kit consisting of a double sided velvet brush and spray on Goldring Magic record rejuvenating fluid. Unlike some other record cleaning potions this one makes old grubby records sound smoother and less gritty, reducing surface noise quite significantly. For best results use with the Mk10 brush.

£11.95 ref: **A13**

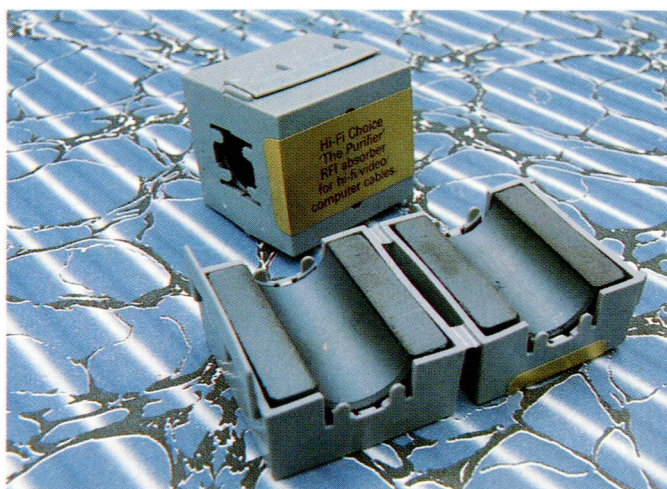
The Purifier

The Purifier is a ferrite cable clamp designed to reduce RF induced noise in audio, video and computer systems. The clamps will accept single or multiple cables of up to half an inch in diameter and can be used on both signal and mains cables. The main benefit is a general cleansing of a system's sound allowing finer resolution of low level detail. They can be particularly beneficial for digital interconnections.

£16.90 per pair ref: **A14**

Nagaoka Anti-Static Record Sleeves no.102

Packs of 50 plastic record sleeves that can be used on their own or inserted into an existing card or paper sleeve. They keep records dust free and eliminate static, but are of course hampered if the record isn't cleaned before it's stored. No great



sound quality claims but in these days of disappearing vinyl it pays to take care of what you've got, after all there may never be a format to beat it!

£6.99 ref: **A15**

Mk 10 Carbon Fibre Brush with Velvet Pad

The carbon fibres efficiently remove dirt from the record grooves, which is then collected by an integral felt pad. This can be easily cleaned with the supplied tool after use.

£9.99 ref: **A8**

Monotrack Support Cones

Supplied in packs of four, these

turned steel support cones are ideal for supporting just about any item of hi-fi, from subwoofers through to amplifiers. The cones provide effective isolation and decoupling at a bargain price.

£8.00 ref: **A12**

System Cleaning Kit 1

Everything needed for maintaining a hi-fi system, all contained in one handsome wallet pack. Stylus cleaner, auto reverse wet tape head cleaner and cleaning fluid, manual CD cleaner and cleaning fluid and a carbon fibre record cleaning brush.

£15.99 ref: **A9**

Milty Work Mat

The Milty Work Mat is a large rubber mat that has been designed to support records, Laser Discs and CDs when they are being cleaned. It is covered in 1mm long tentacles which gently grip the disc so that it can be cleaned without moving about or rotating. The nature of the material ensures that no static is induced and dirt falls between the tentacles. It's a real boon to disc cleaning and makes using cleaning brushes and solutions completely painless

£7.99 ref: **A16**

Kontak cleaning solution

Kontak is a two stage contact cleaner for all audio and mains connections. All connections are susceptible to oxidation and contamination which impairs electron flow and thus affects sound quality. Here's what Paul Messenger had to say when he tried some on his system; "The effect on the power amps alone was so astonishing I had to carry on and cover the whole system. By the time I was finished the system was utterly transformed. Timing and coherence were back with a vengeance; surface noise and coloration were both much less audible and the soundstage had liberated itself from the boxes".

£19.90 ref: **A17**

Newnes Audio and Hi-fi Engineer's pocket book (second edition)

This useful little book covers a wide range of audio topics with concise explanations to clarify the information.

It covers everything from turntables and cartridges to DCC and DAT with as much technical information as the mere mortal could wish for. If you really want to know what makes your CD player tick and aren't afraid of the odd wiring diagram or equation this is the book for you.

£10.95 ref: **A18**

The Art of Digital Audio - John Watkinson (revised reprint)

This book describes all of the essential theory of digital audio, and a good deal of practice, but it is not a history book. Nor is it a conventional textbook, largely because such things have to choose a target audience and stick to that academic level. The

Improve the sound of your system for a mere £15

Ever wondered why some people get taken seriously in hi-fi shops while others are given the run around? Wonder no more. The answer to all your hi-fi problems is the Hi-Fi Choice sweatshirt. Tastefully printed in red and black on grey, as well as being this year's most crucial fashion accessory, it will also readily identify you as a reader of Britain's fastest growing hi-fi magazine. You'll almost certainly be taken more seriously and end up with a better system – and all for a mere £15. We can supply the shirts in two different sizes – Large and Extra Large.



need for understanding in digital audio is too wide and the subject is too interdisciplinary for that. As you can imagine this is a comprehensive tome that covers all aspects of digital technology including disc drives, rotary and stationary head recorders and even interconnects. It is a must for anyone wanting to get fully acquainted with the subject.

£49.50 ref: A19

Technics Auto Compact Disc Cleaner

The Technics *RP-CL300* is a powered wet/dry CD cleaner that can be run off batteries or the mains. It works by rotating the disc and applying the wet cleaner first (cleaning solution is supplied), then reversing the direction of rotation and dry cleaning the disc. The whole process takes just 40 seconds and a set of batteries should clean 80 discs.

£39.95 ref: A20

Audio Technica CD lens cleaner AT-6078

The focussing assembly for the laser head of a CD player is a very delicate affair and yet it requires cleaning from time to time. Rather than fumbling about with cotton buds we would suggest you employ an Audio Technica CD lens cleaner. This is a standard size disc with a set of eight tiny brushes set into it, to use just apply a drop of cleaning fluid on one of the brushes, place the disc in your player and press play. Ten seconds later, hey presto, a clean laser assembly, and cleaner sound from your CDs as a result.

£16.95 ref: A21

Speaker Cables

Furukawa FS-2T14 PCOCC speaker cable

FS-2T14 PCOCC speaker cable is Furukawa's entry level speaker cable consisting of two 1.4mm square drawn PCOCC concentric strands.

Furukawa FS-2F09 PCOCC speaker cable

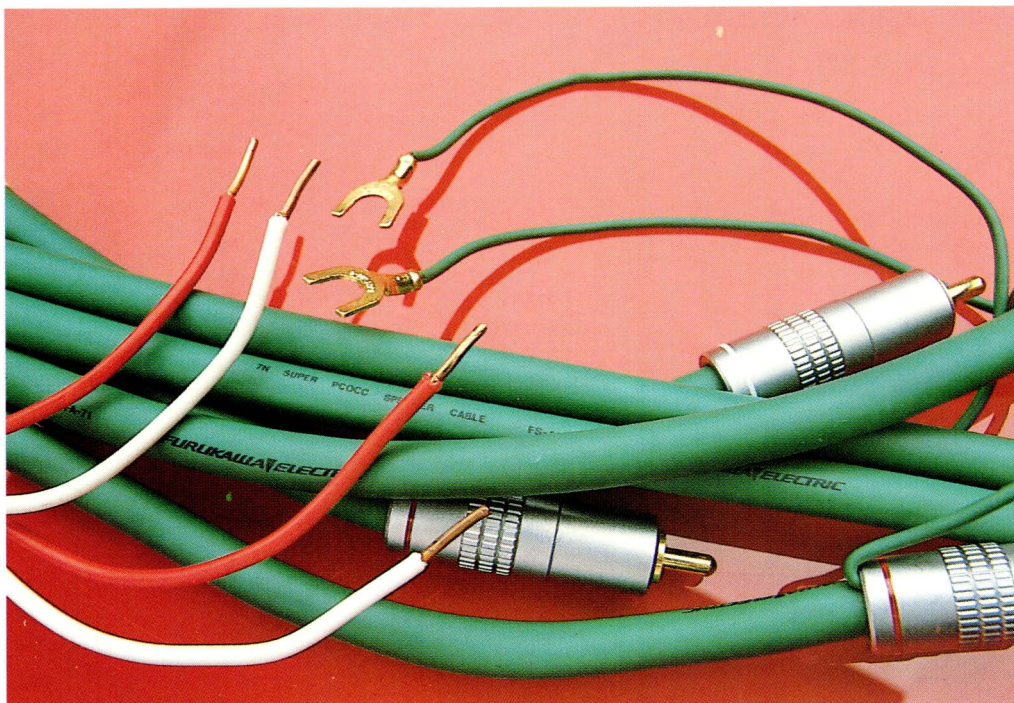
Two 0.09mm square drawn PCOCC strands are contained in a neat, flat, flexible PVC insulation.

The *FS-2F09* is highly regarded by audiophiles around the world.

Furukawa FS-2T30F Evencap speaker cable

PCOCC speaker cable consisting of two 3mm square drawn PCOCC rope lay strands.

FS-2T30F speaker cable, by virtue of its low resistance and



3mm section, increases the audible bandwidth, most particularly in the low frequencies.

FS-2T20P PCOCC speaker cable

PCOCC cable consisting of two twisted 2mm² drawn PCOCC strands laid in a concentric pattern.

The two conductors are insulated in polypropylene and contained in a circular outer sleeve of soft PVC.

Furukawa FS-2T35P PCOCC speaker cable

Produced from six concentric laid conductors in a rope lay this large cable has a low DC resistance and a larger occupation area for the skin effect, therefore bass is larger and treble is even sweeter.

Furukawa FS2T55F Evencap speaker cable

FS-2T55F is a 5.5mm 2 rope lay cable of similar construction to the *FS2T30F*.

Interconnects

We have a variety of interconnects on offer, all sourced from the respected Japanese specialist Furukawa.

The FA21 Series balanced analogue interconnect cables

The *FA21 Series* of analogue interconnects is supplied in matched pairs employing the Furukawa all PCOCC RCA plug with a flying earth or ground lead.

These interconnect cables are recommended for the connection of analogue devices where RCA sockets are provided. They can introduce a wide stereo image with good depth and height.

Furukawa FD-11 Series balanced digital coaxial interconnects

These 75ohm interconnects consist of a PC-OCC central conductor, double insulated with high density and air foamed polyethylene for high mechanical isolation. They are recommended for the interface between CD transports and DACs.

Furukawa FA11S Series balanced analogue interconnect cables

This interconnects is supplied in matched pairs employing the Furukawa hermetically sealed all PCOCC RCA phono plug with a flying earth or ground lead.

The cable's ability to transmit a vast amount of information has the effect of creating an awe inspiring bass, transparent mid range and simply superb unfettered treble.



Audiophile Recordings

We are pleased to be able to offer a selection of records from the world famous Reference label. Guaranteed to get the very best from your system these recordings have been selected for the merits of the performance as well as their outstanding sound quality.

Prof Johnson's Astounding Sound Show: Sampler.

Orchestral Fanfare - Red Norvo Quintet - Cal Arts Ensemble - Richard Morris - Organ - Susan Mc Donald, Harp - Kronos Quartet - David Rosenthal, Tubulung.

A perennial audiophile favourite, this sampler of Prof Johnson's early work shows what Reference can do with a wide variety of musical and sonic experiences.

Includes the only known recording of an unusual tuned mallet instrument, the Tubulung. Guaranteed to give your playback system a royal wringing out!

Copland: *Appalachian Spring Suite, Eight poems by Emily Dickinson.* Keith Clark/Pacific Symphony Orchestra, Marni Nixon, Soprano (in the poems).

Music by America's best loved composer, *The Appalachian Spring Suite* is presented in its original version for 13 instruments. Also included is the world premiere recording of Copland's orchestration of eight of his Emily Dickinson songs.

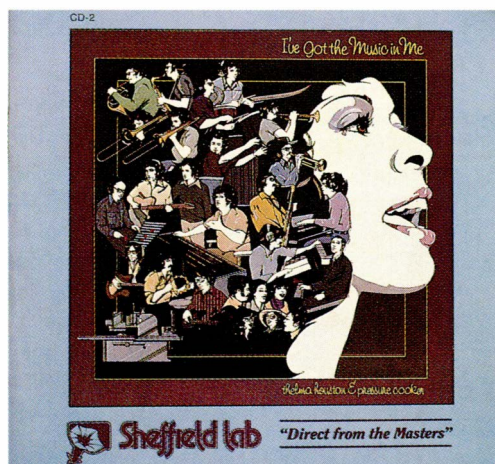
This recording was a Grammy Award nominee in 1987. The CD version also contains *An Outdoor Overture*.

Walker & Garson: *Reflections. Portrait of a friend - Love - First song - Ethereal - Yearnings - Pied piper - The park - Magic spell - You're one of a kind - Reflections - Reason.*

Jim Walker on flute and Mike Garson on piano from the jazz group 'Free Flight' offer something peaceful and soothing for those quiet moments. Surprisingly natural sound.

Helicon Ensemble: *Vivaldi/Bach Vivaldi: Sinfonia in C-Trio Sonata in G minor - Double Concerto in E-Flat. Bach: Trio Sonata in C - Double Concerto in D minor.* (Compact Disc also contains *Prelude in C*)

Albert Fuller conducts from the harpsichord a varied original instrument ensemble in works featuring two solo violins, including the great *Double Concerto* by Bach and three rare, ingratiating works by Vivaldi. Featured solo artists are Japp



Schroeder, Stanley Richie and Linda Quan.

Recorded at the John Harmes Centre for the Performing Arts in Englewood, New Jersey. CD also has Bach's *Prelude in C*.

Walton: *Facade Suite.*
Walton: *Facade Suite - Strauss/Hasnohl:* *Till Eulenspiegel - Scriabin/Elliott:* *Waltz in A-Flat - Nielsen:* *Serenata in Vano.* Chicago Pro Musica.

An instrumental from Walton's whimsical *Facade* in the composer's original scoring makes a perfect vehicle for these brilliant musicians. A chamber version of *Till Eulenspiegel* and the seldom heard pieces of Scriabin and Nielsen complete this engaging programme.

Tafel Music: *Popular Masterworks of the Baroque.*
Pachelbel: *Canon & Gigue.*
Handel: *suite in 'Water Music'* **Purcell:** *air from Suite no. 3 in D and Suite from 'The Moor's Revenge'.* **Vivaldi:** *Concerto op. 10-2, 'La Notte'.*

Canada's finest original-instrument Baroque ensemble plays familiar favourites with outstanding scholarship and musical panache. Note the Pachelbel *Canon* with its seldom heard companion piece, both to the composer's instrumentation. Strings, oboes, recorder and harpsichord offer delightful music recorded in a vaulted ceiling stone church.

Stravinsky: *L'Histoire.*
Stravinsky: *L'Histoire du soldat suite* **Blackwood:** *Capriccio Espagnol.* Chicago Pro Musica.

Stravinsky's landmark composition for a mixed ensemble of seven. Grammy winning performances.

Respighi: *Church Windows.* Keith Clark, Pacific Symphony Orchestra.

This grandiose work, scored for full symphony orchestra, pipe organ and tam-tam, has at last been given its due, musically and sonically, in this celebrated recording. *Church Windows* quite literally pushes to the theoretical limit the dynamic range it is possible to reproduce at home.

The CD also contains Respighi's rare mini concerto *Poema Autunnale* with the violinist Ruggiero Ricci.

Marni Nixon: *Marni Nixon sings Gershwin. Summertime - Let's call the whole thing off - Someone to watch over me - I've got a crush on you - But not for me - The real American folk song - Nice work if you can get it - Embraceable you.*

Marni Nixon's impeccable intonation and diction bring a welcome elegance to these songs which are perhaps too often jazzed up. By beautifully singing what Gershwin wrote, stylishly accompanied by Lincoln Mayorga's piano, Miss Nixon brings new insights to these immortal songs.

Eileen Farrell: *Torch Songs. Stormy weather - Round Midnight - The end of a love affair - Black coffee - When your lover has gone - Don't explain - Something Cool - and more.*



The album Farrell fans have been waiting for. America's great blues diva makes these songs of lost love her own.

Smoky night club arrangements set the stage for some unforgettable singing.

Dick Hyam: *Dick Hyam Plays Fats Waller. Ain't misbehavin' - Keepin' out of mischief now - African ripples - Honeysuckle rose - Willow tree - Stealin' apples - I've got a feeling I'm falling - Handful of keys - My fate is in your hands - Jitterbug waltz - Squeeze me.*

The world's first direct-to-CD on RR-33DCD. A technological and musical triumph, a true landmark in recording history. RR-33DCD (listed as Ref CD87 on the order form) is available as a deluxe numbered limited edition.

Encoded on the highly sophisticated, computerised Boesendorfer reproducing piano, Hyman's performances were played back for Prof Johnson's microphones, and the digitised signal was transmitted via microwave to the compact disc master as the music was being played.

No recording tape of any kind was used, nor was the digital bitstream corrupted at any stage by copying manipulation or editing.

The digits generated at the recording session are the very digits on the finished Compact Disc. Also on ordinary CD and LP.

Michael Garson: *Serendipity, Lady - Autumn leaves - I should care - Spirit of play - Trio blues -*

My romance

With illustrious sidemen Stanley Clarke (bass). Gary Herbig (sax), Peter Sparague (guitar) and fellow Free Flight members Jim Walker and Jim Laceyfield, Michael Garson has put together a tasty program of exciting mainstream acoustic jazz. Recorded by Prof Johnson in a real concert space, *Serendipity* represents an alternative, non-studio approach to jazz recording. A long standing favourite for audio demo, the CD contains two extra tracks.

Star of Wonder:

Silent night - Nativity carol - We three kings - We'll Dress the house - Come all ye faithful - Deck the hall -

Festive music for the holiday season by an outstanding professional chorus, recorded in San Francisco's St Ignatius Church.

The spine tingling acoustics are ideal for this program and *Star of Wonder* contains the full range of Christmas music: imaginative arrangements of traditional carols, renaissance motets and dramatic 20th century compositions.

The CD contains three extra tracks.

Berlioz: *Fantastique. Symphonie Fantastique.* Varujan Kojian, The Utah Symphony Orchestra.

This is widely considered to be the recording of this magical work. The Utah Symphony Orchestra, playing in Salt Lake City's Symphonic Hall, gives a world class performance, and the excellent recording captures it in its entirety.

The CD contains two versions of the explosive finale, one with standard orchestral bells, and another with digitally recorded church bells.

