

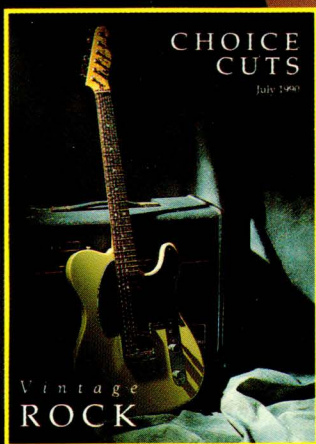
HI-FI CHOICE

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

JULY 1990 £2.95

Separates Systems

GETTING THE BEST SOUND
PER POUND - 8 SYSTEMS TESTED



FREE Supplement

VINTAGE ROCK CD REISSUES

Best Buys Awarded

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RECOMMENDED PRODUCTS

OVER

950 Test Summaries

IN THE CHOICE
BUYER'S GUIDE



ISSN 0955-1115



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THE WORLD'S No.1 GUIDE TO BUYING HI-FI
HI-FI CHOICE
ISSUE NUMBER 84: JULY 1990

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PUBLISHED by Dennis Publishing Ltd, 14 Rathbone Place, London W1P 1DE.
Tel: 071-631 1433. Fax: 071-323 3547 (Editorial); 071-636 1640 (Advertising)
Company registered in England.

REPRO: Graphic Ideas.

TYPESET by: Time Graphics Ltd. PRINTED by: Riverside Press.

DISTRIBUTED by: SM Distribution,
6 Leigham Court Road, Streatham, London SW16 2PG.
Tel: 081-677 8111.

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PUBLICATION

Enquiries regarding the content of this journal should be made in writing to *Hi-Fi Choice* Editorial, 14 Rathbone Place, London W1P 1DE. We regret enquiries cannot be dealt with by telephone. While every care has been taken in the preparation of this journal, the publishers cannot be held responsible for the accuracy of the information herein, or any consequence arising from it. Readers should note that all judgements have been made in the context of equipment available to *Hi-Fi Choice* at the time of review, and that 'value for money' comments are based on UK prices at the time of review, which are subject to fluctuation and are only applicable to the UK market. This edition © 1990, Felden productions. ISSN No. 0955 111 5.

Member of the Audit Bureau of Circulation.

ABC (July-Dec 1989 - 23,847)

PP4

Menu

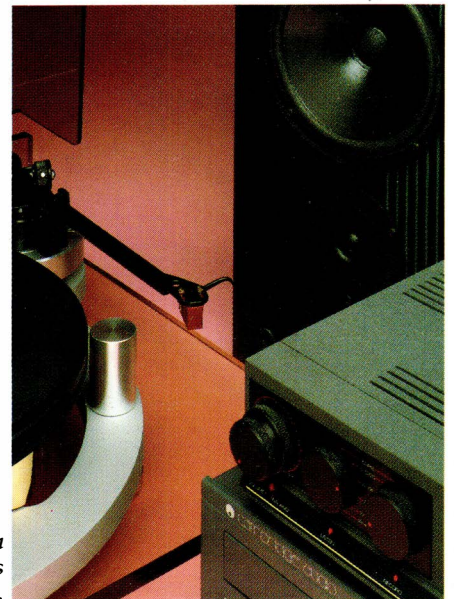
There's a thrill factor involved in getting the best performance out of a hi-fi system, a sense of satisfaction which only hi-fi hedonists will ever experience. And come to think of it, it's the desire to search for true audio nirvana which distinguishes the casual hi-fi consumer - who may be perfectly satisfied boogying to a midi system and, if a keen music enthusiast, might even pay £1,000 or so for an upmarket model - from the true audiophile who wants to turn down the living room lights and be carried away by the musical performance delivered by his or her hi-fi system.

If you've got the bug - the desire to get the best sound possible from a system and hear the tiniest nuances of detail hidden within the recordings on your LPs and CDs (and, perhaps, tapes) - the symptoms are plain for all to see. The most obvious sign comes from the loudspeakers. Are you prepared to juggle with living room furniture so that the loudspeakers can be positioned correctly in the room, equidistant from the sofa and on proper stands which support them at the correct height? If you are, then plainly you'll understand that assembling a thoroughly enjoyable-sounding system is not quite as straightforward as simply buying well known and/or critically acclaimed components. The 'black art' of achieving system synergy is alive and well, as I've been reminded only too obviously during recent weeks. I've been trying all kinds of new components at home recently, which necessarily involves swapping and changing my hi-fi system on a regular basis. And when installing a new component it's often difficult to ascertain whether the change in sound (be it an improvement or degradation) is due to the component itself, or simply an alteration of the system's synergistic interactions.

Specialist hi-fi dealers play an important role in helping customers assemble enjoyable systems. So for this month's reviews we asked a few dealers to suggest a selection of systems for Alvin Gold to audition. Not all of the systems are *exactly* as each dealer recommended due to some manufacturers being unable to deliver the products when we needed them, but they're pretty close. Alvin explains the review methodology in *Choosing and Using Separates Systems* on page 45.

Also this month we've tested a group of high quality cartridges, to be followed in next month's issue by a handful of more affordable pickups. Oh yes, we're still playing our records - even though, as this month's *FREE Choice Cuts* supplement shows, there's more back catalogue being reissued on CD than we ever expected.

John Bamford

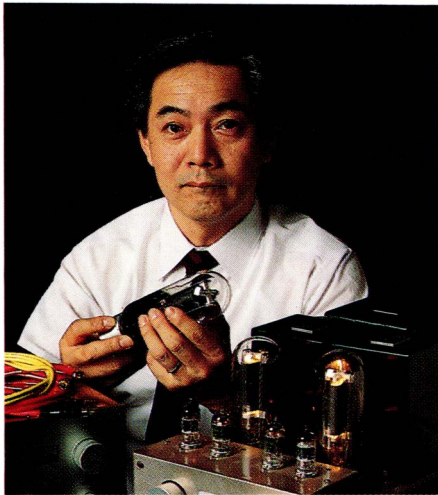


Cover photograph
by Chris
Richardson.

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A prophylactic to dampen that CD sound is discussed in Sessions.



*This month's FREE supplement:
vintage rock releases now on CD.*

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*yamaha
astarte~
a brave
new world...*



*music
naturally*



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AFTER CHRIS PORTER MIXES IT WITH GEORGE MICHAEL HE TAKES THE MIX HOME TO HIS AKAI.

It's hard to imagine from the clarity and precision of the "Faith" album that throughout much of its recording the engineer Chris Porter was "legless".

This, however, didn't stop it walking away with a much coveted "Grammy" award (the Music Industry's Oscar) as The Album Of The Year.

In fact, working on crutches following a riding accident whilst keeping up with the exacting standards demanded by George Michael is just one example of Chris's professionalism.

Fortunately the rest of his career has seen him leaping around the world as a producer/engineer producing a Number One for Aswad, and also working with top bands in the USA and Europe.

Not surprisingly he's working again with George Michael on his forthcoming album.

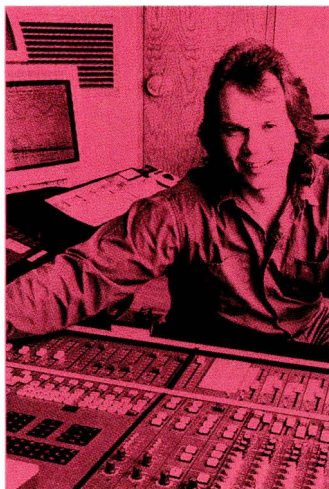
Sitting in his own studio deep in rural Surrey he says, "The engineer's job is to make it look effortless", adding, "when the artist has an idea I get it going quickly".

Getting it going isn't that difficult. He's surrounded by equipment that wouldn't look out of place on the Space Shuttle.

"10 years ago, 90% of this didn't exist", says Chris as he indicates the banks of black boxes, serried rows of dials and switches and pulsating lights.

But then machines like the Akai Pro-Audio Professional range changed everything. Now, at his fingertips Chris has a range of digital effects, samplers, musical computers and drum machines.

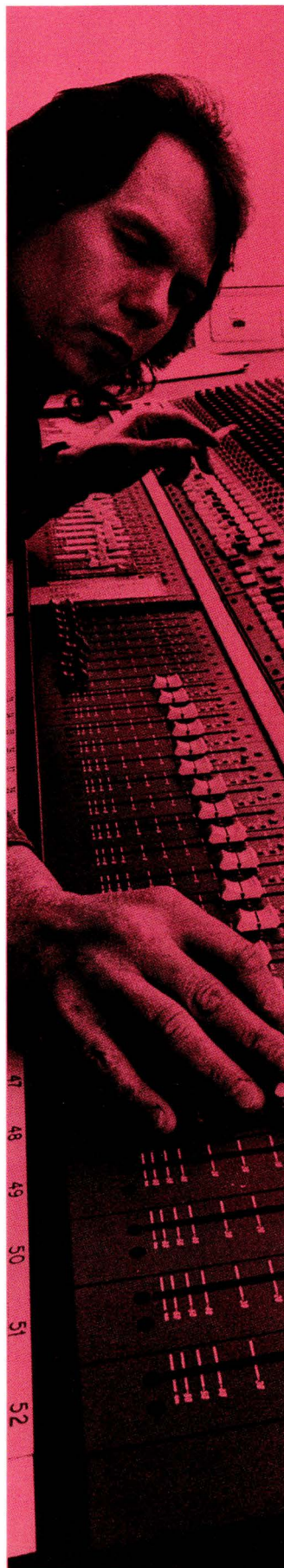
Today, George Michael's



songs are created with the assistance of computers and multi-track recorders.

"Equipment technology seems to change month by month" says Chris. But Akai remains at the forefront. "The Akai S1000 Sound Sampler is the industry standard", he adds.

After spending up to six hours a day over the past eight months perfecting what he calls the "sound picture" of each song, Chris often listens to the tape on his Akai midi-system. Doesn't he



notice an incredible difference in quality?

"Not at all" he says, "of course the sound's only as good as the equipment it's played on... listening on some systems is like viewing a painting through out-of-focus glasses".

The Akai range could never be accused of that. Akai's expertise



in satisfying the professionals has created HiFi systems and separates that keep the sound picture in perfect focus.

They completely live up to Chris's description of good equipment. "Something that keeps the detail and the punch of what we achieve on the master".



AKAI

always professional

Update



PRODUCTS

Pioneering spirit

We've heard it all before: a top Japanese firm puts its hand on its corporate heart and says it has designed an audiophile product at an affordable price. Just so Pioneer . . . just so? On a recent visit to Japan our editor was shown prototypes of two eminently affordable integrated amplifiers with design concepts drawn from British audiophile principles. Five years in the making, the amplifiers have been designed to use low levels of overall negative feedback, with much attention paid to grounding systems and power supplies. And they owe some design techniques to Pioneer's high-end M-6 monoblok power amps which are a cost-no-object exercise at around £8,000 a pair.

Pioneer's new integrated amps are built specifically for the British market – no mean feat when one considers that Pioneer is a global concern, and consequently should suffer none of the compromises in construction by having to appeal to German tastes as well. Due here in July, the A-400 is a 50 watts per channel model costing £229 while the A-300 delivers 30 watts per channel and costs £179. We haven't auditioned these amps yet, but adherence to the above principles (not least a British-only product) suggests something very exciting. Watch out for them.

Fidelity in the bookshelf

Musical Fidelity has launched its new loudspeaker – the £229 MC1. The model has been balanced to work correctly when placed against a wall – an increasing trend which is especially useful to owners of small rooms. Efficiency is high at 90dB and the MC1 is (naturally) described as a perfect partner to the company's A1 or B1 amplifiers. The upgraded MC2 loudspeakers should also be in the shops this month. These £349 models promise dramatic sound quality improvements over the previous MC2 with a slightly larger cabinet and two front-facing ports.

BUSINESS

Managing well

By the time this issue of *Choice* reaches the news stands Linn Products of Glasgow could have won the UK's first Management of New Ideas Award from the Royal Society for the Encouragement of Arts, Manufacturers and Commerce (RAS). Linn, best known for its LP12 turntable, beat off 80 competitors to win the RAS Northern Region's semi-finals in late April. The society recognised that the company, now with a workforce 140 strong, had 'revolutionised hi-fi production processes', giving its assemblers individual responsibility for production,



Musical Fidelity's MC1: Designed to 'go' against a wall.

testing and packaging of separate pieces of hi-fi equipment. The work environment (Linn relies heavily on the use of robotics for mundane jobs), and the company's relationship with its customers through its dealership, will also have played a part if Linn wins.

The award was initiated in October last year. Its aim is to reward businesses which can demonstrate success through the management of new ideas, and secondly to pass on successful management techniques to the rest of British business.

PRODUCTS

Solid as a rock

Keen-eyed *Choice* readers will have spotted them in last

month's show report from Paris, but this month B&W Loudspeakers, of Lancing, W. Sussex, officially launched its *Solid* model to the British market. Designed by Morton Warren the *Solid* is a radical departure from conventional wooden 'box' designs of loudspeaker, being made from moulded resin with a bevelled baffle and radiused ends.

While the specification promises respectable levels of performance from such a small speaker (it measures just 23cm high) the *Solid* has been designed for multi-purpose applications and will probably come into its own for those who want to run a second unobtrusive pair of loudspeakers – to another room, say.

Supplied with an adjustable ball-and-socket wall bracket, which doubles up as a stand for use on horizontal surfaces, *Solids* can be tilted to 'fire' in almost any direction. For the design-conscious six two-tone colour finishes plus the monochrome black or white will cater for different room environments and a cluster of *Solids* can be arranged together to give omnidirectional coverage from the centre of a ceiling. A natty point here: you'll only need one cable to run such a cluster.

Sensitivity rating is 90dB,



British audiophile principles from a Japanese multinational.



Style and sound from B&W with the Solid loudspeaker.

which deletes the need for mega amplification, while B&W has incorporated protection circuitry to safeguard the drivers from levels exceeding 150watts. The *Solids* cost £189 a pair.

Red into brown

Sonic Link has introduced two new cable types for discerning users of hi-fi. The interconnect *Red* uses screened single core silver-plated copper sheathed in red PTFE and costs £7.50 per metre, or is available in gold plated terminated one metre pairs at £35. Sonic Link *Brown* is loudspeaker cable, again made of silver plated copper sheathed in brown PTFE. It costs £10 a metre.

Sonic Link has also changed the name of its similar dedicated mains cable to Sonic Link *Black* which is available at £12 a metre. Sonic Link Amplification, 6 Mill Close, Borrowwash, Derby, DE7 3GU. Tel: (0332) 0674929.

More low-bits

Yamaha joins the low-bit D-to-A conversion race with two new top-of-the-range CD players this month. Both feature the company's S-Bit – a pulse width modulation, or PWM – digital-to-analogue conversion system and incorporate high speed linear feed motors for optimum tracking and stability as well as a new design of chassis to counter vibration and resonance. Both include

remote control. The more expensive model, *CDX-1030*, will cost £500 and is available in both titanium and black finishes. Looking the same and offering the same facilities, but without such internal features as a massive low pass filter or the likes of a brushless spindle motor, the *CDX-930* costs £349 and is only available in black.

The new models join Yamaha's two other new CD players for the 1990 season. However, the cheaper *CDX-730* and *CDX-530* launched earlier feature the company's 'Hi-Bit' DAC technology – and are available in titanium finish for the summer.

On-board 'bitstream' amps

Two British amplifier manufacturers have announced 'digital amplifiers' incorporating Philips' PDM (pulse density modulation) 'bitstream'

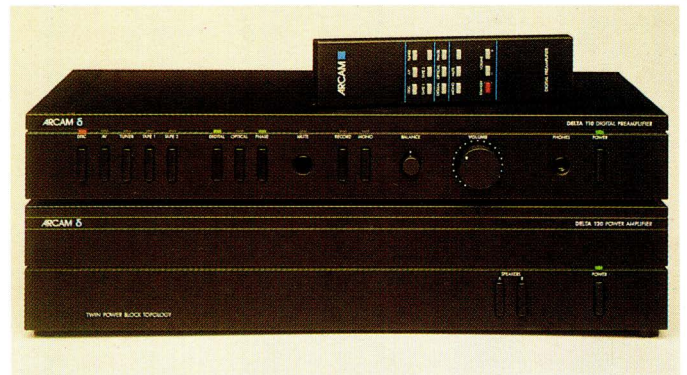
digital-to-analogue converters. Arcam, of Cambridge is adding a pre/power combination to its *Delta* range – the *Delta 110* preamp and *Delta 120* power amp which is a twin mono design, while Kelvin Labs, of Southampton has its *PDM Digital Integrated* amplifier.

The Arcam *110* is a remote control model and claims to be the first preamp to include a PDM DAC. Offering five analogue and two digital inputs – coaxial and optical – it has been designed to complement Arcam's *Delta 170* CD transport but can also be used with any CD player carrying a digital output. Separate listening while recording is possible, and the *110* features a motorised volume control, manual balance control and headphone socket.

monoblocks in the same case. The two channels can be run in stereo or in parallel (for bi-wiring loudspeakers) and bridged mono is also possible. Four pairs of loudspeaker terminals allow bi-wiring as well as running two pairs of loudspeakers – selection of which pair you want to listen to is provided on the front panel. The *110* preamplifier costs £600 and the *120* power amp retails at £499.

The Kelvin Labs *Digital Integrated Amplifier* is basically an upgraded version of the company's *Integrated* (£395). At £499 we would agree with KL that the amp offers a stunning-value avenue into the touted benefits of PDM sound.

However, if you're happy with your existing amp Kelvin Labs also has a new



One to dig out: PDM sound from Arcam.

Arcam says that audiophile principles have been adhered to in designing the amp. Signal paths are kept short and top quality components are employed, while separate toroidal transformers are used for analogue and digital power supplies. The *120* power amp houses two

outboard DAC which will give owners of CD players with digital outputs the chance to enjoy outboard digital to analogue conversion (an advantage in itself) with PDM sound. This natty product measures just 75 x 25 x 250mm and is competitively priced at £199.



Remember non-black hi-fi? Yamaha does.

Seven up bookshelf

Last month we told you about a loudspeaker called the Seventh Veil *System IV* which uses four aluminium Bandor drive units. This month we've found a design that employs two of these diminutive full-range drivers in a pentagonal cabinet. The *Pentachord* is a seven sided bookshelf loudspeaker made out of inch thick solid wood. The aim of the unusual shape is to avoid parallel sides and thus reduce internal reflections to minimise cabinet coloration. As a further aid to rigidity the top and bottom panels are connected together by a torsion rod. This is one solid box!

Because the two-inch drivers are full range, there is no crossover as such and impedances between 4 and 16ohms can be achieved with different connection configurations. Efficiency is quoted as 87dB/W.

The *Pentachord* measures 27.5cm high, retails for £460 a pair and is available in a variety of solid woods including beech, cherry and oak. Further information can be had from Pentachord Loudspeakers, 49 Rusholme Road, London SW15 3LF. Tel: (081) 788 2228.

Sound and vision

A NICAM decoder with its roots in a hi-fi company is a welcome development for anyone interested in sound quality while they are watching television. Arcam's *Delta 150* NICAM stereo TV tuner is officially launched into the shops this month at a premium of £349.90. The remote control unit offers owners of TV sets without NICAM circuitry the chance to upgrade without having to buy a new TV (starting price around £500). The idea behind the '150 is that it will sit in your hi-fi system and relay stereo sound through your hi-fi loudspeakers – which in most cases will be better than those used in televisions. And with UHF remodulation and a dedicated wide bandwidth composite video output



Pentachord: going one better than a six-sided cuboid speaker?

signal feeding into a TV's A/V input socket the unit also promises better picture quality.

NICAM broadcasts are being phased in by independent television networks to give an estimated coverage to 75 per cent of the nation by the end of this year. The BBC, which invented the system, plans nationwide coverage by 1991. Sound quality is touted as being as good as CD – which is a little optimistic. But it is certainly as good as FM radio sound and heralds the true integration of audio and visual formats.

Other standalone NICAM decoders are being made by Motion Electronics, of Maidstone Kent, and Sachs Nicam, of Stanmore Middlesex, which offers a £200 model.



Still live: Helix II and new Ku-Stone stand.

Solid as a . . .

Bonded flint has been employed in the makeup of Linn Products' new *Ku-Stone* loudspeaker stand. The £99 stand, designed especially for use with the company's *Index*, *Helix* and *Nexus* loudspeakers, uses an upright column of bonded flint attached to a spiked steel base to achieve a stable yet absorbent platform. Bolts attach it to the base of Linn loudspeakers but an adaptor kit allows it to be used with other makes and models. The company has also redesigned

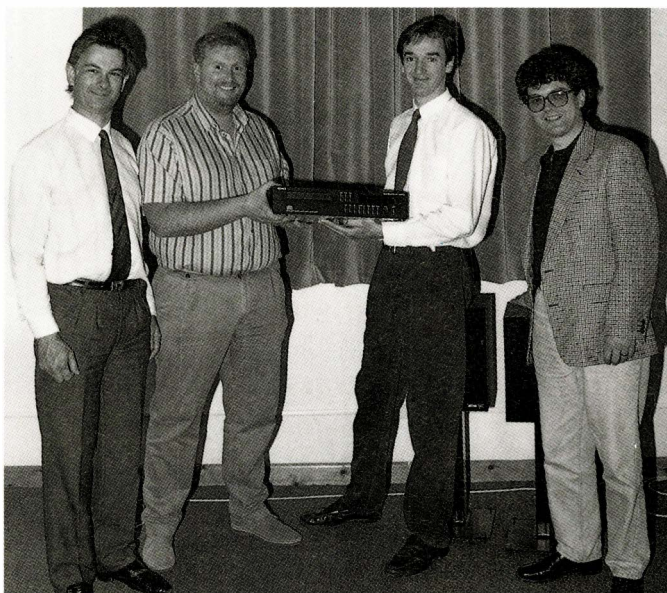
its *Helix* loudspeaker, upgrading the model to *Helix II*. Several improvements are promised including a new design of tweeter and the unit is bi-wireable. Cost? £329 without stand.

BUSINESS

Royal approval

Loudspeaker manufacturer Mordaunt-Short has won a 1990 Queen's Award for Export Achievement. M-S, part of the TGI group which includes Tannoy and Goodmans, was one of 126 British companies receiving awards – and the only specialist hi-fi manufacturer listed. The company, founded in 1967 and now based in Horndean, Hants, has increased its turnover with export value increasing at a rate of 50 per cent a year in 1988 and 1989. It employs 50 people. M-S exports to countries all around the world – not least the Far East and Japan where its products enjoy kudos for sound quality and superlative (five year guarantee) reliability.

Elsewhere Sharp's Wrexham factory also received the Queen's Award for Export Achievement. One



Dave Hunt was the lucky winner of the first prize in our Arcam competition, run in the February issue. Dave is seen here receiving his Arcam system from our very own Jason Kennedy – who actually wore a tie for the occasion! Outside left and outside right are Rod Ardern and Jerry Gould of Alternative Audio in Solihull, our prizewinner's nearest Arcam stockists. Our thanks to them for organising the prize-giving ceremony.



Wouldn't it be nice if all the finer things in life could be enjoyed for as long as the new Delta System?

Here at Arcam Towers we don't hold with the belief that, to qualify for vintage status, a product must be exceedingly old and covered in cobwebs. Certainly it's true that our top of the range Delta System will last for years and years (without being kept in a cellar). But you can enjoy its unrivalled smoothness and subtlety from day one.

The Delta range includes the new 90.2 amplifier (even cleaner and clearer in sound than its predecessor, thanks to a host of refinements such as a much improved phono preamp and more powerful toroidal mains transformer), its baby brother the Delta 60 (a classic 'straight line' integrated amplifier), and the Delta 80 tuner (digital display with twelve presets, six for AM and six for FM plus a user-friendly tuning knob). Our new 70.2 CD player has twin power transformers to keep the analogue and digital stages sonically separate, dimmable/switchable VFD display to improve sound quality still further, 20 track programming and full remote control. Last, but by no stretch of anyone's imagination least, comes the remarkable Delta 170, Britain's first purpose-built CD transport. Whereas a normal CD player reads the digital data from the disc then converts it into an analogue signal, the 170 simply does the first part. With breathtaking accuracy. You need a separate digital to analogue converter (such as our very own award-reaping Black Box) to turn the transport's digital output (coaxial or optical) into an amplifier-ready signal.

The Delta System is vintage hi-fi strictly for the most demanding audiophile. What's more, you can indulge in its mellifluousness hour after hour, day after day, year after year. And, unlike vintages of the bottled variety (and lesser brands of hi-fi too, for that matter), it won't leave you with a headache.

ARCAM DELTA SYSTEM



AMPLIFIERS · TUNER · CD PLAYER · CD TRANSPORT · BLACK BOX · LOUDSPEAKERS

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of four Sharp factories in Europe, the Sharp Manufacturing Company of the UK employs 1,200 people and last year exported 60 per cent of its output – representing nearly £69m. The factory makes CD players as well as VCRs, microwaves and typewriters. Sharp has also just set up a new R&D base – at Oxford which is the first laboratory to be established outside the company's home base in Japan and will concentrate on designing goods specifically for European markets.

Malteasier

Townshend International has moved to a new address . . . in Malta. TI's founder Max Townshend undertook the move principally for economic reasons – the Maltese location offers cheap factory rental and labour and the government has negotiated beneficial import duties with developed countries around the world. However, one suspects that for a former International Hobie Cat sailor there are other advantages as well . . .

With a slicker manufacturing operation Townshend has several new projects in mind – most notably with loudspeakers – and Max is adamant that it's not as much early retirement as a sensible alternative to trying to run a highly specialist firm in the expensive Home Counties. Shipping costs of the very heavy *Rock Reference* turntable and *Glastonbury* loudspeakers will result in a price increase of around 12 per cent, and delivery time of products from the factory will apparently be eight days. But some stock and many spare parts will be held by Townshend's newly appointed import agent – Derek Perriam, of DP Imports, 106 Victoria St, Crewe, Cheshire CW1 2JT. Tel: (0270) 2711091. Derek also runs the successful retail outlet Hightown Audio.

Townshend International's new address for those wishing to contact them direct, is Unit 22 Bulebal Industrial Estate, Zejtun, Malta. Tel: (010 356) 772387.



Taking it seriously: Verdier with re-wired SME arm.

SHOW REPORT

Paris '90 – the high-end

Jason 'Scoop' Kennedy goes on the trail of the lost valve!

Apart from the hotels Sofitel and Nikko, at this year's Paris hi-fi show (see last month's *Update*) there were several other smaller, but no less plush, hotels where smaller groups of exhibitors had grouped together to demonstrate rather more expensive and exotic equipment. At the Raphael, a rather splendid 19th century hotel with mahogany lined rooms and expansive fireplaces, Europe Audio Diffusion was playing five different systems with the same Madrigal *Proceed* CD player front end. Amplification and loudspeakers were also American and reasonably familiar to followers of the high-end. The main attraction at the Raphael was the Tolteque cold plasma loudspeaker, a positive monster standing 2.5m high and 1.45m wide. Somewhat disappointingly, however, it wasn't being played. Using ionised air as a diaphragm, cold plasma loudspeakers are notorious for being impossible to drive with impedances dipping below 1ohm, but Tolteque claims that the impedance on this model never drops below 4ohms and that it's possible to drive the speaker with a good 250W amplifier. We'll have to wait and see; in the meantime only owners of barns or dance halls need investigate.

Further up the Avenue Kléber in the Baltimore Hotel was another niche of high-end distributors playing the

latest goodies from home and abroad. These included the new *Evolution* range of pre and power amplifiers from Conrad-Johnson, Martin Logan's *Monolith IIs* with their electronic crossovers, Krell's *KSA-250B* power amp and a new passive preamp to go with the company's tasty CD transport – it of the deliciously damped acrylic lid.

On the marginally more affordable side was the Hafler *SE150* CD player and Audio Innovations' *Series 200* pre/power combination, now in full production and looking good for the £750 asking price. Another gem that we found in this hotel was a new and very attractive Pierre Lurné turntable that the company is intending to sell complete with parallel tracking arm and cartridge. It's a pity that these beautifully finished turntables are no longer available in the UK.

The best sounds and undoubtedly most esoteric system was to be found in La Maison de L'audiophile, a shop run by the French magazine of the same name that sells the valve kit amplifiers designed by the magazine's editor (and Lectron designer) Jean Hiraga. They were playing a system reminiscent of those espoused by Japanese audiophiles, made up with a Verdier *Epic* turntable (heavyweight 16inch platter, separate motor, silk cord drive, etc), SME *3012* arm and Denon *103* cartridge all suitably tweaked. The amplification took up a kitchen table by itself, consisting as it did of a battery-driven Kanéda preamp and passive filter/crossover, 12, 6 and 3watt pairs of single-ended L'Audiophile valve

monoblocks, utilising the legendary Western Electric *300B* triode vacuum tube (a snip at FF2400 each), and a 50W stereo transistor amp. 'Why so many amplifiers?' you might have asked, had you not seen the four-way horn/dynamic loudspeaker system that they were driving. Competing with the Tolteques for sheer mass, these handmade speakers, based around Japanese Onken motor units, use horns for upper and lower midrange, four futuristic looking bullet tweeters and a pair of 18inch dynamic bass drivers – per channel! This outrageous system, made up largely from enthusiast built components, made easily the most natural sounds we've encountered that side of the channel.

IN BRIEF

Acoustic Gold has released the Final Turntable agency in Europe and the UK. So far no-one has bought one of the £20,000 Japanese-made turntables which read conventional LPs with a laser, and AG concedes the product is too noisy and finicky to use.

A new tape recording system known as Contour Biasing claims to reduce hiss and extend bandwidth on compact cassette.

Excelsior Sounds, of Bushey, Watford, has introduced the Zen Goldline moving coil cartridge. Both a high and low output version of the £135 cartridge are available.

Harman International, the USA-based distribution and manufacturing conglomerate, has reportedly agreed to buy Madrigal – the company which sells high end products under the Mark Levinson and Proceed brands.

Philips acquired a 25 per cent stake in B&O, in a bid to create better co-operation (on new standards etc) between the companies.

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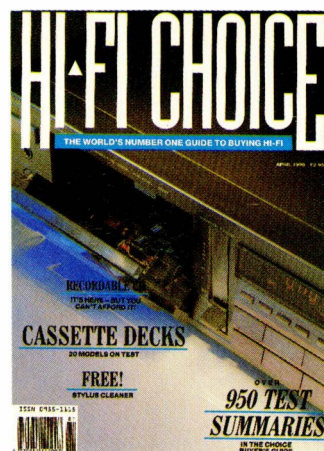
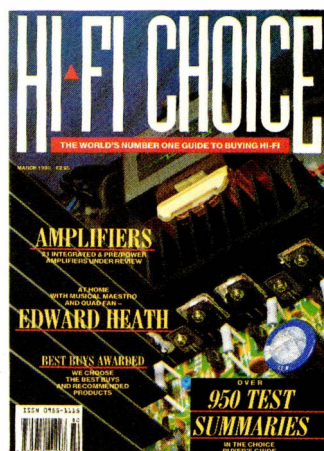
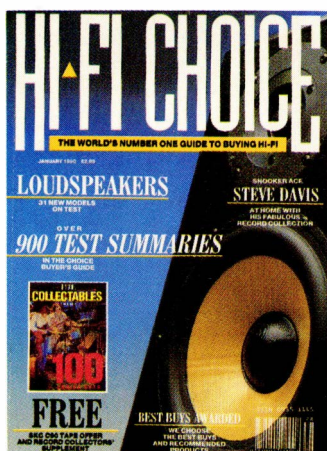
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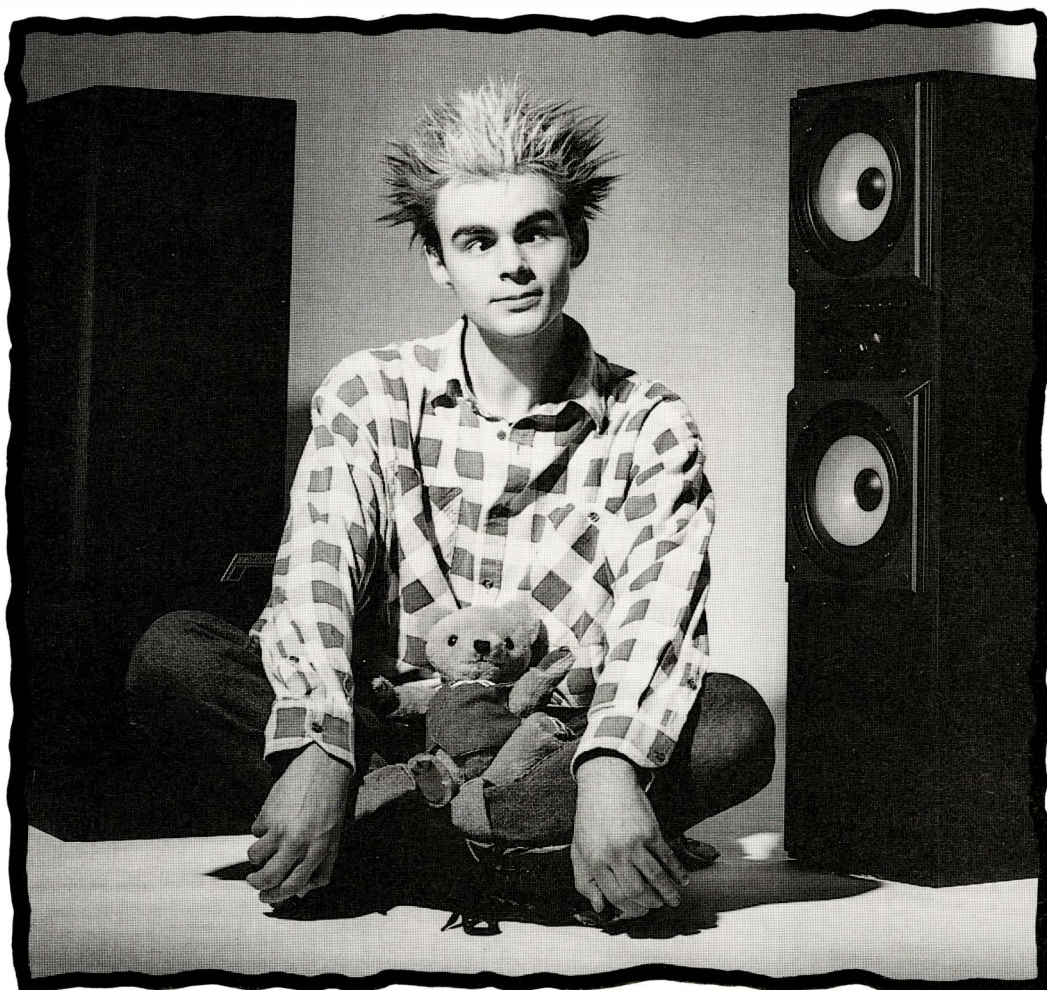
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Choice Sessions

Things we hear . . . This month, see-through sticky mats to improve the sound of CDs; 10 pairs of HPA-21 speaker stands and 10 Isolation Platforms to be won, courtesy of Shan Acoustics; and (even) more on digital data transmission.