The 2-disc 45RPM LP set contains two copies of *March To The Scaffold* and *Dreams Of A Witches Sabbath*.

Nojima: *Nojima plays Liszt. Sonata in B minor - Mephisto Waltz - La Campanella - Harmonies du Soir - Feux Follets.*

The recipient of more rave reviews than any piano recording in recent memory, this is truly one for the history books.

Japan's most celebrated concert pianist won the Silver Medal at the Van Cliburn competition. Connoisseurs of great piano playing will treasure this recording, which has also been acclaimed for its outstanding sonic realism

Chicago Pro Musica: *Weill, Varese, Bowles and Martinu. Threepenny Opera suite - Octandre - Music for a farce - La Revue de Cuisine.*

Chicago Pro Musica gives brilliant performances of four magnificent 20th Century works. Kurt Weill's pungent suite for wind, brass and percussion is the centerpiece.

Featuring the first stereo recording of a rare piece by Paul Bowles, best known as the author of *The Sheltering Sky* but also a distinguished composer for the stage.

Martinu's Parisian ballet from the 1920s contains the steamiest of tangos and a mad Charleston.

Eileen Farrell: *Rogers & Hart. I could write a book - I wish I were in love again - Wait till I see him - I didn't know what time it was - Love me tonight - Nobody's heart - It never entered my mind - Mount greenery - Sing for your supper - Can't you do a friend a favour - Lover - My heart stood still - Little girl blue - You're nearer.*

A wide ranging survey including many great standards and more than a few rarities. Farrell's affinity for the songs of this era is undisputed.

Beautifully sung as her earlier pop recordings were, these new performances reveal an added dimension to the Farrell art - total involvement with the lyrics. And what lyrics! A must for admirers of Lorenz Hart.

Nojima: *Nojima Plays Ravel. Miroirs: Noctuelles - Oiseaux tristes - Une baroque sur l'ocean - Alborada del gracioso - La valse des cloches - Gaspard de la Nuit: Odine - Le gibet - Scarbo.*

Here is the eagerly awaited sequel to Nojima's first American recording, featuring some of his most renowned specialties.

Gaspard de la Nuit is the pianist's Everest, attempted by only a few. *The Miroirs* are a distillation of Ravel's impressionist style, requiring a totally different technique. The Nojima performances are incandescent.

Opus 3 test record 1: Depth of image.

Produced with the idea of analysing hi-fi systems and their ability to reproduce depth of image. This is Opus 3's best selling recording. It contains the work of a broad cross section of the label's recording artists.

Opus 3 test record 2: Timbre.

Timbre or tonal accuracy is a crucial area of performance for audio equipment, this disc is composed of tracks designed to show up the timbral strengths of the components its played through. A good recording of interesting and diverse music.

Opus 3 test record 3: Dynamics.

Another compilation on the Swedish Opus 3 label, with musical extracts carefully chosen

to illustrate what is meant by musical dynamics with comprehensive liner notes to show you what you should be listening for. How good is your hi-fi system?

Opus 3 test record 4: Depth of image, Timbre, Dynamics

In this fourth recording in the test series Opus has linked together the three concepts as a basis for completely evaluating audio equipment. Test record 4 like the first three contains a selection of illustrated music from our catalogue - mostly from the more recent recordings.

Thelma Houston & Pressure

Cooker: *I've got the music in me. I've got the music in me - To know you is to love you - Don't misunderstand - Got to get you into my life - plus four instrumental tracks.*

One of Sheffield Labs' most famous recordings. The original direct cut has been out of print for many years and is now highly collectable - but the recording sessions were of course taped, and this issue will still blow your socks off!

Eileen Farrell: *Sings Arlen. Let's fall in love - Out of this world - I wonder what became of me - I've got the world on a string - Like a straw in the wind - Down with love - Happiness is a thing called Joe - A woman's prerogative - Come rain or come shine - Little drops of rain - Over the rainbow - When the sun comes out - As long as I live - My shining hour - Last night when we were young.*

Farrell worked often with Harold Arlen, and has long been identified with his music: it was an Arlen tune that gave the title to the first of four albums of pop songs she made in the sixties, *I've got a right to sing the blues*.

This definitive new collection is graced with music notes and personal remembrances by Gene Lees.

Jim Brock: *Tropic affair Pass a grill - Ladies of the Clabash - Tropic affair - Anya - Quo qui's groove - Side walk - Palm palm girls - O vazio.*

Vibrant, steamy and sensual, this contemporary instrumental jazz contains more than a touch of the tropics.

Renowned percussionist Jim Brock has recorded and toured with such diverse musical talents as Dave Valentin, Janis Ian and Scott Cossu.

Brock's dynamic ten-piece band, production by legendary Don Dixon, and prof. Johnson's magical live to two-track studio sonics result in a soundstage of such three-dimensionality, you can step inside the music. Enjoy

a vacation without leaving home with tropic affair!

Eileen Farrell: *Sings Johnny Mercer Skylark - I remember you - Early Autumn - Laura - I thought about you - Too marvelous for words - and more.*

Arranged by Manny Albam and Loonis McGlohan, this album includes rarities and favourites from the vast catalogue of America's most poetic and prolific lyricist.

Eileen Farrell: *It's over I get the blues when it rains - How about me? - Easy to remember - Gone with the wind - I remember April - And more memorable tear jerkers.*

Arranged and conducted by Robert Farnon, this album gives Farrell the opportunity to demonstrate her considerable skills, in touching songs of lost love. These great laments respond eloquently to the lush Farnon treatment.

NEW RELEASES

Robert Farnon conducts the Royal Philharmonic Orchestra: Film music and other works *Suite from Captain Horatio Hornblower - Lake in the woods - Canadian impressions - A la Claire fontaine - and more.*

The Royal Philharmonic Orchestra, conducted by the composer, Robert Farnon at the Town hall, Watford.

The recording session that *Hi-Fi Choice* contributor Richard Black wrote about in the February issue (103), produced by the legendary Prof Keith Johnson using both analogue and digital tape recorders to produce the finest results for LP and CD.

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Malcolm Arnold: *Conducts the London Philharmonic Orchestra. A Sussex overture - Bechus - Dandi Pratt - The smoke - Anniversary overture - The fair field - Flourish for orchestra - The Commonwealth Christmas overture.*

On this very latest Reference recording the London Philharmonic Orchestra is conducted by the composer, Malcolm Arnold, at the Town hall, Watford.

This Keith Johnson production includes first recordings of Britain's leading living composer's lesser known works.


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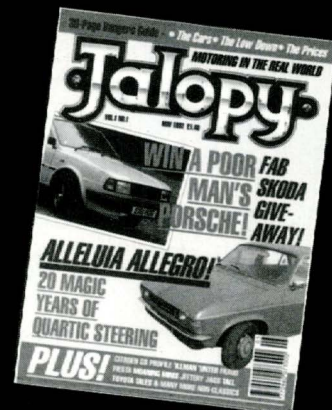
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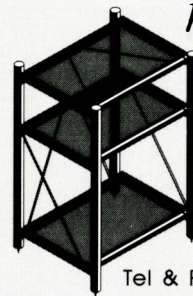
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The Directory

The ultimate buyer's guide with comprehensive information on every currently available product tested by *Hi-Fi Choice*.

Including test summaries covering

Amplifiers

Cables

Cassette decks

CD players

DACs

Equipment supports

Loudspeakers

Personal stereos

Tuners

Turntables

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The Directory

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. The products are split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its current retail price is placed in its respective category in alphabetical order. The prices of the products are updated on a regular basis, although it should be noted that our value rating are based on the product's price at the time of review.

The next column contains the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests were not carried out. One important point to remember is that they cannot be used to compare products from different categories — for example, a cassette deck rated 'excellent' in sound quality will not usually offer the same standard of fidelity as a similarly rated turntable or CD player (unless you can get hold of first generation copies of the master tape!).

The Comments column contains a potted summary based on the original review, emphasising the

salient points of a product's character and sonic performance. The space available doesn't allow for great detail but in the 20 or so words we have attempted to put across the essence of the review, in some cases using quotes from the review itself. Obviously, important information on compatibility or auxiliary equipment used in the test cannot be included, and we would advise you to refer to the original review for this, of which more later. Please note that these comments are those of the reviewer and not, as is the case with some magazines, those of the manufacturer.

The next column varies from category to category but is usually either features or specifications, the former being facilities available on a cassette deck or amplifier or the type of drive system on a turntable.

Specifications vary with product type but usually relate to suitability or capability. For instance, in the case of arm matching, figures are given with the cartridges, which tie in with the mass figures for the tonearms themselves, making it easier to avoid compliance/mass mismatches.

Perhaps the most influential letters in the *Directory* are those found in the Value column, the Rs and BBs denoting the Recommended and Best Buy ratings that are appended to products we consider meritorious. The Best Buy tag

means that a product not only offers good sound quality, but is reasonably priced as well. With source components a price limit of approximately £300 is usually used as a guide.

Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively, that a good value standard is achieved but overall attainment falls short of Best Buy classification. Please note that an expensive Recommended product will nearly always sound better than a cheap Best Buy. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment, system building is unfortunately not quite that simple.

These ratings make a useful guideline for shortlisting components, but only experiencing the actual combination will tell you whether it works for you.

The final column contains a reference to the issue of *Hi-Fi Choice* which featured the complete review. If you wish to get a better idea of a product by reading the complete review it is possible to order a copy (if still in print) through our back issues department. Every *Choice* issue contains a Back Issues page for this purpose.

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SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems to be as strong as ever, and certainly represents the route taken by those who place sound quality first.

The first step in putting together a system is to decide which sources you require. There are now three different prerecorded music media competing for the affection of the hi-fi user, and to go for all three will either cost a lot of money or involve substantial compromises in the sound quality of each. For this reason many separates purchasers may start with just one source, adding others or a tuner when funds permit.

Cassette has never really challenged vinyl's superior quality,

but it's a multiple role format, offering 'go anywhere' flexibility, a useful recording capability, plus a broad catalogue of prerecorded music cassette material. As a hi-fi medium cassette suffers from prerecorded material which has been improving but is still patchy in quality and can usually be bettered by a home recording. There is also the worry that a tape made on a specific machine usually plays best on that machine, which may cause aggravation when upgrading a few years hence.

CD is the relative newcomer but in the last decade it has come to dominate the market. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks. It is probably fairest to say that CD is fine for the majority of listeners, but may not suit everyone. Certainly the lack of background noise and deterioration are major strengths.

The advent of two box audiophile players has certainly

helped to gain better acceptance for the format and unless you are prepared to spend a substantial sum, CD arguably offers the best performance in terms of sound per pound. Players are now exceptionally cheap, having been reduced dramatically since the format was launched, however, the prices of the discs remains extortionate.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Both components and loudspeakers benefit to a surprising degree from proper support in the form of stands that enable them to give their best performance, whether floor-standing or wall mounted.

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a simi-

lar immediate acoustic environment, unencumbered by other furnishings and structure, and a similar distance from listeners, nearby walls, and corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from rigid support

The key to getting the best results from a separate system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrates some likely alternatives.

The *Directory* has been compiled as a guide in the sense that you should use the information in it to make a shortlist of equipment and then audition it before taking the plunge. Tastes inevitably differ and it's unwise to buy purely on the basis of our recommendation, as dealers are the most experienced people around when it comes to making systems work as a whole.

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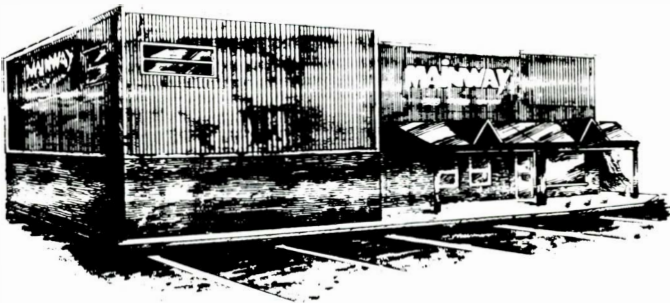
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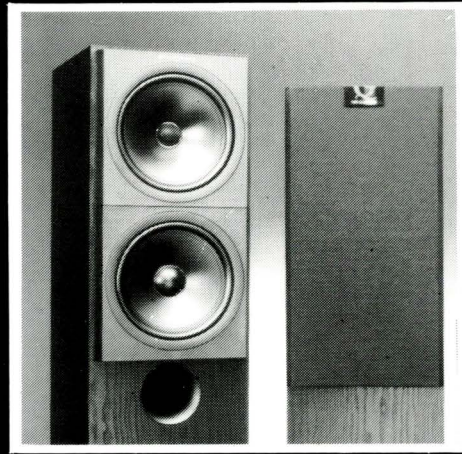
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AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Threshold FET 10e system/ £2895	n/a Very Good	Almost valve-like limpidity and excellent soundstaging are star qualities of the Threshold amps. Line input resistive loading is too low	Component FET phono stage, line pre, FET power amp 100w		Coll. '9
Woodside SC26/STA35 Renaiss £2995	Good Good+	Synergistic pairing with a cool, controlled sound, good focus and transparency. More about poise than grunt	35W, valve, 3 line, optional MM or MC, 2 tape outs	R	100 62
YBA 1 power amp £2895	Good Excellent	This equally well finished power amp offers front rank stereo staging and transparency, and is capable of driving the most difficult loads	85W	R	62
YBA 1 preamp £2895	Very Good Excellent	A front line French audiophile product. Great stereo and a fine Krell style finish	MM/MC, 3 inputs, straight line	R	62
YBA 2 pre & pwr £1395/£1695	Very Good Very Good	Superbly finished French separates, with very good space and transparency, slightly softened bass. Needs extra transformer (£300) for MC cartridges	70W MM (MC extra) straight line	R	56
YBA Model 3 £995/£9	Good Good	Suited to highish sens. loudspeakers this duo produced see-through, ethereal stereo images that were more convincing towards the centre of the soundstage than at the edges	56W stereo amp MM only with 3 line i/ p's.		72
YBA Model 3 £995/£995	Good Good	Suited to highish sens. loudspeakers this duo produced see-through, ethereal stereo images that were more convincing towards the centre of the soundstage than at the edges	56W stereo amp MM only with 3 line i/ p's.		72
Yamaha AX-330e £100	Average + Average +	An improvement on earlier efforts but still a little bland or lack-lustre. Very compatible though	48W, MM, 3 line inputs, source-direct option		80
Yamaha AX-750 £399	Very Good Average	Big and bulky with remotely-controlled input and volume. Impressive handling, but two samples split the opinion of our listeners, one sounded squashed the other fast and articulate	149W, 3 line, 2 tape, MM/MC inputs + remote control		104

CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those intested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as any amplifier does, it's really not too surprising that they can influence sound quality

The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, RF characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The interconnects summarised here were tested in 1m terminated lengths and therefore the results and prices relate

to that length - some cables may well perform differently when used in longer lengths. What's more, most cables are significantly cheaper if you are prepared to fit the plugs yourself. The features column contains information on the material makeup of the different cables with the following abbreviations: OFC - oxygen free copper, OFHC - oxygen free high conductivity (Audionote defines HC as high crystal), PC-OCC - pure copper by ohno continuous casting, LC-OFC - linear crystal oxygen free copper

CABLES - INTERCONNECT

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Audio Note Copper ANA £44	Average Good	ANC sounded punchy with a faintly lean but tightly-focused bass character. This crystalline precision waned slightly at higher frequencies	OFHC copper twin-axial	R	59
Audio Note Flexible Silver ANS £99	Average Very Good	ANS scored a hit with its transparent midband and revealing but quite unforced treble quality. Bass transients were slightly softened	Silver signal & Copper screen	R	59
Audio Note Silver ANV £154	Poor Excellent	Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle	21 strand silver Litz		59
Audio-Technica AT-6115 £40	Very Good Average	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional	PC-OCC copper coaxial		59
Audioquest Livewire Ruby £49	Average Good	Smoother sounding than the Topaz, the extended crystal Ruby is less grainy and coarse, better able to resolve complex passages	FCL copper twin axial	R	59
Audioquest Livewire Topaz £35	Good Average	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end	Gold-plated plugs, OFHC copper		59
Chord Mono-t £27/1.2m	Average + Average +	Offers a slightly rolled-off treble but its rich sound is an upgrade from patch-cords	Unsymmetrical 4-conductor cable	R	83 Supp.
Deltec Gortex Black Slink £152	Very Good Excellent	A true reference quality cable providing an exceptionally detailed and transparent sound	Symmetrical, 8-conductors, Gore-tex ins.	R	83 Supp.
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange	4 silver plated OFC strands PTFE dielectric	BB	59
Kimber Kable KC-1 £65.55	Very Good Average	Tonally faintly leaner and brighter than the more open-weave PSB, KC-1's treble detail was just too sharp and grainy	Multi-gauge PTFE dielectric		59
Kimber Kable PSB £41.40	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open	OFC, PTFE dielectric	BB	59
Monster Interlink 300 £30	Average + Average	A big, larger-than-life sound but with some emphasis of midband detail and loss of bass	Screened, symmetrical cable		83 Supp.
Monster Interlink 400 £50	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life	Multi-gauge	R	59
Origin Live Soli-Core Super £60	Good Average	Improves over previous Soli-core samples in stereo depth and bass weight, but a 'loud' treble presentation remains	Solid-core gold-plated AT plugs		59
QED Incon Graphite P1G Gold £19.95	Average Average	A shielded version of Incon P1, it sounded thicker at the frequency extremes, the top end being coarser and more out of focus. Good for long runs though	OFHC Graphite shielding	R	59
QED Incon P1-Gold £16.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight	OFHC, gold plated Deltron plugs	BB	59
Supra EFF-1 £60/0.75m	Average Average	A new, costly and mildly disappointing addition to the range. Edgy, smeared sound	Screeded, symmetrical dir. cable		83 Supp.
van den Hul MC-Gold £230	Average Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances	Silver & gold plated copper		59
van den Hul MC-Silver £750	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models	19 silver plated copper strands		59
van den Hul MCD-102 III £61.50	Good Good	Possessing the same endearing qualities as the D300, it presented open and transparent soundstages and improved timbral resolution	Twin axial silver plated copper	R	59
van den Hul Thunderline £92	Good Average	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'tizzy' coarseness, bass is tight and dryscreening	Silver plated 'matched copper'		59

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HEADPHONES

MODEL PRICE	FIT SOUND	COMMENTS	TYPE	VALUE	ISSUE
Audio-Technica ATH-611 £51	Average Good	Same basic design as 609 but bigger thinner diaphragm makes this a more relaxed and informative headphone	Circumaural, open-back, dynamic		99
Audio-Technica ATH-909 £60	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at highish levels	Circumaural, semi-open, dynamic		55
Audio-Technica ATH-910 £70	Average Good	The closed-back 910s are an improvement on the 909s with a nice rhythmic quality rarely found with headphones	Circumaural, closed-back, dynamic	R	55
Audio-Technica ATH-911 £80	Very Good Very Good	Nicely finished dynamic headphones with all the trimmings, plus a very clean and subtle sound	Circumaural, open-backed, dynamic	R	63
Beyer DT 325 £32	Very Good Average	Lightweight in more ways than one, the 325s may be a little bright for some systems and tastes but will suit duller sources	Supra-aural, open-back, dynamic	R	63
Beyer DT330 Mk II £50	Good Poor	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
Beyer DT550 £61	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange; not suitable for headbangers!	Circumaural, semi-open, dynamic		55
Beyer DT880 £80	Good Good	Well made cans with a warmish sound but fairly solid midrange, though they're not that informative for the price	Circumaural, semi-open, dynamic		63
Beyer DT990 £102	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones; they have a smooth and yet revealing neutral sound that is hard to criticise	Circumaural, open-back, dynamic	R	55
Beyer IRS690 £203	Good + Very Good	High quality infra-red headphones with soft comfy earpads and mellow but informative sound quality which is hard to dislike	Circumaural, open-back, dynamic	R	75
Jecklin Float Electrostatic £399	Good Excellent	One version of the state-of-the-art, these electrostatics have an openness of sound rarely found in the breed, with good dynamic range to boot	Circumaural-ish, open-back, electrostatic	R	55
Jecklin Float Model One £79	Very Good Very Good	Whilst very unusual in appearance, the Floats give remarkable sound quality and openness at a reasonable price	Circumaural-ish, open-back, dynamic	BB	55
Jecklin Float Model Two £99	Good Very Good	Helmet shaped and pretty unflattering but open sounding and comfortable in the long term. Note lack of adjustment means you should try before you buy	Circumaural-ish, open-backed, dynamic	R	63
JVC HA-D990 £65	Good + Good +	Good looking well made cans that offer good sound quality for the money. Sonic nature is of the easy-going, laid-back variety	Supra-aural, closed-back, dynamic	R	75
Koss K/6X Plus £30	Average Poor	'Sixties-style' phones from the good ole US of A, their sonic style is unique and can make a system sound quite different	Supra-aural, closed-backed, dynamic		63
Koss TD/60 £20	Good Average	Although they're devoid of channel identification and have a decidedly Stateside approach to sound, these are very listenable phones for the price	Supra-aural, closed-back, dynamic		75
Pioneer SE-72 £30	Good + Average -	Neat, very nicely made personal stereo phones along the lines of Sony V3s. Sound is on the veiled side, good for aggressive sources	Supra-aural, closed-back dynamic		75
Quart Phone 30 X £40	Good Average	Slightly dark character makes these more suitable for some sources/material than others, specifically music that needs bass weight	Supra-aural, open-back, dynamic		99
Quart Phone 70 £70	Good Good	Competent performers that were hard to criticise but lacked the life and sparkle of which some of the competition are capable	Circumaural, closed-back, dynamic		63
Quart Phone 95 X £100	Good+ Good+	Can sound even handed, relaxed and open with a good drive system but may be a bit too transparent for lesser headphone outputs	Circumaural, open back, dynamic	R	99
Ross RE2530 CD £20	Average Average	Rather an 'average' £20 phone that some found uncomfortable due to high pressure on the ears. Sonic balance is on the bright side	Supra-aural, closed-back, dynamic		75
Ross RE2560 CD £25	Good Average +	If you're not too fussy about quality of finish and don't have an elfin head then these British phones warrant attention. Sound could be smoother	Supra-aural, semi-open, dynamic		75
Sennheiser HD40 £20	Very Good Good -	Very light and comfortable headphones with an even sonic balance that will suit most sources, but jack is 6.3mm and not suited to personals	Supra-aural, semi-open, dynamic	BB	75
Sennheiser HD450II £40	Good+ Good-	A neat looking supra that makes quite acceptable noises with a variety of outputs, could sound more spacious but is pleasantly relaxed	Supra-aural, open-back, dynamic		99
Sennheiser HD480 Classic II £60	Good+ Good	The same basic design as the 450 but improved sound quality as a result of aluminium coil and extra damping, natural with good bass	Supra-aural, open-back, dynamic	R	99
Sennheiser HD520 £65	Good + Good +	A very comfortable and musically capable headphone. If you've got this sort of bread to blow on cans, give 'em a blast	Circumaural, semi-open, dynamic	R	75
Sennheiser HD530 £75	Very Good Good +	One of the better dynamics in its group, the 530s create a sense of space that eludes most sub £100 cans, and they're dead comfy to boot	Circumaural, semi-open, dynamic	R	75
Sennheiser HD540 Ref Gold £160	Good Very Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sennheiser HD560 Ovation II £120	Very Good Good+	A comfortable and nicely styled headphone that could be more natural sounding at HF, but is detailed and open with good power	Circumaural, open-back, dynamic		99
Sony A21EX £20	Good - Good -	Forward facing in-ear drivers on a folding plastic band provide exceptional clarity for such an inexpensive phone. However, no bass, and fit isn't to everyone's taste	Intra-aural, semi-open, dynamic	BB	75
Sony MDR-CD3000 £300	Very Good Very Good	Better than most of the headphone outputs around so hard to make the most of, potentially up there with the electrostatics	Circumaural, closed-back, dynamic	R	99
Sony MDR-CD350 £32	Good+ Good	Very impressive for the price the 350 is possibly the most open sounding cheap closed back can around, lightweight in balance but transparent	Circumaural, closed-back, dynamic	BB	99
Sony MDR-CD550 £50	Good+ Good+	A very competent headphone for the price, creates a remarkable sense of space for a closed back design and sounds natural to boot	Circumaural, closed-back, dynamic	BB	99
Sony MDR-R10 £2500	Excellent Excellent	Costly state of the art sealed moving coil design built to the highest standards using the finest materials. Sound quality reflects this care, being big, clear, sweet and refined	Circumaural, closed-back, dynamic	R	72
Stax Gamma pro/SRD-X pro £296/£230	Very Good Excellent	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
Stax Lambda Signature/SRM-T1 £470/£895	Very Good Excellent	The Signature when combined with the SRM-T1 valve driver must be the most transparent headphone available	Circumaural, open-backed, electrostatic	R	72
Stax SR Gamma £299 (inc. SRD-6 Adaptorat £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price	Circumaural, open back, electrostatic	R	55
Stax SR Lambda Pro/SRD-7SB Mk 2 Adaptor £360/£185	Very Good Very Good	A bit of an industry reference, the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro/SRM-1 EnergiSer £360/£635	Very Good Excellent	This combination extracts layers of information that other headphones only hint at. The SRM-1 has more edge than the SRM-T1, but it's good	Circumaural, open-back, electrostatic	R	75
Stax SR34 £140	Average Very Good	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR84 £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	63
Yamaha YHL-006 £30	Average Average	Unusual personal stereo oriented phones that curl up when not in use. Earphones are like golf balls and balance is well suited to Walkmans	Supra-aural, open-back, dynamic		75

Last item in the hi-fi chain, to some extent the loudspeaker is merely the slave of what has gone before, capable only of reproducing a signal as good as it is fed. Nevertheless the distortions (colorations and stereo effects) introduced by loudspeakers (and rooms) tend to be more immediately obvious than those anywhere else in the chain, so careful choosing according to taste is very important

The average loudspeaker consists of a smallish enclosure, much of which may have begun life as part of a tree, plus a couple of drive

units hidden behind a removable grille. Inside the box lurks a simple electrical circuit known as a crossover, which divides the incoming (full range) signal into the right bits for the drivers to handle. Variations on the above formula are specifically identified in the entries. The designer's primary task is to balance the sensitivity of the loudspeaker (how loud it goes for a given electrical input) against the bass extension (how low does it go) for the given box size. After that such subtleties as coloration and dispersion come into the equation

Careful placement of the loudspeakers within the room is as important as the initial choice of model.

For good stereo they need to be more or less the same distance from nearby walls, and preferably on rigid stands. The listener should be about the same distance from and listening angle to each loudspeaker. The ideal placement depends on the way a particular model has been balanced (not to mention a number of other factors), and our recommendation is given in the entries.

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Acoustic Energy AE1 £767	Good Good	Amongst the best miniatures around, this metal driver pioneer shows exceptional mid focus and coherence, but is pricey and could be faster and more agile.	29.5x18x25cm stands clear of walls	84dB 48Hz (in room)		102
Acoustic Energy AE2 £916	Good Very Good	Dynamic, solid and lively, a great allrounder if a bit small considering the price. AE proves that metal cone/dome drivers really work	39 x 23.5 x 29.5cm heavy stands, free	88.5dB/w 45Hz	R	66
Acoustic Energy AE3 £1650	Very Good Very Good	Solid, authoritative and impressively accurate – if a shade ponderous and slow – AE's latest 'big one' is a much better bet than the earlier '4, combining	63 x 26.5 x 37cm low stands in free space	85dB/w 23Hz (in room)	R	86
Acoustic Research AR-112 £125	Average Average -	Nicely presented and engineered, but sounds a bit small and boxy without true coherence	36 x 19 x 18.5cm stands near rear wall	87dB/w 75Hz		66
Acoustic Research AR-122 £150	Average Average	Despite a promising enough list of ingredients, the 122 failed to excite real enthusiasm amongst the listening panel	38.5 x 19 x 22cm stands near rear wall	87dB/w 68Hz		68
Acoustic Research AR-132 £200	Average + Average -	Good presentation and detail engineering was not sufficient to counter bass heavy balance problems on auditioning	44.5 x 23 x 25.5cm stands 1ft from rear	87dB/w 50Hz		66
Acoustic Research AR-152 £373	Good Good-	Large bookshelf size model with luxury finish has a slightly thin overall balance, but fine coherence and agility makes it well worth considering	44 x 23.5 x 28cm stand 1-2ft wall	87dB 25Hz in room		98
Acoustic Research Red Box £100	Average Average	Lively and balanced if a bit crude and uneven, this econobox succeeds partly because of its simplicity, and works well with some rear wall assistance	32 x 19.5 x 17cm close to rear wall	87dB/w 85Hz	R	74
Alexander SE11 £299 (stands £69)	Good Good	Clearly better than its cheaper stablemates, the metal jacket delivers a different – and in some respects superior – sound than the wood-based	52 x 14 x 17.5cm stands close to wall	86dB/w 25Hz (in room)	R	82
Alexander SE5 £199	Average Average	Particularly well suited to surround sound A/V applications, the SE5 can give any miniature a run for its money on bass performance; hardness and coloration	40.5 x 12 x 15cm ALS stands near wall	82dB/w 50Hz (in room)		78
Allison AL100 £120	Average- Average	Loud and lively budget wall-mount is bigger and beefier than most of the competition, if lacking some subtlety and refinement	33.5 x 24 x 21.5cm stands against wall	87dB/W 30Hz (in room)	BB	94
Allison AL105 £150	Average Average -	Pretty enough in appearance, sonically the AL105 doesn't really make the grade at the £150 asking price	37 x 24 x 21cm high stands against wall	87dB/w 45Hz (in room)		78
Allison AL110 £220	Good- Good-	Compact bookshelf model is a little dry and mid forward, but bass is extended and solid. Free space balance is good, though build quality could be improved.	40x24.5x22.5cm stands 1-2ft from wall	86dB 28Hz (in room)	R	102
Allison AL120 £429	Good Average	Cleverly engineered compact floorstander is pretty well balanced if slightly mid forward, but sound quality is a little disappointing for the price	63 x 28 x 27cm floor, clear of walls	88dB 30Hz (in room)		98
Allison CD6 £290	Average Good -	An unusual cube-shaped model designed for wall mounting gives exceptional bass extension from a small box, though it's also a bit heavy, coloured and slow	28.5 x 28.5 x 28.5cm stands against rear	88dB/w 45Hz	R	71
Alphason Amphion £680	Good Good	This fine-sounding, nicely finished compact wall-mount is just a little too expensive for formal Recommendation, but is a good performer for all that	44 x 23 x 27.5cm high stands against wall	88dB/w 47Hz (in room)		78
Alphason Artemis £299	Average Average+	Pretty little miniature sounds nicely unboxy but is also a bit short of punch and balanced rather too bright.	27 x 17.5 x 22cm stands 1ft from wall	86dB/W 50Hz (in room)		94
Alphason Orpheus £1000	Good Good +	Large hi-tech two-way features unusual, sweet-sounding isodynamic tweeter; well engineered and balanced if a shade odd in appearance	65.5 x 28 x 34cm stands near rear wall	87dB/w 43Hz	R	71
Apogee Caliper Signature £3350	Good + Very Good	Pretty but power hungry full range panels have remarkable transparency and delicacy, though loudness and bass 'grunt' are both a bit lacking	122 x 59-70 x 6.5-28cm floor, free space	81dB/w 30Hz (in room)	R	81
Arcam Alpha £200	Good Good	It has its own colorations to be sure, but delivers a fine room balance with unusually good dynamics, timing and 'life', and is fine material value	46 x 26.5 x 26cm stands close to wall	89dB/w 30Hz (in room)	BB	82
Arcam Delta Two £340	Average+ Good	Pretty luxury compact sounds a shade forward and coloured but has dynamic and lively bass for its size	37.5 x 22.5 x 27.5cm stands 1-2ft from wall	87dB/W 40Hz (in room)	R	94
Ariston Image £180	Average - Average -	Despite a sweet treble character, the Image fails to impress with a 'lumpy' over-rich balance that has room integration problems	42 x 22 x 27.5cm stands in free space	89dB/w 28Hz (in room)		82
Ariston Q £395	Average + Average	The prettily shaped Q delivers a good impression of scale from a small box, but a rather laid back, ponderous and over-rich overall sound	35 x 16.5-25 x 20-27cm high stands in free	89dB/w 30Hz (in room)		86
ATC SCM20 £1320	Very Good Good +	Massively built to no-compromise Pro monitoring standards, the SCM20 is invariably informative but the rather forward presentation can be uncomfortable	44 x 24 x 31cm stands close to rear wall	82dB/w 28Hz (in room)		86
Audio Electronics TC10 II £599	Good - Good +	Oddball appearance is rescued by a respectable technical performance, interesting and impressive engineering and fine sound quality	70 x 33.5 x 33.5cm low stands in free space	87.5dB/w 40Hz	R	68
Audioplan Kontrapunkt £799	Good Good +	Cute little German miniature sounds as sweet as it looks, dressed expensively in real wood with matching stands. Not for bass or loudness freaks	31 x 24 x 13cm free space, matching stands	83dB/w 48Hz (in room)	R	86
B&W 610 £200	Good Average	Fine presentation and good perceived value, with good in-room bass extension and impressive loudness credentials too, but rather indifferent integration and coherence.	49x23.5x30cm stands clear of walls	89dB/W 25Hz(in room)		102
B&W 620 £299	Good Good	Good value floorstander has well balanced, laid back and slightly lazy sound that is pleasantly easy on the ears; could do with its own spikes	74 x 23.5 x 30cm floor, free space	89dB/W 25Hz (in room)	BB	94
B&W CM1 £400	Good Average	Cleverly thought out luxury design package is also fundamentally well engineered, if a shade pricey on 'sound for pound' basis	24.5 x 16 x 22cm close to rear wall	84dB/w 90Hz		74
B&W DM550 £149	Good + Average -	Beautifully presented, well engineered near-miniature with precise sound but a distinct lack of 'wellie'. Ideal for considerate flat dwellers	35 x 20.5 x 22.5cm stands in free space	86dB/w 70Hz		71
B&W DM560 £199	Average + Average -	Fine cosmetic presentation and good engineering for the price; overload protection may be handy but listening panel was underwhelmed	49 x 23.5 x 30cm stands in free space	88dB/w 55Hz		66
B&W DM600 £150	Good+ Average+	Attractive hi-tech appearance and clever engineering makes for an impressively smooth overall balance, but sound is a touch bland with it	35 x 20.5 x 25cm stands 1-2ft from wall	85dB 30Hz (in room)	R	98
B&W Matrix 801 £3295	Good + Good +	Lacks the transparency of the best panels, and the drama of the best dynamics, but is something of an acoustic tour de force, with low coloration and fine imaging	77/99 x 56 x 43cm floor or stands, free	86dB/w <20Hz (in room)	R	81
B&W Matrix 805 £915	Very Good Good	A genuine compact monitor, stylish, with remarkable imaging properties, good balance and low coloration, though less successful at communicating musical	42(max) x 26 x 22.5cm Slate stands in free	87dB 30Hz (in room)		98