Packs of ten improve performance

Used for some time by manufacturers trying to make the best sounds at hi-fi exhibitions, CD Interface Mats do seem to make a difference. Roy Gregory reckons they're well worth 50p a throw.

As regular *Choice* readers will know, I prefer things hot and glowing: live music, tubes, analogue. But we don't always get things all our own way, and CD is becoming an increasingly insistent claimant on my listening time. Consequently during the past year or so I've become more and more interested in the state of digital technology, and particularly in improvements to CD reproduction.

The better CD sound gets, the better I like it. And yet, for all the frenetic number crunching and hi-tech responses from CD's major protagonists, the upward spiral of bits and pieces seems to have refined its basic nature but done little to erode the format's essential weaknesses. The best sounding players I've ever heard are still modified machines, often based on dated transports and converters but offering advances in the traditional areas of simplification, improved electrical isolation and mechanical integrity. It's almost like the turntable story all over again . . .

Among the various modifications proposed to CD replay systems, the

CD Interface Mat: the clear plastic self-adhesive disc 'damper' goes on the label side of a CD. Simply fit and forget.

most prevalent and cheapest seems to have been the addition of some form of 'damper' to the disc itself. As I recall, this started when people found that placing a second disc in a machine improved sound quality. The original Meridian *MCD Pro* incorporated a rubber disc as part of the disc damping system, and since then dampers have appeared in a welter of different shapes and materials, culminating in wafer thin sheets of highly expensive Kevlar, for example (*Sicom* dampers). That such dampers can effect the sound is reasonably common knowledge; how or what they do is not so well understood.

Not understanding how something works has never led me to ignore it or stopped me from experimenting – which brings me to the *CD Interface Mats*. These clear plastic self-adhesive discs are claimed to improve the sound of a CD if you stick one on to the label side of a disc. They come in packs of ten which cost £4.99 – and they work. I've found that they can indeed produce a fairly dramatic improvement in CD performance. They improve low level information retrieval, lending a much greater sense of life and presence to recordings, and where appropriate much improved stereo images with greater precision in

image placement and a much more coherent sense of space. Weight and warmth of instrumental timbre are also improved along with dynamics and 'slam'. However, the degree of improvement is variable, and seems to depend on the machine in which you play the damped disc.

This isn't in itself surprising. Any damping device will only be as effective as the player's own disc clamp/damper is ineffective. What this means is that *CD Interface Mats* work much better with cheaper machines – where the drawer mechanism, transport and clamp seems to be less capable of controlling the mechanical behaviour of the disc – than with a top-loading player with an integral disc clamp and a properly engineered transport and suspension. The damper will still work within latter (perhaps extreme) cases, but will be less effective. Most machines seem to fall somewhere in the middle ground. I have tried *CD Interface Mats* in a number of drawer-loading CD players and the effect has always been in inverse proportion to the cost of the transport used. Thus a £600 machine modified from a basic Philips model showed a similar level of improvement to that experienced with the £200 basic model.

It has been suggested that the dampers are improving tracking of the disc by the laser head. This is a convenient but possibly unduly simplistic explanation.

What my experiences do convince me of is the vital (and consistently underestimated) importance of the transport to the way a CD player sounds. The design and execution of what amounts to the CD 'turntable' is of no lesser importance than it was in the technology that CD seeks to replace. The problem, after all, is still fundamentally the same: a 'reader' and a rotating disc which need to be held in an intimate and fixed relationship. In theory the ability to manipulate and correct digital information should render such considerations irrelevant. In practice the theory falls short.

In the meantime *CD Interface Mats* will form an essential part of my listening to CD. They have the enormous advantage of being 'fit and forget'; the disadvantage of a small but nonetheless ongoing expense of 50p per disc for anyone with a drawer-loading player will be money well spent. If you have one of the older (or newer – Meridian 207) top-loading players then I would certainly recommend an audition safe in the knowledge that you won't do any harm – the dampers *are* removable. And £5 is little enough to pay for anything in hi-fi these days. *CD Interface Mats* are available from specialist dealers, or direct from distributor Presence Audio. Tel: (0403) 891777.

A final thought. Dampers can be used in multiples. This means with a *CD Interface Mat* and, say, a *Sicom* damper, results are cumulative.

Transmitting the data: III

And you thought this was going to be simple? Paul Miller offers further thoughts on digital interconnects.

In the March issue of *Choice* I offered a brief overview of the problems encountered when transmitting high speed data from the digital output of a CD player, or CD transport, to an external D/A converter. The crux of this article concerned the fact that high quality audio cables might not be equally suited to life as digital interconnects. Indeed, the individual constraints imposed by both audio and RF signals almost guarantee that a cable fashioned for RF data transmission will offer a poor subjective performance in the audio domain. The reverse situation also holds true.

This discussion treated the digital interconnect as part of a 'matched line', the cable terminated by a load equal to its surge characteristic impedance. This characteristic impedance, nominally 75ohm, is dependent upon the resistance, inductance, capacitance and leakage per metre along the line and so is



Proprietary digital interconnect cables – all they're cracked up to be?

inextricably linked to the materials used and geometry of both cable and termination. Only in the case of a matched line are the pulses of voltage and current kept in phase, thereby conveying the RF power (digital data) most effectively to the load (DAC).

All this, as Malcolm Steward pointed out in a follow-up article, is accepted communications practice. All it takes is a little lateral thinking to apply such practice to the digital output of a CD player. Nevertheless this very basic treatise still generated some interest, prompting suggestions of possible 'tweaks'.

One idea concerned the replacement of phono plugs and sockets, hi-fi's de facto standard, with their BNC equivalent, on the basis that BNCs offer a more sympathetic characteristic impedance. Nice idea but not a universal panacea, for wholehearted compatibility relies upon a whole host of other demands being satisfied. These are the constraints of 'real life' transmission lines that I consciously avoided discussing in my original article for fear of opening up a particularly messy can of worms.

Let's take it from the top. 50ohm BNCs are certainly employed on most signal generators, for example, just as 75ohm BNCs are used on TV baseband equipment and either 50 or 75ohm N-type connectors on quality RF generators. High

quality XLR/Cannon connectors are actually superior to BNCs for use at lower frequencies – hence their prevalence on Pro-audio gear.

However, the choice of connector on test and communications equipment has as much to do with mechanical ruggedness (repeatability of insertion, as it is fondly known) as it has their characteristic impedance. After all, every single piece of equipment in my laboratory is either equipped with BNCs or N-type connectors, yet not all the apparatus is concerned with the synthesis or measurement of RF signals.

A pathological hatred of phonos is no bad thing, but not all phono plugs offer a surge characteristic impedance of 220ohms. The physical construction of any conductor, whether it be plug, cable or socket, has a direct bearing on its characteristic impedance and there is, as yet, no 'universal' phono plug.

A mathematical model of the ideal and purely resistive phono plug would look something like this: a cylindrical return conductor with inner diameter of 8.4mm together with a cylindrical signal conductor (pin) of 3.3mm outer diameter. With PTFE as the insulating dielectric (relative permittivity of 2.1) the surge characteristic impedance equals 38.6ohm, a value close to that obtained by practical measurement. Once

inserted into a phono socket the combined surge characteristic impedance would actually decrease further – a far cry from 220ohm!

It should be clear that my recent calculations of surge characteristic impedance *do* take into account the nature of the phono plugs, for all the measurements were performed from *pin to pin*, not on unterminated cable. This method was adopted for several reasons. First, there is a greater variation in the design of phono plugs than in the corresponding phono sockets currently included on modern equipment. The characteristic impedance of a WBT 0101 plug is not the same as that of a Tiffany, EAR or bog-standard nickel-plated phono for instance. I repeat, the physical construction of the plug plays a dominant role.

So, the values of surge characteristic impedance for the interconnect cables published in *Choice's* June *Cables, Tables & Stands* supplement are inclusive of plugs, enabling enthusiasts to choose the optimum lead without recourse to a soldering iron. Exchanging a phono to BNC link may offer some advantage in the mechanical integrity of the bond and, in certain circumstances, the impedance termination. However any gain achieved here must be weighed against the loss of the manufacturer's guarantee.

Furthermore the sheer act of resoldering cable/plug and socket may do more to alter the characteristic impedance of the termination than the nature of the plug and socket itself. And it doesn't end here, for there are further discrepancies to be addressed in the value of the output and load impedances of both CD transports and external D/A converters.

The digital input of my Musical Fidelity *Digilog* (an early review sample) was terminated with a 100ohm load, for example. Consequently, regardless of whether I used a 75ohm coax link equipped with phonos or BNCs, misterrmination was unavoidable. This would result in a partial reflection of the data-stream down the ensuing 'unmatched' line. Unfortunately, few commercial systems offer a characteristic impedance (whether source or load) that is spot-on 75ohm.

The degree to which all incident voltage and current is absorbed by the load is a function of the reflection coefficient, or rho, this also having a bearing on any subsequent corruption of the data itself. Specifically, any modification in the timing between successive logic transitions would compromise the recovery of clock

data by the digital audio interface circuit (prior to the DAC). This would, in turn, take its toll on sound quality.

In the light of these everyday inconsistencies it is hardly surprising that I chose to bias my original article towards the theoretical advantages of a matched transmission line! However, now that this convoluted can of worms has been well and truly disturbed, the pros and cons of real-life unmatched/mis-terminated transmission lines should be investigated.

Stand by your calculators for our next instalment when, for future reference, *Choice* will be providing practical coverage of a range of commercial 'digital interconnects'.

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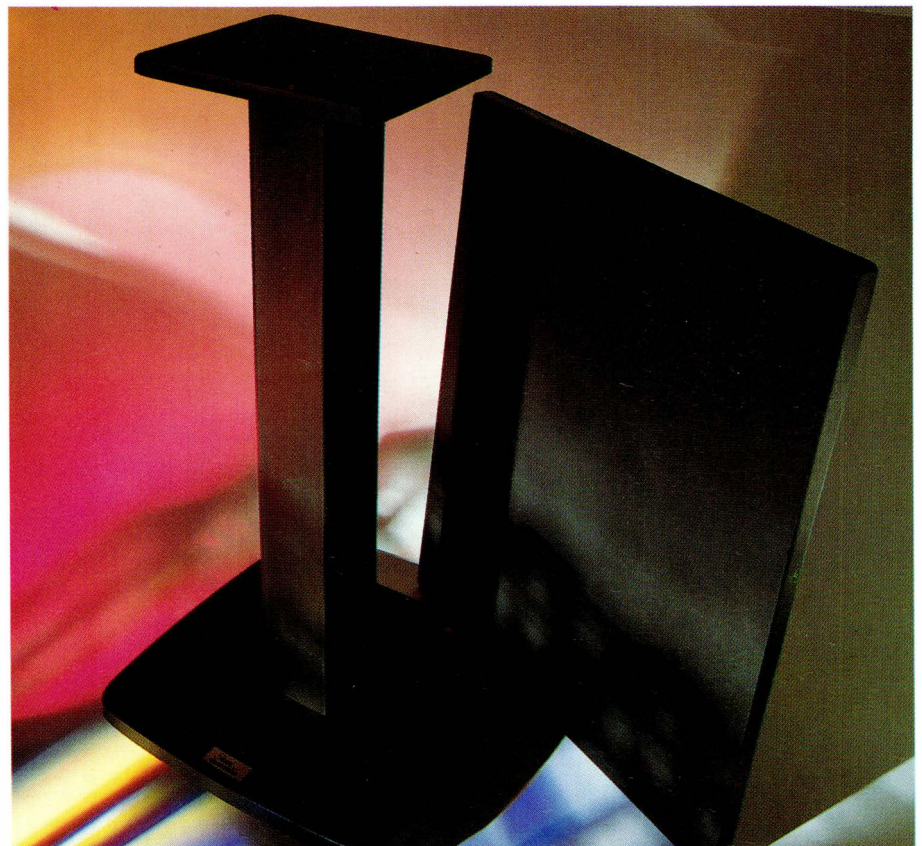
reviewed back in June '89 (issue No. 71). The speaker stands which retail for £45 a pair are fitted with four adjustable spikes and are said to combine the sonic benefits of open and solid metal stands.

The *Platform* retails for £29.99 and will fit into most commercially available stands or can be used a-top cones to support a turntable or piece of electronics such as a CD player or amplifier. The *Isolation Platform*, as its name suggests, reduces vibration reaching the component and thus gives it a better chance to perform optimally.

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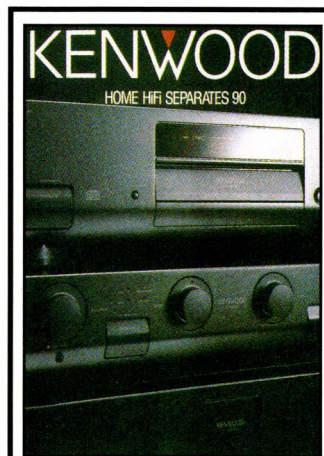
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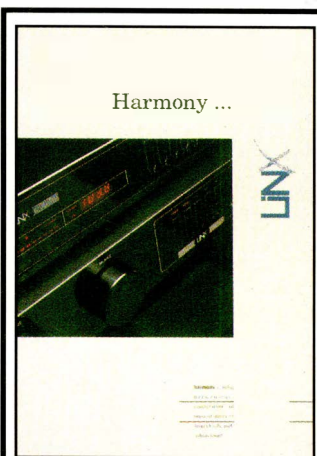
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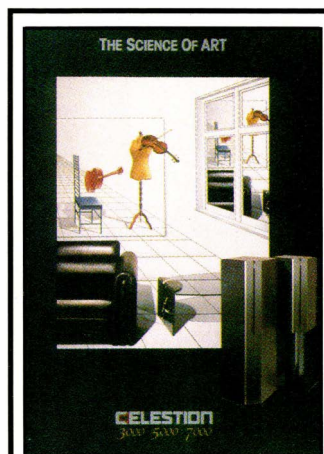
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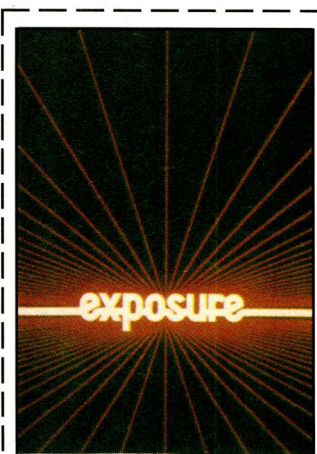


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*Sailing and records are
consuming passions for this
month's audiophile, who further
rejects modern technology by
opting for a valve amplifier. Dan*

*Houston writes, Chris
Richardson photographs.*

The Prodigal Audiophile

This month we're at the home of a prodigal analogue audiophile who, having sold his record collection for the supposed benefits of a compact disc, later discovered that he could not live without a vinyl-playing system.

For 27-year-old Stephen Hogg, a civil engineer with the Department of the Environment in Belfast, a two year dalliance with digital was enough. He had been using a Meridian *MCD Pro* – one of the best CD players of the time – but is now firmly back in the analogue fold; with the fervour of the born again he has also sold his compact disc collection! "I did not have one LP when I bought this deck (*The Voyd*), and I was in some-

where like Zeus Audio looking for amps when I heard it. I just thought 'Oh Jeepers! that is the best thing I have ever heard'. But I had always found CD too harsh. It was straight walled and didn't sound very full; it wasn't real; it was sharp, clinical and not very involving – in fact unpleasant."

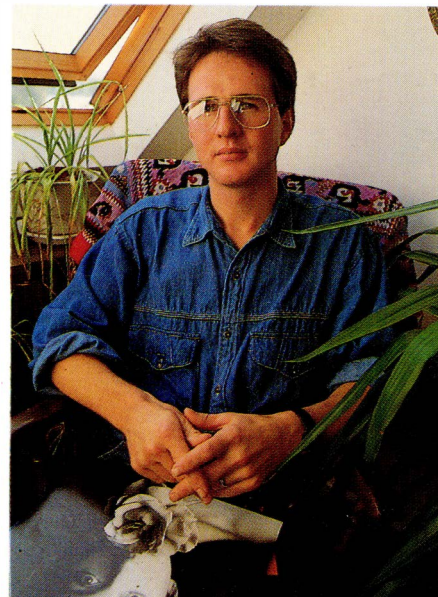
Hogg is rare; like a few other vinyl oriented audiophiles who care passionately about the sound quality of the music they are listening to, he has rejected CD finding it uninvolved. This 'preference' for vinyl on the part of many older audiophiles is sometimes blamed on the fact that they have large and often irreplaceable vinyl collections, as well as

systems tuned around a favourite record player; they can't or won't be taught the new tricks of digital.

But when one meets people like Stephen, or other analogue zealots who have just (in the past couple of years) started collecting records and spending money on high-end equipment, that rule doesn't apply. Even Lord Gowrie, in last month's *Choice* admitted that after almost obscene investment he had only got his CD player combination to sound "80 per cent of the Linn *Sondek*".

You could try blaming it on specialist hi-fi dealers. Maybe they are influencing decisions. But unless they are in the pockets of the record deck manufactur-





Kate Bush sat in my lap: Stephen found analogue improved his sensual world. Guaranteed to fill a blue space: The Voyd (left).

ers (very few of whom have any real clout in that area) then the incentives to sell a CD player are even greater. CD players break down more often than record players and we haven't come across any which offer the likes of Rega's lifetime guarantee. Selling to return custom dealers would certainly make more money on digital equipment.

Perhaps it is the record player's outward mechanical simplicity that is its appeal. The electronics are uncomplicated compared to a printed circuit board or the workings of a digital-to-analogue convertor – and you can see the thing working (which gives it a kind of *Boys' Own* appeal at any rate). What happens

to a CD when it slides into the player? It disappears, as I was once told, like a relative about to be cremated; one is no longer tangibly involved.

Maybe it is this involvement with the whole 'record playing' process that audiophiles thrive on; they can't scrape the dust off a stylus before lovingly lowering it into the run-in groove, with a shiny little scratch-resistant silver disc.

Whatever it is, however, the record companies don't want to be involved with this minority, and many have voted with their feet and walked out of record pressing plants altogether. Vinyl purists haven't seen a new Deutsche Grammophon release for a couple of years, and

the classical repertoire particularly has been much deleted. The digital dawn hasn't so much straight-walled music for the LP buyer as stone-walled it. And while many engineers and indeed audiophiles maintain CD sounds closer to the original and that it is therefore better, it doesn't allow for much choice in the matter. It certainly looks like one of the tricks of CD has been to persuade people to double up on their record collections.

Which partly explains why Stephen has only a limited collection of records, even though he's been collecting for over ten years. It also explains why many of these records are the well-engineered audiophile favourites with which manufacturers demonstrate their systems at hi-fi shows, for example. As soon as you start getting into serious hi-fi you notice poor sounding and imaging records, and that well-engineered software is thin on the ground. Not here though. Bob Dylan's latest, *Oh Mercy*, produced by the truth-seeking Daniel Lanois, was revolving expectantly when we arrived.

Stephen lives with his doctor wife

Joanne in a first floor apartment overlooking a park in the Lagan Side district on the south side of Belfast. It's a cosy bijoux place with a piano in a spare room where his espoused practices and composes songs. The listening room is also their living room and there is a dining table at one end. Hi-fi dominates the other. "It's OK but it's not great," he describes the room. "We're hoping to move to a bigger house outside Belfast where there'll be more space. It'll be much better if I can just get in there with the hi-fi first before my wife starts putting it behind sofas and things."

This room is longer than it is wide with windows at both ends. The speakers are about as well sited as they can be in this setting, under a gabled wall and blending in with the symmetry of the architecture in terms of acoustics. The sofa can be swung out from the wall for serious listening but is otherwise off-axis, arranged for television viewing. The TV is small, and nowhere in the pecking order of electronic excellence nearby. Its shelf life is improved by plants on either side and fish above.

The fish are described as "the only thing you can have in an apartment without it crapping all over place. I went

away for the week and when I got back the plants were wrecked but the fish were fine," says Stephen. The plants have recovered, they appear healthy on the audio diet of his records, but perhaps the fish prefer silence. "When I play something wild they really fly about the place," Stephen adds.

All the equipment is on show, placed on a couple of Foundation and Target isolation furniture stands. The outlandish Audio Innovations *Series 500* integrated amplifier takes pride of place, its open array of glowing bottles ready to realise its nickname of the 'Manhattan Skyline' after dark. Its main source is the *Voyd* turntable with its outboard power supply using a SME *IV* tonearm and Koetsu *Red* cartridge with a Carver step-up transformer. Stephen had used a Helius *Scorpio*, the arm recommended for The *Voyd*, but found the arm 'unreliable'. "After two or three models I changed to the SME," he told me.

Interconnect is the AudioNote *Silver* while speaker cable from the '500 is also AudioNote standard to the Snell Type J's on their Foundation *Pi* stands. Alternative sources bought second hand for £90 each are an Aiwa *ADF77* cassette deck and the Quad *FM4* tuner.



Everything is isolated on Target furniture with the turntable sat upon a secondary Audio Dimensions *Isolation* platform – a slab of marble with three spiked feet on top (for the plinth) and three underneath to the Target table. While it's isolated from vibration, Stephen has to be careful playing records at midday in Summer. The record deck is in direct sunlight then. "One day I had a record on the turntable and it just melted. I heard it go 'off', it sounded terrible after that."

This is a purist system largely following the Audio by Design choice of components. Audio by Design, based in Brighton, Sussex, imports the American Snell range of loudspeakers, and distributes Audio Innovations amplifiers and *Voyd* turntables, maintaining these components match each other sonically and that close accuracy to the original recording is achieved.

Stephen Hogg obviously agrees: "This system really involves you, if you close your eyes then you're right there and the sound never seems to be coming from

Nine glass bottles from Audio Innovations (left).





thinks the arm and cartridge might be upgraded next. "I really like the Koetsu but if this new Audio Innovations tonearm is as good as it's supposed to be then I'd like that with an AudioNote cartridge; the sound would be classic but you'd have to justify the expense. As regards hi-fi that's a problem. You have to reach the point where there's nothing in the system that's annoying you. And it then becomes a minimum standard (you'll accept) rather than a maximum."

Hearing Stephen eulogizing about Windham Hill's *Aerial Boundaries* album by Michael Hedges ("... this is a must for the audiophile, it's absolutely superb, I can hear his fingers on the strings of the acoustic guitar... why can't all records be like that?") you'd think he had the audio bug badly, and completely. But this, he tells me, is only his second hobby, the main joy of his life being a 27-foot wooden sailing boat (which he keeps a little further down the Lagan). The analogy is a further comment on the progress of technology which seems increasingly to separate us from the task at hand. While sails, like records, don't offer the ease of use apparent from their more modern counterparts, Stephen prefers them... or prefers his involvement. Analogue is the wrong word really, it is all about getting back to the original.

the speakers; it is everywhere but the speakers. The sound is very clean. The musical notes stop and start just like that (appropriate hand gesture); you don't want notes hanging around."

By this stage we were playing *This Woman's Work* followed by *The Sensual World*, on Kate Bush's album of the same name. Being used to his wife's voice and piano playing, what did he think of the system's capability with the instrument

Pad of a civilised engineer (above) and a system that puts colour into Van Morrison's Avalon Sunset (below).

and female vocals? "Well I think the full range of her voice is coming across, and the piano never gets lost, the lower notes, bass notes, just swell out into the room - it's extraordinary."

While he's reluctant to criticise any weak points in the system, Stephen

The System:

The <i>Voyd</i> and PSU	£1,319
SME IV	£810
Koetsu <i>Red</i> cartridge	£896
Audio Innovations <i>Series 500</i> amplifier	£889
Snell <i>Type J</i> loudspeakers	£750
Foundation <i>Pi</i> stands	£250
Quad <i>FM4</i> tuner	n/a
Aiwa <i>ADF77</i> cassette deck	n/a
Target furniture	from £43
Cable: AudioNote <i>Silver</i> interconnect	£85/m
AudioNote speaker cable	£100/m

Supplied by: Zeus Audio, Unit 6, Donaldson and Lille's Shopping Precinct, Hope Street, Belfast. Tel: (0232) 332522.



Statements

Monitoring what's happening on the high-end scene . . . This month, John Bamford listens to Denmark's Primare amplifiers (£8,500 – phew!) and moves some air with JBL's top-of-the-range XPL 200 loudspeakers.

928 conjurs up images of a luxury grand tourer effortlessly cruising the German autobahns. You need a healthy bank balance to stand the cost of Porche's flagship automobile, for sure. And while not *quite* as costly, Primare Systems' *Series 928* amplifier system is equally esoteric and – let's be honest – available only to the privileged few who can afford to spend over £8,500 on a hi-fi amplifier.

That's right: £8,500. But if the price tag makes you reel, let's be clear from the start that the *Series 928* pre/power combination is the stuff of which dreams are made. While most audiophiles have to suffer for their pleasures, 'making do' with hi-fi components which deliver the goods sonically but often are inconvenient to use and an eyesore in the home, the Danish Primare 928 system is designed to cater for the most discerning hi-fi enthusiast while offering the luxury of remote control operation *and* looking like a million dollars. It scores in all three targets.

Regular *Choice* readers might remember an *Aspirations* feature dating back to September of 1988 in which we described a system employing the *Series 928* preamplifier driving ATC SCM50 active loudspeakers. Primare's £4,250 preamp (£3,250 if you forego the infrared remote control facility) is perfectly suited to such applications, and features comprehensive user-adjustable set-up facilities. Removing a small plate at the rear of the preamp reveals a bank of DIP switches providing ten different sensitivity settings (0.05 to 2.0mV) and 12

impedance adjustments (7.5 to 2kohm) to suit just about any moving coil cartridge. A further set of switches adjusts MM input sensitivity (2 to 10mV), while just in case you need it – a small toggle switch allows the CD signal to be attenuated by 6dB to allow better matching with other line inputs. The 928's other unashamedly luxurious touches include phase invert, mute, and a low cut filter, plus a 'standby' facility which shuts the preamp down while maintaining optimum operating conditions and working temperature.

Lakeside Listening in our September '88 issue: Aspirations featured a 928 preamp driving active ATC speakers.



All controls – including the MM/MC, CD, tuner, tape and Aux selectors, plus the motor-driven stepped attenuator volume control – are operable via capacitive type finger-touch sensors on the tastiest remote control handset you've ever cradled in your palm. A small infra-



red receptor (25 x 25 x 50mm) connects via a 3m lead and Lemo plug to the rear of the 928, which means that the preamp does not have to be in line of sight from your listening seat. The receptor can be placed anywhere in the room, cable length allowing.

There are touches to the design of the Series 928 which remove it from the world of everyday audio components and put it in a class of its own. For example, the wedged shape of the handset perfectly matches the size and shape of the cut-out on the preamp's fascia. And the position of the handset's touch controls emulate exactly the toggle switches on the preamp itself. Nice. And while there's no balance control (in the best minimalist tradition; there are no tone controls either, of course) there is a set of on-board DIP switches to adjust the gain separately for each channel in 0.5dB steps, allowing you to compensate for any mild channel imbalance in your phono cartridge. The preamp even has a rear mounted headphone socket.

Primare's designers seem to have thought of everything. However, be warned that in the interests of fidelity there is no tape monitor loop in the

'Internally, attention to detail is worthy of the finest audiophile gear. The 24-step rotary volume control uses metal film resistors and gold plated contacts, and in order to prevent signal loss through oxidation all switches and relays have gold plated contact surfaces.'

signal path. This means owners of 3-head cassette decks can't monitor recordings off-tape – which isn't the end of the world as most decks are equipped with headphone sockets. But more significantly (especially since, if I had this kind of money to spend, I'd probably also fancy a projection TV system with Dolby Pro-Logic sound system!), tape loops are useful for hooking up surround sound decoders. Oh well . . .

I referred earlier to the Series 928 'system'. Although the preamp is a fascinating high-end proposition in its own right, most customers are likely to partner it with Primare's matching 928 monoblok power amplifiers. Each is rated at 100W into 8ohm, using discrete components throughout and employing no negative feedback in the power output circuits. The manufacturer claims 40A peak current capability. Certainly Series 928 was conceived as a complete pre/power package, with signal transmission between the two taking place in balanced mode (both XLR and 'ordinary' phono sockets are provided) and with symmetrical circuit configurations throughout all the amplifier stages.

Internally, attention to detail is worthy of the finest audiophile gear. The 24-step rotary volume control uses metal film resistors and gold plated contacts, and in order to prevent signal loss through oxidation all switches and relays have gold plated contact surfaces. The source selector relays are also hermetically sealed as proof against ageing. Meanwhile there are no carbon components in the signal path. Metal film resistors and Teflon insulated cables and sockets are used throughout, while the signal path is kept as short as possible by using servo regulators rather than series capacitors. It's all good stuff, with much attention paid to power supplies and grounding for optimum sound quality. And like Naim Audio's recently launched NAC52 remote control preamp (see last month's Choice), Primare's designers were careful to ensure that no digital nasties from the remote control system could spoil the audio performance of the amplifier.

The bottom line, after all this, is that the 928 pre/power is something quite special, combining superb user-friendliness with the sort of sound quality one usually finds only in stripped-

down 'hairshirt' products. Which is why it costs £8,650 (the mono power amps are £2,200 each). Wearing my heart on my sleeve, I have to admit to a predilection for glowing bottles, and in my opinion this combo 'doesn't have quite the transparency of the best tube amplifiers, but the 928 combo sounded 'rich' and smooth with excellent soundstaging and tremendous 'weight'. Perhaps just a little too polite-sounding for some tastes (though much will depend on partnering speakers), these amps must be the least fatiguing solid-state components I've ever heard, with silky highs, a natural midrange and deep, powerful bass. It's reported to be a natural performer with some electrostatic loudspeakers – and I can believe it.

Audiophiles usually expect their amplifiers to be minimalist through and through. The *Series 928* system breaks the rules in combining high-end performance with sumptuous styling and superb user-friendliness, and in doing so makes it one of the most desirable hi-fi amplifiers in the world. The UK distributor, Quantum Audio of Kilmarnock, Ayrshire, has been asking if I've finished with it for a few weeks now. And I've been using every excuse going in order to hang on to it for a few more days. If I won the pools tomorrow it would be at the top of my shopping list, that's for sure.

“Now that's what I call a loudspeaker,” declared Chris, our photographer, as I manhandled the *XPL 200* out of the service elevator and into his studio. It was a natural enough reaction, I guess, as one look at this giant JBL monitor is enough to tell anyone that the speaker means business.

JBL describes its £2,000 *XPL 200*, top model in the *XPL* range introduced to the UK last autumn, as 'the most refined home loudspeaker JBL has ever made'. In its literature the company holds great store by the fact that it makes its own drivers, crossovers and cabinets, components which are designed and built to work together without compromise. 'The *XPL* series represents the limits that this approach can be taken (*sic*) within the confines of present technology', is the company's bold claim. Is JBL really saying, therefore, that the '200 – the top-of-the-range *XPL* – is the best loudspeaker it can make?

Well, perhaps it *is* the best speaker the



company can make. Certainly it's one of the finest sounding transducers I've ever had the privilege to enjoy in my living room, rating up there with the Duntech *Marquis* and *Crown Prince* for drama, excitement and dynamics. Having played around with the '200 at home for some weeks, experimenting with subtle changes in room positioning as well as partnering electronics, I've had these speakers really singing. Imagine a kind of grown up Yamaha *NS1000*, with explicit detail and fast dynamics, coupled with tremendous bass power and control. That's the *XPL 200*. There's no strain, no nasty high frequency aberrations or 'glare' (often a criticism of high-power monitors), just a satisfying solidity coupled with a massive soundstage.

The loudspeaker has proved extremely transparent to source equipment, and is so clear and effortless in the bass that it makes for a great reviewer's tool when assessing electronics. And the

great thing is, you can drive it with just about anything. The load is nothing to worry about, sensitivity is high at 90dB for 1watt, so even with my low-powered triode valve amplifiers I've been in danger on several occasions of committing a serious breach of the peace.

Off the floor

The *XPL 200s* came into their own when I got them off the floor. You can use them floorstanding, adjustable feet at the front enabling you to tilt the speaker as required, but JBL manufactures some matching *MTX* stands which screw into the base of the enclosures and in my set up these made all the difference. Standing nearly five feet tall on their stands, they sound as business-like as they look. The trapezoidal enclosures are extremely solid, made from MDF and weighing 90lbs each. The baffle is a multi-layered affair of reaction moulded foam, stepped to

provide some degree of time alignment with a neoprene surface coating to reduce diffraction effects. The tweeter, of course, is JBL's by now familiar ribbed titanium dome, married to a new titanium midrange driver which has a substantial 3inch voice coil. *XPL 200* is actually a four-way system, a 6.5inch mid/bass driver operating in its own sealed sub-enclosure down to 300Hz which is where the 12inch woofer takes over. A tuned port vents on the rear.

Other details include a -3dB high frequency contour switch (totally unnecessary in my opinion), gold plated terminals with bi-amping facilities provided, and a switch which takes the crossover partly out of circuit. Apparently JBL makes a two-way active crossover for its '200, of which I have no further information to date. Based on what I've experienced from these monitors so far, I'd bet experimenting with some form of active drive could be a lot of fun.

High-end Update

You might have thought that there's enough expensive cable around by now - but Audioquest doesn't. This American cable, cartridge and accessory manufacturer whose products are distributed here by A&R Cambridge (or Arcam as they are more commonly known) has a new range of speaker cables with prices topping a grand for a five metre terminated pair. The latest offerings are the *Cobalt*, *Green* and *Clear Hyperlitz* speaker cables which retail at £35, £60 and £120 per metre respectively. *Hyperlitz* is the name that Audioquest has given to the topology or construction of the cables which allows multiple strands to be used without touching each other by winding them in a spiral around a non-conductive core. Audioquest believes that because of skin effects, whereby the higher a frequency is the closer it travels to the outside of a strand, it is preferable for individual strands to avoid touching one another. All three *Hyperlitz* cables are built like this but have different levels of copper purity and cross sectional area according to price. *Clear* uses six nines (99.9999 per cent) pure copper and has a total cross sectional area of 3.4mm².

For less than the cost of three metres of Audioquest *Clear* you could invest in an interesting old cartridge. So

what's it doing in *High-end Update*?

Well, the story goes something like this . . . The Cartridge Man - or Len Gregory, as his friends know him - is the UK agent for Garrott stylus tips. He's also something of a fan of the AKG *P8E* cartridge, a low output magnetic made in the Seventies that is now pretty scarce on account of Len buying up AKG's remaining stock. He gets his Australian friends (the brothers Garrótt) to fit one of their Microscanner tips and sells the turbo-charged cartridges for £350 apiece. Which, given the sort of sounds he was making with one on a heavily damped Thorens *TD150* (another Gregory speciality), seems a pretty fair price. Because of limited supply we're not likely to get one for review, but you're always welcome at the Cartridge Man's place in Croydon (tel: 081-688 6565).

What else has been happening in the world of audio exotica? Counterpoint has been busy with a new hybrid pre-amp, the *SA-5000* which uses tube, FET and bi-polar devices with tubes used in the power supply regulation and audio amplification. At the time of writing the *5000*, which includes an MC stage amongst its inputs, hadn't arrived with the company's UK distributor Absolute Sounds, but the price looks like settling between £3,000 and £3,500.

An American brand that has recently returned to these shores is Acoustat. The company has a new loudspeaker range called *Spectra* that includes a near-affordable hybrid (coil bass driver and electrostatic mid/hf panel), the *Spectra 11*, which retails for £1,095. The distributor, Reference Imports, will shortly be adding the more expensive models in the range including a deluxe version of the *11* called *Spectra 1100* (£1,495). Reference Imports, tel: (04352) 4481.

For those of you who are into serious tape recording - for serious read ownership of a Nagra *IV-S* or similar pro machine - Bryston has produced a portable Dolby SR frame. The *280-B* accepts Dolby SR cards (cat. no. 280 at £525 per channel) and allows the use of Dolby's Spectral Recording noise reduction system on the hoof, so to speak. Further information on the Bryston *280-B* can be had from Roksan Engineering.

High-end fans on the south coast can go and soak up some good sounds at the Definitive Audio open weekend. On June 30th and July 1st the Brighton shop will be playing top-of-the-range Voyd/Innovations/Snell equipment as well as some prototype Innovations horn loudspeakers and the very expensive AudioNote *Ongaku* amplifier.

Tractors and drivers

ATC has been making loudspeakers for a couple of decades, supplying to professional studios and, increasingly to audiophiles. Dan Houston visits the factory, photographs by Chris Richardson.

We were on the 'phone: "Yes, and five miles along that road you come over a hill and you'll see an airfield on your left. Turn up beside that and Gypsy Lane's first on the right." Even so we shot past, going through the verdancy of Gloucestershire with Londoners' characteristic haste. We were on our way to the ATC loudspeaker factory where we suspected, nay knew, that some very skilled craftsmen were at work. This isn't an overly obsequious statement. They know it and so do many who need to know. The ATC user list is impressive – particularly on the professional side where the firm has installed its monitors in studios around the world, with the BBC, Abbey Road, Telarc and Nimbus being just a few of its reportedly happy customers.

Music mixed using ATC monitors

includes that by Bruce Springsteen, Madonna, Julio Iglesias, Paul McCartney, John Williams, Pink Floyd, Peter Gabriel, Van Morrison, Terence Trent D'Arby (*who he? – Ed*) – the list goes on. And on the hi-fi, or 'domestic' side, many musicians and audiophiles swear by the speakers' accuracy, power handling, superb frequency extension and transient response, although the firm still has only a limited reputation on the domestic scene.

The ATC (Acoustic Transducer Company) factory is situated in the heart of Gloucestershire, on the side of one of the Chiltern hills. It's quite literally down (or up) a leafy lane and the rustic image is further enhanced by a couple of ancient farm tractors in a state of disrepair, parked near the entrance of the reception area. Tractors, we later learn, are



one of the abiding passions of the firm's founder Billy Woodman; he owns these two and five others.

The main building once housed a fertiliser factory – it's now stacked high with cardboard boxes, shelves of chinese coolie hat-like bass cones and resonates to the muffled 'whoops' of finished loudspeaker drivers being tested. A huge SCM 200, bound for some studio where no doubt it will do its high-level best to blow off an engineer's head, sits next to a row of gorgeously veneered new model SCM20s. ATC puts together loudspeakers, using parts which are made to a specification by outside contractors. The cabinets, for instance, are made by Castle Acoustics Ltd, of Skipton, West Yorkshire, while the gold plated terminals come from another of our 'craftsmen' – John Michell Engineering. The voice coils are wound here and the entire driver is put together with the final product emerging through several stages of operation in the factory. As you walk around the thing that seems most striking (apart from the glue solvents!) is the sheer size and build quality of the ATC drivers. They look, and feel industrial compared to other loudspeaker drivers

Back to basics: Billy Woodman's philosophy applies to both sound and farm machinery.





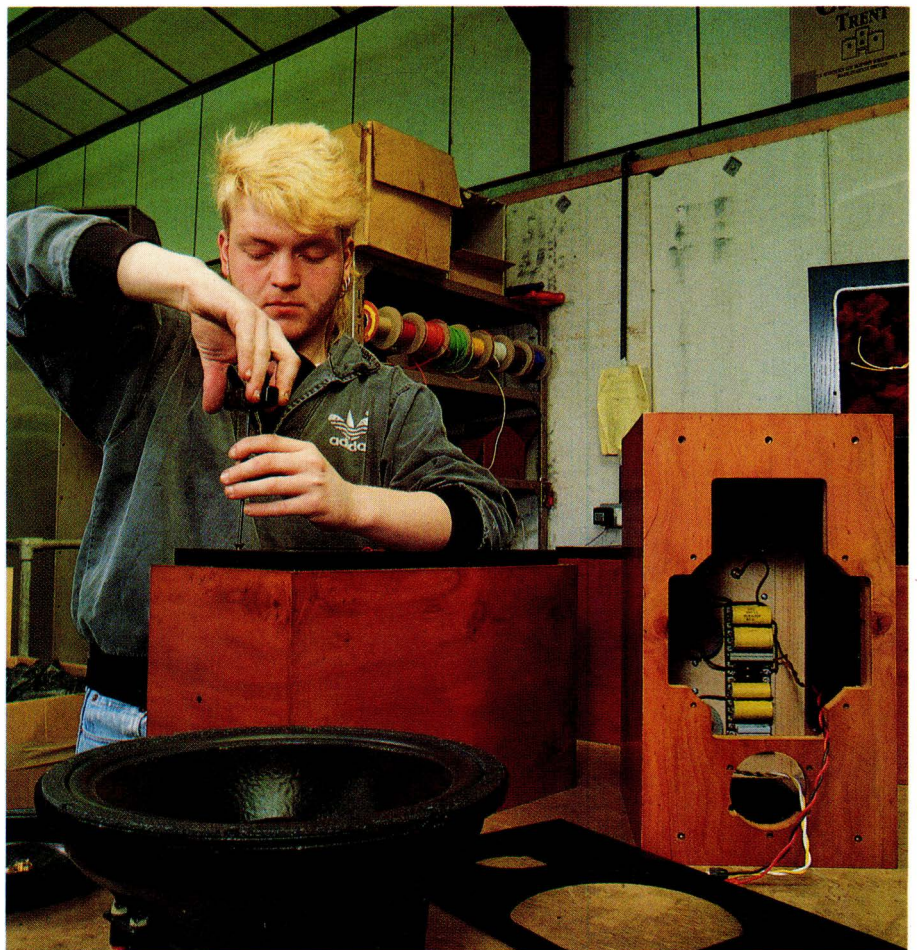
inction between the products it makes and those of many of its competitors. "We make loudspeakers to sound as similar to the original signal as possible," explains Ashley. "People say analogue sounds better than CD or that CD is brash and hard-sounding but digital recording *is* more faithful to the original music. We're not saying people shouldn't buy analogue, but we'd ask that they recognise CD is closer to the real thing. And if you go into a recording studio then you'd hear that most pop music is aggressive and hard sounding – just as a violin can be searing if you stand close to it. The only way to gauge accuracy in loudspeakers is to listen to a sound that you know well and which has been well recorded, such as a human voice or piano. I can absolutely guarantee that we make the most accurate sounding loudspeakers in the world and that's no lie." Ashley is quite passionate. He picks up some other British made loudspeaker drivers and says: "Look, other people are making this flimsy stuff

Basic dome improvements (left), and last minute touches on the finished article (below).

and are bolted onto great, black, solid iron wheel-like baskets with seemingly oversized magnets.

It's all part of the firm's philosophy delivering value for money while using materials and components considered to be the best available. Ashley James, the firm's ebullient marketing manager, took me around the factory and explained that ATC's aim was to create drive units which could do justice to a symphony orchestra, which hits 112dB at times. "We design loudspeakers according to the principles of sound, and those were established long before loudspeakers themselves. When you look at sound you have three distinct events. Firstly the loudspeaker, or whatever makes the sound, secondly the effect of close reflections or anything behind it and thirdly the reverberant effect of sound hammering off the walls thousands of times before it dies." ATC's work has been to try to take all these factors into account when designing loudspeakers. Drive units have been designed with the dispersion characteristics of sound borne in mind – the tweeters are far less directional – and even the firm's latest (and smallest) loudspeakers has been built to cater for sonic reverberation qualities which ATC says many manufacturers overlook.

The company makes an important dis-



and we're making these monsters. It's almost as if everybody else is making a Fiesta and we're making a Ferrari." So how come the firm isn't selling bucketloads of speakers; if its ideas are that good, why aren't people buying them?

It's the age old problem (perhaps age old excuse): the need to get your product accepted by a dealer who wants to sell it. There are plenty of specialist British loudspeaker makers already it seems, and Ashley's initial experience with dealers when he joined the company in 1985 was disappointing. "I rang around doing some market research to ask them as a punter what they might recommend and gauge their level of expertise. I was appalled by their attitude and the way they behaved. And then I couldn't sell them our products and so my immediate reaction was to approach the professional studios instead where the reaction was unbelievable in comparison." On the pro side things began to take off when ATC monitors were installed in the famous CTS studios in Wembley in 1987. HHB, the London distribution outlet for professional sound gear, also took on the range and approval was sealed.

"With hi-fi it was much more difficult (to gain recognition)," Ashley continued. Even with a complimentary review in *Gramophone* magazine (1987) the firm found it difficult to make a niche market although it had several domestic models with unique design features on offer. This has led to a degree of suspicion of magazines: "They need to be more objective," and to a sense of isolation from the rest of the industry. Ashley points out that things aren't quite so bad now, ATC sells more than half its product to domestic users, but also criticises other loudspeaker manufacturers for standing still: "We had loudspeakers in 1976 with 30 times less harmonic distortion than conventional loudspeakers of today. The loudspeaker industry in this country is absolutely dead. Unless some of them do something very soon there will be little advantage buying their products over some of the Japanese stacking separates; it shouldn't be up to us . . . it shouldn't be up to 18 people here to lead the world."

The man who remains above such comments, but who also inspires them is Billy Woodman, a 44 year old Australian who founded ATC in 1974. Billy was raised on a farm in Castlemaine, Victoria, Australia and started out in life wanting to be a professional musician.

But after graduating from Victoria's Bendigo Institute of Electronic Engineering in 1967 he worked for Plessey Rola acquiring his first knowledge and taste for loudspeaker design.

"I was coming to Britain on an extended holiday and I wrote to Goodmans asking if they would employ me," he remembers. "They wrote back and said if I came to see them they would see what they could do." Goodmans, which was then based in Wembley, gave him a job and within three months he found himself running the firm's research and development department - which at least gave him the wherewithal to pay off a \$100 debt he'd accumulated on the way from Australia!

He is credited with having developed the world's first one-inch fabric dome tweeter although he agrees that Peerless was developing something similar at the same time. During his time with Goodmans he completed his Master's degree in acoustics.

Woodman's ideas became more and more exotic and were eventually too expensive for Goodmans to put into production. By 1974 he decided that if he wanted to see his own ideas realised in products he'd have to start his own company. ATC's first product was a 12-inch midrange driver for PA use which was used by Supertramp.

The company was at first an engineering concern - producing drivers utilised by other systems. In 1976 Woodman improved upon his original soft dome tweeter theory by making the world's

Basketwork with a difference (right). Turning the copper voice coils (below).



first soft dome for the midrange. The three-inch driver has become accepted as being nearly all things to all men and gave rise to the expression of 'soft-dome-monitoring' in pro studios. ATC's hopeful ascendancy was shortlived, however - the company went into receivership in 1979. "We had massive overings from overseas, and one of our major clients in the States took us out," Bill said, remaining philosophical about the default. However the firm never ceased trading and in 1981 Bill was able to buy back the business from the receiver and formed ATC Loudspeaker Technology Ltd. His first project was with Tim Isaacs (now one of ATC's directors) of the professional audio firm Turbosound. Tim designed the electronic crossover which was increasingly used in conjunction with ATC drivers in sound studios. "It revolutionised studio monitoring between '81 and '87," Bill says.

However hi-fi enthusiasts probably know ATC best for its active loudspeakers. These were stimulated by an

massive ATC driver baskets being used for the front wheels?

Curriculum Vitae

Billy Woodman

44 years old

Married with a son

First Job: Plessey Rola (Australia)

Proprietor

1970 Working at Goodmans, designed world's first one-inch fabric tweeter

1974 Founded ATC

1976 The Three Inch Soft dome, another world first

1978 S50 launched at Cunard hi-fi show

1979 ATC goes bankrupt

1981 Bought back from receivers: Introduced S50

1981/82 SCM300 incorporating electronic crossover

1983 SCM150 launched

1985 Three-way active studio monitors, and relocation to Gloucestershire. SCM50, SCM100, SCM200 launched

1987 CTS studios installs ATC monitors

1990 SCM20 introduced

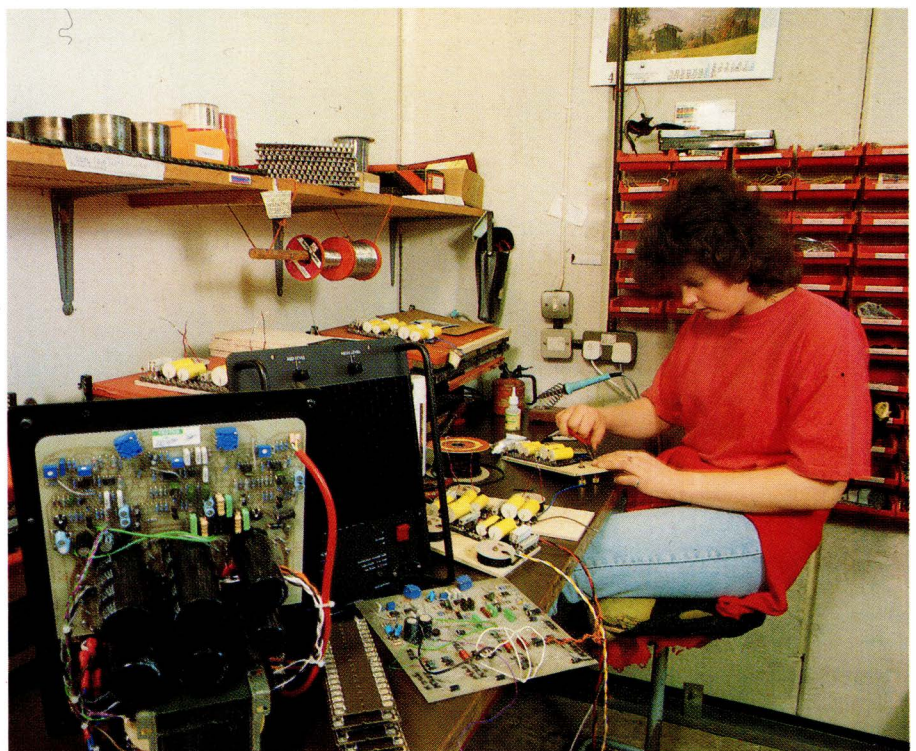
Number of employees: 18

Company turnover: £800,000

Putting together the circuitry of an on-board 'active' loudspeaker amplifier.

order from Danish Radio in 1985. Tim Isaac designed a tri-amp pack to build into the SCM50 incorporating his electronic crossover. The idea had been used before but Bill says the resultant SCM50A was one of the most exciting developments for decades – and one of the most important achievements of his life.

1985 was also the year the firm moved out of London to the Gloucestershire factory. All the employees were relocated but only one has stayed: "I think it's a bit quiet for them," says Bill, who had moved his home to the shires in 1982 seeking 'quality of life'. Nor has the firm had any difficulty in recruiting people from the locality. Quality of life includes getting his latest restoration project – a 1935 Fordson four litre farm tractor – out for a spin at lunchtimes. He found the paraffin driven machine as a rusty pile of bits a couple of years ago and says it's the same model used on his parents Castle-maine farm when he was a boy. It's a perfect, prizewinning, restoration . . . but hang on, aren't those a couple of





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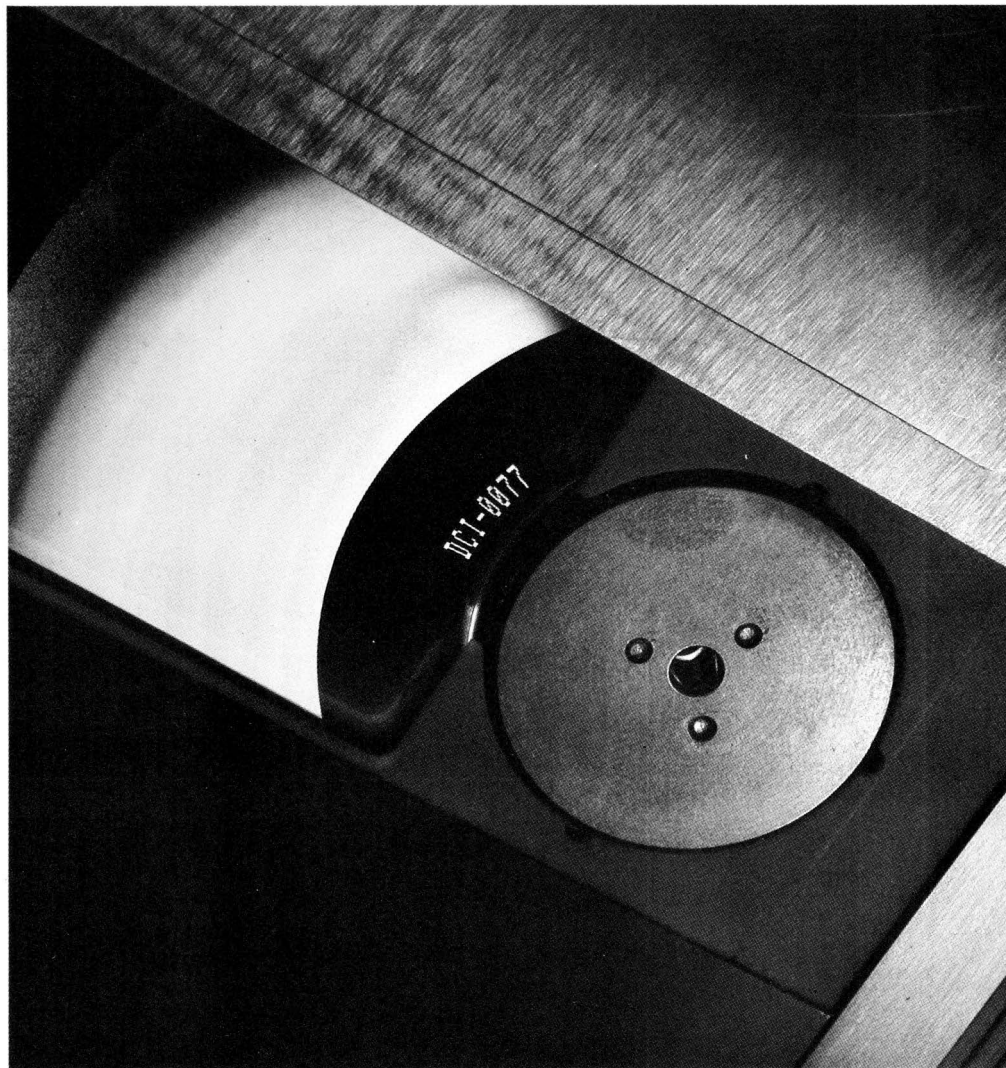
The art, science or engineering discipline – call it what you will – of high fidelity is, in essence, all about the business of storing sound signals. The stored signals then need to be reproduced as accurately as possible, so as to recreate the original sonic event, be it music, speech or sound effect. But how should one store the signals? Sound is, by its very nature, a transient phenomenon which cannot be pinned down or conveniently ‘bottled’ for future reference, and it must be converted to some other form which can be kept. Or to be strictly accurate, an *analogue* of the sound must be generated which represents the sound and can be used to regenerate it.

This analogue may take many forms, (for example, the groove in a record or the patterns on magnetic tape) and it may be further encoded, as in digital recording or radio transmission. The important feature of any such system, however, is that the analogue must be generated according to a defined set of rules which can easily be reversed to regenerate the sound. Clearly, a good recording system must possess this property. It must also be capable of storing and processing the analogue to high precision, or sound signal will be lost during the regeneration stage.

About sound

The most important thing about sound is the human ear, or, to be pedantic, the human hearing system including bone conduction, sympathetic chest resonance and all. Biology has shown how animals have differently developed hearing systems to cope with their various requirements, all designed to be an efficient aid to survival and communication. Human hearing is a very precise mechanism for receiving and analysing sound, and we are capable of some quite remarkable feats of aural discrimination which we carry out on a routine basis. The apparently simple task of recognising a voice, for example, is something which large and powerful computers are only just being made to do reliably, yet we do it in seconds even when the voice is badly distorted.

Music, which is the most common sound signal as far as most hi-fi equipment is concerned, is an ordered sequence of sounds which the ear interprets according to various learned or inherited reflexes. Learned reflexes include such procedures as following a voice in a Bach fugue, and an example of an inherited reflex would be a feeling of fear on hearing certain loud, high-pitched sounds. In highly developed

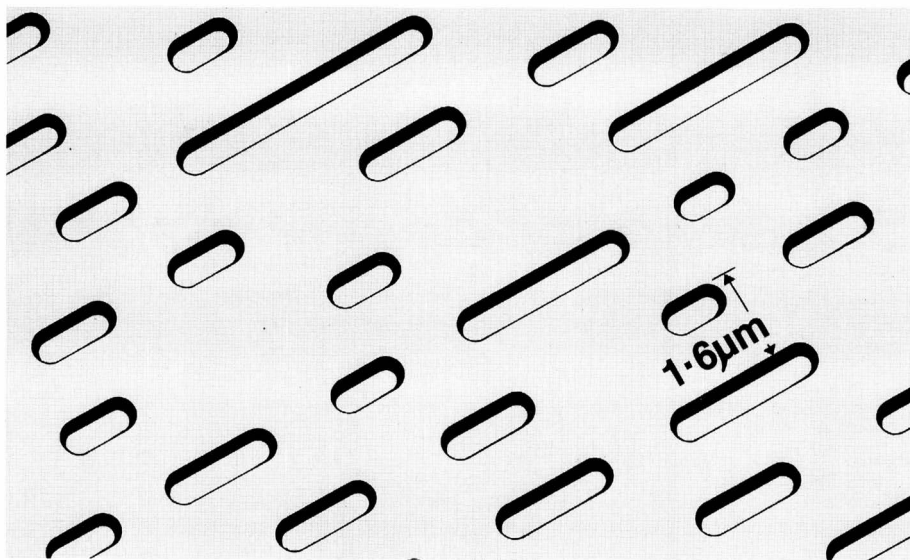


The Information Business

Richard Black examines the various techniques used for storing music signals and considers a future medium that combines analogue and digital technology.

music, the smallest nuance can carry much weight and it is particularly important to recreate the music accurately to avoid losing these nuances. ‘Losing’ in fact usually means ‘covering up with distortion’, and it seems that certain forms of distortion, which on their own would not be audible, can still bury very fine details of musical performance, so such distortion must be avoided at all costs.

Analysing sound (whether done by the human ear or a laboratory instrument) involves looking at the two basic parameters of a sound signal: its amplitude at a given instant and the frequency or rate at which that amplitude is changing (which comes to exactly the same thing as knowing the amplitude of the sound at two instants and the time interval between those instants). For



reduce information and therefore required bandwidth), a really first-class system must record all the information that the ear might ever require, and that means a dynamic range of at least 120dB (20 bits) and a bandwidth of at least 50kHz – information content 2,000,000 bits/s. This should ensure that important information is never left out under any conditions; most of the time, it is an ‘overkill’ specification, but it needs to cater for worst case conditions.

The means

Any means of information storage or transmission can be considered by information theory. In hi-fi, the most common means are LP (mechanical analogue), CD (digitally encoded electronic), radio (analogue encoded electronic) and magnetic tape (effectively analogue encoded electronic). Any electronic signal is also open to the same treatment.

CD is the easiest of the storage systems to analyse, since the information has been strictly quantised (ie reduced to a condition of exactly known accuracy in time and amplitude) as an inherent part of the system. As is widely known, CDs store digitised audio which has been ‘sampled’ at a rate of 44.1kHz and quantised to 16 bits. So as already mentioned, the information content of CD is simply 705600 bits/s (per channel). This is a fundamental constant of the recording medium, and is unaffected by over-sampling, ‘bitstream’ decoding or any other go-faster trick.

LP is rather harder to analyse, but is the most interesting case. The ultimate resolution of LP is defined by the size of the molecules in the LP’s material, since that is the basic unit of which the material is made, and in making the record you can’t cut away anything smaller than that. Cutting a record in reality means cutting a lacquer, having it electroplated in several separate stages, then using the results of the plating to press the disc in vinyl. The limiting stage is the one with the largest molecules, which is the vinyl record itself. In vinyl of the type used for LPs, the size of molecules is in the order of 1nm (1 nanometre, or one thousand-millionth of a metre).

In round numbers, record grooves can be cut to a maximum modulation of 0.1mm or about 100,000 molecules, so the resolution of the system is about one part in 100,000. As the stylus traces the groove, however, it sees a considerable number of molecules; the average

amplitude read *pressure*, since sound travels in air as a process of alternating high and low pressure. When sound is recorded and played back, the aim is to recreate the original amplitude and rate of change of amplitude so that the ear is ‘fooled’ into hearing the original sound source. Thus the stored analogue of the sound must contain as much information as possible about these parameters, generally referred to as the amplitude and time components of the sound.

That word, ‘information’, is crucial, and is the key to the whole business of comparing sound recording systems. Information is, in its broadest sense, anything that conveys meaning from one person to another. The meaning may be highly abstract, as in music, but if any fact, emotion or distinct sensation is communicated there is meaning in the signal. Meaning is not easily quantified, but by one of those neat abstractions on which so much applied mathematics is based, information has been given a rigorous definition that can be used as a measure in comparing systems for storing, converting or transmitting signals.

Information theory

There exists a sizeable branch of engineering mathematics known as ‘information theory’, which deals with the properties of information. Whole books have been written on the subject, but what it boils down to is that to transmit or store more information one must increase the frequency band of the signal, or increase the signal-to-noise ratio – or both. The measure of information adopted by information theorists is the number of bits of digital information one

An artist's impression of the signal indentations on the surface of a CD.

can transmit in a second, or store in one second’s-worth of signal storage system. This comes down to the (base-2) logarithm of the signal-to-noise ratio times the bandwidth of the storage system. Digital audio is a very simple illustration of this: the logarithm of the SNR is 16 (16 bits) and the bandwidth for this purpose is 44.1kHz (the sampling rate), so the information content is 705600 bits per second. One argument over digital versus analogue audio relates to whether this number is large enough.

According to conventional theory, the ear has a frequency range of 20Hz to 20kHz, and music has a dynamic range from about 20dB (roughly the background noise level in a quiet concert hall) to 110dB, or 90dB total. This gives an information content of at least 600000 bits/s (working on twice the maximum frequency since one needs to know about positive and negative half-cycles), implying that digital audio should be accurate enough. However, on the one hand it seems we can detect sounds at a higher frequency than 20kHz and can distinguish certain sounds that are ‘buried’ in noise, and on the other hand we are not equally sensitive to all sounds. The former consideration increases the information rate; the latter reduces it.

Given that it has not proved possible in hi-fi terms to reduce the amount of information required in a good recording by ‘data compression’ (although this technique is becoming more widely used in areas like cordless telephones to



groove speed is about 0.25m/s so the number of molecules passing the stylus in a linear direction is something like 250 million per second. This means that the record can be thought of as a sampling system with a sampling rate of 250,000,000 samples per second and a resolution in digital terms of about 16.5 bits. This gives it an information content of 4 billion bits/s, about 6000 times that of CD – but that figure is a bit misleading since you could hardly use the whole information content.

What actually happens is that the stylus, instead of counting individual molecules, averages over many thousands of molecules along the groove. From sample to sample, the exact signal amplitude may be in error by up to (at least) half a molecule, and it can be shown that if a process such as this averages over N samples, the error at the end

An electron micrograph shows the complexity of an LP groove.

will be about the square root of N times the error in each sample. It's a bit of an informed guess as to how many samples to average over, but the stylus probably rests on around 2,000 to 5,000 at a time (equivalent to a maximum frequency response of some 50kHz, very crudely), so the error in its position will be about one seventieth of a molecule size and its resolution about 22 bits. With an effective 'sampling rate' limited by the stylus and cutter to, say, 100kHz the information content is now at least 2,200,000 bits/s.

Does this mean that LPs in practice achieve a signal-to-noise ratio of over 130dB? No, but noise is not quite the same thing as distortion; noise is random, whereas distortion is intrinsically

related to the signal, and it seems the latter can be very much more noticeable than the former. Allowing for surface noise, a more reasonable figure for SNR would be 85dB, maybe 90dB exceptionally, hence 1,400,000 bits/s. Even with its limitations in terms of SNR, the LP clearly does not suffer perceptibly from certain forms of distortion that plague strictly information-limited systems, such as quantisation distortion and frequency aliasing.

Magnetic tape can be treated in the same way as records, looking at individual magnetic particles, but there is a complication in that magnetic recording behaves rather like a sampling system in its implementation. It's not usually possible to record straight on to tape; instead, the signal is superimposed on a high frequency carrier tone (the 'bias signal'), which prepares the tape for the signal. This high frequency tone acts as a sampling signal, limiting the information content of the tape. In a cassette recorder, the bias frequency is often about 100kHz, so the information content comes to perhaps 1,200,000 bits/s for 72dB SNR. Neglecting random noise, however, the resolution can be as high as 22 bits (if one looks at the number of magnetic particles influencing the head per 'sample'), which gives an information content more like 2,200,000 bits/s.

Even a simple electronic signal has its limits, defined by the frequency response of a given circuit and the amount of current flowing round it. In most circuits, the number of electrons

High magnification shows the difference in particle density between DAT tape (left) and a Type IV cassette (right).