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
B&W Vision DS1 £120	Average Average -	Although significantly hampered by upper bass cabinet coloration, the DS1 cleverly combines high sensitivity with a rich and generous soundstage	36 x 21 x 19cm stands quite close to wall	91dB/w 40Hz (in room)	R	82
B&W Vision DS2 £180	Average Average -	Although the box is generous for the price, the DS2 is a rather uneven performer, both on the measurement and listening.	50 x 24 x 25cm stands in free space	89dB/w 43Hz (in room)		86
Bose 305 £350	Average Good -	A bit of an oddball, fine dynamic liveliness and a good room match more than make up for the strange stereo imaging and treble	28 x 45 x 23cm high stands near wall	88dB/w 40Hz (in room)	R	78
Bose 901 MK6 £1600	Good Average	Still controversial after all these years, the pre-equalised multi-driver 901 is cleverly engineered to deliver exceptional loudness.	33 x 54 x 32cm rigid stands in free space	(92dB/w midband) 28Hz (in room)		86
Bose Interaudio 3000XL £150	Average Average -	Lots of perceived value and well enough balanced, but low cost cabinet and driver engineering results in a crude and unsubtle sound	46.5 x 29 x 23cm stands in free space	89dB/w 45Hz		71
Boston A120 £349	Average + Good -	Ugly but cleverly engineered, the 120 combines a tiny main driver with much larger ABR to give a generous, bighearted and lively sound despite little bass	62.5 x 31.5 x 25cm stands in free space	89dB/w 48Hz	R	86
Boston A40II £120	Average Average -	Competent performance for size and price but below average relative to the UK competition	34 X 21 x 20cm on stands near wall	88.5dB/w 63Hz		41
Boston Acoustics T830 £399	Good Good	A lot of speaker for the money, the T830 is a smooth and accomplished performer with a big and easy - or alternatively a lazy and laid back - sound	82.5 x 25.5 x 24cm floor, away from walls	87dB/w 30Hz (in room)	R	82
Cambridge SoundWorks Ambiance £179 (mail order only)	Average Poor	Attractively styled sub-miniature sacrifices sensitivity in the interests of bass extension, but manages to lose dynamics along the way too	28 x 18 x 14cm close to wall	83dB/W 45Hz (in room)		94
Canon S-50 £349	Average Average+	Though only a small cone miniature at heart, the fascinating styling and extended stereo listening area feature make it utterly original and unique.	30x24(diam)cm stands in free space	84dB 48Hz (in room)	R	102
Castle SG Trent £129	Average Average	The grey paint finish looks much more modern than black vinyl woodprint, and this miniature wall-mount sounds lively and engaging, if a bit rough at the top.	33.5x18x20cm stands close to wall	88dB 50Hz (in room)	R	102
Castle Chester £599	Good Very Good	A brilliant throwback, using horn-type approach to provide startling midrange dynamics and coherence.	94 x 23 x 27cm floor, experiment	87dB 45Hz	BB	98
Castle Durham £259	Average + Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/w 67Hz	R	46
Castle Pembroke £379	Good Average +	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/w 46Hz	R	31
Castle Warwick £229	Good Average -	Excellent presentation and fine engineering with overload protection, but a sonic disappointment in bass and dynamic qualities	46.5 x 25 x 23cm stands 1ft from rear	88dB/w 50Hz		66
Castle Winchester £1400	Very Good Very Good	This unconventional and beautifully crafted model is physically large for its bass extension but is engagingly agile and sounds attractively open and airy	114 x 24 x 47cm in free space	87dB/w 25Hz	R	90
Celef CF2 Nimbus £230	Good - Good -	Nicely balanced overall but a little uneven with it, this lively and dynamic largebookshelf model came close recommendation	46 x 25.5 x 24cm stands in free space	88dB/w 55Hz		71
Celef Cirrus £180	Average Good	It's nice to see Celef back in the UK, with this decent sounding small reflex box that seems unusually tolerant of siting	39 x 20.5 x 23cm stands in free space	84dB/w 60Hz	R	66
Celestion 3 £109	Average + Average	This attractive little wall-mount gives good balance and stereo imagery, with a character which leans more towards inoffensiveness than excitement	31 x 18.5 x 21cm high stands against wall	86dB/w 55Hz (in room)	R	78
Celestion 5 £149	Good Average	Cunningly conceived and balanced, the 5 may be a little slow for some tastes, but is well suited to CD-oriented budget systems	35 x 20.5 x 26cm heavy stands close to wall	89dB/w 30Hz		90
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system - with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/w	R	60
Celestion 7 £200	Average Average+	Good value, good looking large bookshelf size wall-mount has lively up front presentation. Can sound a bit coarse and stand selection is critical.	45 x 24.5 x 32cm heavy stands close to wall	87dB 30Hz (in room)	R	98
Celestion 9 £249	Good Average	Nicely presented and fair material value, with impressively flat bass-to-mid balance, the 9 doesn't really make a convincing case for the return of the three-way.	49.5x20.5x24cm stands clear of walls	89dB 30Hz (in room)		102
Celestion DL6 Series II £179	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/w 65Hz		59
Celestion DL8 Series II £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/w 60Hz	R	59
Celestion SL12Si £599	Average Average	Careful setting up does reveal elements of fine sound quality, but this 'grown up' SL6 variation has a lumpy response alongside its improved power handling	53 x 20 x 27cm matching stands clear	85dB/w 50Hz		66
Celestion SL600Si £799	Good + Good	This Aerolam high tech miniature has certain remarkable qualities that some will find irresistible, but needs careful system and room matching	27 x 20 x 23cm free air on tall stands	82dB/w 52Hz		68
Celestion SL6Si £399	Average+ Average+	This stereotype luxury compact can sound a bit dull and congested, but really opens up on Slate Audio stands; favours CD	37.5 x 20 x 25cm stands 1-2ft from wall	86dB/W 30Hz (in room)		94
Creek CLS20 £200	Good Average -	Looks good material value, but sound is distinctly over-rich and thick in the mid-bass region; maybe the box is a little too large.	49 x 24.5 x 24cm open frame stands, free	88dB/W 30Hz		90
Dali 700 £600	Very Good Average	Good material value and fine bass extension for size and price, but overall sound is disappointing, perhaps due to complexity of driver array	110 x 28 x 35cm clear of walls	88dB/w 20Hz		90
DCM Timeframe TF250 £350	Average + Average	Neat and unusual floorstanding presentation, marred by indifferent build and cuddly but rather coloured sound, especially on spoken word	86 x 32 x 16cm close to rear wall	88dB/w 45Hz		90
Duntech PCL1000 Crown Prince £6120	n/a Excellent	Immensely 'listenable', refined sounding speaker capable of creating lifelike musical images. Not overly transparent to source, but very civilised	180 x 30.5 x 43.5 free standing away from	90dB/w 42Hz	R	72
Duntech PCL500 Marquis £3998	n/a Very Good	Better value for money than the Crown Prince - and arguably more dynamic, with real bass 'slam' but a little less refined in the higher registers	147.5 x 27 x 40cm free standing away from	92dB/w 48Hz	R	65
Eitax Linear Response 8 £399	Average- Average+	Good material value Danish floorstander suffers from 'loudness contour' balance due to twin main drivers, but nevertheless has pleasing coherence	97 x 21 x 33cm floor, free space	88dB 22Hz		98
Epos ES11 £300	Good Good+	Pretty luxury compact uses integral baffle/driver to give a remarkable combination of low coloration, transparency and speed; bass is a bit shy	37.5 x 20 x 25cm stands 1ft from wall	86dB/W 45Hz (in room)	BB	94
Epos ES14 £449	Good Very Good	Substantial stand mount model delivers delightful midrange focus and delicacy with good bass control. Tends to be system sensitive	49 x 22.5 x 29cm own stands 1-2ft from wall	85dB 25Hz (in room)	R	98
Equation 0 £1290	Average + Very Good	Expensive but most attractive floorstanding miniature. Bass is limited and mid tends to shout but sound is fast and lively with fine dynamics and timing	85 x 20 x 35.5cm floor, c1ft from wall	85dB/w 45Hz	R	90
Faraday Siren £330 (direct sale)	Average- Average-	Interesting if ugly high mass concrete cabinet is let down by imbalance of ageing driver combination	46 x 27 x 27cm stands, free space	87dB/W 48Hz (in room)		94
Faraday FS5 £589	Good Good	Pricy and ugly, but with its own sonic charm nonetheless, thanks to the substantial (largely positive) influence of the concrete enclosure has upon the sound	46x27x26cm stands in free space	90dB 28Hz (in room)		102
Goodmans B-Max/Maxim 2 £100/£90	Poor Average -	Stick with the Maxims on their own until you can afford some real grown up loudspeakers	60 x 21 x 26 see above, suck and see	89dB/w 55Hz (in room)		78
Goodmans HIM 440 £350	Good Average -	Amazing perceived value, sensitivity and good bass extension, marred by serious cabinet coloration, a nasty tweeter and a difficult amplifier load	87 x 38 x 40cm low stands clear of walls	94dB/w 24Hz		90

LOUDSPEAKERS

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
Goodmans M100 £80	Average + Average -	Effectively a Maxim on the cheap, the M100 measures more smoothly but sounds somehow less involving than its more famous stablemate.	20 x 17 x 26cm close to rear wall	85dB/W 50Hz (in room)	R	86
Goodmans M300 £100	Average Average -	Conveying much of the charm and life which has made the Maxim 2 so popular, the M300 is sensitive, but hampered by upper bass cabinet coloration	38.5 x 21.5 x 17cm stands close to rear	89dB/W 50Hz (in room)	R	82
Goodmans M500 £130	Average Average-	Large 'bookshelf' size means plenty of speaker for the money plus good sensitivity, let down by unruly mid/bass performance and indifferent build	47 x 24.5 x 21.5cm stands, free space	89dB/W 50Hz (in room)		94
Harbeth HL Compact From £539	Very Good Average	The clean and neutral sound lacks resolution and gives rather unsubtle though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high	87.5dB/W 65Hz		59
Harbeth LS3/5A £343	Good Average	Still a classic miniature, though not to every taste, and none the better for the recent update under our listening conditions. Limited dynamic range	30.5 x 19 x 16cm stands in free space	81dB/W 60Hz		66
Heco Interior 120 £169	Good Average	Drab appearance belies a lively enough character, though the balance is altogether a bit bright for UK tastes	32 x 23 x 23cm high stands against wall	88dB/W 50Hz (in room)		78
Heco Interior 430 £429	Good Good -	This tall floorstanding enclosure delivers an impressively even sound balance with good bass extension, if not the lively dynamics to satisfy enthusiasts	85 x 24 x 27.5cm free space	88dB/W 43Hz	R	71
Heco Interior 90 £159	Good Average -	Neatly finished and engineered miniature, but the disappointingly 'lifeless' sound left the listening panel decidedly underwhelmed	27 x 18 x 16cm on high stands	87.5dB/W 90Hz		74
Heco Interior Plus 404 £400	Average+ Average+	Odd shape and size; twin main driver arrangement creates a slight 'boom'n'tizz' effect, but mid focuses well and bass extension is impressive	58 x 26 x 31cm low stands free space	88dB/W 25Hz (in room)		94
Heco Reflex 10 £160	Average+ Average	This nicely balanced and well mannered small bookshelf wall-mount is a competent rather than exceptional package for the price, thanks to indifferent build.	32x21x23cm stands up to 1ft from wall	90dB 30Hz (in room)		102
Heco Superior 740 £599	Good Good -	A similar sonic package to the cheaper Interior 530, these Superior clothes are very pretty indeed, though spikes are still awaited	84.5 x 22 x 25cm on floor in free space	88dB/W 30Hz (in room)		78
Heco Superior 940 £999	Good Good	This large and beautifully finished floorstander has an impressively smooth and transparent midband. Bass is well extended but follows rather than drives the music	110 x 26 x 31.5cm free space	88dB/W 20Hz		86
Heybrook HB1 S3 £250	Average+ Good	Latest version of long established favourite delivers good liveliness and fine coherence for the price, even though the shape looks a bit dated	47 x 29 x 24cm HBS1 stands close(ish) to	88dB 30Hz (in room)	BB	98
Heybrook HB100 £279	Average + Good	Well matched for wall siting, the HB100 is a lively and informative performer in the tradition of the popular HB1	47 x 26 x 28cm stands near rear wall	86dB/W 50Hz	BB	66
Heybrook HB150 £369	Average Good	Convincingly communicative but a bit coloured and congested, this lively compact wall-mount is nicely finished but a little costly for the content	40.5 x 23 x 22cm stands close to rear	89dB/W 42Hz (in room)		82
Heybrook HB200 £429	Average Average	This luxury successor to the HB2 is lively and informative, but sounded insufficiently balanced to convince our listening panel	46 x 23 x 26cm stands against rear wall	87dB/W 55Hz		66
Heybrook Point 5 S2 £179	Good Good	Lively, revealing and enjoyable wall-mount can sound unruly with multi-strand but comes dramatically into focus with solid core cable.	37.5 x 23 x 24.5cm HBS1s against wall	85dB/W 28Hz (in room)	BB	94
Heybrook Point 7 £185	Average Average	Physically an attractive package, but not entirely convincing in lab or listening panel test; interesting for all that	40.5 x 23 x 23cm stands against rear	85dB/W 60Hz		68
Heybrook Solo £159	Average + Average +	Discreetly styled wallmount sounds a little untidy in both bass and treble but handles complex rhythmic material much better than most	36 x 23 x 22cm HBS1 stands close to wall	87dB/W 28Hz	R	90
Heybrook Sextet £949 (inc frame)	Good Very Good	Elegant floorstanding three-way wall-mount is engagingly coherent and a highly analytical, partly due to distinct and not always comfortable upper-mid forwardness.	96x27x20cm close to wall	85dB 25Hz (in room)	R	102
Infinity Kappa 6 £795	Good Good	Interestingly styled US loudspeaker has unusual high tech drivers and good neutrality, but the sound seriously lacks excitement	63 x 38 x 24cm stands, free space	85dB/W 35Hz		66
Infinity Kappa 8 £1850	n/a Very Good	Very nicely made and unobtrusive but large four-way speakers which have a tendency to sound bass heavy unless used with solid core cables	118 x 51.5 x 17.5cm floor standing, open	89dB/W 33Hz		72
Infinity Modulus £695	Good Average +	Luxury high-tech miniature, carefully conceived and beautifully built. Undeniably attractive in the mid and treble, it failed to handle the bass as successfully	30 x 18 x 26cm high stands 1ft from wall	84dB/W 45Hz (in room)		86
Infinity Reference 10 £149	Average Average	Follows the Infinity tradition in providing an engaging and lively sound from a prettily finished and substantial small bookshelf size model	36 x 23 x 23cm stands in free space	87dB 50Hz (in room)	R	98
Infinity Reference 20 £220	Good Average	Large bookshelf size model is well presented and balanced with good bass control, but somehow lacks convincing cohesion and agility; build was slightly suspect too.	46x27x24cm stands 1-2ft from wall	88dB 27Hz (in room)		102
Infinity Reference 50 £499	Average Average-	Despite hi-tech drivers, attractive presentation, good bass extension and sensitivity, this three-way floorstander suffers from a forward, coloured sound	86 x 26.5 x 25cm floor in free space	89dB 25Hz (in room)		98
Infinity RS2001 £180	Average Average +	A little coloured and unruly in the treble, the 2001 nevertheless retains the lively dynamic bounce of its predecessor; pity the price has gone up	36.5 x 22.5 x 20cm lightweight stands	87dB/W 50Hz (in room)	R	78
Jamo Concert II £250	Good Average -	A thoroughly respectable 'bookshelf' performer that needs free space siting but includes attractive cabinetwork and a neat grille	41 x 24 x 25cm stands in free space	85dB/W 48Hz		66
Jamo Concert V £500	Average Average	Compact, solid, nicely finished floorstander delivers unusually extended bass at the expense of lowish sensitivity; midband is smooth but laid back.	86x24x28cm well clear of walls	85dB below 20Hz (in room)		102
Jamo Concert VII £650	Average+ Average	Beautifully built large floorstander uses unusual double reflex bass system, unsuccessfully as far as low frequency resolution is concerned	96 x 28 x 31.5cm floor, free standing	87dB/W 25Hz (in room)		94
Jamo Cornet 40 £100	Average- Average	Pretty little Danish-built miniature with respectable rather than exceptional sound quality for the price	32 x 20 x 22cm stands 1-2ft from wall	86dB 48Hz (in room)		98
JBL Control 1 Plus £229	Average Average	Sub-miniature with forward midrange and no real bass; highish price partly justified by cute, near-indestructible Pro styling and build	23 x 15.5 x 14cm close to rear wall	89dB/W 50Hz		90
JBL L20T3 £249	Average- Average-	Compact bookshelf model delivers bouncy miniature-type sound when free space mounted; pleasant enough but uneven and undistinguished	39 x 23 x 20.5cm stands free space	87dB/W 48Hz (in room)		94
JBL LX33 £259	Average + Good	A bit of a cheat, but a lot of speaker for the money, which manages a better room balance than many 'large bookshelf' rivals, and delivers a fine acoustic	80 x 25 x 21cm floor, 1ft from wall	89dB/W 48Hz	R	82
JBL LX44 £339	Good - Average	This generously built model offers good power handling, bass extension and dynamic range, but suffers from the 'three-way syndrome', with middle muddle	58.5 x 30 x 29cm stands in free space	89dB/W 40Hz		71
JBL LX55 £350	Good Average	This big bluff three-way provides lots of speaker, bandwidth and loudness for the asking price, but is ultimately a bit of a dinosaur	66x34.5x29cm stands clear of walls	91dB below 20Hz (in room)		102
JBL XE2 £149	Average- Average-	Budget Danish-built 'bookshelf' model has anomalous 'laid back' balance and lacks the genuine JBL spirit	38 x 23 x 23cm stands in free space	88dB 48Hz (in room)		98
JBL XPL 90 £699	Good Average +	Though undoubtedly pretty and very expensively engineered, this elaborate near-miniature didn't really convince our listeners.	39.5 x 24 x 24cm stands in free space	85dB/W 45Hz (in room)		86
JPW AP2 £175	Good Good	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm	89dB/W 65Hz	R	53
JPW AP3 £225	Good Average +	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/W 57Hz	R	46
JPW Minim £85	Average + Average -	Very civilised but dynamically limited, the Minim is well suited to the smaller room and where limited loudness is acceptable	27.5 x 18 x 19.5cm stands against wall	85dB/W 28Hz (in room)	R	82

LOUDSPEAKERS

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ VALUE ■ ISSUE ■ BASS FROM
JPW P1 £145	Good	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/w 60Hz R 59
JPW P1 Vinyl £135	Good	Not particularly pretty, this is still a lot of highly competent loudspeaker for the price, with a safe and middle-of-the-road sound that's unlikely to disappoint.	43.5x25.5x26cm stands 1-2ft from wall	87dB 32Hz (in room) BB 102
JPW Sonata £115	Good	Well balanced and integrated, this near-miniature offers fine sound if limited bass and dynamic range, plus real tree wood at a nearly silly price	32 x 23 x 20cm stands near rear wall	86dB/w 55Hz BB 71
JPW Sonata Plus £135	Average	This luxury variation on the redoublingable Sonata theme features a metal dome tweeter, and is not the better for it	32 x 23 x 21cm about 1ft from wall	87dB/w 30Hz 90
JRT AD1 £500 (stands £100)	Average + Good +	A most auspicious Choice debut for relative newcomers JRT. A fair share of cosmetic deficiencies do little to spoil the impressive coherence and timing	59.5 x 28 x 36cm own stands close to rear	86dB/w 28Hz (in room) R 86
JRT AD1 Micro £389	Average	Beautiful bijou miniature has delightful life and coherence and gives surprising impression of scale; some aggressive tendencies but very open to system tuning	28 x 17 x 21cm stands against wall	87dB/W 50Hz (in room) R 94
Kammerzelt Reference Mini Monitor £545	Average+ Good	Lovely miniature has a beguilingly sweet sound with good pace and drive, but scale is restricted and presence a little dulled considering the high price	stands 1-2ft from wall 85dB/W	50Hz (in room) 94
KEF 104/2 £1,295	Very Good Very Good	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound level	90 x 28 x 41.5cm floor standing in free space	92dB/w 50Hz R 60
KEF Q60 £349	Good Good	Uni-Q co-axial driver provides fine imaging and mid coherence, while magnet decoupling reduces cabinet coloration. Goes loud, bass not entirely convincing.	48x25x27cm stands close to wall	90dB 25Hz (in room) R 102
Lindley New Age £1100	Average - Average +	Attractively different presentation with classy finish, this tall cylindrical floorstander has fine bass extension but a rather uneven overall balance	105 x 23 x 23cm clear of walls	86dB/w 25Hz 90
Linn Index II/KuStone £235/£109	Good Good	Combination of stand and speaker looks and sounds very good for the price, with good bass extension and control, fine dynamic range. Clean, clear if a shade slow	44 x 21 x 23.5cm (box only) close to rear	86dB/w 28Hz BB 90
Linn Helix II £357 (stands £109)	Good Good+	Ku-Stone supported, this is one of the best 'large bookshelf' size models around. Dry, controlled bass and very open, if slightly aggressive balance.	57x24x30cm KuStones 1-2ft from wall	88dB 33Hz (in room) R 102
Linn Kaber LS500 £1098	Average Good +	Discreet wall-mount package trades sensitivity for fine bass extension and midbass performance; can be a little relentless but has prodigious dynamic capabilities	93 x 19 x 28cm floor- against rear wall	86dB/w 28Hz (in room) R 82
Linn Kan II £439	Average + Average +	A niche product for those prepared to tolerate its strong character for the sake of its fine bass performance and near invisibility	30.5 x 18.5 x 16.5cm Kan stands against	82dB/w 35Hz (in room) 78
Linn Nexus LS250 £458	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall	89dB/w 60Hz 59
Magneplanar MG1.4 £1190	Good + Good +	Replaces the stalwart MG1c with a revised panel layout. Offers a very crisp and articulate sound, particularly revealing of upper mid vocal details	155 x 8 x 57cm open space	88dB/w 40Hz R 72
Magneplanar MG2.5R £1998	Good Good	Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/w 35Hz R 60
Magneplanar MGIIIa £2700	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/w 35Hz R 46
Magneplanar SMGa £675	Average - Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/w 56Hz 46
Marantz LD-50DMS £230	Very Good Good	Well behaved larger two-way has fine balance, stereo and integration with good bass extension, albeit with mild boxy, chesty and fizzy effects	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room) R 71
Martin Logan CLS II £3998	n/a Very Good	Much improved high resolution design, fussy about system set-up and demanding of ancillaries and software alike. It rewards the efforts though	60 x 28 x 7.5cm open space	86dB/w 45Hz R 72
Meridian Argent 1 £1,200	Good+ Good+	Beautifully built, finished and shaped but pricey compact has fine bass extension and virtual absence of 'boxiness'; needs a big amplifier	33 x 27(max) x 27(max)cm Slate stands	83dB 28Hz (in room) 98
Meridian Argent 2 £995	Good+ Good	This beautiful but pricey high-tech 'large compact' delivers an extended, smooth and neutral sound with fair speed. Slate Audio stands are almost essential	48.5 x 21 x 29.5cm stands free space	85dB/W 23Hz (in room) 94
Meridian M30 £895	Average + Average	Pricy but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz 46
Mission 760 £100	Good Average +	Smart presentation and an engaging sound, this sensitive budget miniature sounds notably more lively and less boxy than most of its peers	29 x 18 x 20cm stands close to wall	88dB/w 50Hz BB 90
Mission 761i £150	Good Average	Variation on 760 theme adds an extra main driver for easier amp loading and power handling. Sound was judged slightly inferior to its simpler, cheaper stablemate.	38x19x24cm stands close to wall	88dB 48Hz (in room) 102
Mission 762 £200	Average Average -	Mission's 'bookshelf middleweight' offers high sensitivity and loudness capability, but at the expense of a somewhat untidy and rather 'heavy' sound	50 x 25 x 27cm stand, experiment advised	91dB/w 55Hz 66
Mission 763 £300	Average + Average +	A very artful combination of generous volume and good bass extension at a modest price. Works well in the listening room despite a few rough edges	77 x 25 x 32cm near rear wall	86dB/w 40Hz BB 68
Mission 764i £480	Good Average	Despite improvements, this large floorstander still lacks low frequency authority, which is probably a function of its comparatively modest price	1ft from wall, freestanding 87dB/W	below 20Hz 94
Mission 767 £2500	Very Good Very Good	Magnificent and massive part-active monoliths have fine acoustic subtlety and impressive loudness capability, ultimately limited by partnering (Cyru) electronics	138 x 29 x 43cm floor, flexible	91dB/w <20Hz (in room) R 81
Mission Cyrus 780 £180	Good Average +	Pricy but very pretty miniature based on Mission 760 but with beefed up box and crossover network to enhance sound quality still further	29 x 18 x 26cm light stands close to wall	88dB/w 50Hz R 90
Mission Cyrus 781 £250	Average + Good	Properly run in, the pretty little 781 delivers a fast, dynamic and informative sound which more than justifies its price.	43 x 22.5 x 28cm matching stands 1ft	88dB/w 28Hz (in room) R 86
Mission Cyrus 782 £350 (stands £80)	Good - Good -	Lively, articulate and beautifully finished, this compact wall-mount model with twin main drivers has good integration but a rather rich, 'Loudness' balance	50 x 25 x 32.5cm Cyrus stands near wall	90dB/w 50Hz 71
Monitor Audio MA1200 £900	Average Average +	This smooth and civilised slimline floorstanding loudspeaker is well built and nicely presented. But it is also expensive	94 x 20 x 26cm in free space	85dB/w 48Hz 68
Monitor Audio MA1800 £1400	Good Average +	Attractive and beautifully finished, even when ballasted with lead shot the 1800 inclines towards upper bass richness and lacks genuine extension	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room) 81
Monitor Audio Monitor 11 £330	Average Good	This tall and slim and attractive free space compact has an extra driver to help out in the bass, giving extra urge at some price in delicacy	52 x 20 x 24cm stands free space	87dB/W 48Hz (in room) R 94
Monitor Audio Monitor 14 £400	Average Average	Floorstanding version of M11 suffers from excess upper bass, giving a thick, chesty coloration beneath a quite lively and well focused mid and treble	78 x 20 x 24cm floor well clear of walls	86dB 30Hz (in room) 98
Monitor Audio Monitor 7 £180	Average - Average	This lively and punchy near-miniature looks pretty enough and is good value but is let down by an unruly and indifferently integrated tweeter	34 x 16.5 x 17cm stands 1ft from wall	84dB/w 70Hz 74
Monitor Audio Monitor 9 £220	Good Average	Despite a much better treble balance than the 7, the Monitor 9 is less engaging and lively at low frequencies than its smaller sibling	37 x 20 x 21cm high stands near wall	85dB/w 30Hz 78
Monitor Audio Studio 10 £1200	Average Average +	Expensive, luxury build/finish and all-metal driver diaphragms provide engagingly transparent midrange and treble, spoilt by over-strong mid-bass.	40 x 20 x 25cm heavy stands clear of walls	87dB/w 45Hz 90
Monitor Audio Studio 5 £500	Average+ Average+	All metal diaphragm luxury miniature has splendid presence coherence but sound can be aggressive and lacks welly.	32 x 18 x 20cm stands close to wall	83dB 28Hz (in room) 98

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Monitor Audio Studio 15 £1,600	Average+ Good	A little slow and lazy but better balanced than the smaller <i>Studio</i> models, the midband coherence and focus is superb, but it ain't cheap	51x20x26cm free space	87dB 45Hz (in room)	R	102
Mordaunt-Short Classic 20 £395	Average+ Average+	Luxuriously finished compact delivers beguiling mid transparency but bass is altogether less convincing — one for the carpet slippers generation perhaps	37x22x27cm stands in free space	86dB 45Hz (in room)		102
Mordaunt-Short MS3.10 £110	Average Average+	Probably the liveliest and most communicative miniature around, this beautifully presented design is probably better suited to budget 'real hi-fi'	28.5x17.5x20cm stands in free space	88.5dB 48Hz (in room)		78
Mordaunt-Short MS3.20 £140	Average Average+	All the charm of its BB rated £99 baby 3.10 brother, plus a smidjeon more bass for those in a suggestible frame of mind	35.5x18x20cm stands against wall	85dB 50Hz (in room)	R	82
Mordaunt-Short MS3.30 £200	Average Average+	A little too mid-forward for neutrality or formal recommendation this attractive, good sized model nevertheless has more than enough appealing qualities	46x23.5x27cm stands 1-2ft from wall	87dB 38Hz (in room)		78
Mordaunt-Short MS3.40 £260	Average+ Average	It looks pretty and sound civilised but the 3.40 failed to ignite any degree of enthusiasm amongst our listeners. LF room matching is critical	57x23.5x27.5cm stands in free space	87dB 30Hz (in room)		86
NAD 8100 £269	Average+ Average+	Floorstanding variation on attractive 8225 miniature adds some half convincing extra bass thump and saves the price of stands - very cost effective	75 x 20 x 25cm floor clear of walls	88dB 25Hz (in room)	R	98
NAD 8225 £150	Good Average +	Notwithstanding lacklustre styling and an unprepossessing appearance, this NAD miniature has a smooth and even midband plus an appealing overall jauntness.	34 x 20 x 18cm stands close to wall	87dB/w 45Hz (in room)	R	86
Naim NA IBL £798	Average+ Good	This tiny and elaborately engineered floorstanding wall mount delivers outstanding dynamics, speed and detail, marred by pronounced upper mid forwardness	60 x 32.5 x 32.5cm wall, freestanding 84dB/W	30Hz (in room)		94
Naim SBL £1,527	Good Very Good	Impressive scale and full bandwidth coherence from an attractively discrete floor standing wall-mount — coloured midband but very well balanced and agile with it.	88x26.5x17-27cm close to wall	86dB 25Hz (in room)	R	102
Neat Petite £525	Average Good+	Pricey and far from perfect, this near miniature is nevertheless one of the most entertaining and enjoyable speakers around, colorations notwithstanding.	30.5x20x18cm stands close to wall	86dB 33Hz (in room)	R	102
NVA Cube 1 £600 (stands £200)	Good - Good +	Attractive, cube-shaped semi-omni is very sturdily built, and gives an idiosyncratic but unusually open, spacious and informative sound	33 x 32 x 32cm own stands c0.5m from wall	85dB/w 52Hz	R	71
NVA Cube 2 £380	Average Good	A rude but exciting miniature, with unusually accomplished bass capabilities for its size	28.5 x 27 x 28.5cm NVA stands against wall	85dB/w 48Hz (in room)	R	82
NVA Cubix £1100	Average Good	Too idiosyncratic for formal recommendation, the Cubix possesses remarkable bass extension for its size, but is tricky to optimise	60 x 32.5 x 32.5cm	84dB/w 28Hz (in room)		78
Opus 3 Capella £599	Good Good	The sound of this Scandinavian curiosity certainly benefits from the crushed marble enclosure, though presentation is strictly DIY	32 x 40.5 x 26(ave)cm amongst books in	86.5dB/w 45Hz		66
Opus 3 Credo £399	Average Average	Credo's odd-shaped silicate-based cabinet confers good box and bass performance, but the sound could be more neutral for the price	32 x 28 x 32cm stands in free space	88dB/w 65Hz		74
Pearl & Oakley Victoria 200 £1099	Average - Average -	Extraordinary — and to many very attractive — 'ginger jar' presentation in Staffordshire ceramics, but let down by need for further acoustic development	93 x 33 x 33cm on floor in free space	87dB/w 30Hz (in room)		78
Philips FB815 £250	Average Average	An impressively — indeed imposing — physical package for the price, clever engineering gives a very competent if slightly hard and brittle sound quality	63 x 27 x 27cm low stands in free space	85dB/w 30Hz		86
Philips FB820 £450	Good Average	Big-but-less-than-beautiful three-way is well enough balanced but lacks communication skills in the time domain	86 x 27 x 35cm floor clear of walls	87dB 28Hz (in room)		98
Philips FB825 £650	Good Good	Generous sounding and impressively uncongested for the type, loudness and bass extension don't quite match the large and rather plasticky box	110 x 29 x 41cm on cones clear of walls	88dB/w 25Hz	R	90
QLN Model One £700	Good Average	Similar to Signature at two thirds the price, Model One exaggerates the latter's rich and heavy midbass and lacks its velvet smoothness	35 x (16-25) x (21-27)cm pillar	85dB/w 28Hz (in room)		82
QLN Signature £1100	Good Good	Beautiful but expensive luxury compact has a rather laid back and 'heavy' sound, but coloration is low and stereo imaging very good	37 x 18 x 36cm heavy stands in free space	83dB/w 30Hz (in room)		78
Quad ESL-63 £2072	Good + Very Good	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without	92 x 66 x 27cm open stand well clear of	84dB/w 34Hz	R	60
RAM Hermes £425	Average- Average+	Slim small floorstander is a bit tall for its footprint. Good sensitivity is combined with an attractively lively sound, but it's uneven and not truly coherent	70 x 21.5 x 23cm floor, freestanding	91dB/W 45Hz (in room)		94
RCF Mytho 3 £1,395	Average Average+	Undoubtedly very attractive and well built, incorporating a number of unusual and interesting ideas, the highish price isn't really justified by the performance.	100x21.5x30cm away from walls	88dB 25Hz (in room)		102
Richard Allan CD5 £184	Average - Average -	This neatly presented small reflex design can sound engagingly communicative, but is flawed sonically and technically and quite expensive too	38 x 19 x 23cm on rigid stands	88dB/w 80Hz		68
Rogers LS2a £193	Average Average	Provides very good engineering and stereo performance for the price, alongside some 'boxiness' and certain dynamic constraints	36 x 23 x 21cm low stands 1ft from wall	88dB/w 50Hz (in room)		82
Rogers LS4a £255	Good Good -	This artfully voiced and well balanced compact gives a fair flavour of the classical 'BBC sound' at a very reasonable price	43 x 25.5 x 24.5cm stands 1ft from wall	87dB/w 32Hz (in room)	R	78
Rogers LS6a £316	Good Good	Stereotypical model with impressively even balance, prospective purchasers will have to weigh the midband naturalness against slightly lazy dynamics and timing	51 x 27.5 x 28cm stands in free space	86dB/w 25Hz (in room)	R	86
Rogers LS7t £449	Good + Good +	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/w 48Hz	R	59
Rogers LS8a £425	Average + Average +	This modestly priced floorstander is a bit of a mixed bag, with plenty of scale and welly but lacking the subtlety, clarity and agility delivered by some rivals	89x25.5x25cm clear of walls	91dB 48Hz (in room)		102
Rogers Studio 1a £612	Very Good Good -	The classic BBC monitor style sound sensitively updated — transparent and natural with fine stereo, but a touch 'heavy' in balance	63.5 x 30.5 x 30.5cm stands in free space	87dB/w 36Hz	R	66
Roksan Darius £1569 (£389 integral stand)	Good Very Good	Now totally realigned, the current Darius provides an exceptionally impressive combination of transparency and delicacy with fine information retrieval and speed	47 x 27 x 40cm own stands angled in space	82dB/w 20Hz	R	86
Royd A14 II £199	Average Good	Not the smoothest or prettiest around, this is still an informative if sometimes aggressive large bookshelf model, with plenty of welly for the price	40 x 26 x 23cm stands 1ft from wall	87dB/W 30Hz (in room)	R	94
Royd A7 Series 11 £115	Average + Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near	86dB/w 75Hz	R	53
Royd Apex £485	Average + Good	Not the smoothest sound around, it more than compensates with an impressively communicative and informative musical presentation	85.5 x 20 x 30cm on floor close to wall	87dB/w 33Hz (in room)	R	78
Royd Eden £235	Average Average +	Delightful mid/treble speed and transparency but determinedly bass light, this oddball miniature threatens cult status but could use a sweeter tweeter	31 x 20.5 x 18.5cm stands close to wall	87dB/w 85Hz	R	66
Royd Sapphire £200	Average+ Good-	Neat little miniature sounds a touch cold and thin but unusual main driver delivers remarkable speed and coherence for such a reasonably priced model	30.5 x 20.5 x 21cm frame stands 1ft from	88dB 28Hz (in room)	R	98
Royd Sintra £330	Average + Good	Balance is bass light and a little bright, but superb dynamics, speed and timing make this luxury miniature musically very informative and satisfying	30.5 x 20.5 x 19cm stands close to wall	88dB/w 50Hz	R	90
Ruarik Swordsman £219	Good Average	Very attractively styled and finished, the Swordsman is a well built 'small bookshelf' model that delivered better test than listening results	38.5 x 20 x 27.5cm stands 0.5m from wall	84dB/w 50Hz		71
Ruarik Swordsman Plus £269	Good Average	This real wood variation on the established Swordsman theme looks and measures rather better than it sounds, probably due to rather prosaic drivers	38 x 20 x 28cm stands 1-2ft from wall	84dB 27Hz (in room)		98