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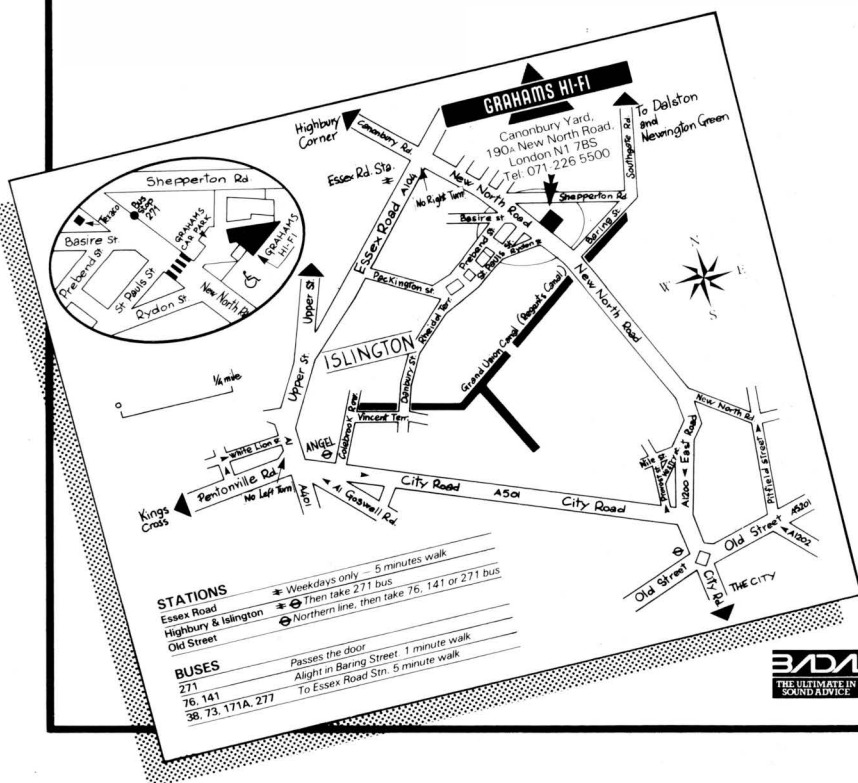
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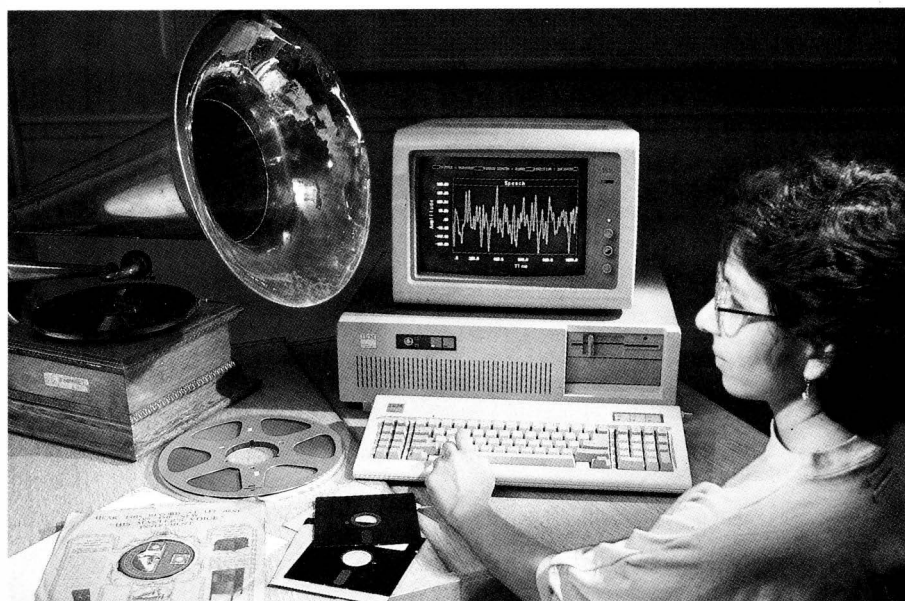
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flowing is very large, certainly enough to define a very high data rate. For example, a current of 1nA, which is on the low side of what one might find in a practical audio circuit, is equivalent to a maximum information content of some 1,600,000,000 bits/s. Noise is generally a bigger limitation, and in, for example, a phono amplifier with a moving coil cartridge the SNR may be 100dB and the frequency response 100kHz, hence over 3,000,000 bits/s – better than most information storage systems.

Comparing systems

In audio it is important to consider exactly how the data is stored, as this makes a difference to the end result. Digital audio is a linear encoding system and is very efficient at using storage space; as soon as one has defined exactly how much information there is, one can decide how much storage space is required to store it all. Judged as a storage system for digital information, however, CD itself requires rather large 'bits' on the disc which gives a relatively inefficient system (each bit consists of around 100,000 molecules). FM and AM radio are also quite good at using bandwidth, although AM particularly cannot use all the dynamic range available because of SNR limitations imposed by interference and the like. LP could store more information if it were differently encoded so as to make more use of the enormous theoretical bandwidth in the groove, though this would require some major technological input. Most tape recorders could cope with a much higher bias frequency and so store more information.

But there is an important difference in kind between the information limit of digital storage systems and that of 'analogue'. In the former, the amount of information is *precisely* defined, while in the latter it is normally limited by noise or other sources of distortion (i.e. sources not an intrinsic part of the storage system). If, as mentioned before, we can hear things happening below the noise floor – and it seems that we can, because the ear has a clever knack of 'locking in' to signals that it wants to hear and ignoring large amounts of random noise – the dynamic range of a system, and therefore its effective information capacity, extends beyond that defined by the bandwidth and the SNR. This is when it becomes important to consider the fundamental limits, as with individual molecules in an LP groove. In fact, the LP is potentially the best storage medium of all, since its resolution is molecular; CDs and tape by definition



From 78s to tape to computers. What next?

involve the alteration of much larger lumps of matter and therefore cannot possibly store as much information in the same volume!

Conclusion

How might we find audio stored in future? The writing is on the wall; for reasons of convenience and cost, digital techniques seem set to take over to a large extent. However, there are many different ways to store the digital signal of which CD is only one. DAT, which stores exactly the same information as CD but on magnetic tape instead of an optical disc, is another way, and other formats have been proposed. It is to be hoped that the standards for digital audio will be extended to embrace new technology as it comes along.

One possibility is that digital audio will be stored on silicon chips. These are used as memory devices in computers of every sort and can store as much as 16,000,000 bits on a single chip – enough for all of 8 seconds of *very* high quality audio, or 23 seconds of CD quality. Chips with a capacity of 1000 million bits are postulated, but they are going to be expensive, and so will probably never compete with simple means like tape. However, the recent appearance of such devices as the talking translator from Silicon Publishing shows where the true audio applications of large semiconductor memories may lie.

ICI recently announced 'optical tape', which uses CD technology but records optically on to a special tape rather than a flat disc. One reel of tape can store as much as 1000 CDs, for a claimed lower cost per bit, and a system like that clearly

has great potential. Meanwhile, work continues on magnetic discs for computers, and these are coming close to competing with CD for bits per square inch. These of course would be recordable, unlike (current) CD.

I think one of the most fascinating areas of information storage has just been opened up by the Scanning Tunneling Microscope and related devices. The STM uses an incredibly fine needle to traverse a surface, measuring the electric current between the two and adjusting the needle position to keep the needle-to-surface distance constant. This device can 'see' single atoms, as can an even more improbable-sounding tool, the Atomic Force Microscope. This simply traces surfaces with a diamond stylus and, by keeping the tracking force constant against a spring, gives a reading of the profile of the surface which is mapped by a computer. LP technology again – except that the tracking force is about one millionth of a gramme!

Researchers at Philips have apparently found that the fine needle used in the STM can also be used to prod the surface under investigation, leaving tiny pinpricks. If this method can be made to work outside the rather strict laboratory conditions of Philips' experiment, it could be used to store information at a scale almost of single atoms, effectively doing what the LP (as we know it) is too crude ever to achieve fully. So perhaps in future we will all have an Atomic Force Microscope playing digital records and realising all the potential of the century-old gramophone in storing billions of bits per square inch. The wheel will then have come full circle rather nicely!



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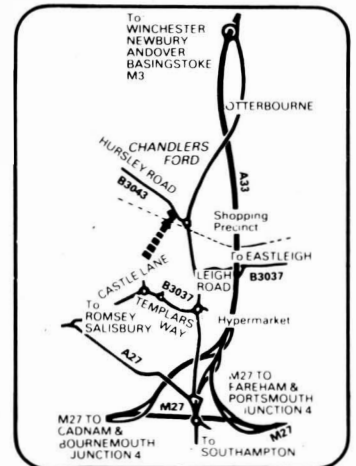
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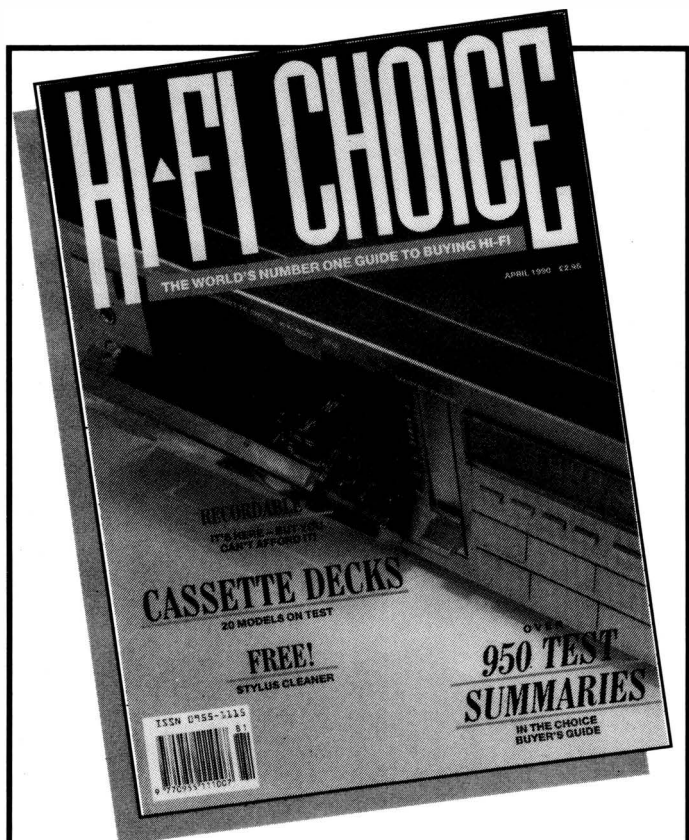
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Fifteen months ago I purchased a system comprising the following components; Michell Gyrodec/RB300/AT-F3 record player, Denon PMA 720 amplifier and Spondor SP2 loudspeakers.

My husband listens to modern jazz and big bands. I play classical music. I have noticed on some concertos and choral music like Handel's *Coronation Anthems* (cassette) that, although they sound good, sometimes power is lacking – not in volume, but strength. I occasionally have to turn up the volume to get the sound I want out of the music, but it is not volume that is needed.

I am not sure whether this is due to the music cassettes, or whether the speakers need upgrading. I was thinking of Spondor SP1 or Proac Mini Towers, but I am not sure. I do not want to change if unnecessary; but I would most certainly appreciate your advice. Also if I were to upgrade on the system, what would be your choice, please? (Apart from the turntable which my husband and I do not want to part with as we know John Michell, featured in your May issue). Also we were thinking of buying a CD, but again, with the turntable and cassette deck, are not sure if we need one or what to buy.

I have been a regular reader of your journal for years and prefer it to any of the others on the market. It certainly is my No. 1 choice.

PAULINE POWLESLAND,
HOUNSLOW, MIDDLESEX.

We suspect that what you are after is an improvement in dynamic range. This is an



Michell Gyrodec: new bearing and power supply are worthwhile upgrades.

increase in the difference between the level of the loudest and the quietest sounds that the system will produce at a given volume level, which also entails reproducing the relative level of different instruments/notes more accurately. A system with wide dynamic range will sound 'powerful' and realistic even at low levels.

Coaxing this sort of performance out of your system, however, will require some alterations. Given your existing set up the most cost effective path would be to replace the amplifier with one that operates largely in Class A, and perhaps even an example that employs valves rather than transistors. We would suggest you listen to the likes of the Musical Fidelity A1 (£269), Kelvin Labs Integrated (£395) or the Sugden A48 from the transistorised camp. If the prices don't horrify you, even more dynamic results can be achieved with tube amplification such as the Audio Innovations Series 400 integrated (£624) and Series 200 pre/power combo (£389/£429) or alternatively Croft's Micro/Series V (£199/£499) pre and power amps.

Other things that will enhance the dynamic range of your system include Blu- or Black-Tacking your speakers to very heavy stands such as those made by Foundation and Audio Dimensions and putting the Gyrodec on a Mana Sound Table (placing rubber pucks between the aluminium feet of

the deck and the glass top of the table). The Gyrodec itself has recently been improved by Michell with the incorporation of an inverted bearing and a £99 power supply.

That's quite an expensive package of upgrades but they can be carried out bit by bit and you will probably find that replacing the amp and installing the Mana table will create the effect you're looking for. The other options represent relatively subtle though worthwhile improvements. The bearing upgrade at around £50, for instance, seems particularly good value.

Whether or not you need a CD player depends entirely upon the software that you want to buy. If the music you desire is not available on vinyl then a CD player may prove an absolute necessity. But don't buy one just for the sake of it.

Examining the options

I currently own a Kenwood DP-X9010 CD transport which I use with an Arcam Black Box DAC. This is played through a system consisting of a Musical Fidelity A100 amplifier and Linn Helixes.

What I want to do is improve the sound of my CD player by upgrading the converter. I have tried the Digilog and the Marantz CDA94 and am considering the Deltac PDM One. I've also considered changing the speakers and am currently trying Wharfedale Coleridges. I've also listened to several other speakers including AE1s, MC2s and KEF C95s but haven't been completely won over by any of them.

I listen mainly to popular music but occasionally venture into classical territory. My budget for the upgrade is £600. I would also like to put in a good word for Peter Tyson of Carlisle who has proved very helpful in my selection of equipment. ROCHEY BRAITHWAITE, WORKINGTON, CUMBRIA.

This is a tricky situation. On the one hand improvements to the source are considered to be of greatest importance, but on the other it's irrational to carry on upgrading if the loudspeakers aren't able to make the most of your upgrades.

At this stage we would advise you to listen to the PDM One. If you're bowled over by it, then that would be the way to go, otherwise upgrade the



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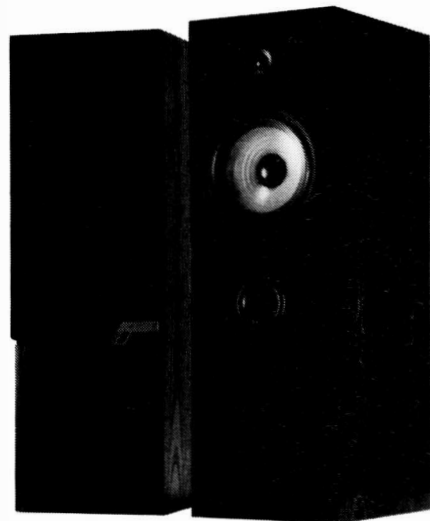
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loudspeakers instead. From the list of models that you have found wanting we can see that you're not going to be easy to please, but there are a few that fit your budget and may surprise you with their abilities. The most economical, radical and effective loudspeaker system that we have come across of late is the KEF C15/C200 satellite and subwoofer combination which costs a mere £330 – although you need to add the cost of a pair of high'n'heavy stands. This setup sounds a heck of a lot better than it deserves to!

On the more conventional front we are particularly fond of the Snell Type K and can quite easily put up with Spendor SP2/2ss and Monitor Audio 852s. Black-tack any of these to the heaviest stands you can afford (Target and Audio Dimensions make reasonably priced ones).

Flexibility

In your April '90 review of twenty cassette decks Alvin Gold criticises the Pioneer CT-445 and Rotel RD-845 for having manual tape type selection. Unless I am misinformed, tape decks with automatic tape type selection rely on the relative size of the holes around the write-protect tabs on cassettes to detect the type of tape being used. While this is obviously useful when recording on blank tapes, every one of the prerecorded tapes I have ever seen using Type II tape has had tab holes of exactly the same size as Type I tapes, thus negating the benefits of chrome formulation for those of us with decks that have automatic tape selection.

Rather than being criticised for retaining manual tape selection, I suggest Rotel and Pioneer be congratulated for returning a degree of control to users while other manufacturers automate the last degrees of flexibility out of existence.

P. E. BROWNE,
BRADFORD, YORKS.

Because many of the players that are used to playback cassette tapes (ie cheap personal stereos, in-car players, etc) don't have the facility to equalise for chrome/metal tape types, pre-recorded material that is released on

chrome tape is custom equalised so that it will playback correctly at the 120µs ferric eq. setting. In this way many of the advantages of chrome tape are retained without compromising versatility.

While it is useful to have some control over recording and replay of tape in areas like bias and noise reduction, automatic eq. is not a disadvantage. Let's face it there are too many buttons on the average cassette deck already. Any reduction in this count which doesn't detract from reliability and sound quality should be welcomed.

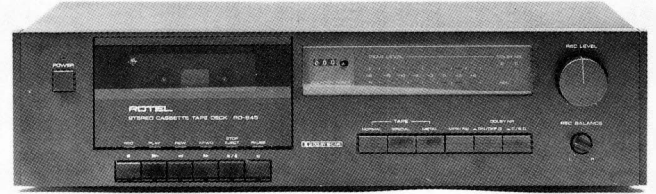
P.S. I'm sure this won't go to print . . .

With the advent of the new decade it might just be time to review some of your hi-fi consultants as opposed to the latest pieces of equipment. The reason why I suggest this is because some of them appear to be unable to move with the times and are hence not doing your magazine any credit. I refer specifically to Paul Messenger's *Personal Messages* column in the March edition.

What a negative, uninspired and quite frankly selfish little piece it is. Comments such as "my hi-fi system has hardly changed in the decade" and "CD has tended to muddy the pool", show a narrow minded approach which speaks volumes about the reviewer, not the achievements of the past decade. In fact how many times in the past ten years has a review finished with "if I could afford it I would buy it" or "it is going to be hard to part with it", etc. How many times has the review finished with "the best the company has yet come up with"?

Paul's piece is insulting to the buyer (he/she might as well have brought his/her system ten years ago); and even more so to the manufacturers who might as well not have bothered with R&D at all!

I'm not going to comment on the CD/vinyl debate here (despite having strong views on the matter); all I will say is that the best examples of both



Manual tape type selection: a boon or a hindrance?

systems can be made to sound pretty darn good when set up correctly.

If reviewers with this degree of bias (ie far beyond mild personal preference) are allowed to continue, it will only serve to work against your magazine in the long term. "I conclude that the '80s were not a particularly exciting decade" – honestly, do us a favour!

P. NETTLETON,
HELSTON, CORNWALL.

Might I first draw Mr Nettleton's attention to the title of my monthly column? *Personal Messages* is so named precisely in order to provide license for personal opinion that may well be both controversial and at variance with the 'collective' stance of the magazine.

However, the statement "my hi-fi system has hardly changed in the past decade" is fact, not opinion. Both the sound and the music have got a whole lot better, but the basic components (Linn turntable and loudspeakers, Naim amplification) are much as they were. The arm and cartridge have both been replaced more than once, but by far the most substantial improvements have come about through the introduction and refinement of support furniture, especially loudspeaker stands and turntable tables, and in the upgrading of power supplies throughout the chain.

There are reviewers and commentators who are forever swapping their components and gushing over the latest this and that, but I'm afraid that just isn't my style. To my mind, keeping a sense of direction which recognises real progress towards some hi-fi ideal is what hi-fi reviewing and commentating is (or ought to be) about. It's something I find difficult even without the disorienting effect of frequent equipment changes.

My regular refresher courses with such hi-fi landmarks as the 20 year old Spendor BC1 and 35 year old Quad Electrostatic only serve to confirm my caution. Almost invariably an improvement in some aspect of performance has a trade-off elsewhere.

I suspect the reason for Mr Nettleton's outburst comes down the phrase 'towards some hi-fi ideal', plus my own somewhat curt dismissal of CD. I would never try to pretend that my ideal is the only true path. In fact I don't really know what it is about music that turns me on – only that it's almost certainly something quite different from the stimulus that gets Mr Nettleton excited.

My own prime criterion is the behaviour of the experimental rat (see *Personal Messages* June, facing inside back cover). The absolute performance of my hi-fi system is directly proportional to the amount of time I spend listening to it. And despite having access to the best commercial CD player I've yet heard (Radford WS1), and all the convenience of remote control, I still find myself playing vinyl the overwhelming percentage of the time.

My opinion that CD has muddied the pool and encouraged us to take our eyes off the musical ball was recently corroborated by two of the country's leading CD engineers. Both described a sort of 'tunnel vision' when developing CD players, gaining worthwhile incremental improvements but only within the context of the format's capabilities; returning to vinyl was often a sobering experience. The music industry is doing its best to ensure that all will have to come to terms with the silver disc in the end, willing or unwilling. My hope is that this can be achieved without sacrificing our musical goals and ideals along the way.

Paul Messenger

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Choosing and Using . . . Separates Systems

There's more to assembling a good system than picking great components. Alvin Gold explains this month's reviews.

This year's test departs from the pattern set in last year's component systems test in one tiny, almost insignificant detail. Instead of *Choice's* own highly trained (and in any case, far too busy) editorial staff sticking pins in lists of equipment, the task has been offered to a number of specialist hi-fi dealers. But before you start rifling through the text to see which has made the biggest ass of himself, we are not disclosing which dealer chose which system. This is not to protect the innocent as you might have supposed, but because of the nature of the tests.

We specified a budget to

the dealers, but no other details such as room size or musical tastes. So their recommendations may not be especially well focused for particular applications. It is for this reason that we didn't feel it was a good idea to hold the dealers up to detailed individual scrutiny. On the other hand, we did expect and look for a reasonable degree of system synergy, and it is possible to glean from these tests something of the overall standard (or lack) of competence bought to bear by our selection of the good and the true.

Our friendly dealers were given one of four price points to match with a system which in each case was to include a record deck, a CD player, an amplifier and loudspeakers, with two dealers submitting suggestions for each of the four price steps which range from £600 to £5,000 with intermediate steps of £1,200 and £2,500. As you will see, these neatly related steps are interpreted with a certain degree of flexibility by some of our respondees.

A word on pricing before

moving on. In most cases even the essential accessories were not included on the equipment list, which meant that systems were specified without speaker cables or supports for example. There were exceptions: for the Meridian system, a particular type of interconnect (van de Hul 102) was specified, supplied for test and therefore used, and in the same fashion Zyp stands were supplied with the Spica TC-50 loudspeakers. Cables and stands can load the cost of system significantly, but in general terms it isn't even worth thinking about running systems with bellwires and up-ended wastepaper baskets just for the sake of saving some money. Invariably a cheaper combination of equipment used with more suitable accessories will produce a superior overall result.

On the other hand, cost does not necessarily equate with quality. As an example, good but relatively inexpensive solid core loudspeaker cables almost always produce superior low

'Cables and stands can load the cost of the system significantly, but in general terms it isn't even worth thinking about running systems with bellwires and up-ended wastepaper baskets just for the sake of saving some money.'



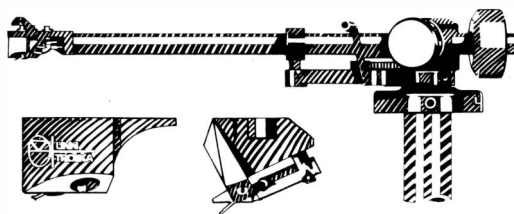
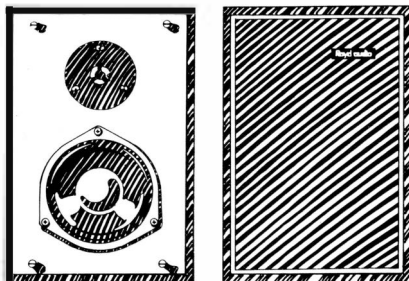
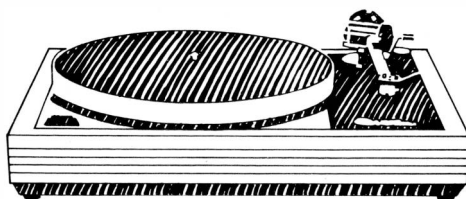
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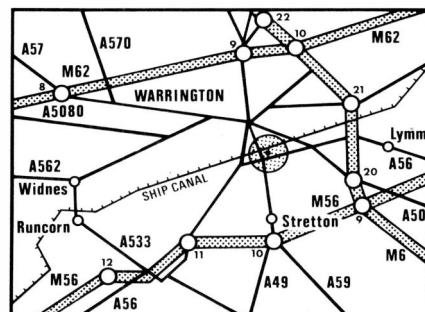
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level resolution and control than the over-endowed audiophile stuff which can cost a fortune, though it may not sound as dramatic. Without making too much of a meal of it, these points are addressed where they occur in the reviews that follow.

Why records and CDs? Why not radio tuners or cassette decks? Well, by general consent CD and vinyl are the two most readily available high quality sources of archived music for use in the home. Radio has always been essentially a lucky dip medium, which in a way is both its great strength and its overriding weakness to the music lover. Pre-recorded cassettes still continue to disappoint, even in those cases where the cassette deck itself is capable of vinyl or CD standards of reproduction (which is possible with certain caveats). Cassettes may also be bought for quite different reasons. It may well be that one buyer wants a no-holds barred design to offer best possible sound

when they're treated as a single entity.

Let's move on . . . Since last year's test, there has been some development on the CD vs black vinyl front, which has shifted significantly if not decisively in favour of compact disc.

The situation isn't entirely one-sided. New up-market turntable introductions are few and far between, but the last year or so has seen several new and important up-market arms and cartridges (eg Roksan *Artemiz/Shiraz* and some important lower price introductions including the Pink Triangle *Little Pink Thing*, which I was disappointed to see that none of our specialist dealers suggested). On the other hand, we have managed to include a brand new budget model called the Systemdek 1 from Dunlop. By and large though there's an element of déjà vu about this year's list, which accurately reflects the state of the market.

Even more important than

'Given a good enough source, the importance of the amplifier to system performance is incalculable, and indeed this is where several of the systems we tested turned out to be at their most vulnerable.'

quality, whilst another may simply want a twin transport deck to dub existing tapes, or other sources for use in a car or personal stereo.

This is not to argue against the viability of either of these alternative sources – I for one use both radio and cassettes for much of the time – but simply to note that when putting together a system at almost any practical price point, there are advantages in starting with a relatively simple configuration, perhaps much like the systems tested here, and treating the tuner and cassette deck as add ons. It also helps to clear the field for the most important part of this test, which is to determine how systems (or the kernels of systems) work

what's happening in the hardware area is the way that new classical titles have started to dry up on vinyl. At the time of CD's introduction I (and many others) suggested that the progress of CD vis a vis vinyl would be determined by software and not hardware. There can be no real chicken 'n egg situation where the industry has been so heavily promoting the new medium, buoyed by wider retail profit margins and other factors. But the reasons are less important than the situation itself, which is that anything new that isn't absolutely mainstream or Top 20 material, takes more hacking down than it used to.

CD player technology has been developing apace.

Although this hasn't yet filtered down to the affordable end of the market, products like the Meridian 208 (see tests) and other even more exotic developments (time domain filtering from Wadia, Theta etc) are setting quite new standards in their respective areas of the market. Unfortunately, those of us with nearer average disposable incomes will have to wait a year or so for the potential advantages of (for example) bitstream technology to filter down market where the state of the art has so far been unaffected by technological developments of the last year – even in the case of some less expensive bitstream hardware.

However these developments are important even for those who can't afford them, because they demonstrate once and for all that the compact discs available now in the shops can ultimately be made to sound better than has been apparent up til now; that is that the absolute quality of the recordings is not the only limitation.

Given a good enough source, the importance of the amplifier to system performance is incalculable, and indeed this is where several of the systems we tested turned out to be at their most vulnerable. The loudspeakers affect the sound more immediately, and in a more dramatic way, but the musical integrity of a system can be powerfully undermined by the wrong choice of amplifiers in a manner that rarely occurs with loudspeakers.

The amplifier's role is also the most complex to define. As well as accepting low level signals from the various source components, and in the process partly determining (through its input impedance etc) how those sources will behave, it also drives and controls the loudspeakers, which as the technically literate will know, is not the easy task it is often cracked up to be. Consequently the influence of the amplifier is peculiarly if not uniquely far reaching. (Although this does not mean that the amplifier, or any other component for that

matter, is of dominating importance.)

In the end however, I was less interested in the individual components than I was in the systems as a whole. The first question I asked when I set each system up and started listening to it in earnest was always music related. That is, I was less concerned about the depth of the bass or the airiness of the midband (though inevitably such things must play an important role in any written appraisal) than whether the music was communicating in a way that either made me either want to continue listening or that helped make sense of the funny thing is that there appears to be surprisingly little correlation between the systems that worked and their cost. There were good and bad systems as most price levels.

Finally, procedures. Special conditions affecting individual systems (for example cable types etc) are explained in the individual reviews. Each system was run in for several hours and sometimes for very much longer (eg the Spica loudspeakers and the Meridian components) where the nature of the products dictated. Each system was auditioned in two separate rooms of fairly normal size, and the components were swapped and changed about quite a lot.

Our thanks to the following dealers for helping us assemble this month's separates systems:
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 The Listening Rooms, London SW5
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£590 System

SYSTEMDEK/AUDIO TECHNICA TURNTABLE COMBO, CEC CD PLAYER, ROTEL AMPLIFIER, JPW LOUDSPEAKERS



The first of two £600-ish systems assessed in this month's review project employs a mixture of established and unfamiliar machinery. The JPW *Sonata* is the best known item: this loudspeaker comes from a small West Country producer that specialises in real wood veneers even on its £100 models, and the *Sonata* is one of two really hot £100 designs. The other is the *Celestion 3* which attacks its brief with a hi-tech blend of moulded baffle/drive unit chassis components and metal dome tweeters. A comparison of the two approaches is not part of the brief for this piece, but is strongly recommended to the interested reader.

The other components are a little less well known. The Rotel *RA820AX* for example is not directly related to the *RA820BX* series, now in its series 4 incarnation, but is a derivation of a model with more mainstream appeal, the *RA820* and its successor, the *RA820A*.

The Systemdek will be unfamiliar to many. Not only is this model brand new, it is also the first Dunlop turntable without a suspended subchassis, and therefore marks something of a departure for this long running and conservative family firm. Finally, the CEC CD player was a completely unknown quantity to the author as it will be to most readers. CEC was known to me only as a somewhat anonymous Japanese OEM house. On the evidence of the *540CD* it is no Sony or Technics. It clearly intends to major on hitting price points, which probably accounts for its presence in this system.

Systemdek 1 turntable and arm, Audio Technica AT95E cartridge

This new model sprang largely from a requirement from various Systemdek distributors in other countries for a turntable that would be easy to use and site for those who are not into handling floppily suspended turntables.

The Systemdek 1, which was first shown to the public at London's Audio 90 hi-fi show, is something of a departure for the company whose name to date has been associated exclusively with suspended subchassis turntables.

Non-suspended subchassis turntables have their own design problems. With a suspended design, the subchassis is decoupled from motor vibration, which is dumped harmlessly (one hopes) into the outer plinth. The designer of non-suspended decks has no such luxury, and motor vibration is fed straight onto the structure that supports both the arm and platter main bearing. Dunlop has decoupled its motor with a rather ingenious arrangement whose main active elements are small pieces of Sorbothane. These effectively kill almost all the vibration that is normally only too evident, without resorting to a very floppy motor coupling which could result in pitch problems.

The motor is the well known Philips derived Airpak (nee Impex) synchronous design. Capacitors used for starting and phasing purposes are hard wired straight into the back of motor terminals for simplicity. The main on/off switch is

fitted with anti-spike capacitors which reduces but doesn't quite eliminate switch-on 'thump'. The feet are also fitted with small Sorbothane domes, which again do a surprisingly good decoupling job.

There are some other ingenious points, such as a main bearing that screws straight into the solid wood base, eliminating separate fixing screws and facilitating lower lines. The bearing is tight fitting but free running (though it benefits more than you might credit from a few hours running in), and the subplatter and vestigial motor hubs are machined from a nylon material. The platter is glass and a thin felt mat sits on top.

Systemdek will in due course release a version of this deck which can take Rega or Linn fit arms, but for the present it is only available with the company's own arm. A conventional budget design, the base is made in-house. Cable wiring is also done by Dunlop, but the well adjusted bearings, armtube and chunky, Rotel-esque headshell come from Japan.

Aesthetics are a strong point of this design. Your £179 buys you a very simple but attractive looking product with a real wood veneered finish covering the chassis (dark American walnut or black ash) and an almost equally attractive cover which at first sight looks as though it has been fabricated rather than simply moulded. Excellent graphics for the manufacturers logo complete a package which, in stark contrast to a number of competing budget decks, actually looks and feels more expensive than it is.

It was probably a combination of this systems' budget status and the need to use a high output cartridge with the Rotel amp that led to the decision to specify Audio Technica's low-end favourite cartridge, the *AT95E*. There's nothing very clever about this cartridge: the elliptical billing for the stylus is in danger of contravening the Sale of Goods Act – I could detect no trace of anything non-spherical in the grind of the otherwise quite nice diamond; the cartridge pins are pretty rough and the plastic body creaks like my old granny. But this has never stopped it dancing all over the graves of many more costly cartridges, so I had no particular worries about its use here.

CEC 540CD CD Player

Compared to the foregoing, the story here is much simpler, and almost entirely summed up in one word, phrase



though it is surprisingly well executed given the price. The box is a relatively compact one, sealed, and fitted with two very ordinary drive units, an Audax miniature cone/dome tweeter and a pulp cone bass driver with a rubber roll surround from the house of Elac. The crossover is a very simple, low order network.

The real icing on the cake however is the enclosure which is based on a smallish but solid box with dovetail joints, fully veneered on all surfaces in a number of alternative wood species.

Sound Quality

Having just finished my formal listening with a blistering account of the Respighi's *Pines of Rome* (Dutoit/Decca if you wanna know), it is pretty obvious that that tone of this system is set by the loudspeakers and by the amplifier. The amplifier plays a particularly prominent role.

First, I should say to RA820BX owners that the AX is not quite in the same class. This amplifier is much less well controlled. It has an almost blowsy quality, partly due to a rumbustuous dynamism and forwardness, which enables the amp to throw stereo soundstage information forward and well clear of the loudspeakers. But the AX is also a little rough and ready. What it gains in simplicity and directness of approach, it misses in refinement and sophistication. This rough and ready quality, which by the way was essentially the same irrespective of whether the line inputs or the phono one was being driven, is very much part of the *Sonata* package too . . .