LOUDSPEAKERS

MODEL	LAB	COMMENTS	SIZE	SENSITIVITY	VALUE	ISSUE
PRICE	SOUND		PLACEMENT	BASS FROM		
Ruark Talisman £629	Average Good	Clever and beautifully finished compact floorstander has some coloration but is impressively informative and communicative, with fine pace and timing	83.5 x 21.5 x 31 (max) cm close to rear wall	86dB/w 30Hz	R	90
SD Acoustics OBS £845	Average Good	Recent changes have added some refinement to a seductive midrange, good timing and fine sensitivity, though bass extension is limited and coloration obvious	102 x 35 x 25cm floor, angled, away from	92dB/w 30Hz (in room)	R	82
SD Acoustics Ribbon £2150	Average Good +	Entertaining but a little underdeveloped and rather amplifier sensitive, the Ribbon is a lively and loud hybrid marred by some colorations; some like it, others don't	152 x 30 x (15-30)cm floor, angled, away	91dB/w 30Hz (in room)		81
SD Acoustics SD1 £1350	Average Very Good	A large scale, airy and unusually detailed system with excellent dynamics. Current model has more civilised top-end and warmer balance than original model	123.5 x 38.2 x 31.9cm free space	90dB/w 50Hz	R	60
SD Acoustics SD3 £379	Average Good	Neither cheap nor perfect, this near miniature sounds unusually lively and dynamic within inevitable physical constraints. Both engaging and entertaining!	38 x 19 x 29cm stands 10cm from wall	83dB/w	R	86
Seventh Veil System IV £1290 (€340 integral stand)	Average Good +	Lacks welly and loudness but delivers astonishing results with female vocals in particular. Antithesis of the 'good allrounder'	72 x 44 x 21 x 29cm own-stands close to	84dB/w 28Hz (in room)	R	86
Shan Shimna £315	Average+ Good-	Pretty little miniature with resin-based enclosure has a bright, thin but sweet and communicative sound; loudness and welly are both limited	31 x 21 x 17cm own stands 1ft from wall	84dB 48Hz (in room)	R	98
Sony APM-101ES £100	Good Average	Big hearted sound from small bookshelf successor to BB '10ES, sounds a little untidy at frequency extremes, so suits CD better than vinyl	39.5 x 22.5 x 23.5cm stands, free space	86dB/w 52Hz	R	71
Sony APM-121ES £150	Average Average -	Good perceived high tech value, but the balance has an artificial 'loudness' character, too rich in the bass and too strong in the treble	43 x 25 x 28cm stands, free space	86dB/w 25Hz (in room)		86
Sony APM-141ES £200	Average Average	A great deal of loudspeaker for the money, the rich sounding '141 needs a big room and still shows significant 'loudness' (boom'n'tizz) tendencies	61.5 x 26 x 32cm stands in plenty of	88dB/w 30Hz (in room)	R	78
Sony APM-181 ES £300	Very Good Average	Big and beefy but equally fat and bass heavy, this well engineered 3-way has notable strengths but lacks transparency and sounds better at lower levels	57.5 x 29 x 36cm low stands, free space	87dB/w 40Hz		71
Spendor SP1 £800	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands, free space	87dB/w 41Hz	R	60
Spendor SP2/2* £500	Very Good Good +	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm stands, free space	87dB/w 45Hz	R	59
Spendor S20 £510	Very Good Good	This solid and elegant luxury compact maintains Spendor's tradition for peerless mid-to-treble coherence and perspectives. Bass is rather unconvincing.	38x22x26cm stands 1-2ft from wall	83dB 25Hz (in room)	R	102
Spica Angelus £1295	Good Average	A little bass shy and soft in the bass and lower mid, the free standing Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm away from walls	86.5dB/w 50Hz		60
Spica TC50 £599	Good - Good	This triangular-profile 'grown up' miniature is a shade boxy and laid back but has good rhythmic and musical integrity	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Spica TC50SE £799	Good - Good	A heavily UK-modified TC50, the SE sounds less boxy and more spacious, but lacks some of the urgency of the standard model	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Studio Power DMS100 £249	Average + Average +	Close to a BB rating, and in many respects remarkable value for money. Delivers an impressively smooth and large sound, but sheer ugliness will limit its appeal	51 x 26 x 32cm open stands 1ft from wall	86dB/w 25Hz (in room)	R	82
Tannoy Westminster £3600	n/a Good +	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from	96dB/w (manuf.)	R	Coll '87
Tannoy 603 £120	Average+ Average+	Pretty hexagonal cabinet miniature is optimised for free space siting and delivers fine imaging with little boxiness, but little in the way of welly and power either.	33.5x22(max)x16cm high stands in free space	85dB 45Hz (in room)	R	102
Tannoy 609 £250	Good Good	Distinctive hexagonal cabinet reduces box colorations, and new dual concentric driver is sweeter than its predecessors, making this one very superior speaker	50x32(max)x22cm stands clear of walls	90dB 25Hz (in room)	BB	102
TDL Monitor £1799	Very Good Very Good	Fine solidity and good accuracy, with enough bass extension to satisfy even organ freaks. Needs a big room and can sound a bit lazy and a shade tinkly	118.5 x 30 x 47cm 0.5m from walls	85dB/w 28Hz	R	66
TDL Studio 0.5 £399	Average Good	This tiny floorstanding transmission line has good agility but doesn't provide the coherence or even balance of the slightly bigger Studio 1	55 x 20 x 30cm own stand, free space	85dB/W 40Hz (in room)		94
TDL Studio 1 £599	Average + Good	Delivering genuinely extended bass from a compact floorstanding enclosure, the Studio is very detailed but a shade clinical and detached in presentation	76 x 23 x 33cm	84dB/w 25Hz (in room)	R	78
Technics SB-CS5 £70	Average Average	Clearly fine material value for money, the CS5 nevertheless betrays its midi system heritage.	42.5 x 25 x 24cm Stands in free space	86dB/w 48Hz	R	86
Technics SB-EX2 £179	Average- Average	Nicely presented, well built and decent size enclosure sounds solid but somewhat dull, thanks presumably to rather ordinary, low cost drivers	48 x 23.5 x 27cm stands clear of walls	86dB 20Hz (in room)		98
Technics SB-RX50 £600	Very Good Average +	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/w 40Hz	R	46
Technics SBC 250 £140	Average + Average -	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/w 60Hz		46
Townshend Glastonbury IIS* £1700	n/a Very Good	What? No bass? Actually, like the KEF 107, Glastonbury II goes down so low you might not notice how good it is. A truly remarkable performer. Superb	91.5 x 28 x 4.6 free standing in room	88dB 27Hz	R	65
Townshend Glastonbury Tor £1495	Average - Very Good	Prodigious bass extension, stunning stereo focus and low cabinet coloration, but limited loudness from low sensitivity and power handling	99 x 26.5 x 33cm well clear of walls	82dB/w below 20Hz	R	90
Vandersteen Model One £1000	Average + Average +	This compact American floorstander's elegant staggered baffle arrangement contributes to a refreshing freedom from boxiness, but the price is quite high	100 x 30.7 x 25.6cm floor clear of walls	87dB/w 23Hz (in room)		86
Vecteur Premiere £695	Average Good	Expensive for its material content, this pretty French compact nevertheless has a beguiling sound quality that indicates painstaking development	34 x 19.5 x 25cm light stands clear of walls	88dB 48Hz (in room)		98
Videotone Minimax 2 £80	Poor Average -	Cheap in build and QC as well as price, but cheerful (if coarse) with it – if a little too cheerful after extended listening	27.5 x 17 x 20cm near rear wall	84dB/w 90Hz	R	74
Visonik David 6001 £173	Average - Poor	Sharp styling a classy looking miniature makes, but the complex grillework worsens a sound which starts off with too much top and not enough bottom	20 x 12 x 13cm against rear wall	87dB/w 130Hz		74
Wharfedale 410 £130	Good Average-	One step up from the Diamond, this attractive and sensitive small bookshelf model sounds smoother but is also rather bland and uninvolving	34.5 x 22 x 22.5cm stand against wall	89dB/W 45Hz (in room)		94
Wharfedale 505.2M £260	Average+ Good-	Luxury red mahogany finish version of 505.2, confirms that this well balanced design remains fully competitive nearly three years after the original	44 x 25.5 x 25.5cm stands in free space	87dB 45Hz (in room)	R	98
Wharfedale 505/2 £190	Average Good	This lively Wharfedale provides plenty of speaker with unusual refinement for the money, and should be fairly tolerant of room siting	44 x 25.5 x 24cm stands 1ft from wall	86dB/w 55Hz	BB	66
Wharfedale Coleridge C £600	Good Good	Very prettily dressed and sounds pretty good as well, though whether enough to justify the £600 pricetag is open to debate. Well balanced, smooth and a little dull.	48x25.5x25.5cm stands clear of walls	86dB 30Hz (in room)		102
Wharfedale Delta 30.2 £100	Average- Average	This hundred pounder has a bigger main driver than many of its rivals, and so packs a bit more welly and loudness. Coloration is rather obvious, but timing is good	38 x 22 x 17cm stands close to wall	88dB 48Hz (in room)	BB	98
Wharfedale Diamond IV £109	Good Average +	Thanks to a new metal dome tweeter, the new Diamond is much more civilised than its predecessors, with an attractive lively bounce but some boxiness	27 x 18 x 18.5cm stands close to wall	86dB/w 48Hz	R	90
Yamaha NS 1000M £900	Good Good +	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/w 40Hz	R	46

LOUDSPEAKERS - SATELLITE AND SUBWOOFER SYSTEMS

Satellite and subwoofer systems, sometimes referred to as three way systems, consist of a small pair of speakers (the satellites) and an extra box (or two) to handle the low frequencies.

Most systems use a single sub-woofer to supply low bass output, although stereo sub-woofer systems are available. By freeing the main speakers of the necessity of generating deep bass they can be made much smaller than a standard design and as a result satellite

and subwoofer systems are usually visually unobtrusive.

Positioning of the sub-woofer is usually not as critical as the positioning of a conventional speaker and as a result the largest part of the system can be hidden away entirely, although please refer to the placement notes below as this does not apply to every system.

In general the sonic performance of these systems will fall below the performance of a good, comparably priced, conventional speaker.

The value ratings given below are judged in the context of sat and sub woofer systems only and are not judged by the same criteria as the main loudspeakers, thus a Recommended sat and sub system probably won't sound as good as a Recommended traditional speaker

If you are prepared to compromise slightly in terms of sound quality then a satellite and sub-woofer system might represent a good solution for those situations where the loudspeaker should be heard but not seen.

LOUDSPEAKERS - SATELLITE AND SUBWOOFER SYSTEMS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (cm) PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Allison MS 205 £420	Average Good -	Tasty high quality satellites give this quite pricey 3-box system a touch of class. Subwoofer is very compact and only slightly boomy.	25.5x14.5x15 + 29x 29x36 stands close to wall	86dB 30Hz	R	104
Bose Acoustimass AM3 £289	Average Average	Ultra compact 3-box is well balanced though limited in loudness and bass. Tiny satellites are a bit fierce, and grilles unhelpful	9x11x11 + 20x37x19 close to wall	85dB 48Hz		104
Bose Acoustimass AM5 £569	Average + Average +	Pricy but cleverly engineered 3-box system is well balanced and uses tiny twin-driver satellites to good effect	16x7.7x12 + 36x19x48 sats at wall, sub 2ft from wall	85dB 40Hz	R	104
Heco Libero £375	Average Average	Attractive 3-box package uses neat metal satellites with versatile mounting accessories, but subwoofer is boomy in the midbass	18x11x12 + 21x55x 31.5 uncritical	85dB 45Hz		104
Jamo SW/SAT300 £300	Average Average	Attractively finished 3-box package has 'tunable' subwoofer that allows boom to be minimised and a good balance achieved	21x15x8 + 21x48x34.5 uncritical	85dB 40Hz	R	104
RSS Solid/Bass Station £550	Average Average	Multi-driver macho subwoofer adds mucho muscle to Solid satellites, but it's much more midbass than serious extension	24x12x12 + 47x 48 x 20 sub at wall, sats in free space	91dB 45Hz		104
Wharfedale 2130 £300	Average Average +	3-box system marred by indifferent boomy subwoofer but rescued by novel wide-dispersion satellites that give an open sound	14x24x11 + 19x32x 50 sub away from wall	86dB 48Hz	R	104

PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than all manner of domestic systems and as such demand some attention.

Now that personal CD players have joined the ubiquitous Walkman in the market, the variety and standard of sound quality is huge, with obscurely named cassette players practically falling out of your cornflakes packet and the top Discmen going for £300 or more.

Despite their diminutive size personals attempt to incorporate as many gimmicks and features as possible, cassette players often incorporating tuners, Dolby noise reduction or even graphic equalisers.

CD players are still relatively expensive, although prices have come down a lot, and don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Rechargeable batteries are extremely useful and increasingly popular, some can now be recharged within the unit and charge capacities are also being increased.

Most models come with a mains adaptor, which in some cases doubles as a battery charger and some include a wired remote control. A few are now appearing with infra-red remote control although this is more applicable to CD players.

Sound quality on the cassette front seems to

have a proportional relationship to price and integrity of construction – wow and flutter being quite obvious on the cheaper models.

CD players become less noisy as they get dearer and also reduce in size; one drawback of the latter seems to be that immunity to shock suffers as a consequence, although newer models are starting to buck this trend. Cassette players do, on the whole, seem better suited to the outdoor life than their digital counterparts, as does the software. Bear in mind that the sound and lab ratings given below cannot realistically be compared to those in other categories or between cassette and CD personals

PERSONAL CASSETTES

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa HS P505MkII £70	Good	Very good clutch of features and accessories plus good sound at a reasonable price. Could be more user friendly	Remote control, rechargeable battery and charger	BB	102
Aiwa HS-PL707 £135	Very Good-	Has a precise, attractive sound, if a little clinical and cold. This player might be ideal for the user who will listen to mostly classical music. Somewhat fiddly to use	Remote control, BBE sound enhancer, charger & battery	R	102
Aiwa HS-JX705 £220	Good	Rather expensive radio-equipped player. Sound quality on tape playback didn't match up to the Aiwa HS-PL707	FM/AM tuner, recording mic remote control, charger		102
Panasonic RQS15 £85	Good	Considerable power and immediacy to the music though with some raggedness. Good features and accessories. Well designed and easy to use	Remote control, rechargeable battery and charger	R	102
Panasonic RQV520 £100	Good	Features an onboard radio without sacrificing sound quality on tape playback. You lose out on accessories, though (no battery charger)	Radio, remote control, bass enhancer		102
Panasonic RQS65 £130	Good+	Solid, warm sound plus a good selection of features and accessories all combined in a stylish and very user friendly package. Comes with one of the better remote controls	Remote control, rechargeable battery and charger	R	102
Sanyo MGR401D £40	Average-	Easy to use budget model with a radio and some useful features (including a simplified remote control). Sound quality on tape isn't great but is helped by the bass enhancer	Radio, remote control, bass enhancer with graphic equaliser		102
Sanyo MGR580 £50	Poor	A more sophisticated radio than on Sanyo's 401D but the feature count is low and the tape playback unexceptional	Radio 'digital tuner', auto reverse		102
Sanyo SPT1000 £40	Average	Despite outlandish colourful trim and features completely unrelated to audio enjoyment (a 'Pedometer' for monitoring jogging) this has a better basic sound than the other Sanyos	Bass enhancer		102
Sharp JC-510 £30	Average	Serviceable sound quality and some decent features at a low price	Radio, bass enhancer, auto reverse		102
Sharp JC-K99 £160	Good-	Sharp's 'extremely lightweight' model. Well made, elegant and it certainly doesn't weigh a lot. Pleasant sound, marred on the test sample by some distortion	Remote, rechargeable battery and charger, bass enhancer		102
Sony WM DD33 £90	Good-	Well built and resistant to vibration on the move but comes with very limited features and accessories for the price	Bass enhancer		102
Sony WM EX80 £150	Good	User friendly Sony with a good remote control and high quality, accurate sound. Comes with all the extras	Remote control, rechargeable battery and charger	R	102

The Directory

PERSONAL CASSETTES

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Sony WM DD99 £240	Good-	Mixed bag of accessories (nice headphone storage system, but no remote control) with variable sound quality at a steep price. But it does have Dolby B&C, good build quality and ergonomics	Dolby B&C, rechargeable battery and charger, auto reverse		102
Sony Walkman Pro £249	Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56

PERSONAL CDS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa DX-P50 £155	n/a Average -	A tad aggressive both through earphones and domestic systems, not very walkable but it has got two stage bass enhancement	Digital output, mains adaptor, remote		94 Supp
Denon DCP-100 £250	n/a Good	Solidly constructed and nicely finished in the slightly impractical Velvex, almost walkable, competent if uninspiring sound quality	Remote, mains adaptor, no earphones, rechargeable batts		94 Supp.
Denon DCP-50 £180	n/a Average +	Not very walkable, but lightweight and nicely finished in a nextel like grey. Sound through a system is a tad unexciting but not too bad	No headphones, remote, mains adaptor		94 Supp
Goodmans GCD-10 £120	Average - Poor	Cheap, flashy and not short on accessories, the GCD-10 is a rather noisy player that left a lot to be desired on the sound quality front	13.5 x 3.7 x 18cm, 478g, mains adaptor		66
Kenwood DPC-41 £130	n/a Average -	Lightweight, not very walkable but nice control layout. Sound through the phones is on the thin side, through the line output it's pretty average for a portable	Mains adaptor, rechargeable batts		94 Supp.
Kenwood DPC-81 £200	n/a Good +	Chunky metal cased player that makes pretty confident sounds through a system but sounds dry via earphones and ain't exactly walkable	Remote control, mains adaptor/charger and batts, digital output		94 Supp.
Philips AZ6897 £200	n/a Good +	Unusually designed and equipped with a radio the Philips is almost joggable, it sounds remarkably good via a system and a little cautious through the phones	Mains adaptor with built in plug, wired remote, clock and carrying case	BB	94 Supp
Sanyo CP-12 £260	Average Good +	Sonically amongst the more enjoyable personal CD players and capable of revealing the musical aspects of a disc in an interesting and entertaining fashion	12.5 x 2 x 12.7cm, 380g, wired remote, mains adaptor	R	66
Sony D-350 £300	n/a Good	More buttons and widgets than any of the others but not the sound quality or walkability to go with it	Mains adaptor, clock, comprehensive facilities, rechargeable batteries		94 Supp.
Sony D-66 £180	n/a Average +	One of the few walkable CD players on the market, sound quality is a little muddled but not offensive	Mains adaptor, rechargeable battery pack	R	94 Supp.
Technics SL-XP1 £140	n/a Good +	Remarkably competent and enjoyable player that you can actually use on the move and sounds enthusiastic through a domestic system	Rechargeable batts, mains adaptor/charger	BB	94 Supp.