As I remarked earlier, it's easy to see why the *Sonata* was chosen for a system of this type, but there is a side to the *Sonata's* character that can make it a dangerous bedfellow. In some ways it is better adapted for use in very capable, expensive systems where the other com-

or saying - £139. This is the Skoda cum Moskovitch of CD players, and was specifically chosen to help get the system up and running for the price of just 2,400 copies of the *Independent*. But whilst this was the basic reasoning, I can't say I spent a great deal of time regretting the features it didn't have, which makes an impressive list starting with remote control and including index search, random play and a mess of other so-called facilities. Remember, the CEC doesn't have any of them.

What you do get is a simple 16 track memory, repeat play, track skip and audible scan - the usual basics in fact. The discreet display limits itself to track numbers only, but in an unexpected luxury attack you do get a headphone socket with a volume control.

The technology employed is nothing to write home about. It's all standard commercial stuff inside, the converter being old-style 16-bit with 2x oversampling (remember that?). The player is lightweight and a bit creaky in operation, and track access is very slow. It worked without problems though, and like all modern players is compatible with 8cm discs.

Rotel RA820AX amplifier

This relatively recent addition to the Rotel lineup slots in below the more celebrated, purist 820BX4 which is both more expensive and more sparsely equipped.

The RA820BX is derived from last years 820 via a change in the power transformer to a new, better regulated design which is intended to address a certain slackness in the performance of its predecessor, especially via the line inputs. Power output is left unchanged at 30 watts a side.

Fixtures and fittings include tone controls, mono switching and a second set of speaker terminals, which unlike the main set can be switched using a front

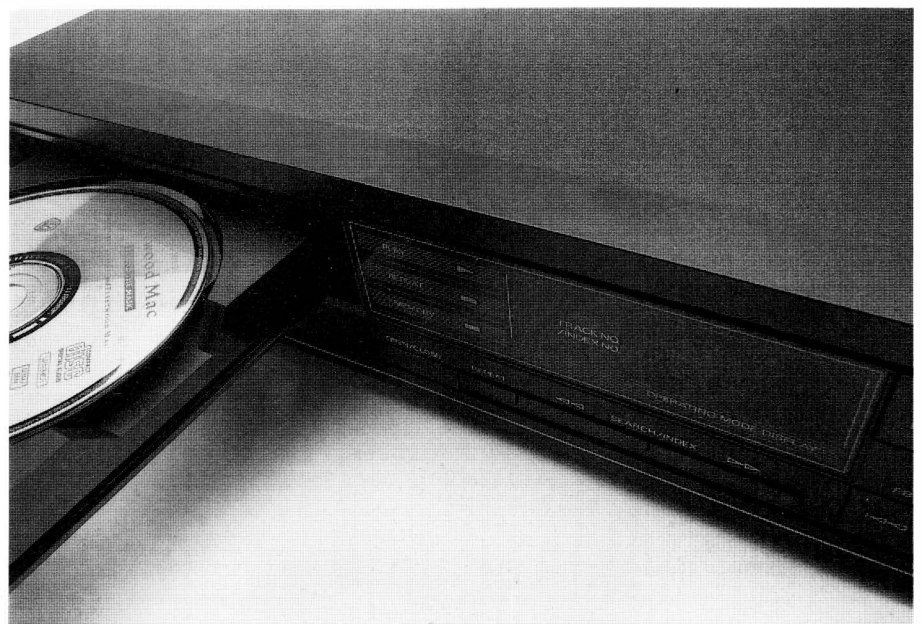
panel press button. The 820AX control set is very similar to the one originally designed for the 840BX, though this turns out to be coincidental as the two amplifiers are not related under the skin. Audiophile sensibilities are addressed with a tone bypass control and the direct routing of the loudspeaker wiring.

Like all Rotel integrated amplifiers, the RA820AX is compact, solidly built, uses excellent components in an intelligently conceived circuit and has smooth, well designed controls - and not too many of them.

JPW Sonata loudspeakers

It's easy to see why the *Sonata* was chosen for a system of this type. It's the most expensively engineered and expensive looking cheap loudspeaker there is. This could be due in part to the costs of producing enclosures on modern machinery in one of HM prisons, but is more likely a result of economies of scale.

Technology is nothing unusual,

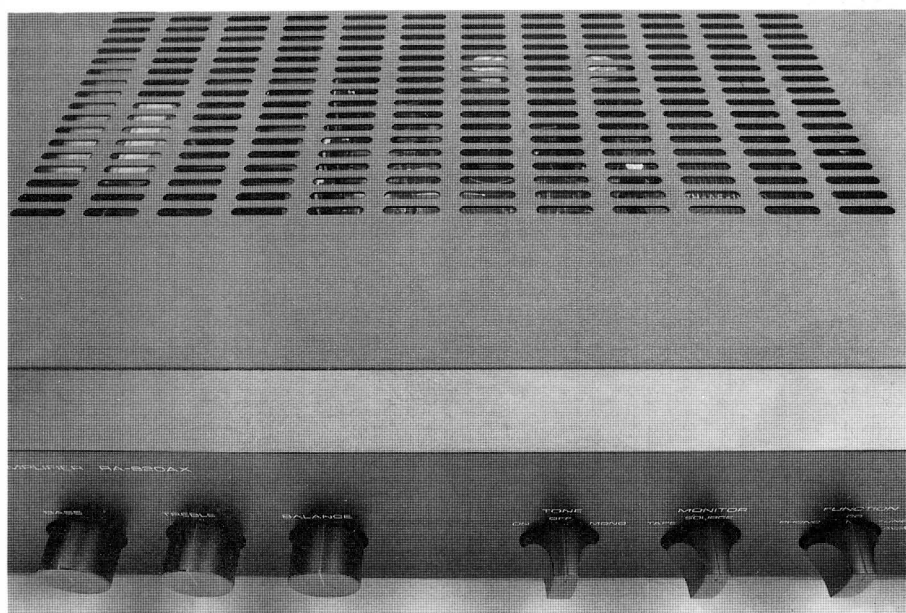


ponents keep a firm grip on it's rougher edges. The Rotel copes – just – but only once the *Sonata* has been thoroughly burnt in, which can take as much as about 30 hours of FM interstation noise (the tweeter needs to be run in as well, not just the bass driver as with most other speakers).

Unusually in a system at this price level, this JPW/Rotel based system can bite as well as bark, but this lends it an engaging, often foot-tapping quality denied some of it's more sophisticated but restrained peers. It is also quick and assured in it's musical presentation as well as being lively and even tactile with the right kind of material.

But with the CEC CD player, all this became just too much of a good thing. For much of the time, this budget CD player trundled along, sounding OK in it's unremarkable way. At the same time, the player tended to lack warmth and was a little edgy and thin sounding too with a certain amount of distortion and coloration evident at times – but nothing dramatic. But when the music became complex, typically in the maelstrom of full orchestral recordings, perhaps with brass, woodwind and percussion going together, the CEC appeared to go into terminal overload and the output from the player became muddled and distorted. Comparison with other players shows this clearly, and direct comparison with the Philips *CD610*, as chosen for this month's other low cost system, showed how even a budget priced player can maintain a grip through adversity. The same passages were replayed by the Philips with panache and clarity, and none of the CEC's evident congestion and loss of control.

The turntable on the other hand worked beautifully. The *AT95E* sounded a little duller than I recalled, and it's tracking limitations were only too apparent. And so was the cure. If these things



prove too restricting, a new cartridge will cost anything up to £50 or so but could effect a dramatic improvement. I tried some new Nagaoka moving magnets to good effect, which revealed that the *Systemdek 1* is a real success. Unlike certain other low cost players it has remarkably stable pitch and is surprisingly immune to feedback and football noise when adequately supported. Bass is firm and true, and I can see a big future for this attractive newcomer which, by the way, sounds best with the lid raised or – better – removed.

Conclusions

I would go for a change in CD player, perhaps to the Philips *CD610* to replace the rather rough and ready though not wholly unworthy CEC model. I would also keep the options open on the cartridge front. Despite previous advocacy I found the *AT95E* a little too dull and frazzled in extremis for my taste, though there is inevitably a wide production spread with low cost cartridges, and I

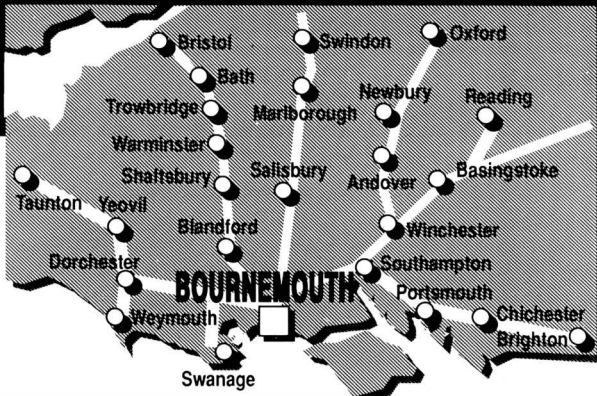
have heard better '95s. The rest of the system however hits the nail on the head. As a system, it can tend to thinness at times, but it is also detailed, assured and at times even tactile. What we have examined here is the basis for a very fine system indeed.



GENERAL DATA

Typical retail prices	
Systemdek I/Audio Technica AT-95E	£178/18
CEC 540CD	£139
Rotel RA820AX	£150
JPW Sonata	£100
Turntable	
Type	manual/2 speed
Speeds	33/45
Cartridge	magnetic
Dimensions	42.5 x 47 x 37/6cm (h x w x d)/overhang
CD Player	
Digital output	no
Headphone output	yes
Dimensions	9 x 42 x 29cm (h x w x d)
Amplifier	
Power output	30wpc
MC cartridge compatible?	no
No of inputs (ex tape)	4
No of tape circuits	1
Dimensions	9 x 44.5 x 29cm (h x w x d)
Loudspeakers	
Type	2-way, sealed
Recommended placement	near wall
Impedance	8 ohms
Sensitivity	87dB/watt/mtr
Power handling	70 watts approx
Dimensions	32 x 25 x 22cm (h x w x d)

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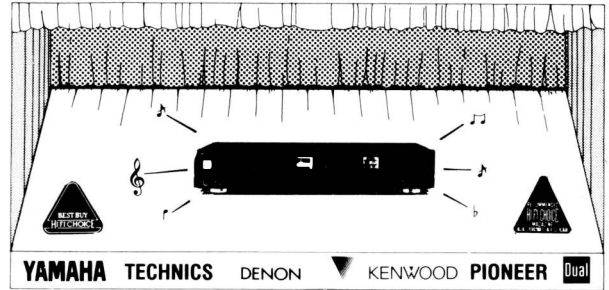
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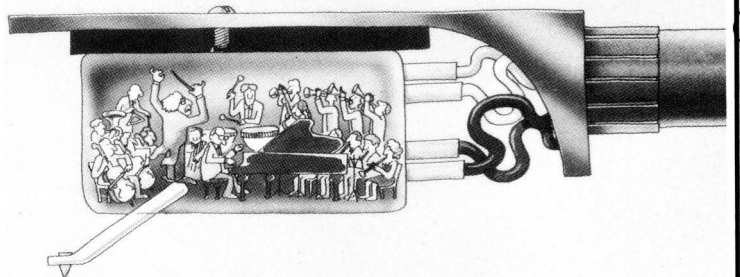
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£610 System

DUAL/AUDIO TECHNICA TURNTABLE COMBO, PHILIPS CD PLAYER, DENON AMPLIFIER, MISSION LOUDSPEAKERS



In many ways, the priorities served in this system reverse those espoused by the dealer who suggested our other £600 system. This is particularly evident in the case of the turntable and the CD player, and to some extent with the loudspeakers too for reasons which may already be obvious but which will in any case quickly become apparent.

There are also some important features our two systems have in common. Like its alternative, this system features relatively compact loudspeakers, and the system recommends itself for moderate volume levels in rooms of medium size or smaller, with bass depth sacrificed in the interests of low frequency tunefulness and transient response.

Dual CS505-3 record player & AT95E cartridge

With the solitary exception of the £89 NAD 5120, 3/5th of a pony is about the minimum you can reasonably expect to get away with for a credible high fidelity turntable to use in a system of this kind. Of course 'credible' and 'system of this kind' are vague concepts by any standards, but few would dispute that there are very few turntables worth considering that cost less than the Dual's £160, and of those that do exist the CS505-3 is the longest established, the best known, the most successful and probably also the best liked of those that offer more than completely manual operation. For many years it has been the product to reckon with alongside the Rega Planar

Two (which is manual) and, more recently, the semi-auto Ariston Q-Deck. These two alternatives cost £155 and £165 respectively.

The Dual is more than just popular and musically worthy. It is also uncommonly user-friendly – uncommonly that is for a turntable with audiophile credibility as automatic arm functions have always been taken to be invidious to performance. All other seven turntables in this month's *Choice* are fully manual in operation, but the Dual is a turntable that none need feel hesitant to use. At the end of record side, the arm lifts and the platter motor shuts off. Pulling the arm back to its rest also resets the cueing lever to the 'up' position to make it difficult to annihilate the stylus. Speed change is by switch. All this is not as impressive as full automation, but it's the next best thing.

The other aspect of user friendliness concerns the form in which the package is supplied. The Dual comes out of the box all but ready to run, with an Ortofon made cartridge prefitted (it can be changed of course). Only simple setting up procedures, which are well covered in the instructions, need to be performed. This is the case even though the Dual has a coil-sprung floating subchassis, which with some turntables is the cue for endless setting up. The platter is captive, the suspension is non-adjustable and the arm permanently fixed; it is these factors which help reduce setting up requirements.

The hardware is well tried and prob-

ably familiar to most users. Most of the metalwork is based on steel pressings and simple castings, and the chassis is part moulded and part – the pretty part – wood veneered. Long standing idiosyncrasies include the pitch adjustment which is accomplished by a motor pulley that is segmented like a grapefruit allowing it to be contracted and expanded at will, and a low mass dynamically balanced counterweight. In its current incarnation, the 505 is (thankfully) fitted with a nearly conventional headshell. The Dual comes with an Ortofon made cartridge similar to the OM10 or OM20, but the Audio Technica AT95E was specified and used.

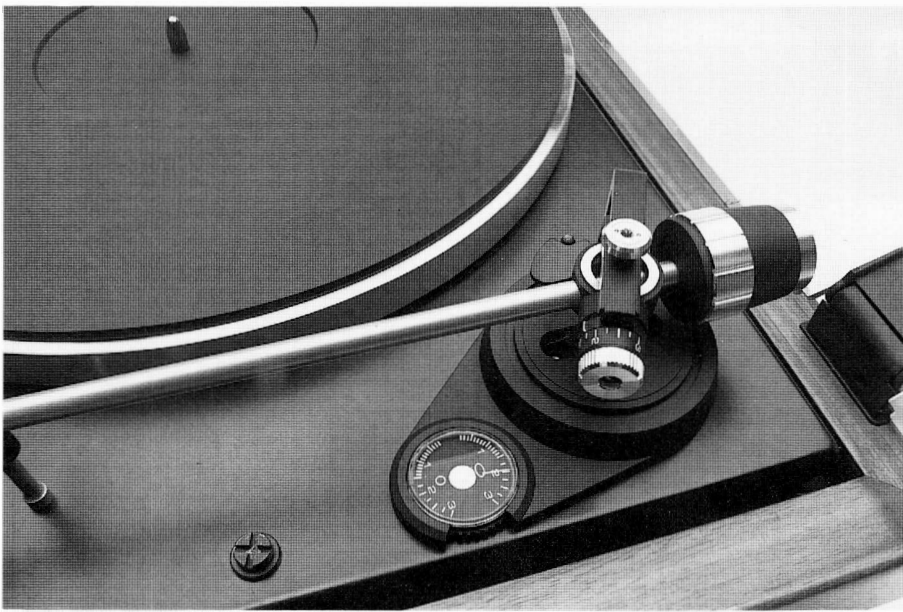
Philips CD610 CD player

This budget priced player from the Philips stable costs £160, yet makes surprisingly few concessions to price. It comes with a full set of features including a well designed remote control featuring a track number keypad and index search keys. On the player itself are controls for the usual range of play modes and some lesser ones like A-B repeat and random play. Audio interfaces include standard analogue and headphone outlets, both of which operate at fixed level. The player's limitations are its lack of a 'display off' switch (well that would have been something in a £160 player!) and a digital output.

In addition to being well equipped, the 610 is surprisingly well made. The player employs a number of quite effective anti-resonance measures in its construction and the controls and displays are all of high quality. Disc handling is a little more pedestrian, but satisfactory nevertheless. Technology is 16-bit 4x oversampling based on Philips' new economy converter, the TDA1543, which offers a slightly lower technical specification in exchange for simpler peripheral external circuitry, the real reason for the low price of the player. The laser optics are built around the well known CDM4 mechanism.

Denon PMA-250II amplifier

This product is billed in Denon's propaganda as, and I quote, a UK special product designed to address the UK's 'budget audiophile' market. The PMA250 is far removed from traditional Far Eastern design priorities, being the progeny of a design programme instigated in this country (wherever that is). This was the approach taken by Rotel some years ago and, coincidentally or otherwise, the amp has some obvious



similarities to the Rotel RA820AX which is included in our other £600 System review this month.

The rather fussily designed front panel is populated by tone controls, a rotary source selector, a large volume control and tape monitor controls. The phono input is for moving magnet cartridges only, and there are three line inputs without the tape circuit. The control count also includes a press button to bypass the tone control and balance circuitry. Leaving the tone controls out altogether would have made more sense, but would, it seems, have restricted the market for the amplifier, increasing unit costs and probably also the selling price.

Most of the technical interest lies under the skin. The fully discrete power amp section is designed for a high current yield to help drive low impedance loudspeaker loads. The tone control section itself has a restricted range of action and is based on passive circuit topology. High quality capacitors and resistors have been employed in critical areas and special attention to earthing is quoted by Denon as evidence of the thoroughbred nature of the design.

It's also nice to see that the design team has prevailed upon its principals in Japan to specify 4mm binding posts instead of the bare wire terminals normally used on Japanese amplifiers. Power output is 30 watts per channel.

Mission 761 loudspeakers

The Mission 761 (which has appeared before in a previous components systems issue) is a budget design of some originality. It is priced about 30 per cent higher than the model selected for this month's other £600 system, the JPW *Sonata*, but repays this by being slightly larger, by being extremely well built with a very high standard of finish (though like most £130 speakers the 761 doesn't feature real wood veneers) and by using

rather more costly drive units. The small soft dome tweeter is strictly not in the same league as the Audax cheapie used by JPW (though in fairness JPW makes the most of its materials). The bass cone is also a relatively high spec Mission made unit with a doped pulp cone.

The two units are mounted into the sealed (IB) enclosure in a vertically in-line configuration but with the tweeter mounted below the woofer. The design listening axis is a little above the tweeter plane which allows conventional placement on normal stands, say 50cm tall, close to a rear wall for bass loading purposes. The high bass unit placing helps reduce the room reinforcement effects due to reflections from the rear walls and the floor. This neat piece of lateral thinking helps maintain upper bass/lower midband uniformity to standards that other transducers find hard to match.

Sound Quality

With most of this month's eight systems (but with one or two notable exceptions,

especially in the case of the Meridian based system), the CD player plays second fiddle to the record player. I expected this to be the case here, but for much of the time it wasn't the case.

The Philips CD player sounded clear, articulate and concise. It offers quite a brightly lit, agile kind of sound with surprisingly good depth resolution and a real sense of tangibility with much material. The bass is light but firm, tuneful and *very* deep, whilst the presentation of the system veers just the right side of sounding raw-edged or bright, though it sailed fairly close to the wind with some complex, wide-bandwidth material. More expensive CD players can and often do sound smoother and easier on the ear, but the Philips CD610 player tackled the fundamentals effectively, and with considerable aplomb.

Whatever objective shortcomings there may have been however, the Philips had little difficulty disposing of the Dual record player, at least in its standard form. The first point I noticed – auditioned at first with the supplied Ortofon cartridge rather than the specified Audio Technica – was that the clarity of the CD source was largely dissipated. Records tended to sound smeared and a little coloured, and imagery was vaguer and less stable in presentation.

Of course these are just the areas popularly taken to be weaknesses of black vinyl, and to some extent this is true. What made records particularly open to criticism in this system, however, was the fact that the usual compensations – greater depth and solidity to the sound – were largely missing. The Dual sounded quite natural in its way, but poorly focused and somewhat opaque. Positioning wasn't the problem as I established by experimentation, and a sample of the Systemdek 1 used in the other £600 system sounded consistently better just where the Dual was at its



weakest.

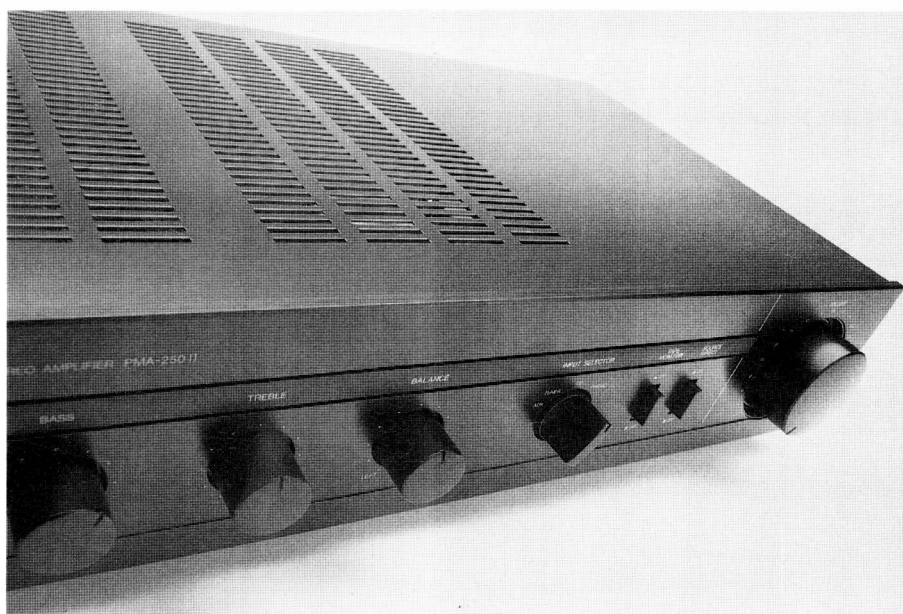
Changing from the Ortofon to the AT contributed some extra midband dynamics and clarity, but a loss of the Ortofon's treble presence and smoothness, and this wasn't considered a success. A change to a much more expensive cartridge such as the new Stilton/Nagaoka cartridges, which are due to be released shortly, did help effect a cure. Coloration levels decreased, resolution increased and the sound began to snap into focus. But I couldn't help noticing that the same changes performed on the Systemdek, or the Rega Planar 3 from another of the eight systems, led to even greater improvements.

The amplifier didn't help either. In certain respects contradicting my experience with this amplifier when it was first released, I found the phono input significantly woollier and dynamically flatter than the line stages, but at no time, even via the line inputs did the Denon display the low frequency grip or overall authority of, say, the similarly positioned Rotel RA820AX. In fairness though, the latter could sound a little rough and unsophisticated at times.

This might not have mattered with another loudspeaker, but it did with the Mission which tended to sound congested with full blooded recordings played on the record player (the greater clarity of CD in this region helped pull it through). I have no real complaint about the Mission, though I do feel it is beginning to show its age: it has neither the low frequency agility nor the airy articulation in the midband of the JPW *Sonata*, say, but it was clear that it wasn't best served by the amplifier or the turntable in this system.

Conclusions

I couldn't help noticing that this is a really rather nice looking system, in many ways closer to the mass market



products of the industry majors than the often rather simpler, chunkier approach typical of specialist equipment. It's certainly easy and convenient to use. In comparison with our alternative £600 system, the Dual's semi-automatic features and the remote control handset for the Philips CD player do a lot to make the system more accessible.

But these are side issues. On the central question of sound quality, it is much harder to come to a balanced view. The key quality that defines the most successful of our systems is synergy. In everyday terms, we're looking for systems that are in a sense more than the sum of their parts, that serve the music faithfully irrespective of specific shortcomings with individual components.

In practice what I found here was a system made exclusively from fine, worthy components (though some were finer and worthier than others), yet without that essential synergy. The amplifier, though good in relation to price, isn't up to controlling the speakers

in the way they demand, and even the speakers are beginning to sound less than fully developed in the midband.

The Dual 505-3 is an excellent low cost deck, but is slightly pale and undemonstrative – and no substitute for some of the record playing machinery featured elsewhere in this test project, some of which costs only marginally more. Only the CD player seemed to me an unequivocal success, both in its own terms and as a part of a complete working system.



GENERAL DATA

Typical retail prices	
Dual CS 505-3/Audio Technica AT-95E	£160/£18
Philips CD610	£160
Denon PMA-250 II	£140
Mission 761	£130
Turntable	
Type	belt drive, semi-auto
Speeds	33/45 + pitch
Cartridge	magnetic
Dimensions	41 x 43.5 x 37/4cm (h x w x d)/overhang
CD Player	
Digital output	no
Headphone output	yes
Dimensions	10.5 x 42 x 28.5cm (h x w x d)
Amplifier	
Power output	30wpc
MC cartridge compatible?	no
No of inputs (ex tape)	4
No of tape circuits	1
Dimensions	9.5 x 43.5 x 25.5cm (h x w x d)
Loudspeakers	
Type	sealed, 2-way
Recommended placement	near wall
Impedance	7 ohms
Sensitivity	87dB/watt/mtr
Power handling	70 watts approx
Dimensions	38 x 21 x 21cm (h x w x d)



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REGA TURNTABLE + CARTRIDGE, MARANTZ CD PLAYER, ONIX AMPLIFIER, MONITOR AUDIO LOUDSPEAKERS



The £1,200 'price point' has been tackled for this review project by two striking but contrasted systems. This system employs what without doubt is the most famous of all £200-ish turntables, the Rega *Planar 3*, teamed in this case with the best and most expensive of Rega's recently introduced cartridge range (anything less than 10 years old counts as recent in Rega time) – the inexplicably titled but elegantly (mis)spelt *Elys*. The other music source is one of the best mainstream Philips CD player clones, the *Special Edition* variant of the Marantz *CD60*.

The Onix *OA21S* amplifier looks rather like a stripped down *Mission Cyrus* as used in the other £1,200 system – until you switch it on. Finally, and here we find the most obvious differences from the alternative *Systemdek/Denon/Mission/Arcam* system, this one comes with the smallest loudspeaker yet from the Monitor Audio range, the *Monitor 7*.

Rega Planar 3 turntable and Elys cartridge

For more years than I can remember the Rega '3 has been the yardstick against which all sub-Linn *Sondek* priced turntables have been measured. In the time that it has been on sale the motor unit has changed very little, but build quality has remained consistently high and on the whole the Rega '3 has retained its competitiveness. This said, Rega no longer has the field to itself as it once did.

Whilst the Rega's motor unit has

scarcely altered, the *Acos Lustre* clone tonearm originally specified by the Southend-based company has been changed for its own design, the *RB300*. This arm was revolutionary in engineering and value for money terms when it was released, and has remained so to the present day.

Most readers will be familiar with this model, so a short description will suffice. The Rega *Planar 3* is a solid (non-suspended) design based on a thick faced wood baseboard to which the arm and main bearing are bolted, and from which the synchronous motor is decoupled. Drive is transferred by round section belt to a plastic inner platter which in turn supports a heavy felt-covered glass platter. Rega was amongst the first – perhaps *the* first – to use glass as a platter material. Glass has the advantage that it is rigid and non-resonant at low frequencies whilst being simpler to fabricate than a traditional metal platter.

The arm is a low mass device with a one piece cast headshell, arm tube and bearing yoke, the counterweight being kept very close to the pivot and some of the tracking force being applied by spring to minimise inertia effects. Rega has replaced the original rather tatty looking phono plugs with new, only slightly less tatty newcomers, and the cable with its non-standard earthing arrangement is on the cheap and nasty side, ensuring a healthy aftermarket in rewiring. This apart, the standard of engineering of the arm is remarkable at

the price, and that of the rest of the deck is scarcely less so.

Rega's *Elys* cartridge is a well built, plastic bodied moving magnet with a fixed stylus assembly and an (optional) three point fixing method, applicable with the *RB300* arm, which with other measures endows it with a standard of physical solidity unusual if not unique in a moving magnet cartridge.

Marantz CD-60SE CD player

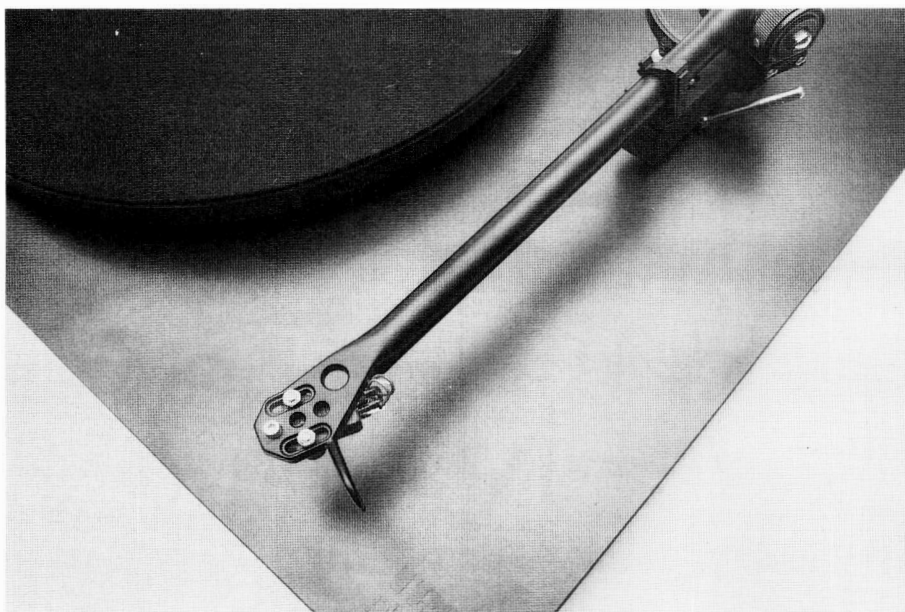
The *CD60SE* is one of the better recent Marantz players and is based on 16 x 4 Philips converters – a decision that caused more than a few raised eyebrows as its parent company, Philips, was then introducing its first 1-bit model, and Marantz must have had privileged access to the technology. For the record, Marantz claims, with some justification, that 'bitstream' wasn't good enough to consistently improve on existing technology.

In fact the Philips technological pedigree is just what a system of this kind is likely to be most at home with. The Marantz *CD60SE* is based on the TDA1541A converter and digital filter, which is well tried and capable of providing extremely fine results when used properly. In the *CD60SE* the converter is surrounded by a circuit with well endowed power supplies and excellent analogue components, some of which are specifically upgraded for the extra-cost *SE* version of the player. The physical structure of the player is also well designed to ameliorate the effect of acoustic or mechanical feedback. It can be further enhanced visually and structurally with optional side cheeks.

The features list is on the long side, and includes some tape editing aids, FTS (Favourite Track Selection: a non-volatile memory that recognises individual discs and plays previously programmed track selections on command) and a full set of search, memory and repeat facilities. It also has a well designed display of about average complexity. Fixed and variable analogue outputs are supplemented by optical and electrical digital outputs and a variable output headphone socket.

Onix OA21S amplifier

Of all the amplifiers in this project, the Onix is the most elegant. The front panel overhangs the rest of the carcass, which is vaguely *Mission Cyrus* flavoured but lower and sleeker. Front panel fittings are limited to a volume control and an input selector flanking an on/off switch and power indicator. The controls are



the low frequency cutoff point. The drivers are ostensibly more sophisticated than usual too. It's all fast impregnated pulp cones and even faster one piece aluminium treble domes here, both units making a feature of their ability to handle substantial quantities of power. In the case of the tweeter, for example, this is partly achieved by using the dome as part of the heatsink, and partly by venting the voice coil to allow air egress. Ferrofluid is also applied to the gap, and the result is a system which, by avoiding much of the heat build-up of its peers, also goes a long way to evading power dependent compression.

The enclosure is extremely well made, the entire carcass being made from 12mm MDF, a material more often used just as a baffle material, covered in a stiffening layer of wood veneer in black woodgrain on all surfaces. But where many tiny loudspeakers use a port and the proximity of walls to achieve the last ounce of bass extension, the *Monitor 7* has a sealed enclosure which gives a gentler rate of roll-off starting at a rather higher point, but a response that is less at the mercy of nearby reflective surfaces, and with less ringing since the Q of the LF resonance is reduced.

The *Monitor 7* is barely less sensitive than larger speakers (sensitivity is often sacrificed with small loudspeakers, again in favour of more bass) and as promised it will handle plenty of power. On paper and in practice the '7 is a good match to the Onix amplifier. They're *both* small but beautifully put together.

Sound Quality

Above all else, this system provided a powerful confirmation of the far reaching influence on the musical character of a system wielded by a really fine amplifier. I'm not saying that the amplifier is more important than the turntable or CD player (I'm not saying they're less impor-

entirely unlabelled, only a tiny registration mark indicating the current setting in each case. With just five switch positions to choose from, brain strain is little more than a distant possibility. Even so, I gather from the manufacturer that certain markets – the US and the UK in particular, I'm sorry to say – tend to object to the lack of labelling, and Onix now supplies a screen printed label that can be attached if required.

On a purely personal note, this is the kind of product I like to use, partly because I'm not very happy counting much beyond two. This said, the *OA21S* obviously doesn't belong in a complex system with a multiplicity of sources, and there is no off-tape monitoring facility so 3-head cassette decks will be wasted unless you monitor using headphones off the cassette deck itself. Note that the only output available from this amplifier is for one pair of loudspeakers. No provision is made for headphones.