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier


cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually)

acrossthe bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories. (The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

TUNERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa XT-003 £105	Average Average-	Economically designed and built in the UK, but trade-offs have a marked influence on FM and AM sound quality.	FM/AM digital, 30 presets, no signal strength meters.		93 Supp.
Akai AT-52L £150	Very Good Very Good	Holds its own on FM against many much more expensive tuners, but AM is very poor	All bands	BB	65
Akai AT-93L £250	Good + Good +	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	65
Arcam Alpha 2 £185	Good Average+	Re-styled to blend in with the Alpha system, Arcam's cheapest tuner makes up for its lack of features with a sensitive front-end and mellow sound.	FM/AM analogue, no presets, manual tuning + AFC	R	93 Supp.
Arcam Delta 80 £340	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder	6AM, 6FM presets. FM/MW/ LW display, manual tune	BB	55
Creek T40s3 £220	Average+ Average	Creek's FM-only analogue tuner is now in series 3 form, though the aesthetics remain unchanged. Our sample was hampered by an obvious bass 'hump' though production units are said to be cured.	FM-only analogue, no presets, manual tuning + AFC		93 Supp
Denon TU-260L £100	Very Good Good+	A new cheapie from Denon with the bare minimum of features. Careful designwork promises a surprisingly open and vivacious sound, so don't overlook it!	FM/AM digital, 20 presets, manual and auto tuning	BB	93 Supp.
Harman Kardon Citation 23 £600	Good Very Good	Fine performance, interesting features and ease of use are this tuner's forté, and the sound quality is top notch	FM/AM seek/manual adjustment muting 16 presets remote control	R	60
Harman Kardon TU9400 £250	Good Very Good	Striking in appearance and with a sound to match, this new digital tuner comfortably exceeded our expectations. On stereo FM it's HK's best yet.	FM/AM digital, 24 presets, auto-tuning, signal strength meter	R	93 Supp.
Linx Theta £475	Good Very Good	A Magnum Dynalab on the cheap with the hallmark styling of this small British newcomer. Some of the best midrange from any tuner	Manual analogue tuning, no presets, signal strength meter	R	72
Magnum Dynalab FT101 £599	Good Very Good	Although expensive for its fairly minimum set of facilities, its excellent sound makes up for what it lacks elsewhere	Analogue manual tuning, no presets, signal strength meter	R	72
Marantz ST-40L £140	Average + Good	A little slow to tune but once accomplished it provides a meaty and dynamic sound on FM. AM too has a little extra bite to its performance	FM/AM digital, 30 presets, manual/auto tuning	R	93 Supp



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TUNERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Meridian 204 £660	Good + Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, timer		55
Naim NAT 01 £1377	Very Good Excellent	There may be better sounding tuners in the world, but we have yet to hear one	No presets. Two box, flywheel tuning, FM only, Analogue	R	50
Nakamichi ST-7E £750	Good + Good +	Exceptionally good for weak-signal areas, and good all round	16 AM/FM presets, auto time digital		55
Pioneer F91 £360	Excellent Good +	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/AM 24 presets	R	60
Proton AT-300 £199	Good Good	The AT-300 is pretty on the outside, orthodox on the inside and rather dear. AM - poor	FM/MW only	R	65
Quad FM4 £399	Very Good Good +	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets, Digital	R	50
Revox B260 £1120	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM - virtually everything	R	60
SAE T-102 £449	Good + Good +	Expensive for all the radio you get, but sounds interesting. AM - poor	FM/MW only	R	65
Sony ST-S530ES £200	Good+ Good	The cheaper version of Sony's revered '730 certainly looks and feels the part but its sound is, well, less startling. Civilised, yes, but lacks much enthusiasm.	FM/AM digital, 30 presets, hi-blend + Cal tone + manual/auto tuning.		93 Supp.
Technics ST-G70L £200	Good+ Good+	Another very polite and refined-sounding tuner but one that does retain just enough sparkle to keep your interest. Plenty of widgets to play with too...	FM/AM digital, 39 presets, selectable RF/IF + fine tuning, signal. str. mtr.	R	93 Supp.

TURNTABLES - CARTRIDGES

Very much the 'slave' of turntable and tonearm and to some extent undermined by the supply of free 'starter' cartridges on many turntable systems, the cartridge is still worth taking seriously. The quality of both the stylus itself and the cartridge's tracking performance are important in preserving that most important part of the hi-fi system – the record collection – and the cartridge also plays a significant role in determining the overall balance of a system.

Cartridges fall into two groups: high output models, capable of working directly into any amplifier, and more expensive low output models.

Stereotypically, low output cartridges use the moving coil principle of operation, have better mechanical integrity and tighter tolerances, and give better performance but at much higher cost. Most under-£150 amplifiers and many valve designs need either an extra head amp or

transformer to cope with the low output.

Cartridge/amplifier interfacing can be very subtle, but even basic high output moving magnet designs benefit in overall balance from optimised amplifier capacitance loading. Still more important, the mechanical cartridge characteristic of cantilever compliance ('springiness') needs to be considered in the light of the effective mass of the tonearm which will be used.

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Arcam C77 £22	Average + Average +	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
Arcam C77Mg £30	Average - Average	Punchy sound quality with plenty of extra energy to liven things up. The solid body seems well worth the extra £10	4-8g Normal, MM	BB	67
Arcam E77Mg £50	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8gN Normal, MM	R	48
Arcam P77Mg £60	Average + Average +	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
Arcam PMX10 £100	Good + Very Good	Not the very clearest in complex high-frequency sounds, but lively and exciting, good transients	5-11g Low, MC	R	85
Audio Note I02VDH £1295	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity', needs a transformer	8-18g Very low, MC	R	43
Audio-Technica ART1 £800	Good + Very Good	This is a delicate and very fluid-sounding MC that tracks well, offers very low distortion and exceptionally good stereo separation	9-18g Low, MC	R	72
Audio-Technica AT-420E £35	Average Average	Better suited to pop recordings, this MM bears some of the sonic hallmarks of the Linn K5	7-14g (damp) Normal, MM	R	67
Audio-Technica AT-95E £19	Average - Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio-Technica OC-10 £307	Good + Good +	Good treble and good detail too, but some congestion and coloration reduces its informativeness.	4-12g Low/MC	R	103
Audio-Technica OC-5 £123	Good + Good	For the price, it's unusually effortless and detailed, but it tends to become rather relentless and tiring after a while.	5-14g Low/MC	R	103
Audioquest AQ 404i-L £400	Very Good Good +	Slight harshness detracted from the performance of this otherwise clear-sounding and detailed cartridge	8-16g Low, MC		84
Audioquest AQ 7000 £1200	Good Good +	Stunning stereo imaging and good detail at low levels are spoiled by less-than-perfect tracking and high sensitivity to arms.	6-20g Low, MC		91
Audioquest MC5 £220	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Cello Chorale £750	Average + Good	Now available through a new distributor at a saving of some £300, the Chorale is still blessed with a delicate but highly detailed treble. Arm matching is a problem	3-9g Low, MC		72
Denon DL103 £99	Good Average +	An oldie but in many ways a goodie, the 103's good performance in bass and general 'life' is seriously let down by its spherical stylus which kills subtle details.	9-22g Low/MC		103
Denon DL110 £69	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £89	Average + Good	Although listeners just preferred the 110, its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Normal, MC		43
Denon DL304 £200	Very Good Excellent	Uncoloured, detailed, neutral, superb tracking; top notch altogether, and a top notch bargain too.	4-12g Low/MC	R	103
Dynavector 17D2 £280	Very Good Very Good	Clear, detailed, neutral and generally very informative - excellent	6-18g Low, MC	R	91
Dynavector DV-50X £99	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC	R	48

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Dynavector DV10X IV £125	Average Average +	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g (damping) Normal, MC	R	48
Dynavector DV23RS £230	Average + Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector XX-1 £680	Very Good Good +	Good, but not immensely competitive at the price, and not helped by comparison with the low output version	7-15g Normal, MC		84
Dynavector XX-1L £680	Very Good Very Good	Very clear, very detailed, no troubles with tracking; response lift around 20kHz seems to do no harm	7-13g Low, MC	R	84
Empire Benz Micro MC-Gold £130	Good + Good	Nothing is obviously wrong, but nothing is stunningly right either and tracking isn't perfect. Safe, but perhaps a little too safe	7-17g Low/MC		103
Empire Benz Micro MC-Silver £130	Good Good	High output MC that though ultimately not the peer of the MCGold is more appropriate to the sort of equipment it's likely to be partnered with	8-18g Normal/MC	R	103
Empire Benz-Micro MC-2 £699	Average Good +	Similar to both the Empire MC1000 and vdH MC2 in design, the Benz offers a warmer and very transparent account of the music. Its tracking prowess is slightly limited	5-12g Low, MC	R	72
Glanz GMC-10EH £50	Good Good	The rising HF trend of this high o/p MC may cause problems in certain systems but with a favourable wind its seductive qualities will win out	8-14g Normal, MC	R	67
Glanz GMC-10LX £80	Average + Average +	Bearing some of the hallmarks of the '10EH, the '10LX is still less competitive in the sonic stakes	7-15g Low, MC		67
Glanz GMC-20E £129	Good + Good +	Very good tracking, smooth sound and good detail. Very slight surface noise enhancement	5-10g Low, MC	R	91
Glanz MFG-110EX £25	Average Average	A little bright but giving detailed bass and clear treble, this was competitive at the price	6-16g Normal, MM	R	43
Glanz MFG-310LX £50	Good + Very Good	Detail and treble outstanding for sub-£100 cartridge. Slight coloration may be due to body resonance	6-10g Normal, MF	BB	85
Glanz MFG-610LX £90	Good + Good +	Similar to cheaper '310 but slightly clearer transients and bass. Benefits from lowish impedance loading	3-10g Normal, MF	R	85
Goldmund Clearaudio £1500	Average + Very Good	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring 1012 £50	Good + Good	Slightly harsh sound but plenty of life and quite good detail. Some very high frequency coloration apparent	6-12g Normal, MM	R	85
Goldring 1022 £70	Good + Good	As with 1012, a touch harsh; detail and transient purity improved, though, and it goes well with electric guitar!	5-11g Normal, MM	R	85
Goldring 1042 £90	Good + Good	Not terribly subtle, and not such good value alongside 1012 and 1022. Quite lively, though	7-12g Normal, MM		91
Goldring Elan £20	Average + Average	A lightweight and frisky-sounding MM that appears to be based upon the same body as the Nagaoka mm4	7-15g Normal, MM	R	67
Goldring Elite £200	Good + Good	The basics are right, and the Elite will cheerfully tackle any source material, but its sound possesses a certain dirtiness which can irritate.	8-18g Low/MC		103
Goldring Epic II £32	Average Average +	An excellent budget choice though the limitations of the stylus are rather obvious at higher frequencies	5-12g Normal, MM	R	67
Goldring Eroica H £105	Good Good -	More confused and coloured than its low-output sibling - high output less of an issue in these days of cheap MC-compatible amplifiers	8-15g Normal, MC		84
Goldring Eroica LX £120	Good + Good	Not the most subtle cartridge in the world; can sound edgy at times, but lively and informative	8-14g Low, MC	R	84
Goldring Excel £549	Average + Good	Goldring's most expensive cartridge to date errs on the warm and heavy side of neutral. Strong bass lines are its forte though its ability to resolve subtle treble details is weaker	6-13g Low, MC		72
Goldring Excel GS £600	Very Good Good +	The Excel has some true high end quality in its lack of annoying colorations, but tracking seems indifferent and high levels tend to sound rough and edgy.	9-20g Low/MC		103
Grado ZF3E + * £47.50	Average - Average	Downtilting balance disguises the brightness of this cartridge; bit of a mixed bag at this price	9-20g (damping) Normal, MM		54
Grado ZTE +1 £26.50	Average - Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal, MM	R	54
Kiseki Blackheart £1795	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Blue Goldspot £450	Very Good Good +	Good bass and imaging, but hints of spit and coloration let the side down slightly	8-15g Low, MC		84
Kiseki Lapis Lazuli £4000	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluidity of the Clearaudios	4-12g Low, MC		60
Kiseki Purpleheart Sapphire £799	Good + Good +	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		48
Koetsu Black S £612	Average Good +	The S is an OEM design built to Koetsu's blueprint. It features a sturdier fixing plate and offers a brighter, faster and more tactile sound than the earlier K	8-15g Low, MC	R	72
Linn Asaka £373	Good + Good +	Disciples of Linn who are trying to realise their true "Karma" may find that saving money is not a short cut to heaven	9-18g Low, MC	R	Coll. '86
Linn K5 £39	Average Average +	Not as crisply focused as the costlier Linn magnetics, the K5 offers a smoother presentation	7-16g Normal, MM	R	67
Linn K9 £89	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal, MM	BB	Coll. '86
Linn Karma £564	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems; results may be less predictable in more general application	9-18g Low, MC	R	Coll. '86
Linn Troika £798	Very Good Good +	Good all-rounder, but still some hint of unhappiness at very high levels. Good imaging and bass.	6-18g Low, MC		91
London Maroon £149	Average Average +	Now manufactured under the London brandname this Decca cartridge is as iconoclastic as ever	9-20g (damping) Normal, MM		67
London Super Gold £300	Poor Average -	Immediate and (in the midrange at least) detailed, but very coloured, very nonlinear and questionable effect on records. Devotees swear by it	9-15g (damping) Normal, fixed stylus MM		84
Militek Aurora £249	Good + Good +	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	Coll. '86
Militek Olympia £349	Average + Good +	Warm and detailed sound - packs the punch of the best MCs with high output as a bonus	12-20g, (damping) Normal, MC	R	54
Nagaoka MM4 £9	Average - Average -	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £18	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48

The Directory

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Nagaoka MP11 Boron £40	Average Average +	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP11 Gold £47	Average - Average +	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Ortofon 510 £30	Good Good +	For the price, a good blend of virtues - weight, clarity and neutrality.	3-11g Normal, MM	BB	85
Ortofon 520 £50	Average Average +	Very sensitive to load capacitance this new Ortofon maintains the company tradition for a lively, effervescent SQ	7-16g Normal, MM	R	67
Ortofon 530 £80	Good + Good +	Very clean and assured sound; transients not quite perfectly pure but plenty of detail.	4-11g Normal, MM	R	85
Ortofon 540 £100	Average - Average	Graced with an advanced FGII stylus our sample possessed too high a compliance for broad arm matching. It could also sound a little unforgiving	3-8g Normal, MM		67
Ortofon MC10 Super £70	Average Good	"What a delightfully sweet-sounding cartridge this is . . ." we said	5-15g Low, MC	BB	48
Ortofon MC15 Super £100	Good + Very Good	A good all-rounder, with outstanding performance in detail retrieval, even if it can be very slightly bright and close-up at times.	10-24g Low/MC	BB	103
Ortofon MC20 Super £200	Average + Good +	An "inviting" sound quality; polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low, MC	R	Coll. '86
Ortofon MC3 Turbo £100	Average + Good	Not terribly subtle, but it obviously doesn't aim at that. The 3 Turbo is bright, cheerful and bouncy - take it as it comes!	10-24g Normal/MC	R	103
Ortofon MC30 Super £270	Very Good Good +	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coll. '87
Ortofon MC3000 MkII £850	Very Good Excellent	Low levels of body resonance are a real ear-opener. Nothing to criticise elsewhere; one of the very best	9-16g Low, MC	R	84
Ortofon MC5000 £1500	Good + Good	Review sample could not be fully run-in, which might explain limited tracking ability and bright and forward sound, though imaging is excellent. Fussy about s.	12-20g Low, MC		91
Ortofon Quartz £120	Good + Good	Lively, quite detailed, and a touch bright, the Quartz has many qualities of the much dearer Quasar	3-12g Low, MC	R	91
Ortofon Quasar £300	Very Good Very Good	Many of the qualities of the MC3000, although a touch bright. Good detail and delicacy	8-15g Low, MC	R	84
Ortofon Quattro £200	Good + Good +	Undoubtedly a competent performer, the Quattro however seems a less obvious choice than the other Qs. Generally neutral, but can be edgy and bright in loud passages.	6-18g Low/MC		103
RATA RP20 £22	Average - Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average +	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average +	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
Rega Bias £34	Average Average +	Difficult to mount in some arms due to its shallow build, the bias offers a gentle, refined SQ that certainly makes it worthy of audition	4-10g Normal, MM		67
Rega Elys £74	Good Good	Clearly superior to the Bias, despite their common heritage, the Elys is both more detailed, accurate and musically convincing	8-15g Normal, MM	R	67
Revolver £20	Average + Average	This modified AT-95E enjoys a very lively mid and treble even if the bass is somewhat 'slower' in comparison. A firm budget buy	8-16g Normal, MM	BB	67
Roksan Corus Black £110	Good + Good	Recognisably related to Corus Blue, but distinctly more civilised and smoother.	7-12g Normal, MM	R	91
Roksan Corus Blue £65	Good + Good	Roksan-specified modified Goldring 1012; slight harshness detracts from otherwise good sound.	7-11g Normal, MM		91
Shure M104E £36	Average - Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure M105E £49	Average Average -	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 Summ
Shure M110HE £60	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 Summ
Shure M111HE £72	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal, MM		38 Summ
Shure M92E £17	Average - Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £29	Average - Average -	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 Summ
Shure ME75ED £26.50	Average Average -	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure ME97HE £49	Average Average +	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48
Shure ML120HE £95	Average + Average +	Quite decent sound quality and a generally fine balanced performance	6-18g Normal, MM		48
Shure ML140HE £120	Average + Good	Qualitatively the treble of this well-balanced moving magnet model was a match for many moving coil cartridges	6-16g Normal, MM		43
Shure Ultra 500 £499	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Shure V15 VMR £215	Good Average +	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure VST V £173	Very Good Very Good	Quite exceptional assurance with difficult material; very stable and clear sound. One of the best. Dynamic Stabilizer actually works!	4-11g Normal, MM	R	85
van den Hul MC One £699	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale - worth it for the extra money	6-12g Low, MC	R	60
van den Hul MC Two £899	Good Very Good	Connected directly to any standard MM input the vH MC Two rewards with a highly detailed yet fluid and musically convincing portrayal	6-13g Normal, MC	R	72
van den Hul MC1 Super £799	Very Good Very Good	Slight softening effect on transients was the only real flaw, but it didn't quite seem to have that special touch one expects for the money	8-15g Low, MC		84
van den Hul MC10 £599	Good Good +	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60
van den Hul MM1 £200	Good + Very Good	If its wooden-sounding midrange coloration could be tamed, the excellent imaging and admirable all-round security of the MM1 would make it an excellent performer.	7-15g Low/MC	R	103

TURNTABLES

The schizophrenic split between consumer electronics and 'real hi-fi' is most obvious amongst turntables. The former are supplied simply as a means of playing vinyl in a system context. Cheaply manufactured in the Far East, these are complete players with a variety of automatic facilities, sometimes tied into system remote control. But engineering compromises severely limit sound quality, cartridge choice may be P-mount restricted, and such machines are rarely stocked by specialist hi-fi dealers these days.

Specialist turntables offer big sound quality improvements, but lack so-called convenience features (that practised users often find irksome). Such turntables at the cheaper end of the market (sub-£350) tend to be supplied with matching tonearm, and often include a 'starter' cartridge. Still better quality is found at higher prices amongst the separate motor units and tonearms. Careful partnering and set-up is essential for these individual components, but 'naturally sympathetic' combinations do exist, and the good dealer can help.

Listed separately as integrated players and as turntable motor units and tonearms, our sound quality rating is based on results achieved using a high quality system - but in point of fact the turntable is usually the limiting factor soundwise in any system. Lab performance summarises the speed stability, vibration generation and environmental isolation of turntables, along with the friction, alignment and adjustment of tonearms. The tonearm's physical characteristics also define a range of compatible cartridges.

TURNTABLES - INTEGRATED

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	ISSUE
Acoustic Research EB-101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Sonata/HR-100S MCS/Atlas £835/£550/£400	Very Good Very Good	Good sound in all areas - bass, clarity and neutrality all in the top class and bettered by very few decks. Atlas PSU expensive but worthwhile	Belt drive, suspended, optional PSU, 13g	R	79
Ariston Pro £160	Good Good	Remarkably clear and detailed for the price, very neutral. Benefits from cartridge upgrade	Manual, belt drive. 12g, cart.	BB	91
Ariston Pro Maxim/RB250 £210	Average Fair	Warm, full sound with a deep bass and solidity is partly offset by lack of fine detail in mid and top. On a suitable surface, with a crisp sounding cartridge, it easily qualifies for shortlisting	Solid plinth, belt drive, manual, 11.5g		103
Ariston Q-Deck £180	Good Average +	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid, inc. cart	BB	67
Dual CS-505-4 £170	Average Average	Easy to set up and to use, this is a consistent sounding and well isolated turntable with a long pedigree. It is slightly lacking in balls, but compensates with a consistently unmuddled presentation and good stereo focus perspectives.	Auto-armlift, interlocked cueing, 2 speed, pitch control	R	103
Dual CS-750 £300	Average-Average	Attractive but lazy performance from a deck with many good ideas and which is a pleasure to use. Cartridge is past it's sell by date. Has 78rpm facility	Solid plinth, belt drive, cart. 3-speed, quartz referenced auto lift		103
Dual CS430 £100	Average Average -	Ragged, sometimes unpleasant cartridge mixes with a modest pleasing player in a very sharply priced package	Belt drive, with cartridge, auto return, 5g	R	67
Dual CS5000 £230	Average Average +	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Dual CS-503-2 £145	Good - Average	Not wholly inspiring; generally coarse and wolly sound is at least not offensive, but easily bettered by the CS505-4. Good value in material terms	Semi auto, belt drive, 10g	R	91
Goldmund ST4 £4589	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard performance at £2,000 less, in a neatly integrated though bulky package	Solid subchassis, direct drive, parallel arm, detachable h/shell	R	60
Goldingr Excelda 1 £160	Poor Poor	Untidy, resonant sound, narrow effective dynamic range and lack of tracking security. The cartridge (the only authentic Goldring part) is quite nice	Manual integrated arm, synchronous motor, auto-start/stop		103
Heybrook TT2 turntable & arm £469/£269	Average Good +	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, R belt drive, 14g	R	67
JVC AL-FQ555 £170	Average - Poor	Clear midband sound but wolly bass and crude treble. Ease of use however ranks highly, and there's little to go out of adjustment	Auto, direct drive, 5.5g		67
Kuzma Stabi/Stogi Reference £995/£899	Very Good Very Good	Beautifully made in a solid oak plinth, the Stabi also sounds very clear, detailed and extended. Stogi Reference is also most capable.	Manual, belt drive, subchassis. 12g	R	91
Linn Axis/Akito £443	Good - Average +	A neat, attractive and well-made package which delivers a rather harsh sound with a 'one-note' effect in the bass, but it's well suited to mid market systems	Belt drive, semi-suspended, electronic PSU, 10g		79
Linn Basik £250	Good Average+	Strong midband analysis and imagery, clean if sharp treble is matched to a good if occasionally wooden bass. Good at the price, and requires no complex setting up or fine tuning in service	Solid plinth, inc cartridge, manual speed change	R	103
Linn LP12 Basik/Akito £599/£137	Very Good Good	Familiar Linn virtues and vices - plenty of the former though and few of the latter. Trails the full LP12 significantly, but pace, rhythm, timing etc. still in top class, and bass tauter than of old	Suspended subchassis, belt drive, single speed, 45rpm adaptor	R	103
Linn LP12-Lingo/Ekos/Troika £1168/£1097/£798	Good + Good +	The classic reference is improved (at a price) by the Lingo but character remains the same - not as detailed or neutral as the best. Ekos arm, though pricey, is well made and suited to many decks	Manual, subchassis, belt drive, 9g	R	91
Manticore Mantra/Musician £340/£170	Good + Good +	Well engineered deck with satisfying sound. The arm is particularly fine and very good value	Belt drive, suspended, 15g	R	79
Marantz TT400 £160	Average - Poor	Everything one hopes a budget deck won't be; coarse, confused, muddled and woolly. Construction isn't wonderful, either	Manual, belt drive 16g		91
NAD 5120 £90	Average Average	A number of running improvements have given this player a range and tautness denied its lazier sounding antecedents.	Semi-auto belt drive, detachable armtube/weight, 9g	BB	67
Opus 3 Continuo/Decca London International (Revise) £599/£99	Poor Good	Heavyweight motor unit with many fine properties, but which needs further development. The idiosyncratic arm is a suitable (though not ideal) platform for the Decca cartridge. For all its faults though, the whole transcends the sum of the parts	Belt-drive manual, damped unipivot arm, 12g		67
Rational Audio Aura 01 £189	Poor Good	Poor lab results reflect bad rumble, but midrange and treble are very pure and clean; idiosyncratic sound and styling should be tried!	Manual, belt drive, linear tracking arm 10g	R	91
Rega Planar 2 £185	Average + Good	A remarkable product at the price, surprisingly articulate and confident	Manual, 11.5g	BB	48
Rega Planar 3 £250	Good Good	A long time leader in its price category, the '3 (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Manual, 11.5g	BB	48
Revolver Rebel £185	Average Good -	Quite lively and detailed but not the strongest on subtlety, with slightly lumpy bass. Motor breakthrough audible, and watch for bent motor shaft on delivery!	Manual, belt drive, semi-suspended 12g	R	91
Revox B291* £892	Average - Average -	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, cart		55
Roksan Radius/Tabriz zi £635	Good Good	Truly modern turntable in appearance. The design is subtle, refined and easy on the eye. Musically it offers exceptional performance with a minimum of setting up and operational fuss	Semi-suspended, belt drive, mains plug PSU.	R	103
Roksan Xerxes 33/Tabriz zi £550/£255	Good Good	Good but not exceptional sound quality from expensive package. At its optimum with a relatively inexpensive arm/cartridge unless upgrade to full Xerxes is contemplated. XPSII PSU adds 45rpm and much to sound quality	Semi-suspended, belt drive, 33rpm only, mains plug PSU, one piece arm tube, 'intelligent' counterweight		103
Roksan Xerxes/Artemiz /Artaxerxes £785/£655/£559	Excellent Excellent	Superb though costly record playing hardware, highly integrated and synergistic in nature, but suitable for use with any good MC cartridge. Will not suit all tastes, however	Semi-suspended, belt drive, quartz locked 2 speed PSU	R	103

TURNTABLES - INTEGRATED

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	ISSUE
Rotel RP-855 £200	Good Good	Great sound for the money - detailed and clear with good bass and no irritating nasties	Belt drive, solid, speed adjust, 9g	BB	79
Systemdek 1/900 £188	Poor Average-	The motor unit is derivative of the Rega Planar 2, but sounds inferior by virtue of insufficient structural integrity. Pitch stability is also far from acceptable	Solid plinth, manual speed change, no cartridge		103
Technics SL-DD33 £120	Average Average	As with the QD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
Technics SL-L20 £120	Poor Average -	A rather lightweight parallel tracker achieving a poor overall rating, with little to recommend it unless you dig facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £150	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Technics SLBD-22 £100	Average - Average -	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi automatic, solid plinth, electronic, 6g P-mount	R	48
Thorens TD 166 Mk V £240	Good Good	Classic suspended-subchassis deck with clear, stable sound of no particular character. Unlikely to make enemies	Belt drive, suspended, 12g	BB	79
Thorens TD 280 Mk II £190	Good - Good -	Legendary Thorens build quality on the cheap - slightly unobtrusive sound but eminently liveable-with and very good value	Belt drive, solid, electronic PSU, 12g	BB	79
Thorens TD 316 Mk II £250	Good Good -	Very solid deck with neat split-chassis construction. Sound is a bit insecure in the bass, but it could suit classical music lovers well	Belt drive, suspended, electronic PSU, 12g	R	79
Thorens TD-3001/TP90SF £850	Very Good Good	Excellent middle ranking esoterica, with strong all round abilities rather than excellence in particular areas. Engineering content is particularly high	Suspended subchassis, belt drive, available w/o arm	R	103
Thorens TD166 VI/UK/RB250 £270	Good Average-	Refined and articulate sound with well focused imagery, suitable for use with good MM and budget MC cartridges. The Rega arm is the best at its price, a good purist deck	Manual, belt drive, suspended, 11.5g	BB	103
Thorens TD2001 £650	Good Good -	Similar to TD320 but much dearer - why? Sound is comfortable but not very detailed	Semi-auto, belt drive, subchassis 15g		91
Thorens TD280 II/UK £189	Average Average	Excellent value for money from a built to last player which is also easy to use. Will benefit from a cartridge upgrade in due course, but has an energetic and detailed sound	Solid plinth 2-speed player, inc cartridge	BB	103
Thorens TD320 Mk II £400	Good Good	Good, consistent sounding deck with much improved (but not ideal) arm. A little expensive for performance offered	Semi-auto two speed belt drive, 14g		67
Townshend Rock Reference/Excalibur £2295/£745	Excellent Excellent	Overall the closest reproduction to master tape we've yet heard, with stunning real bass and excellent neutrality. Front end damping trough improves LF detail significantly	Belt drive, suspended, electronic PSU, front-end damping, 12g	R	79
Voyd Reference/Helius Cyalene £5414/£1350	n/a Excellent	Voyd's flagship is equipped with three of the biggest motors in the business, a Lexan platter and a real brute of a power supply (it dwarfs most power amps!). A strong contender for best turntable in the known universe	Belt drive, 3 motors, subchassis, outboard PSU, 12/14g	R	Coll. '90
Well Tempered WTAT £1690	Average Very Good	Intriguing and challenging design. Musically it is not ideal, but it has a limpid quality and a lack of artificiality that sets standards as well as turning the ear, though it's not completely uncoloured. A charmer yet mainstream enough in its virtues to be viable	Manual 2-speed, damped, suspended arm, 7.5g	R	67
Zarathustra S4/Pluto 5A Prestige/PSU £1500/£2500/£500	n/a Excellent	The very well made and finished heavy platter S4 with the superb Pluto arm make a devastating combination ranking up there with the very best	Subchassis, manual, available without PSU	R	72

MOTOR UNITS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
CEC ST930 £599	Good Very Good	A rarity - a serious hi-fi product that loses nothing to budget rivals in finish or convenience. Good clean sound, very stable and assured	Belt drive, external PSU, 78 speed inc.	R	79
CS Audio Resan kit for Rega £90	Good - Good	After-market kit to convert Rega 2 or 3 to semi-suspended subchassis style. Looks good and sounds tidier than original. Feedback is much reduced	Conversion kit, all work reversible	R	79
Michell Gyrodec £595	Good Good	Sweet and natural sounding player, well exploited by the Rega RB300 arm. Aesthetics, and the acres of acrylic, are unique	Manual, belt drive, suspended motor unit		55
Michell Syncro £265	Good Good	A happy blend of qualities endows the Synchro with a blend of subtlety and force - the mailed fist in the velvet glove. Easy on the ear in the best sense.	Manual, belt drive, suspended motor unit	R	67
NVA Senior £450	Good - Average	Very high sensitivity to low-frequency vibration, especially on NVA stand, gives strange subjective bass response and confused sound. Looks are unusual but pleasing	Belt drive, electronic PSU, two-part plinth		79
Oracle Paris £695	Good - Average	Looks good but sounds coarse, confused and uneven, with bass liable to thump	Belt drive, semi-suspended, electronic		91
Origin Live Oasis A £495	Good - Average	Rather coarse sound with lack of detail resolution - but lively presentation may appeal. Appearance is industrial	Belt drive, external mains filter, 33rpm only, suspended		79
Origin Live Oasis B £199	Average Average +	Aesthetics are not its strong point, but its lively and articulate - if idiosyncratic - sound will please some tastes. Highly resonant construction is very sensitive to feedback	Belt drive, 33Gy1/3Gyrpm only, solid plinth/subchassis		79
Oxford Acoustics Crystal Reference £2495	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery. Recently updated to mk.II form	Manual, belt drive, subchassis, stand	R	60
Pink Triangle Anniversary £1175	Excellent Excellent	Possibly the most detailed, clear, neutral and therefore accurate deck around. Likeness to master tape is almost uncanny	Suspended, belt drive, electronic, motor on subchassis	R	91
Pink Triangle Export £676	Very Good Excellent	Basically a PT TOO with built-in power supply. Retains features of great transparency and neutrality. Review sample had highish motor noise - presumed untypical	Suspended, belt drive, electronic	R	91
Pink Triangle Little Pink Thing £392	Good + Very Good	Leads the field for clarity and neutrality at this price or a good bit more. It also looks very smart! Excellent value. Arm cut-out suits Rega or Linn style	Belt drive, semi-suspended, electronic PSU	R	79
Revolver £150	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Systemdek IIX/900 £200	Good Good	The Systemdek IIX is a high performance, low cost turntable which is particularly strong in the areas of fine detail resolution and imagery. Tested with Rega RB250	Suspended subchassis, metal armboard, glass platter, 2 speed	BB	103
Systemdek IIXE/900AP £358	Good Good+	A development of the IIXE/900, with a comparably detailed sound reinforced by better frequency extremes, timing etc. Needs careful setting up	Suspended subchassis, metal armboard, acrylic platter, PSU	R	103
Systemdek IV £495	Good Very Good	The level of wow is a theoretical concern at least, but elsewhere this player shines, combining euphony, information and imaging in a polished, untemperamental package	Two-speed manual belt drive	R	67
Voyd 0.5 £3062	n/a Excellent	Based on the standard 3-motor Voyd but with upgrade options (better bearing, platter, etc) which take it half way to a Voyd Reference. Superb build and finish; colourful, dramatic performance	Belt drive, 3 motors, subchassis, outboard PSU	R	72
Voyd Valdi £868	Good - Very Good	Recent power supply upgrade has resulted in around improvements. This Perspex plattered, two motor deck is remarkably competent, revealing and neutral	Belt drive, suspended subchassis, electronic PSU		79
VPI HW-19MK3 £1600	Very Good Very Good	Built to accommodate parallel tracking arms, this large but elegant deck produced clean, smooth sound when fitted with an SME arm. Good bass	Belt drive, suspended subchassis	R	79

Personal Messages

This column normally avoids the ins and outs of the hi-fi business. On occasion, however, a commercial change has such far-reaching implications I feel justified in turning out a 'consultant editorial'. Just such an event is the de facto resignation of Linn Products from what I understand as the specialist hi-fi business. This is important because Linn's actions have always proved highly significant. It's also probably inevitable, given the ongoing expansion of a number of UK brands and the limited size of the specialist marketplace. But what in my view is both sad and reprehensible is that Linn has clearly decided its future health must involve a drastic pruning of many of its roots.

Paul Messenger describes some radical changes which are in store for the British hi-fi industry, with potentially dramatic consequences for manufacturers, dealers and, indeed, you.

The crucial fact is that a number of the UK's best respected specialist hi-fi dealers have recently 'resigned' their Linn agencies. Dealers part company with manufacturers (and vice versa) all the time, of course. But to find as many as a dozen simultaneously talking of 'resigning' a major agency in the depths of a recession is sufficient reason for those inverted commas.

The root cause is that Linn wants dealers who are firmly committed to its complete range of products and enthusiastically demonstrate complete Linn systems, not those that specialise in, say, selling, setting up and maintaining *Sondek* turntables. It's a situation that has numerous implications and repercussions, which differ dramatically depending upon the point of view.

It's easy to see the logic behind Linn's strategy. The *Sondek* and its ancillaries are now a very small percentage of the total business, and the company has always stressed the important advantages of controlling the whole system chain. As I understand it, Linn sees its future in the marketing of complete and effectively integrated, yet flexibly upgradeable, quality hi-fi (and maybe A/V) systems, and is therefore implementing the appropriate strategies towards creating itself just such an upmarket niche. There are obvious parallels with European brands like B&O and Revox.

One can at least comprehend Linn's determined attempts to come to terms with its historical growth imperative. But it's impossible not to feel moral outrage on behalf of the longstanding independent specialist dealer about to 'give up' his agency, and exasperation at the knock-on effect this will have upon his established customers.

Back in the mid Seventies, those who recognised the true merit (and the appalling significance) of the *Sondek* were few and far between. It was (and still to a degree is) a fiddly and expensive product that only

the most committed and dedicated dealers even considered taking on, relying in the early days, at least, largely on their own expertise for matching and setting up arms and cartridges, and selecting partnering amplifiers and speakers.

Such dealers wanted to sell an exceptional turntable. Some had a similar faith in one or more of Linn's original three speakers too, but the turntable, arms and cartridges always had the widest distribution. The vital decision over which products to stock remained fundamentally the dealer's.

Which in an ideal world is exactly as it should be. Said (idealised) dealers stand or fall by their ability to mix and match separate components to individual preferences, and by their ability to deliver high quality demonstration, home installation and backup services. The successful ones build a business up steadily over the years, relying increasingly on satisfied customers returning for regular updates.

Alongside the independence of the dealer himself, this longterm dealer/customer relationship is at the very core of specialist hi-fi. 'First find your dealer' is my invariable reply when asked about buying serious hi-fi equipment, simply because long term satisfaction is unlikely unless a degree of empathy is established between customer and dealer.

Crucial relationship

And it's the crucial ongoing relationship with customers past, present and future that this new Linn initiative undermines. I can't pretend to be a normal customer myself, but I know of those who've read my ramblings and visited two or three Linn dealers to find the one nearest to their wavelength, fallen in love with the *Sondek*, and enjoyed oodles of musical satisfaction for the past decade or more.

Putting myself in their shoes, I would be right cheesed off to pop into my chosen dealer after a couple of years interval to get the stylus checked, to discover that the brand I was using (and saw no reason to change) was now only available from another dealer unknown to me and situated several miles away.

There's no denying specialist hi-fi is moving inexorably towards the packaged system approach, simply because mutual component interaction is a vital ingredient in the end result, and the potential pitfalls (and potentiality for pratfalls) are a constant source of surprise. Last month I discussed all the traumas I was suffering trying to mix and match components which were the result of very different design philosophies. This month I was amazed to discover that a Naim CDS CD player sounds an awful lot sweeter if there isn't a Linn *Lingo* turntable supply connected to the same ring main. (And it doesn't matter whether the *Lingo* is on or off; and at least one other CD player has so far shown the same effect.)

For these sort of reasons the complete one-make package will often turn out to be the best solution. But this imposition of a particular manufacturer's world view directly onto the end user can never match the subtlety and diversity available by enlisting the skills of the genuinely enthusiastic and independent specialist dealer.

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