The Onix is immaculately built inside its smartly turned out steel casing. The 250VA ILP toroidal transformer is about as big as can be accommodated, and is partnered with good quality components – Rubycon reservoir caps, an ALPs potentiometer and a surprisingly positive feeling cable linked source selector. Power output is quoted at 48 watts per channel into 8ohm, and nearly double – 90 watts – into 4ohm. A rear panel socket accepts the feed from an outboard supply which stiffens up performance especially at the frequency extremes, but leaves static power output unaltered. The supply is an £180 option which was not sent for review, though from what Onix says it isn't really appropriate for this system. A novel quick-resetting output protection circuit is fitted, and a full five year guarantee is provided. Note that the amplifier is supplied as MM or MC compatible, but can be changed for a maximum charge of £35.

The company was founded a decade

ago, and to this day is oriented more to export markets than the UK. The *OA21* itself has been available in one form or another for eight years during which time the product has developed organically, punctuated by occasional thirty-something-ish bouts of re-evaluation. Onix's proud boast is that a high percentage of its new *OA21S* customers are upgrading from older versions of the *OA21*.

Monitor Audio Monitor 7 loudspeakers

If the phrase 'small but beautifully put together' ever really belonged to just one product, it just has to be that gorgeous Aiwa personal cassette with radio, you know the one with all those buttons. It isn't a bad epithet to apply to the Monitor Audio *Monitor 7* either . . .

Superficially, the *Monitor 7* follows in the footsteps of a number of super miniatures, but there are differences. The '7 is as slender as any, but it is considerably taller, increasing volume and



tant either – the point I'm making is unrelated to this), merely that in a system with a source that is of good quality the amplifier plays a more critical 'make or break' role than is often appreciated.

The proof of the pudding is in the eating, as they say. The first point that impresses is that the rather low key visuals are contradicted by a smooth but surprisingly ballsy, engaging style of music making. The tiny *Monitor 7s* can pack quite a punch, but it quickly became apparent that this was only the case when the system was driven by an amplifier of the Onix's stature or better – and that this kind of ability doesn't grow on trees. I was intrigued to note that despite the visual links, the Onix sounds about as different from the Mission *Cyrus One* as it is possible to get. To a first approximation, where the *Cyrus* majors on clarity, precision and detail, Onix has been more concerned with such attributes as power, weight and authority – though there is no lack of balance in the *OA21's* performance which could easily have been associated with a much bigger and more expensive product.

As part of the task of putting this system through it's paces, I used some of the other turntables with the Onix amplifier. On balance I would probably be content to stick with the Rega unless I could raise the extra £78 for the Systemdek *IIX* with the same arm, a combination I felt sounded substantially sharper and more dynamic. This in turn made it clearer – especially in the deep bass region – and therefore easier on the ear. There is always less strain involved when systems reproduce more detail.

The Systemdek does tend to leave the Rega sounding a little slow and lacking in transparency. But the Rega remains a fine, stable sounding deck, and the Rega cartridge does a fair imitation of Koetsu style weight and authority, in the context of a big, stable soundstage. The *Elys*



suits the system well, and so in its slightly sharper, more abrupt style does the Marantz *CD60SE* which is one of the best middle price CD players. It lacks the translucency of the better 'bitstream' models, but it has more energy and dynamism which is arguably more important.

Last but not least, we have the *Monitor 7* loudspeakers, which more than make up for what they lack in cubic centimetres by their boldness, clarity and the absence of box-like attributes. Used in this system, the '7s lack surprisingly little low frequency extension or weight. Their fundamental linearity, and the very high standards achieved by their latest generation metal dome tweeters, allows them to reproduce the harmonic structure of individual notes accurately, and so suggest the presence of low frequency fundamentals that aren't actually present. In most circumstances only close familiarity with the source material shows that the fundamentals have been omitted.

Conclusions

I note for the record (as it were) that a change to the Systemdek *IIX* almost looks feasible if the Marantz *CD60SE* is replaced by the £50 cheaper *CD50SE* in this system. It's all a question of priorities. The *CD60SE* has glamorous features like FTS, but the difference in sound quality between the two CD players is not huge (though the more costly model is better). The rest of the system is, as implied earlier, a lesson in the art of being small but beautifully put together.



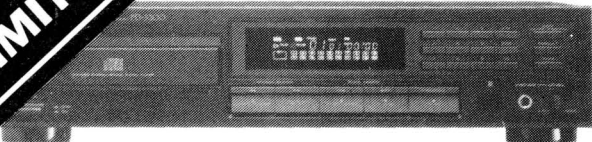
GENERAL DATA

Typical retail prices	
Rega Planar 3/Elys	£207/£74
Marantz CD60SE	£380
Onix OA21S	£299
Monitor Audio Monitor 7	£150
Turntable	
Type	belt drive/manual
Speeds	33/45
Cartridge	moving magnet
Dimensions	40.5 x 45 x 36/6.5cm (h x w x d)/overhang
CD Player	
Digital output	electrical
Headphone output	yes
Dimensions	12 x 42.5 x 28.5cm (h x w x d)
Amplifier	
Power output	45wpc
MC cartridge compatible?	1
No of inputs (ex tape)	4
No of tape circuits	1
Dimensions	8 x 23 x 36.5cm (h x w x d)
Loudspeakers	
Type	2-way bass reflex
Recommended placement	near wall
Impedance	8 ohms
Sensitivity	88dB/watt/mtr
Power handling	70 watts approx
Dimensions	34.5 x 16.5 x 17.5cm (h x w x d)

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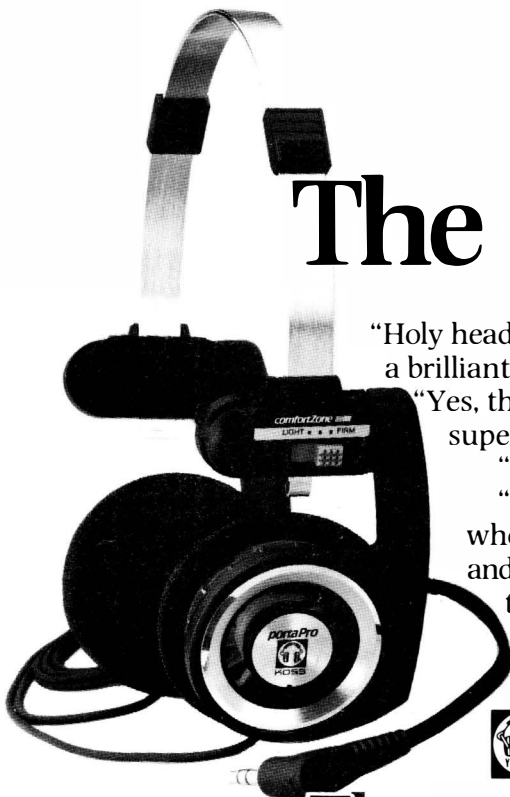
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SYSTEMDEK/MOTH/AT TURNTABLE COMBO, DENON CD PLAYER, CYRUS AMPLIFIER, ARCAM LOUDSPEAKERS



This is a kind of 'greatest hits' system. With one exception, each component is amongst the best liked in its class, and stitching them together into a system is about as predictable as VAT and, on the whole, a pretty safe bet. Or is it? Good teamwork, which is what system design is all about, need have little to do with the excellence of individual components, and looked at in these necessarily rather wider-drawn terms, the success of the system as a whole is far less assured than you might at first think. Now read on . . .

Systemdek IIX turntable, Moth arm, Audio Technica AT-F3 cartridge

In our last hi-fi system project one of the systems used a Systemdek *IIXE*, which is basically the same as the turntable featured here with the addition of an outboard power supply. Both versions are understandably popular, being amongst the least obviously compromised low cost suspended turntables currently available.

Aesthetics are unobjectionable but plain. The carcass is a faced chipboard box with a hardboard base which acts as a platform from which an aluminium girder subchassis component is supported by three coil springs. The arm base is interchangeable to ensure wide arm compatibility, while the well made main bearing is fitted to a Medite sub-platter/drive hub on which sits a felt covered Rega-like glass platter. And why not? The suspension has a low,

undamped main resonant frequency and given good support (from an Alpha-son equipment table for this project) it offers extremely high levels of immunity from environmental noise and feedback. Speed change is manual.

The Moth (nee Rega *RB250*) arm is a natural and affordable way of getting the Systemdek on the road. It uses the same one-piece armtube as the more costly Rega *RB300*, but with a much simpler bearing/counterweight assembly. The Audio Technica *AT-F3* is AT's budget fixed stylus MC cartridge, and a popular choice for this reason, though the better moving magnet cartridges in the same price band can give it a good run for the money.

Denon DCD-920 CD player

In the past year or so I've noticed that at least some of Denon's new products have been looking more obviously mainstream in their technology, build and appeal. The *DCD-920*, which is a kind of hi-tech version of the *DCD-820* reviewed in our November '89 CD player issue, could have come from any one of about six Japanese manufacturers.

It is extremely slick in operation and has some worthy and even sophisticated internal technology, to wit a 'real' 20-bit Super Linear converter (not to be confused with the rather simpler configuration used in the *DCD-820*'s converter) with 8x oversampling. It also has fixed and variable analogue outputs (the latter adjustable using the supplied remote control), electrical and optical digital out-

puts and a headphone socket with its own volume control.

The Denon is also grossly over-endowed with play and search aids, potentially useful tape editing features, and a rather ugly display area which includes a postage stamp-like calendar style track number readout. This last item is not a particularly pretty site.

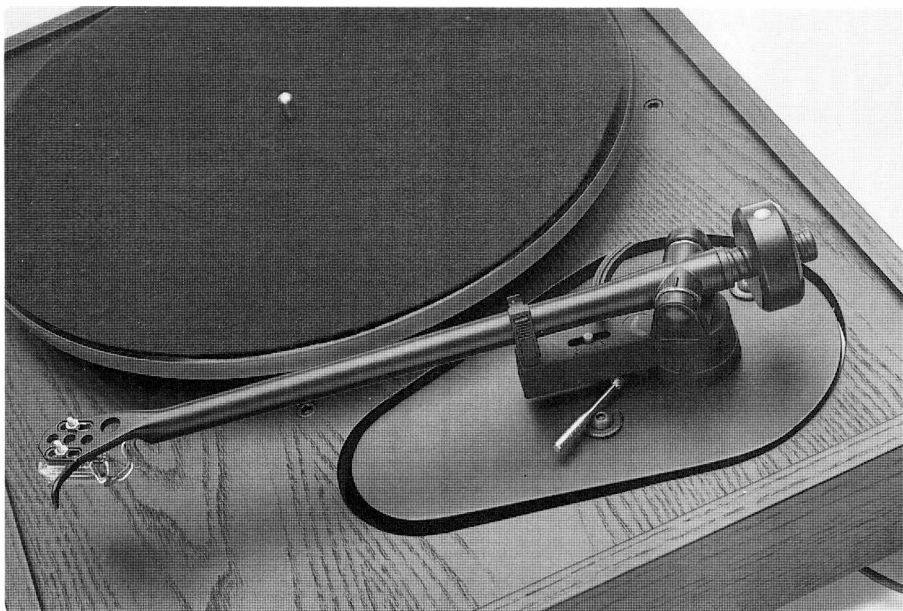
Mission Cyrus One amplifier

There was a time when the shoebox shaped *Cyrus One* was built into a tacky plastic outer cover with poor fit and finish, while the innards reputedly were something less than wholly reliable. Despite these things, and persistent production bottlenecks, the *Cyrus One* was an outstanding critical success. Mission's response was to throw some money at it. In less capable hands this kind of meddling might have ended in a dilution of the strengths that were present from the start, but no. It ain't like that. And it ain't made by Mission any more either. A label on the back imparts the shocking news that this most quintessentially British amplifier is 'Made in Taiwan'.

No larger than a decent packed lunch without the tinnie, the current *Cyrus One* shares no more than its proportions and general circuit topology with the original *Cyrus*. The most obvious change is to the casework, which is now made from very high grade alloy diecastings and is covered in a Nextel-like textured grey coating. The casting that constitutes the bottom section of the case includes a generously designed heatsink, ensuring good thermal contact with the entire amplifier and efficient heat dissipation.

The other obvious change is to the control system. The old - rather vague - controls with confusing one-letter mnemonics have been replaced by a completely new set with a new and much more transparent operating logic, plus clearer labelling. At the same time the volume control has been replaced by a dual concentric arrangement which facilitates balance adjustment as well. There's also an extra line input, which gives the Mission three line inputs (though none is labelled 'tuner' even though Mission makes one!), plus tape and phono with switchable MM/MC input options, all with separate source/tape selection and a separate 'mute' switch position.

Power is constantly applied to the preamplifier section and the headphone socket has been deleted, both in the interests of sound quality.



Arcam Two+ loudspeakers

The Arcam *Two+* is a product that is so anonymous in appearance it almost defies description. It is quite compact, quite attractive with quite a good quality real wood veneer enclosure (stained black or walnut, with a reticulated foam cover). The technology is quite, well, traditional in flavour, though in execution it is reasonably modern, boasting in its latest incarnation a quite natty bi-wire terminal pad. The port too is quite well designed. It has been positioned on the rear to reduce the usual range of audible side effects such as unwanted midband output, wind noise and the like although there is no attempt at chamfering the entrance to reduce turbulence. Nevertheless, the Elac bass and small Vifa dome tweeter are good quality items, and the carcass is well designed.

Putting everything together, the picture that emerges of the Arcam *Two+* is of a design whose essential attributes are never made too overt or obvious. This is a truly British speaker, and it's also quite musical as we shall see.

Sound Quality

The opening preamble was a smoke-screen, written after I'd listened to the system, and designed to introduce a little uncertainty into the proceedings. I did worry about this system at first, but I needn't have. It worked beautifully and in perfect (together now) harmony . . .

Starting at the loud end and working back, I knew I used to like the Arcam *Two+*, but I had forgotten how much. I had forgotten how the music managed to project itself forward of the plane of the speakers, with a natural layering of depth from near the listener to about half way towards the speakers, with the recorded acoustic sometimes painted as a realistic curtain of sound behind and extending above the plane of the enclosures. Yet there was no obvious

tradeoff. In the past I have felt that the Arcam *Two+* was a touch lazy or slow, but this wasn't the case here. Instead it sounded fast, assured and surprisingly tactile – more so in fact than I remember. It also has great solidity and dynamics.

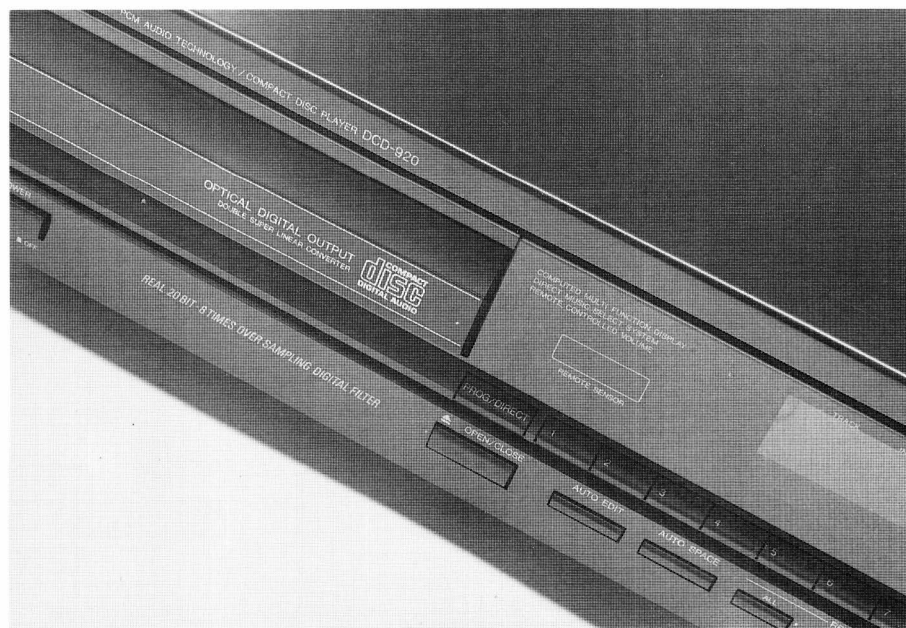
There's always the possibility that manufacturing changes have changed a good loudspeaker into a better one, but, while I don't rule this out, I think the reasons for the Arcams' success in this system are more prosaic. There are two, no, three obvious points, all to do with the way the speakers are used.

Point one is the equipment being used to drive them in this set-up happens to suit them particularly well. Any tendency in the speakers to 'hang on' after the note has passed is amply counteracted by the Mission *Cyrus One* which has excellent control and majors on transient response and timing. But this is to some extent at the expense of weight and power, qualities the Arcam *Two+* is not short of and therefore perhaps doesn't need reinforcing by the rest of the sys-

tem. The loudspeakers are never allowed to wander off and do their own thing under the Mission's strict regimen. By the same token, the Systemdek turntable and Audio Technica cartridge have a much better controlled and leaner sounding LF than many competing turntables, and the Denon CD player, like most CD players, was never likely to be caught out in this respect either. Obviously.

Much of the rest of the secret (as I suppose it might be described, quite wrongly of course) is related to issues like positioning. So important is the height and stability of the support of the Arcam, the importance of using an appropriately designed stand almost outweighs the importance of the loudspeaker itself. I confess I have them seated right now on 65cm tall pedestal stands from Acoustic Energy, the ones normally used for the *AE-1*, and they have never sounded better. Not only is this stand much taller than is normally recommended for this model, it also costs more than the speaker itself. I'm not seriously suggesting that you pay this mu . . . Goddam it, that's *exactly* what I *do* suggest. These are the ideal stands for this loudspeaker in this system, and they're worth every penny of their £300+ price tag. But you can do nearly as well for a great deal less lucre. Just be sure the stands you choose are rigid, tall, heavy and that they're positioned well clear of room boundaries.

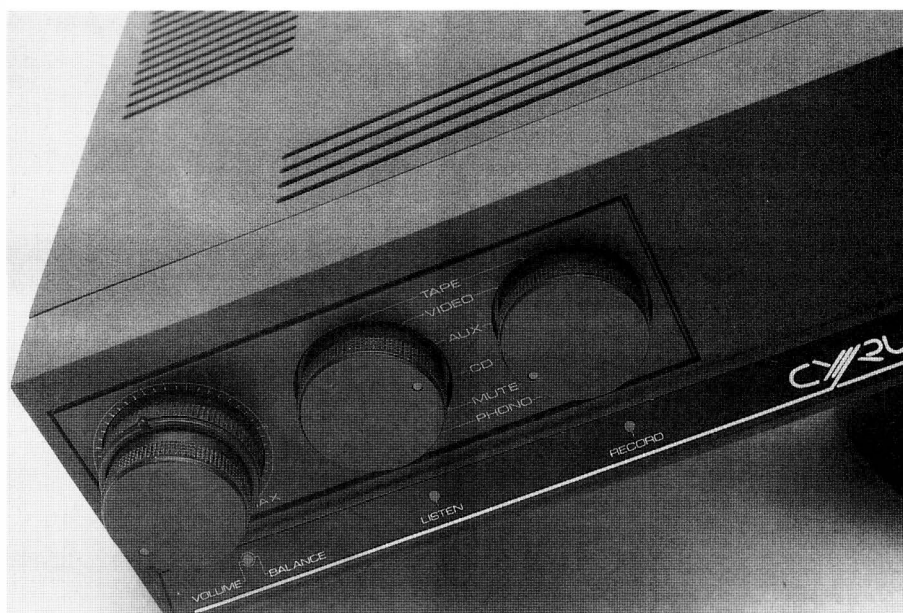
Mission's little baby amp is in truly excellent voice, though you need to be in basic sympathy with its rather lightweight balance which favours agility and transient attack over weight and depth. This said, the *Cyrus One* is essentially seamless. There is very little obvious sense of a machine manipulating electrons. The effects of the *Cyrus* are very hard to detect, though soundstage information tends to be a little lacking in the



dry, upfront balance. This said, the level of resolution off records and (particularly) compact discs is quite extraordinary, and although it's clichéd to say so, I was able to hear subtle background effects and in one case (Shostakovich *Symphony No 7* – Bernstein/Chicago SO on DGG) rustling and chair noises and other such low level detail that I have never once heard before.

Of the two sources, the record deck is plainly superior. There ain't no doubt about it, which leads to the observation that this is an analogue system first and foremost. The Systemdek is a particularly fine affordable record deck, and one I was recently able to compare directly to a Linn Basik with results that unequivocally favoured the former. It has been around for quite a few years, and it would be surprising if any important bugs hadn't been ironed out by now. In fact the deck offers stable pitch, a solid but agile bass essentially free of overhang and a sharp, articulate midrange with excellent imagery and stability. The cartridge suits the arm well and has a relatively forward balance and a slightly congested treble. If I had the money, I'd go for the slightly more expensive *AT-F5* or (better still) the rebodied Stilton 'SB' version of the same thing. The *AT-F5* offers a clearer, smoother sound with more detail, especially towards the end of side where the *AT-F3* begins to sound a little out of focus during loud passages. The Stilton version strengthens the bass and midband to match the improved top end resolution.

The Denon CD player sounded fine in its own right, yet suffered when compared directly to other players. I was particularly struck by the way it compared to an Arcam CD player featured in another of our systems. The Arcam does cost more, and it uses what might in these days of 'bitstream' be dismissed as an outdated technology, nevertheless it



won all round. It has a much fuller, deeper sound and is capable of a level of soundstage resolution that lies outside the compass of the rather dry sounding Denon.

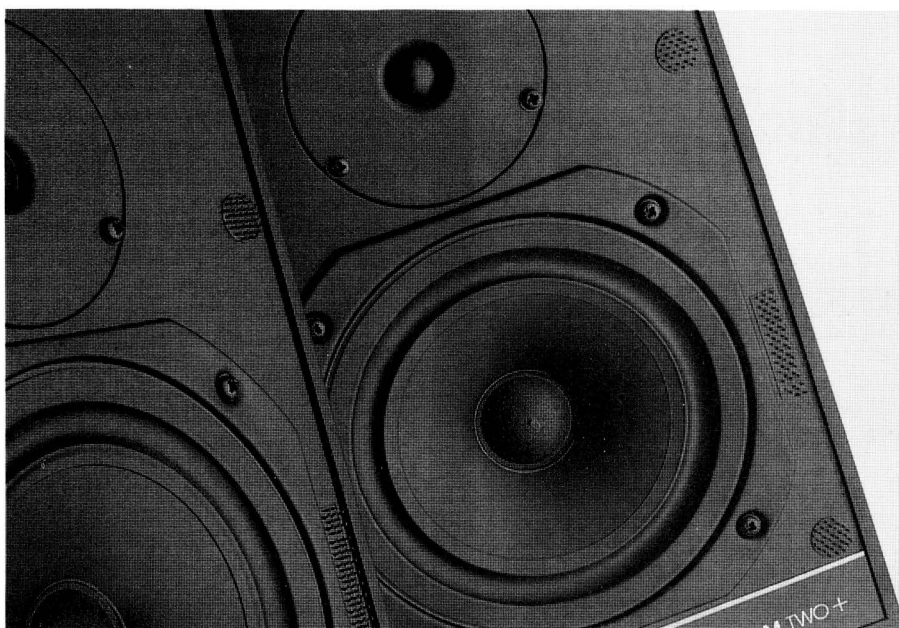
Changing to the Arcam was rather like opening a door to the performers that was formerly three quarters shut. It surely cannot be insignificant that the Arcam is also a much better tracker. The Denon was consistently tripped up by blemishes on test discs and sometimes even on supposedly clean ones used for normal listening that the Arcam (and other players) sailed clean through.

Conclusions

This system impressed your reporter as being an excellent, capable combination suitable for medium level use in small-to-average size rooms. It is more than adequately refined yet sounds sharp and clear, with strong dynamics, a touch of warmth and a smooth, progressive quality that contrasts favourably with the somewhat mechanical quality of many

hi-fi systems.

This said, I'm not wholly convinced that the CD player is a particularly good match to this system. One reason for this is that its particular strengths are at odds with those of the turntable, and partly because the concentration on gadgetry with instant showroom appeal detracts from the purposefulness of the design as a whole.



GENERAL DATA

Typical retail price	
Systemdek IIX/ Moth arm/Audio Technica	
AT-F3	£170/£78/£74
Denon DCD-920	£320
Mission Cyrus One	£200
Arcam Two+	£280
Turntable	
Type	manual/interchangeable arm
Speeds	33/45
Cartridge	moving coil
Dimensions (tt)	46.5 x 47 x 37/5cm (h x w x d)/overhang
CD Player	
Digital output	optical & electrical
Headphone output	yes
Dimensions	10.5 x 43.5 x 31.5cm (h x w x d)
Amplifier	
Power output	25wpc
MC cartridge compatible?	yes
No of inputs (ex tape)	4
No of tape circuits	1
Dimensions	8.5 x 21.5 x 35cm (h x w x d)
Loudspeakers	
Type	2-way bass reflex
Recommended placement	near wall
Impedance	8 ohms
Sensitivity	87dB/watt/mtr (est)
Power handling	70 watts approx
Dimensions	46 x 26.5 x 26.5cm (h x w x d)

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TURNTABLES

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ALPHASON TURNTABLE COMBO, ARCAM CD PLAYER, MAGNUM AMPLIFIER, ROGERS LOUDSPEAKERS



If one word can be used to sum up this system, it must be 'conservative'. Each component is designed by the book according to well established and uncontroversial criteria. This may sound a little unexciting on paper, but a slightly conservative approach isn't a bad idea when you're spending your own money. It's reviewers on the lookout for a good story, and who are not spending their own money, who tend to prefer the dangerous approach. But everything depends on whether the classic criteria are classic because they have stood the test of time, or classic because they're old and tired . . .

Alphason Sonata/Alceus turntable/power supply, Xenon MCS arm, Stilton Audio Technica AT-F5 cartridge

The *Sonata* was originally designed as an essentially compromise-free platform for in-house arm testing purposes. The design philosophy is transparent: it's all about mass – mass to act as an energy sink, mass to inhibit motor coupling through to the record and loads a mass combined with springs to provide a free running suspension with an ultra-low resonant frequency.

The three suspension springs are used in extension instead of compression, being hung from the top of three tall suspension towers which facilitate easy levelling but which tend to get in the way in day-to-day use. The platter is made from a synthetic material with vinyl-like properties on which the record sits

directly, restrained by a heavy centre clamp. Drive uses two synchronous motors (!) 180 degrees apart, run either directly from the mains or (as for this test) via an optional outboard supply. Two such supplies are available, the variable speed *Atlas* (the optimum choice for good sound quality, but costly at £340) and the one supplied for this test, the £149 *Alceus*, which drives the two phases of the motors from a quartz referenced source. Speed change is available using a switch on the back (why?) of the attractively packaged power supply.

It's clear that Alphason has learned a thing or two over the years. The current *Sonata*, which is barely different visually to the original, is superbly built by any standards and *Verily a Joy to Behold*. It looks and feels as though it will last a hundred years, and it probably will. The woodwork is particularly fine, a quality it shares with other Alphason products.

For this test, the *Xenon* MCS arm was chosen. Not Alphason's flagship, but the next model down, it has a one piece internally damped titanium arm tube/headshell which ends at a point in front of the bearing yoke. The tool steel ball races (the senior *HR100* has ceramic bearings) run in true gimbals in both planes and bias is handled by a thread and weight. The cabling in this version is van den Hul.

The Audio Technica *AT-F5* is almost too well known to need introduction. It is undoubtedly the best known and best selling budget (or near-budget) moving

coil, and is now sold with an improved standard of QC and finish. Although the standard *AT-F5* was specified for this test, none was available and a more costly Stilton Audio modified version was substituted. The Stilton *AT-F5* has a much improved body which is machined in the UK, and helps answer the criticism that the straight *AT-F5* looks at least potentially underpowered in this particular system.

Arcam Alpha CD player

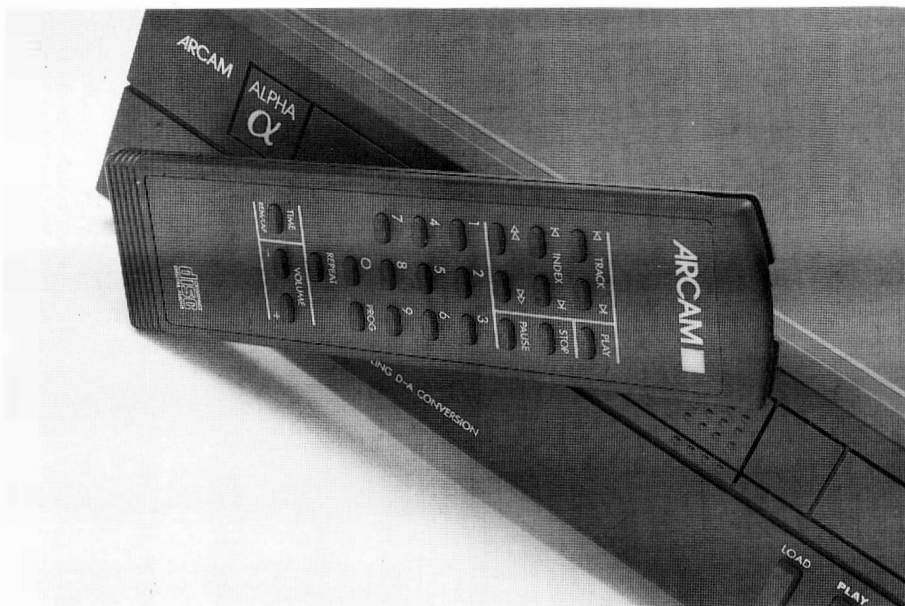
Arcam's new 'budget' (£379.90 – hah!) CD player bears the *Alpha* name, and is attractively designed with a sensible minimum of controls and neat lines enhanced by subtle bevelling of the top and bottom fascia edges. A pleasingly modern display conveys track, time and function data simultaneously and without the clutter that infests all too many modern players. The machine is supplied with a standard stick-type remote control from Philips and includes random track access and volume control keys which are redundant in this application. Other facilities include 20 track programming, the usual audible track cueing and (via the remote handset) index search. There is no headphone socket, but a self-shorting electrical digital output supplements the fixed analogue outputs.

There are no surprises under the skin, but plenty of evidence of good, solid design. The *Alpha* is based on Philips technology, including the CDM4 single beam laser/transport system and a TDA1541A based 16-bit 4x oversampling converter. Two transformers are fitted, one for the digital electronics, display and servo circuits, the other for the DAC and output amps.

Magnum IA 150 amplifier

The vital statistics of this compact but ultra dense amplifier are 3 inches, £425, 7.5kg, 80 watts per channel into 8ohm and 110 watts/4ohm. By any standards, the *Magnum* makes few concessions to the dictates of fashion. It's an almost unrelievedly austere looking black box (there is a thin feature line around the fascia edge) boasting three front panel controls – an input selector, a mode selector which includes stereo/mono switching and a volume control – and a large on/off switch. What the *Magnum* lacks in style it more than makes up for in robustness.

Functionally, the *Magnum* has relatively straightforward facilities implemented in slightly unusual ways. There



the other side of the story, which is that I found the system something of a turnoff. It had many qualities associated with high fidelity at its most intrusive, and for all its neutrality the system sounded obvious, sometimes hard and frequently cluttered. The music communicated only fitfully; the sound was boxbound, and I was unable to get the speakers to sound 'open', or to produce a realistic stereo soundstage even after prolonged breaking in and experimentation with positioning, different cables and so on. In contrast to, say, the Roksan/Cambridge Audio/Sumo/Spica system, this is not one that turns heads from outside the listening room. In fact the system sounds rather as you might expect a system to sound from outside a room even when it isn't – distant, uncommunicative and lacking in resolution.

Initially, I thought all the signs pointed to the amplifier. What I heard sounded rather like some of the early Musical Fidelity amplifiers before Tim de Paravacini took over design responsibility and stopped optimising for minimum static distortion by using high levels of feedback. An alternative view is that the amplifier sounded as though it was being used cold, straight out of the box, even though it wasn't. The tight, unyielding sounds I heard are often associated with unformed capacitors and components working below their design operating temperatures.

Although the Magnum must share some of the blame, substitution with other components (DNM and Musical Fidelity amplification, Spendor *SP2* and other speakers) I soon realised that the shortcomings were shared with the Rogers loudspeakers in about equal measure. The last time I came face to face with a (rather cheaper) Rogers design, the *LS4a*, I was deeply impressed. The *LS7t* however has a midband which fails to project naturally and a hard sounding

are two separate phono inputs, for moving coil and moving magnet cartridges, and inputs for CD (with slightly reduced sensitivity), tuner and tape. There is also a separate 'monitor' input which can be used for 3rd head tape monitoring, but which can also be used as a 'purist' input which feeds the volume control directly. The other inputs are diode logic/relay switched. Circuitry is based mainly on Hitachi devices, including MC phono ICs and power MOSFETs.

Rogers LS7t loudspeakers

The *LS7t* updates and replaces the *LS7*, a middle range, medium size two-way bass reflex design of considerable repute in its time. Like most Rogers (and Spendor) designs, the *LS7t* embodies the classic old BBC inspired ideals of relatively thin cabinet walls heavily damped with Bitumen pads to control the amplitude and Q of panel resonances. The bass driver is a polypropylene coned design and the tweeter an unspecified titanium dome unit (an innovation for the 't' model), crossed over by a relatively complex 18dB/octave network at 3kHz. Bass loading is by a damped, air-flowed front facing port. Bi-wiring – another innovation – is both possible and highly desirable.

Finished utterly conventionally in a well turned out but rather anonymous real wood veneer (walnut, black ash and teak are available – I think the review pair is supposed to be teak), the Rogers is designed for use on stands of medium height. I used Heybrook *HBS1* stands away from room boundaries.

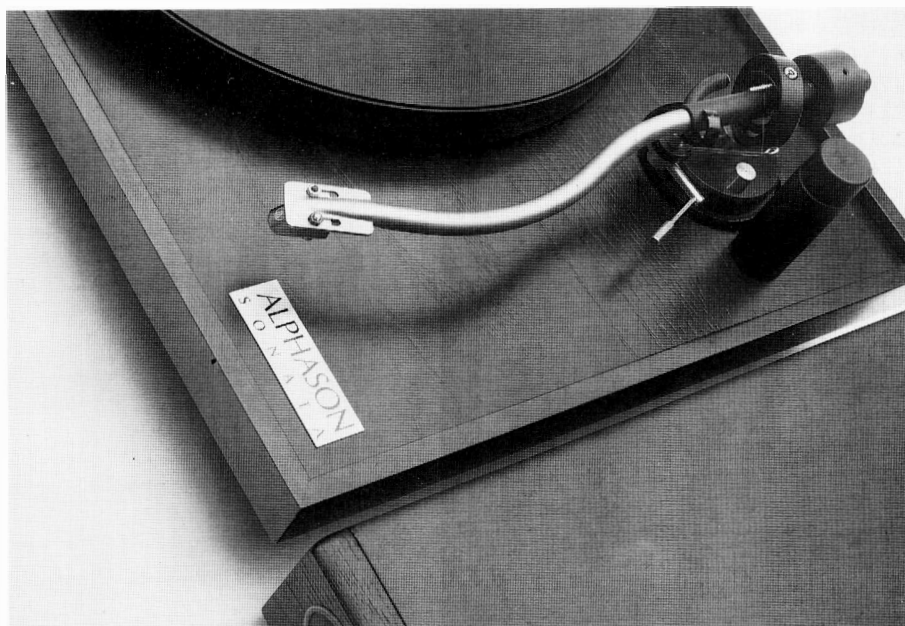
Sound Quality

It wasn't Alphason's fault that the packing had been opened en route for the purpose, apparently, of extricating the rubber belt. I mean if you were offered a grand's worth of precision engineering off the back of a lorry, you'd nick the rubber band that went around it rather

than the product itself, wouldn't you? Anyone would I suppose. The effect was that I spent my first few days with this system playing compact discs and twiddling my thumbs.

It was a mixed experience. Prefacing the remarks that follow, I must say first of all that the system has many fine and admirable qualities, and this is not to damn with faint praise. The system has an essentially neutral balance, with excellent integration, low levels of coloration and a useful ability to play loud without compression, though the sound does become very 'honky' and coloured when driven very hard. The good points reflect well on the amplifier, and to some extent the loudspeakers. At the same time, it was also apparent that the CD player is a better than average near-budget model offering an unusually finely judged balance between warmth and listenability on one hand, and precision and clarity on t'other. All of which is seriously wonderful, solid stuff.

Having said all this, I am bound to put



tweeter.

The system was at its best with simple material with a steady, well defined bass sound, for example Schonherz and Scott's *Wishing Well* which I have on a Windham Hill sampler – it's wallpaper music with class in case you don't know it, but with a surprisingly tactile drum sound that hits squarely in the solar plexus. It was at its worst with densely scored orchestral music such as the Brahms 1st I'm listening to now (Chailly/Concertgebouw on Decca).

I have no such complaints about the Arcam CD player. It can sound a little self-effacing at times, and I began to wonder if it wasn't a little expensive judged strictly on performance grounds. In the end I decided that the answer was no. The *Alpha* CD follows the route of its namesake, the *Alpha* amplifier, in producing a slightly sanitised version of what's on the disc. There's little of the gut wrenching dynamics or occasionally jarring detail of the best of today's high resolution players, or the sweetness of the low end bitstream models. What the *Alpha* does is to concentrate on listenability, partly through a meaty, reasonably full sounding bass, and partly with a treble quality that is a notch or two above average for presentation, the tradeoff being the last few percentage points of detail.

If the *Alpha* CD isn't (and wasn't conceived as) a 'shoot for the stars' type of product, the Alphason *Sonata* turntable of course certainly is. Even in this combination, with a near-budget moving coil and with an arm that is a notch or more below the company's best, the Alphason is impressively firm and stable on audition. There was never the slightest suggestion of less than perfect pitch stability, and the bass is as deep and true as I have ever heard.

The *Sonata* makes it very easy to hear what the arm and cartridge are doing,



and in the context of this system the *AT-F5* really isn't quite good enough. Although crisp and detailed, the bass is a little thin and the cartridge as a whole can sound ragged. With the Miltek *Olympia* (from this month's Gyrodec/ Meridian system) in its place, records took on a whole new life and vitality.

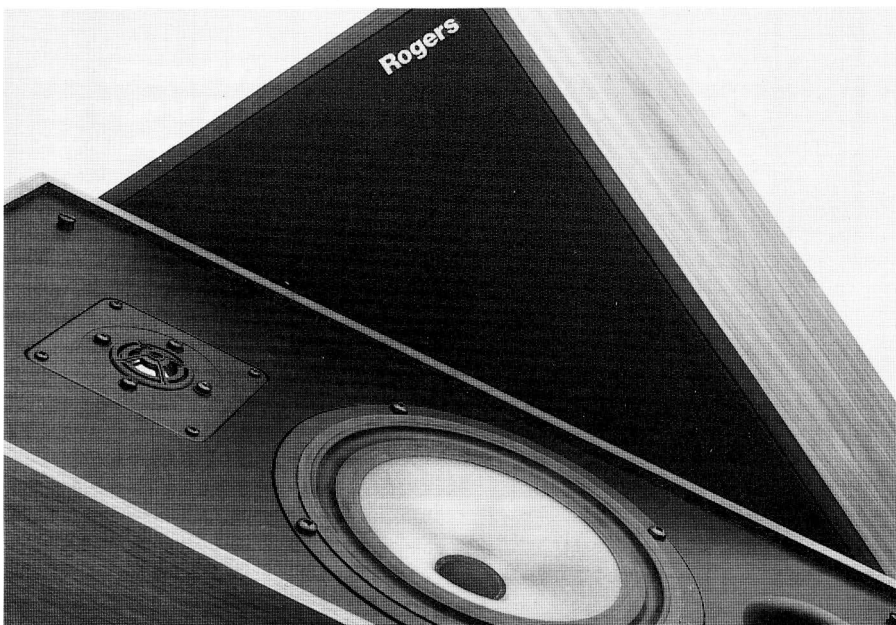
Conclusions

In my opinion the *Alpha* does tend to show a slightly rose tinted view of the music, but the tint is very mild indeed, and I found it easy to listen to the CDs for a long period without fatigue, though not I must say, in this system. The fault lay partly with the slightly ponderous sounding amplifier, but the Rogers *LS7t* takes a substantial part of the blame too. This simply wasn't a happy combination.

The record playing components are individually good, but poorly matched to each other. With a cartridge more appropriate to a state of the art record player like the *Sonata*, records really

come to life. The trouble is, the rest of the system is scarcely capable of doing it justice. Conclusions? Nice hi-fi components, shame about the way they've been slung together, apparently at random.

Editors note: Although these systems were chosen by retailers some of them, including this one, were compromised by the availability of exact components.



GENERAL DATA

Typical retail prices

Alphason *Sonata*/Alceus P.S./Xenon *MCS*/

Stilton *AT-F5* £720/£150/£300/£140

Arcam *Alpha* £380

Magnum *IA 150* £425

Rogers *LS7t* £400

Turntable

Type belt drive/manual

Speeds 33/45

Cartridge moving coil

Dimensions 43 x 46 x 26/7cm (h x w x d)/overhang

CD Player

Digital output yes

Headphone output no

Dimensions 8.5 x 43 x 29cm (h x w x d)

Amplifier

Power output 80wpc

MC cartridge compatible? yes

No of inputs (ex tape) 4 (inc 2 phono)

No of tape circuits 1

Dimensions 9 x 37 x 31cm (h x w x d)

Loudspeakers

Type 2-way bass reflex

Recommended placement free space

Impedance 8 ohms

Sensitivity 88dB/watt/mtr

Power handling 200 watts approx

Dimensions 56 x 27.5 x 28cm (h x w x d)

Alphason Designs Ltd., Unit 2, Linstock Way, Wigan Rd.,

Atherton, Lancs M29 0RL. Tel: (0942) 897308.

Path Group plc, Desborough Ind. Park, Desborough Park Rd.,

High Wycombe, Bucks HP12 3BG. Tel: (0494) 441736.

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the spendor SP2/2

Accurately matched and of known consistency, the SP2/2 should endure for as many years as its illustrious predecessor, and deserves a strong recommendation. It was as near a perfect all-rounder in its price range as anything I have yet reviewed.

Hi-Fi News & Record Review October 1989.

Sendor Audio Systems Limited

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£2,520 System

VPI/ALPHASON/DYNAVECTOR TURNTABLE, ARCAM CD PLAYER & AMPLIFIER, SPENDOR LOUDSPEAKERS



At the heart of this system are two fine, conservatively designed items, the Arcam amplifier and CD player. The hi-fi dealer who suggested this set-up specified a loudspeaker best known in the studio and broadcast world but one that receives relatively little publicity from the hi-fi press, and a turntable that looks as exotic and as unusual as the Arcam items appear to be prosaic and mundane. At the very least this provides our system with a certain interest, a *frisson* at its core . . .

VPI HW-19 turntable, Alphason Opal arm, Dynavector 17D2 Mk II cartridge

This American audiophile import is a large, middleweight combination of the novel and the familiar. The platter is a Pink Triangle-like acrylic item, rim-driven by a round section plastic belt from a synchronous motor, rather awkwardly mounted below a triangular cover secured by three thumb screws which must be removed to facilitate speed change. The VPI platter is designed for use without a mat, with the record clamped down over a central washer by a ring clamp bearing on the record label's outer edge. The clamping action also damps the platter and the record.

The motor pulley is a twin diameter item moulded from plastic. The chassis/isolation system consists of a thick chipboard top plate which sits on four Sorbothane feet, which in turn locate in and support the corners of the top plate from

the open-box main chassis. Rubber tipped feet can be adjusted differentially for levelling, or replaced by spikes.

Compliance provided by the 'suspension' is very low, and the VPI could probably qualify as non-suspended, Roksan fashion. Another feature shared with the Roksan is the fact that the arm is mounted directly on the top plate, which promotes good physical integrity. The sample supplied for test was powered directly from the mains, but the mains cable is single insulated, and therefore doesn't meet UK safety standards. The importer should rectify this forthwith.

Although large enough to accommodate most parallel tracking arms, the VPI is far from impressively built. Finish for example is a crudely applied black piano gloss which has been laid over a surface that is far from flat. The main bearing was significantly canted over on our test sample, and the platter top surface is not correctly dished to allow ideal record contact when used with a rubber washer below the record and the screw-on clamp above, as recommended. On the other hand the heavy (non-counterbalanced) lid is magnificent.

Arcam Delta 70.2 CD player

I suspect it's no coincidence that more A&R products were selected by the dealers we polled than products from any other supplier except Audio Technica. Arcam has a reputation for good sound, commonsense engineering and long term serviceability perhaps unrivalled in the industry. The *Delta 70.2* seems to me

to sum up the company creed perfectly: it's no high flyer, but it is an excellent, no-nonsense design that is a little better than much of the competition both on paper and in real life. It's a classic alternative to the Marantz *CD94II*, but it would be hard to describe it as a bargain.

Now a well established model, the *Delta 70.2* is based slightly more loosely than usual on Philips technology and hardware, including the standard 16-bit 4x oversampling chipset, in this case including the SI Crown version of the TDA1541 converter. The mechanics include the CDM4 laser servo and a quality Hall effect turntable motor. Power supply design is predictably elaborate with a total of ten regulated supplies from two separate transformers. The analogue output stage uses high grade 1 per cent metal film resistors and polypropylene film caps. Coupling caps have been eliminated in this direct coupled design and special attention has been paid to an area that has been identified recently by a number of other CD designers as of paramount performance – the master clock oscillator.

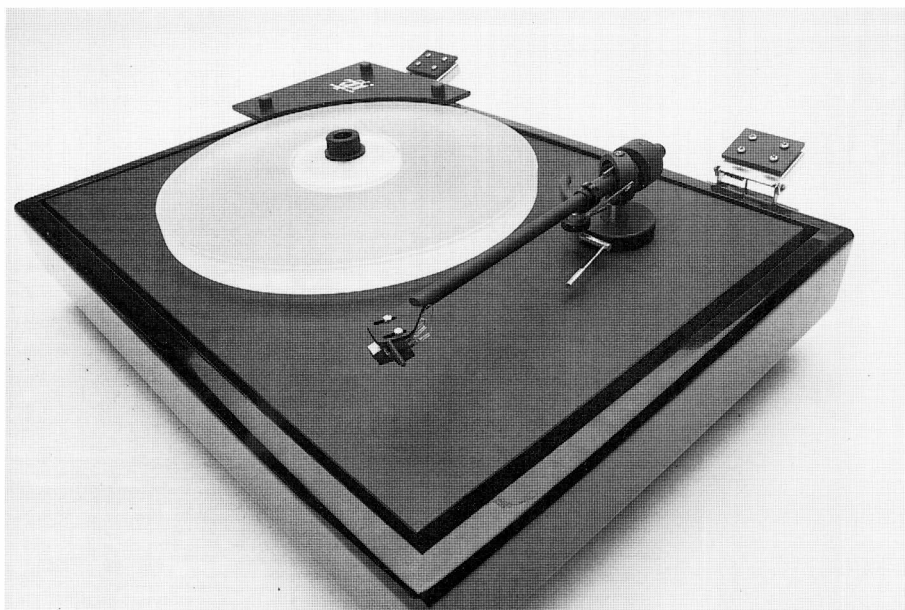
The control system is simple and mostly well organised, coupled in this case to a rather old fashioned track, index and time display, easily bettered by the one used in the company's cheaper *Alpha* CD player. Other facilities are basic. They include programming and – from the supplied remote control – random track selection and index search. The player has fixed and variable outputs (the latter has a 21dB range in 3dB steps controlled from the remote handset) and an electrical digital output. There is no headphone socket though.

In common with an increasing number of CD players, the *Delta 70.2* has a 'display off' facility. In fact it has a three position switch giving a reduced brightness level too, but there is no track or time indication between tracks or in pause or stop modes as there is with other players boasting this facility.

As with all recent Arcam products, build quality is excellent. The case is fabricated from alloy panels and extrusions giving a very high quality finish, though panel graphics don't match the standards set in Japan (this is a widely acknowledged weakness of the British industry). The stick-on feet can become unstuck, and did in one case with the test *70.2*. Here endeth the complaints.

Arcam Delta 90.2 amplifier

In many ways the Arcam *Delta 90.2* is to



As Derek Hughes (of Spondor) explained it, Spondor wanted a better unit than was available at the time, and dug out an ancient and forgotten 19mm Scanspeak tweeter from the back of a storeroom. It measured nicely and another was ordered from the factory, and as a result Spondor ended up with two tweeters made about 8 years apart which turned out to be so close they could hardly be told apart. This speaks of a very high level of consistency and a well sorted manufacturing process, and this was therefore the tweeter chosen for the job. And that, folks, is the story of the SP2/2.

Sound Quality

This system turned out to be about 80 per cent successful. Predictably, the central A&R components performed their tasks well, but it was the Spondor loudspeakers that really caught my, er, ears.

The VPI turntable might make quite a mark for itself at a reasonable price. Say £300 or so. At £684, even allowing for the usual loading because it has been imported from the 'States, it's a bit over the top I'm sorry to say. To charge as much as the established references – Linn, Roksan, Pink, etc – suggests that you need to be offering something really special.

Let me stress that despite the harsh words, I liked the turntable. It has a quick, engaging quality (not uncharacteristic of decks with plastic platters) with good integration and analysis, a sharp but slightly distant bass and a fine overall sense of control. But the level of detail extracted from records is only moderately good (though part of the shortfall is due to the arm) and dynamics are also a little under-developed – there was a clearly defined averaging process at work, and the VPI never achieved the dynamic swings nor the sense of power and grip I had learned to expect from

amplifiers what the *Delta 70.2* is to CD players, and it was therefore no surprise to see the two specified for use in the same system. They obviously look well together too.

As Arcam's senior integrated amplifier, there's an element of the 'all things to all persons' about it. Although blessed with a modest enough control count, the 90.2 has a wide range of inputs and outputs, including two tape circuits and two speaker outputs (one of which is switchable, and can be defeated by inserting a headphone plug if the front panel switch labelled SP2 is set appropriately).

Also on the input side, there are separate 'listen' and 'record' selectors to facilitate off-tape monitoring, tape dubbing and recording while listening to another source. The 90.2 also boasts mono switching and bass and treble controls with a true bypass option. Attention to detail – always an Arcam hallmark – extends to such niceties as reduced CD input sensitivity and restricted tone control range which leaves the midband essentially unmolested. Phono input loadings can be varied using custom modules, but none were supplied, or indeed needed on test as the 220ohm MC input impedance is close to optimum for the Dynavector cartridge.

Rated power output of this aluminium-clad and unusually heavy beast is 70 watts a side.

Spondor SP2/2 loudspeakers

Without doubt the real interest in this system lies with the Spondor SP2/2 loudspeakers, the latest version of this highly regarded if not too well known two-way bass reflex design. As expected, the SP2/2 is designed for stand mounting (Spondor were the first to advocate stands, if memory serves) well away from room boundaries.

For those who know the original SP2, changes for the /2 are moderate and evolutionary in character. The speaker

has been fitted with a new version of the Scanspeak tweeter (ferrofluid cooled, which reduces compression), which has improved behaviour towards the LF end of its passband due to a revised acoustic loading chamber with increased damping. The tweeter also has a more rigid casing too, while the mounting plate has more fixing points. The bass unit has a new diecast frame which mates much better than before to the baffle, again partly due to an increased number of mounting points. The same homopolymer polypropylene cone is used.

Finally, although the crossover has broadly the same circuit, it has a reduced Q for the HF section to cater for the altered tweeter characteristics, and has been rewired to allow bi-wiring. The reflex loaded enclosure, which shares much with the slightly larger Rogers LS7t, is a well made but conventional box, internally damped to control resonances.

The reason for using the Scanspeak turned out to be a story of some interest.



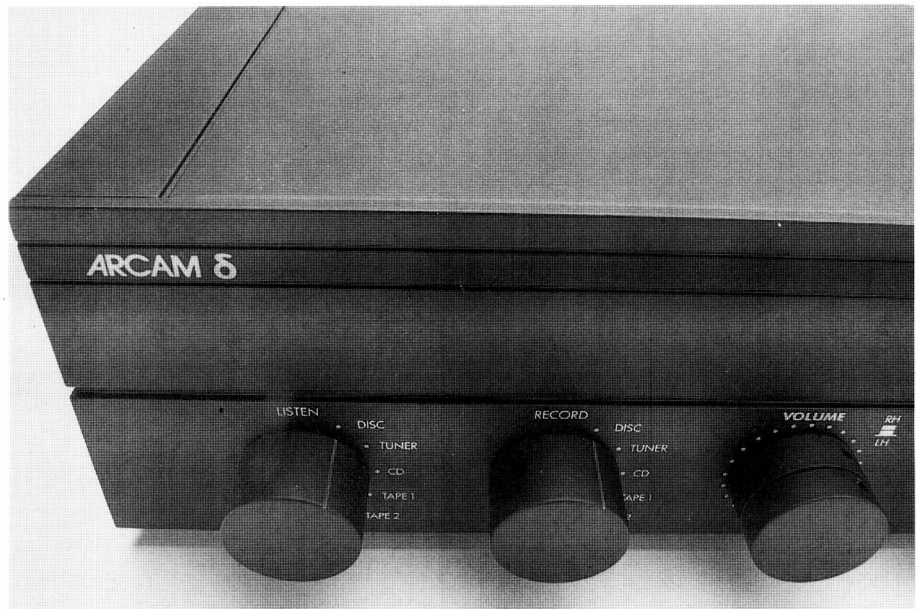
other combinations. Finally, pitch stability was only moderately good. Some sustained woodwind and piano passages displayed the telltale warble characteristic of turntables suffering fast wow artefacts.

It's fair to say that the arm doesn't suit this turntable. Something with a little more finesse and control at the frequency extremes would have been more appropriate. The cartridge however proved extremely interesting, and a short spell in the Alphason *Sonata/Xenon* MCS combination confirms that it is a gem. It has strikingly good mid and high frequency performance, combining the clarity of cut glass and the ability to follow the contours of the music – tonally and dynamically – with unfettered freedom. The VPI/*Opal* combination tended to cramp it's style.

At the far end of the system, the Spondors performed marvellously. I had expected low levels of coloration and a high degree of seamlessness because these are the things Spondor is known for. They were provided in full measure. They also delivered what the metal tweeter equipped Rogers *LS7t* was incapable of: mid and high frequency clarity, poise and unobtrusiveness. The Rogers has the brittle, congested sound of early metal domes, whereas the Spondors sounded ineffably right.

Little need be said about the two Arcam products, because what they did they did unobtrusively yet without any sense that they were either adding to or detracting significantly from the signals they handled. The CD player however, is open to some censure on the grounds that it tended to sound congested, though other observers might prefer to call it 'mellow' or 'analogue-like'. The last of these seems to me a double edged sword.

The 90.2 amplifier can also be described in similar terms, and I note



that it has been described as 'ponderous' in these pages before. But it has improved significantly since I heard my first, and to describe the current models in this way would be far too severe a judgement for what is a highly articulate and competent amplifier. In practice it held the system together effectively by exerting fine control over the Spondors, and by reproducing the bass and mid-band with appropriate power and weight. Tonal colours were richly painted, and spatial separation was well maintained. Although the line stages are better than the phono input, the shortfall is not large.

Conclusions

I felt a tinge of disappointment with the stability and resolution of the record deck/arm combination, which also turned out to be unequal to the task of wringing the best from the surprisingly good Dynavector cartridge. I had expected more at this price level. The rest of the system however performed

well, and this is on the whole a fine, honest system with considerable gravitas, a very fine musical presentation from the Spondor speakers (they turned out to be a real revelation), and a sophisticated sound from the Arcam CD player.

Editor's note: Because of product availability problems this system did not turn out exactly as the dealer specified.



GENERAL DATA

Typical retail prices	
VPI HW19 Junior/Alphason Opal/ Dynavector 17D2 II	£689/£130/£280
Arcam Delta 70.2	£550
Arcam Delta 90.2	£400
Spondor SP2/2	£470
Turntable	
Type	belt drive/manual
Speeds	manual
Cartridge	moving coil
Dimensions	50 x 54 x 41/6cm (h x w x d)/overhang
CD Player	
Digital output	electrical
Headphone output	no
Dimensions	9.5 x 43 x 27.5cm (h x w x d)
Amplifier	
Power output	70wpc
MC cartridge compatible?	yes
No of inputs (ex tape)	3
No of tape circuits	2
Dimensions	9.5 x 43 x 31cm (h x w x d)
Loudspeakers	
Type	2 way bass reflex
Recommended placement	open space
Impedance	8ohms
Sensitivity	88dB/watt/mtr est
Power handling	80 watts approx
Dimensions	50 x 26 x 28cm (h x w x d)

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Shiraz . . . Spica . . . Athena . . . Xerxes . . . These are names to be – not so much conjured with, as to cause a certain amount of wry amusement. But this is a system with much more than just silly names to commend it. This system is filled to overflowing with fascinating components, each of which sparks off special qualities in the others. It's also a truly heavyweight package aimed squarely at the committed audiophile. As such its appeal is quite different to our second £5,000 system discussed in this issue built around the elegant Meridian 208 CD player/preamplifier and M60 loudspeakers.

Roksan Xerxes turntable, Artemiz arm, Shiraz cartridge

The *Xerxes* is an engineer's dream: a belt driven turntable, plain in appearance but subtle and complex under the skin, it eschews a normal suspension, though some heavily damped subchassis movement is allowed. The drive system is outwardly conventional, but again appearances deceive. Features such as a motor which rotates against spring pressure whilst being rigidly restrained in the other two planes provide the clue to the unorthodox management of unwanted torque effects, as well as providing a smooth takeup of power. The inner and outer platter are also more complex than they look, each being made in two parts. The main bearing design is also novel and sophisticated. Engineering overall is of the very highest standard.

Like other high grade turntables

before it, the *Xerxes* has evolved significantly in its lifetime, most of the key components having been redesigned at one point or another. The bearing was completely redesigned a couple of years ago and, more recently, a new and much better power supply has been substituted for the original. Identifiable by the use of two small press buttons on the front panel for speed and on/off selection (the original has a front panel lever switch and an on/off switch on the rear), the new supply confers important sonic advantages, but is one factor in pushing the price of the player well above its one-time near parity with the Linn *Sondek LP12*.

The other thing that has changed is the introduction of the *Artemiz* arm with the so-called 'intelligent' free hanging counterweight, and the *Shiraz*, an exotically rebodied variant of the EMT generator, cantilever and sharp, pointy bit. Again both have been subject to certain running improvements, but only in matters of detail.

Like other record players of the genre, the Roksan needs to be set up expertly, and requires occasional routine readjustment, though after an initial settling-in process drift is not a problem. The Roksan is no primadonna and is far from being temperamental.

Ease of use is good for a manual turntable due to the electrical speed change and a fairly quick run-up to speed, but for best results the centre spindle cover should be removed when the record has been positioned.

Cambridge Audio CD3 CD player

I was initially puzzled by the product name. The *CD2* was the original one-box CD player from Cambridge Audio as designed by Stan Curtis, who subsequently sold the company to the present owners, and this model looks almost exactly like a *CD2*.

Early incarnations of the *CD2* were somewhat messy internally and far from being wholly reliable. The *CD3* might more appropriately be known as a MkII version of the *CD2*; the name change was probably imposed to underline the fact that significant changes have been made to counter the somewhat notorious reputation of the original.

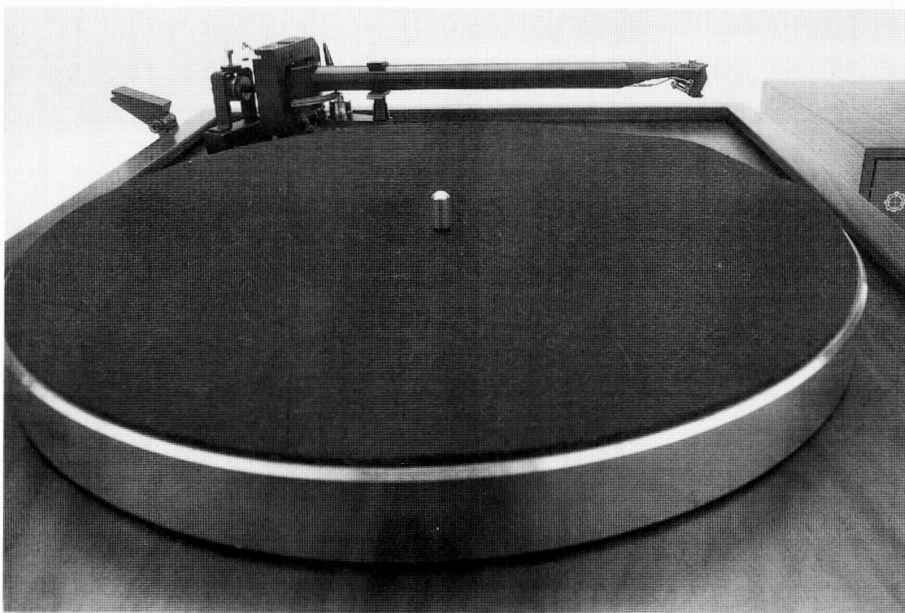
The changes are in the nature of a cleaning up exercise. The internal layout has been simplified and rationalised, partly to improve heat dissipation. Some of the components have also been upgraded, the use of relatively costly Sidereal capacitors for example. The front panel and control matrix have also been improved. The original was extremely tacky, the current one is less so, though it's still far from achieving normal industry standards, the control button matrix in particular being sloppy and lacking in proper tactile feedback.

The basic design, including the central 16-bit 16-times oversampling converter that set it apart at the time of its launch, remain unchanged. 16-times oversampling means that the normal analogue filter network can be dispensed with entirely, the DACs being connected to the output sockets through a de-emphasis network (where necessary) and a coupling capacitor only. The circuit features a relatively sophisticated power supply. Electrical and optical digital outputs are fitted.

The *CD3* is supplied with a simple remote control. The very rudimentary display can now be turned off. Unusual features include a 'disc condition' light which flashes when errors requiring interpolation are detected, and a de-emphasis indicator.

Sumo Athena + Polaris pre/power amplifiers

Notwithstanding the Japanese allusion in the manufacturer's name, Sumo is an American outfit through and through. The *Athena* is a self-contained preamplifier, slim in build and with detachable 'rabbit's ear' grab handles. The similarly endowed power amplifier is a relatively compact MOSFET unit with a specified 100 watts per channel power rating.



The *Athena's* front panel furniture holds a few surprises. There are no tone controls of course (it's nice to be able to say 'of course' about something that not long ago required detailed explanation), and the increasing popular arrangement of split tape and listen selectors is employed, labelled in this case 'input' and 'tape copy'.

The phono input has an internal gain/impedance switch to allow MC and MM cartridges to be used. Loading resistors can also be changed, but the normal value is 100ohm, a perfectly usable figure in most cases including this one. Additionally there are two tape circuits and three line inputs.

A volume control and concentric balance control (with Noble potentiometers) are fitted, alongside mono, high pass filter (a near useless 6dB/octave below 70Hz!) and 'bypass' switches. The last of these removes all active circuitry (and 10dB of gain) from the preamplifier which then becomes passive, with the exception of the output buffers which provide a nice, low impedance 75ohm source to feed long interconnect cables.

The *Polaris* has more than enough gain to coexist with the *Athena* in its low gain mode (though other power amps might not) and following experimentation this is how the amplifier was used. The power amp itself is featureless, the only external points of note (apart from biasing LEDs which shine through the ventilation slots!) is its ability to catch unwary shins. Take care.

In common with the Cambridge Audio *CD3*, the Sumo amplifier is bereft of headphone sockets. Or even socket, which would have been enough.

Spica TC-50 loudspeakers

As Paul Messenger so aptly noted in his epistle in issue 71, the Spica *TC-50* represents a challenge to potted plant lovers, everywhere. Its uncompromising (tri)angularity makes a very rigid and

irregular shape which helps disperse internal standing waves, though the parallel side walls means they're not actually eliminated. Solid triangles are also intrinsically strong. Well this once certainly is. The slanted front panel, which is covered in thick sound absorbing material to inhibit secondary radiation, provides physical time alignment between the two drivers.

Electrically the *TC-50* is relatively conventional, the highlights being a doped pulp cone bass unit with a hard centre cap and a soft dome tweeter. Bass loading is infinite baffle (sealed), and the system is designed for open standing mounting 25cm or so from the rear wall. The Zyp stands (included in this test), which are spiked in both directions, are neither especially heavy nor particularly rigid, but they work uncannily well when compared to other stands that I though might be more suitable.

The official 84dB/meter/watt sensitivity figure doesn't look very promising, but a low 40ohm impedance disguises the

fact, as does the system balance, of which more shortly. And oh how times have changed! The Spica instructions have a section labelled 'Breaking it in' (Sumo's has a similar chapter by the way). Not too long ago the very idea of running-in hi-fi equipment was widely regarded as little short of black magic.

Sound Quality

The Cambridge Audio *CD3* sounded wonderful. For comparative purposes I ran it in parallel with a Deltec *PDM One* 'bitstream' outboard converter, which I have used for other purposes with excellent (though not world-beating) results. The test unequivocally favoured the *CD3* on it's own, which this and other comparisons showed to be at the very top of the one-box player league. True, there were many specific differences which might have led other observers to take whatever view they liked of this comparison. The Deltec, for example, sounded tauter and produced a more sharply defined focus of sound around and (in particular) between the two loudspeakers. For the author, however, the crucial advantage of the Cambridge player is that time and time again the sound took on an independent life of its own which appeared to emanate from the far end of the listening room and – occasionally – beyond. With the Deltec, the music often seemed box-bound, a trace of stridency or coloration of the kind often associated with capacitors inhibiting the sense of organic freedom so evident from the unaided *CD3*.

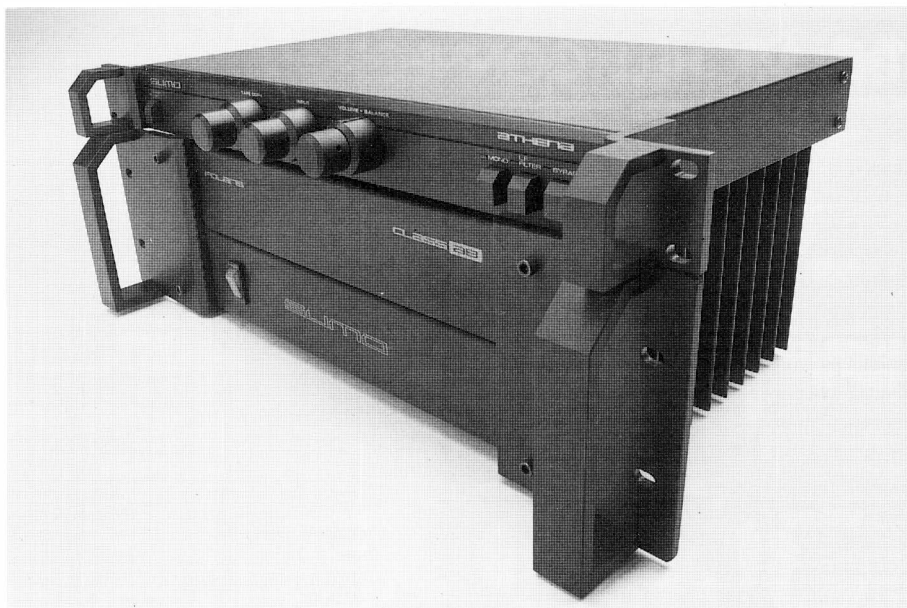
It's no match for the best two-box players however, and I repeat that its spongy control matrix, tardy response to commands and primitive fluorescent display give it a somewhat geriatric feel. But by single box CD player standards it is dangerously close to the state of the art, and it proved particularly well suited to the rest of this system.



Since it was first released, I have been an unashamed, though not always uncritical fan of the Roksan deck, which struck me then as having a near ideal blend of solidity, depth and excellent timing. Rightly or wrongly, though, it paints a rather drier, flatter picture of the bass and lower midband than some, and with the wrong material this can leave the midband sounding a tad exposed. I stress this is never a liability except with very dodgy recordings where the slightly slower, warmer quality of other established references can have a mildly civilising influence. The Roksan was always good, but it was not always nice. On the other hand, who wants nice?

But it positively insists upon a high level of resolution and coherence from the system it is used with. It's here that the Spica loudspeakers really shine. They're fast, assured, very concise and precise and have an absolutely unstoppable feel. They're refined enough for the job, but refinement is never an excuse not to get to grips with the dynamics and structure of the music, which can be the case with audiophile loudspeakers. Despite the unfashionable tweeter (no metal domes here!), the treble is sharp and clear without grain, though it does sound slightly bright, and the bass, though lean, is astonishingly accomplished. Low frequency performance is ideally integrated into the system as a whole, and in terms of speed and tunefulness it is amongst the best.

In this system, I found the *Polaris* power amplifier totally transparent. It did its thing with utter consistency, sounding for much of the time rather like a drier sounding and lower powered version of my Musical Fidelity A370. The preamplifier was in the same class when driven by the CD player in its passive (bypass) mode, but the same didn't apply with the phono preamplifier, which is just slow enough to pull the



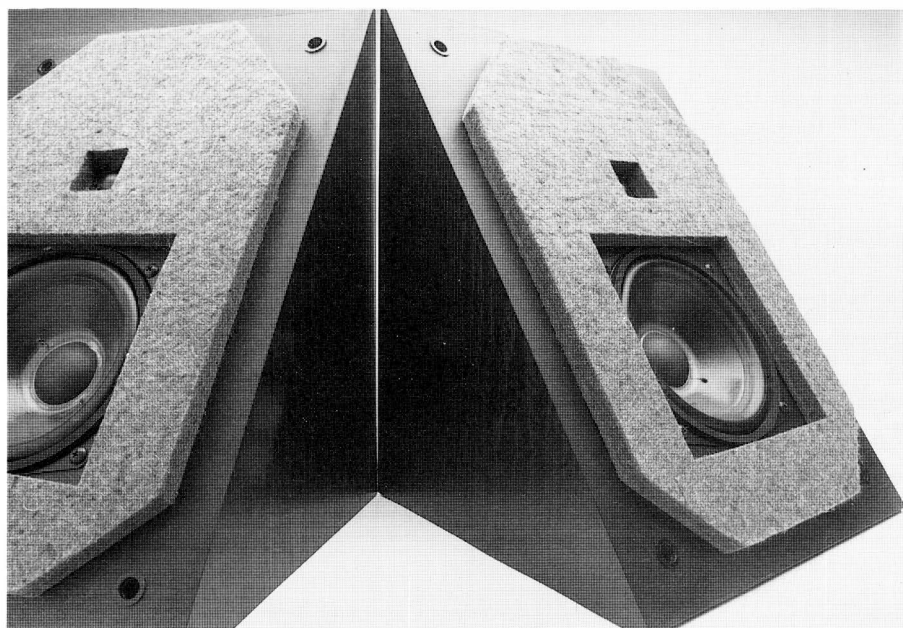
performance of the record player down to earth. As a footnote, I tried substituting a DNM preamp which sounded significantly tighter and more coherent – at a price.

Conclusions

As a system, this one is tantalisingly close to true all-round synergy except with the record deck, which is blocked by the preamplifier's phono stage from providing the kind of inner resolution and dynamic stature it is capable of. With the *Athena* switched for a DNM *Primus*, the sound becomes incredibly tight and together, but the price increases by over £400, which is unfortunate. A better and more practical solution might be the brand new Roksan *Artaxerxes* phono amplifier (powered by the spare output on the new turntable power supply) which will feed any preamplifier line input direct.

One word on practicalities. If ever there was a system that cried out for solid core loudspeaker cabling, this is the

one – despite the absence of bi-wire connections on the rear of the speaker. The system is capable of fine resolution from both sources and at surprisingly high volume levels, with electrifying transparency and liveliness. Thick stranded cables sit on the sound, blunting transients and to some extent spoiling the dynamic interplay of background instruments during complex recordings.



GENERAL DATA

Typical retail prices

Roksan Xerxes/Artemiz/Shiraz	£695/£595/£655
Cambridge CD3	£649
Sumo Athena/Polaris	£695/£750
Spica TC50/Zyp stands	£599/£229

Turntable

Type	manual/belt drive
Speeds	33/45
Cartridge	moving coil
Dimensions	15 x 48 x 39/7cm (h x w x d/overhang)

CD Player

Digital output	electrical & digital
Headphone output	no
Dimensions	10 x 43 x 29cm (h x w x d)

Amplifier

Power output	100wpc
MC cartridge compatible?	yes
No of inputs (ex tape)	4
No of tape circuits	2

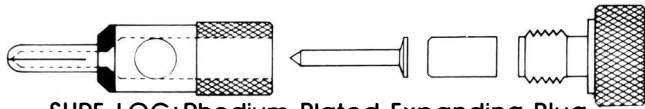
Dimensions Athena	4 x 48 x 22cm (h x w x d)
Dimensions Athena	13 x 48 x 22cm (h x w x d)

Loudspeakers

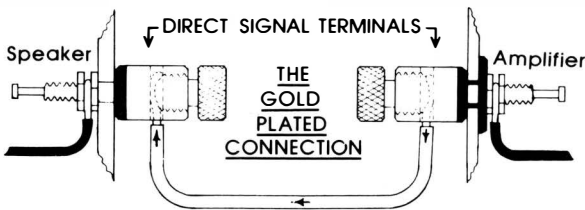
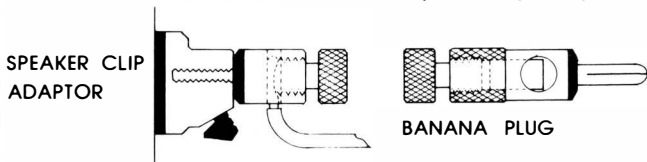
Type	2 way/sealed
Recommended placement	open space
Impedance	4ohms
Sensitivity	84dB/watt/mtr
Power handling	50 watts approx
Dimensions	39.5 x 33 x 29.5cm (h x w x d)

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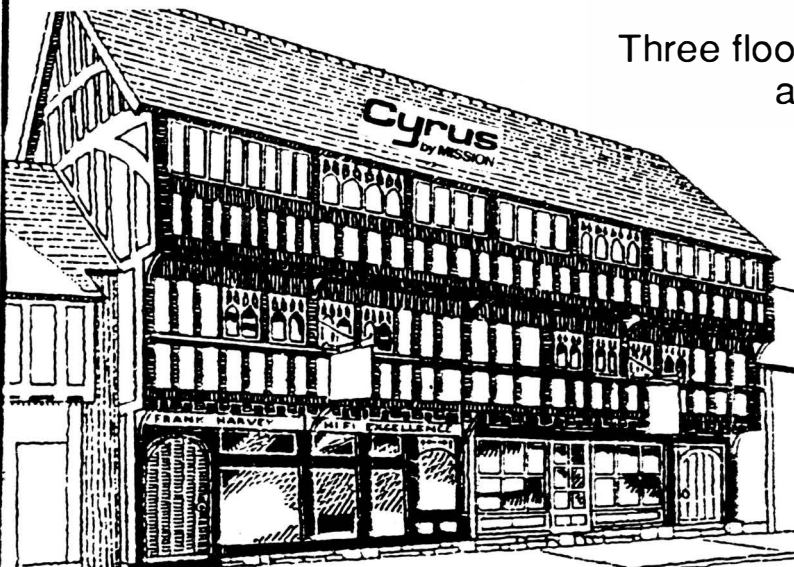
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GYRODEC/MOTH/MILTEK TURNTABLE, MERIDIAN 208 CD/PREAMP,
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This intriguing system is based on quite different priorities to those that form our alternative £5,000 system, which is assembled with hairshirt audiophilia from tip to tail. To a greater extent than any of the other seven systems assessed this month, this one, whose central components are a combined CD player/preamp and loudspeakers with built-in power amps, is a visual treat, and one that will look the part in some very smart homes indeed.

Michell Gyrodec turntable, Rega RB300 arm, Miltek Olympia cartridge

I was pleased to hear that John Michell was to be the first subject in a series looking at engineers in the hi-fi industry (*Craftsman* – issue No. 82). Michell is one of the most unassuming personalities in the industry, but he is without doubt the consummate engineer. In what might be a personal mark of esteem by one of their more prominent peers, Michell is the only manufacturer able to obtain RB300 arms direct from Rega on an OEM basis. All others have to make do with the *Moth/RB250* arm.

Readers may be surprised, as I was, to discover that the *Gyrodec* has been in existence for almost ten years. A recent price rise, from £595 to £645, is the first since 1981, and coincides with a package of improvements.

Physically massive, the *Gyrodec* is based on a 12.5mm thick Perspex platform with three feet, on which a massive, sandcast alloy subchassis is hung

from suspension towers, whose covers can be readily removed for adjustment purposes. The platter is an acrylic disc heavily loaded with vinyl and carbon, with gold plated weights slung under the platter rim to increase rotational inertia. The platter is very slightly dished, the deck being supplied with a quick fit (and very elegantly designed) centre clamp. Arm bases are machined and weighted so that the arm and base combination always weighs the same (imperial *and* metric!), obviating any need for suspension adjustments in normal use, and keeping suspension spring rates constant irrespective of the arm. The platter is rim driven by two round section belts from a high speed Papst outer rotor motor.

Recent changes include a redesign of the motor casing which is now totally enclosed in order to eliminate wind noise from rotating parts (identified in a previous review). The main bearing has also been totally redesigned. Previously conventional, the current one is inverted so that the belt plane runs through the plane of the bearing. The bearing outer is made in two parts, a hollow shaft with a screw on cap to eliminate the otherwise inevitable runout when drilling at the bottom of a long, blind hole (Roksan does something similar). The (patented) lubrication system uses a spiral cut around the bearing shaft to pump the oil upwards (lubrication is a key problem with inverted bearings) and a relief hole is drilled at the top to drain the oil back for recirculation. The tolerances of the

bearing are amazingly high.

Although supplied with a standard in-lead power supply, this test specified the new optional outboard supply (£99), a rather beautiful Perspex encased item which has an internal LED to show when it is under power. Speed change however, remains manual.

The Rega RB300 is one of the best known arms available. The sample supplied has a slightly more robust looking cable than older versions. For the few who don't know, the Rega has a single piece cast headshell/armtube/bearing yoke, which has won at least one engineering industry award. Only the rear arm extension is separate. Tracking force is applied partly by spring and partly using an ultra-dense tungsten steel counterweight positioned close to the pivot, both measures having the effect of reducing effective mass. The RB300 has always been an incredible bargain in engineering terms, and the progress of time has changed nothing.

The Miltek *Olympia* cartridge looks like nothing other than a featureless rectangular box, painted red and weighing in at a substantial 9gms, with a fixed stylus assembly. It turns out there are two Miltek cartridges, both made by Kiseki but cheaper than the Kiseki branded models. They're high output moving coils with a nominal 2mV output (at 5cm/sec). The *Olympia* is the more costly of the two, and is fitted with a sapphire cantilever and an unspecified line contact stylus.

Meridian 208 CD player/ preamplifier

The Editor has just reminded me that Meridian was the first British specialist hi-fi manufacturer to take CD seriously to the extent of producing an audiophile version of an existing (Philips based) player – the *MCD*, and later the *Pro MCD*. The 208 is the latest and most expensive player Meridian has produced, though some of the cost properly belongs to the preamplifier which is included gratis and for free.

The 208 consists of two self-contained units, a transport module and an electronics module, which are bolted together for convenience whilst offering near perfect electrical isolation. The transport is based on a Philips mechanism in which the whole heavily built transport slides forward on command. The electronics module is home to the self-indicating controls and socketry, which includes facilities for one line level item, a record player (or a second line



when a designer comes along with something different.

But this wasn't why I was so anxious to try the Meridian. The real reason is that the 208 is a 1-bit PDM 'bitstream' CD player, and others whose opinion I have learned to trust have suggested to me that it is "A thoroughly good thing and wonderful to listen to as well as to behold."

I should perhaps have prefaced these remarks with a few words on where I see bitstream coming from, since much has been written by others that I believe to be disingenuous. Bitstream has been touted as the answer to the problems of CD, and some reviews have concluded that any further improvements will be small and maybe not worth having, echoing Herbert von Karajan's infamous epigram on CD 'all else is gaslight!'. Piffle. Balderdash.

But I've indicated that the 208 really is something special. Is it bitstream made good? Probably not, at least if Meridian is right in its assertion that the D-to-A converter contributes no more than about 20 per cent to the sound of the player as a whole. In any case the 208 is emphatically *not* the complete answer to the familiar rollcall of CD limitations. Its sound does not have the architectural qualities, the solidity, the weight and the power of the high-end Wadia and Theta D-to-A converters with their time domain filtering.

Enough of this. The Wadia doesn't do what the Meridian does either. It was clear that the 208 was special from the moment I fired it up with another amplifier and loudspeakers. It is an extraordinarily well behaved player, refined, astonishingly detailed and, for reasons I cannot explain, unusually easy on the ear – even in protracted use. Although the 208 tended to underplay the dynamic and structural properties of music, it did so in an entirely innocuous fashion,

input if the phono module is omitted) and a tape circuit with proper monitoring for those who have 3-head cassette decks. A headphone socket, which tends to require inconveniently high volume settings, is buried away at the rear.

There are no tone or balance controls; the volume control is a 64 step digital type supplemented by a full mute switch. The display has a number of modes, but generally gives a bare minimum of information.

Two extras were included. One is the switchable MM/MC phono module circuit which fits inside the preamplifier casing. The other is a 'table top' remote control, the 209, which adds some extra facilities – non-audible cueing, track programming, random track selection and an absolute phase toggle. LED indicators on the front panel of the player read the current phase status and disc read errors requiring interpolation. The handset also serves as a full system remote with preamplifier source switching, tuner channel selection and so on.

performs best with them off. The base can be fitted with hard feet, which can be dismantled to reveal spikes. Three guesses which sounds better . . .

Sound Quality

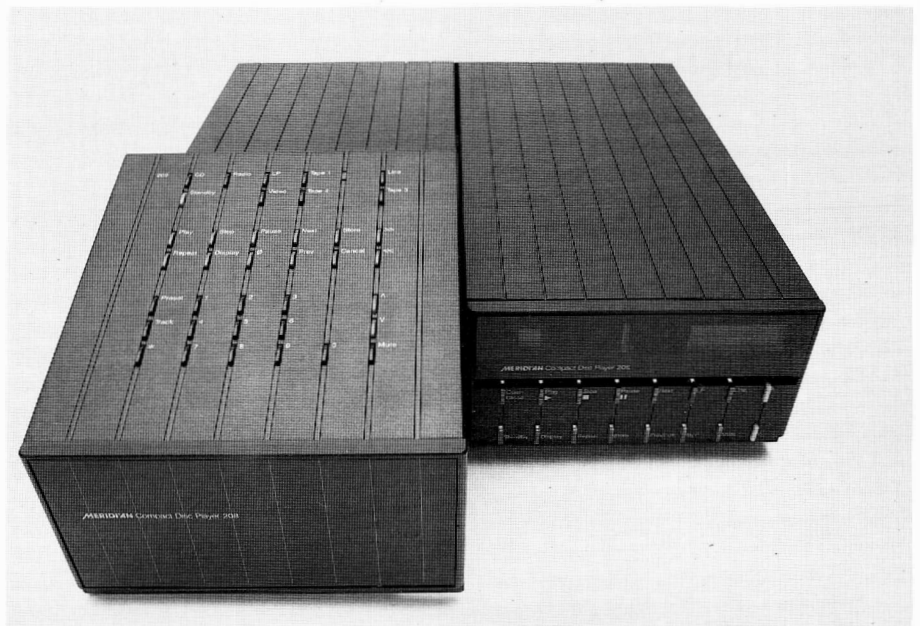
When I finally had all the boxes for this month's test project lined up like gross toy soldiers in their original packing, it was this system that I ripped the packaging off first. What do you think it was that attracted me? The swanky splendour of that Perspex and alloy marvel, the *Gyrodec*? Well no, I've used the *Gyrodec* before. The Miltek Olympia cartridge? Not really. At the beginning of the test, it was just a name that sounded like a football ground.

No, what attracted me were the two Meridian items. The 208 is full of interest from every conceivable angle. Visually it's more than a cut above the rest. In a world where most designers are tripping over each other in their desire to conform to clapped out styling clichés (I hope the Prince of Wales is reading this), I value it

Meridian M60 active loudspeakers

The M60 is an active loudspeaker featuring a plastic coned bass unit, a similar size bass/midrange unit and a metal dome SEAS tweeter built to Meridian's specifications. Each enclosure also includes three 65W amplifiers and crossovers, so instead of accepting loudspeaker cables, each enclosure needs a mains lead and a signal lead (van den Hul 102 Mk 3 was supplied, and seems generally satisfactory). The M60 has balanced and unbalanced inputs, but the 208 has only an unbalanced output. In-line miniature switches on the back of each enclosure allow for fine tuning of system response as well as varying input arrangements.

The M60 is tall, narrow and elegant, especially with its covers on, though it



while stereo soundstage presentation was first class.

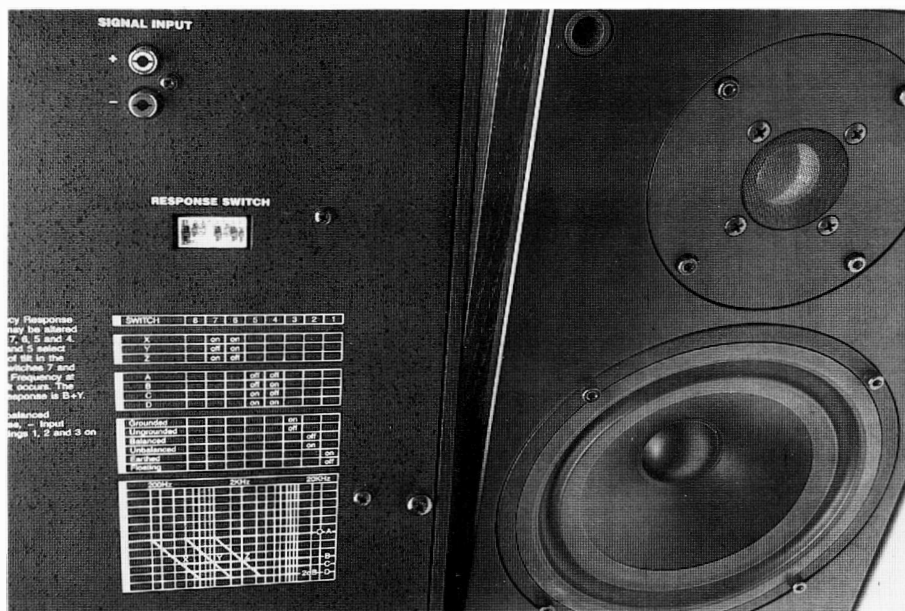
As a preamplifier, the 208 is also pretty good, though it's limited by the number of inputs on offer. On balance, the moving coil input is the weakest point: it sounded a little tight and dry, and this affected record reproduction a little, though not too severely I'm pleased to say. The Michell player combination was still handled extremely effectively, bar a slight weakening of bass.

Bass aside, I was delighted with the record deck, and the way it sounded through the Meridian. The Miltek cartridge is particularly praiseworthy. It has much of the energy, weight and openness in the midband of a Koetsu, and it tracked like a dream. It made big, bold and lusciously textured noises which projected way out from the speakers – gripping stuff indeed! Needless to say, this couldn't have happened without the expert connivance of the Michell turntable (which, from what I can hear, sounds considerably better than it used to) and of course the Rega arm.

Finally, the speakers. The visual elegance of the M60 is reflected in a clean and elegant, rather clipped style of presentation. The metal dome tweeter is not as good as some recent units: the treble sounds a little forced and lacks transparency. By contrast the midband is extremely refined and transparent, and is capable of the nearest thing I have heard to audio holography for some time.

The real limitations of the M60 are to be found in the bass, which rings. Certain very deep notes boom quite severely whilst slightly higher frequencies are smoother and more distant in presentation. There is also a loss of air and space around individual musicians, especially affecting bass.

This leaves the system suiting certain

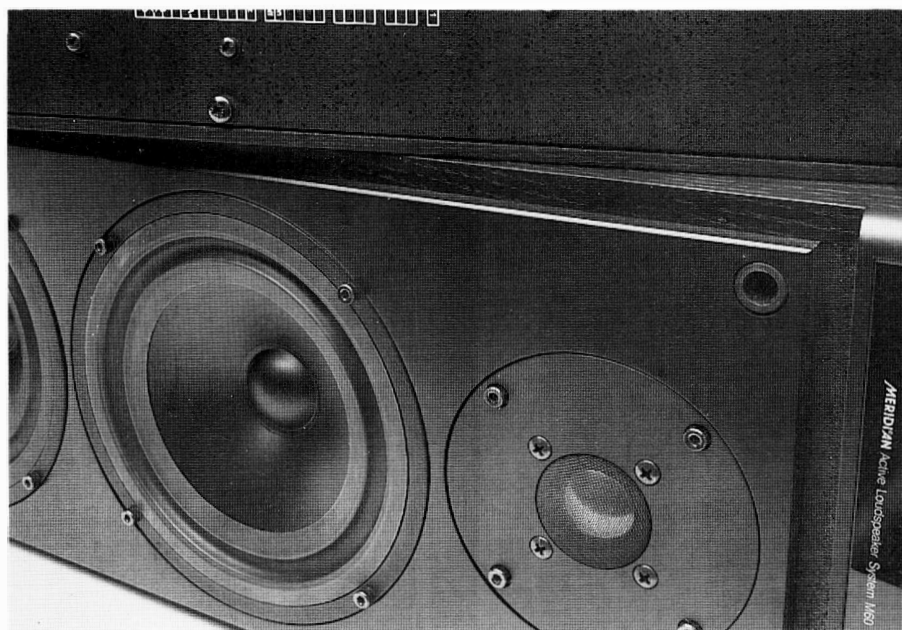


types of music better than others. The M60 works very well with much chamber music and more generally with smaller instrumental and vocal forces, but the lowest octave on grand pianos can sound rather mechanical, and heavy rock or orchestral material can also run foul of the deep but restricted bass quality. On the other hand, simple very pure bass sounds, such as are heard on many organ recordings, can sound beautiful and, at times, exciting.

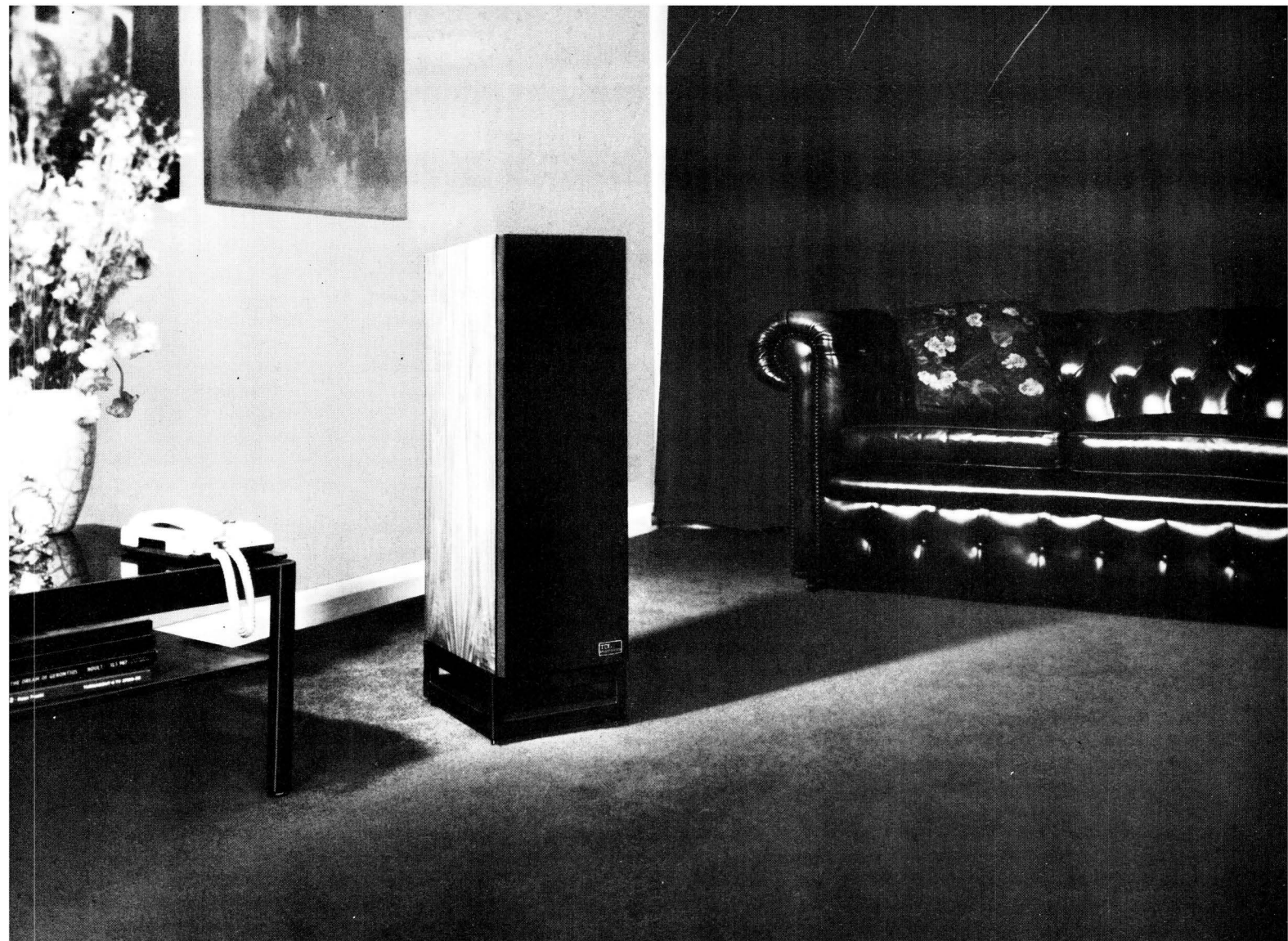
Conclusions

The turntable sounds marvellous, and the Miltek in particular is an unexpected and welcome find, a cartridge with the all round capabilities and much of the style and power of a similarly priced Koetsu (if such a thing existed). The 208 is equally praiseworthy, and obviously amongst the finest CD players yet made with a perfectly adequate preamp thrown in. It lacks almost any trace of digital nasties, and substitutes an unusual degree of clarity and refine-

ment. The M60 however might be a problem. It is extremely refined in its own terms, but the treble is not of the highest class, and the bass ringing (which can be modified but not cured by small changes in positioning in the listening room) represents a limitation with some wide bandwidth recordings.



GENERAL DATA	
Typical retail prices	
Gyrodec/Moth arm/Miltek Olympia	£744/£78/£349
Meridian 208/PM Phono module	£1,490/£99
Meridian M60	£1,800
van den Hul 102 Mk 3 (6m terminated)	£200
Turntable	
Type	manual/belt drive
Speeds	33/45
Cartridge	moving coil
Dimensions	55 x 54 x 41/6cm (h x w x d)
CD Player/Preamp	
Digital output	2 optical/1 electrical
Headphone output	yes
MC cartridge compatible	optional
No of inputs (ex tape)	2
No of tape circuits	1
Dimensions	10 x 32 x 32.5cm (h x w x d)
Active Loudspeakers	
Type	active, self-powered
Recommended placement	open, free standing
Power output	3 x 65wpc
Impedance	n/a
Sensitivity	n/a
Acoustic Output	> 115dB/1m
Dimensions	90 x 21 x 29.5cm (h x w x d)



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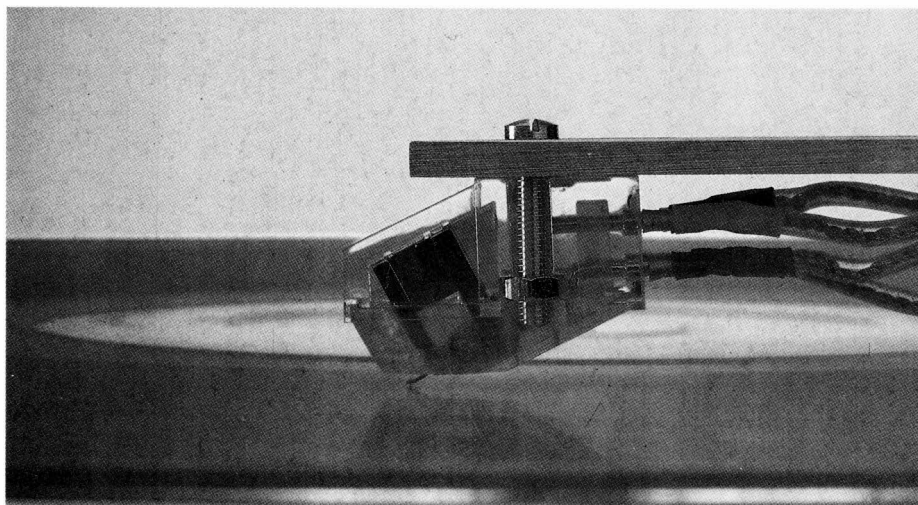
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Richard Black looks at the complex task assigned to the cartridge and details the lab tests used in our reviews of ten moving coils.

Choosing and Using . . . Cartridges



To the cartridge is entrusted the job of converting the mechanical signal in the record groove to an electrical signal that can be amplified and used to drive the loudspeakers. This is far from easy, for the signal has a frequency range from only a few Hz to well above 20kHz and a dynamic range from single molecules to a tenth of a millimetre.

Almost all modern cartridges share the basic operating principle of scanning the groove with a diamond stylus attached to an electrical generator, using the same principles that generate electricity for the National Grid. To achieve faithful reproduction, the stylus must follow the groove accurately and the generator must be very linear in converting the motion to an electrical signal.

The difficulties of following the record groove, especially at high frequencies, have given rise to the large number of stylus profiles currently used. Early cartridges mostly had simple conical (spherical) styli, and the first improvement on this was the elliptical stylus, which with its smaller depth achieved better high-frequency performance than the spherical type. Now, it is common to find various 'line contact' styli such as the van

den Hul, Gyger and micro ridge types, all of which are capable of working to very high frequencies indeed.

An additional problem is that at a certain frequency the mass of the stylus-plus-cantilever (or other stylus support) and the springiness of the vinyl from which the record is made will resonate, making accurate groove tracing impossible and effectively defining an upper limit on the cartridge's mechanical frequency response. This 'tip resonance' should occur well above the audio band, say at least as high as 50kHz, which requires a very light stylus assembly, ideally less than 0.3mg (as low as 0.07mg has been achieved, but 0.3mg is by most standards a good figure). This in turn places constraints on the structural integrity of the cantilever, which should nevertheless be as stiff as possible so as to ensure minimum bending and inherent signal loss. Hence the use of such exotic cantilever materials as boron, beryllium and precious stones.

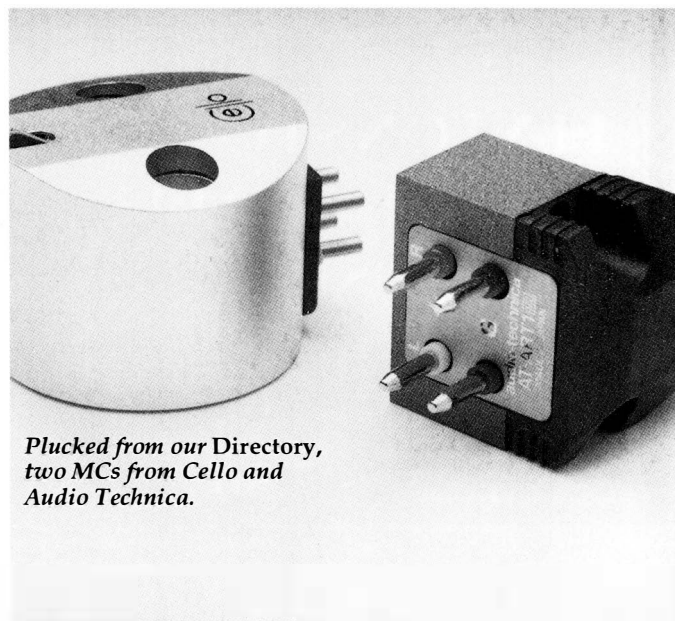
Of course, the cantilever must be attached to the cartridge body by a springy suspension, and this adds more problems. For one thing, this springiness adds another resonance, with the mass of the arm and the

cartridge body, this time at a low frequency. It is usually necessary to tune the resonance by careful matching of arm and cartridge to ensure that it is neither too high (where it would intrude directly on the music signal) nor too low (where it could be triggered by record warps and cause all sorts of intermodulation effects in the cartridge, amplifiers and loudspeakers).

Ideally, arm resonance should be damped at the front or back of the arm; the small amount of damping within the cantilever suspension is quite inadequate to have much effect on it. Where there is no provision for this, however,

the general rule is: low compliance (ie stiff suspension) – high mass arm/cartridge and vice versa.

Another important area of cartridge performance, which is also affected by compliance, is tracking of high signal levels. The suspension provides a restoring force to the stylus, ensuring that it stays in the groove, but if the modulation is too severe the stylus may try to move outside the range of the suspension when it will lose contact with the groove. This is termed 'mistracking' and sounds like tearing paper – horrible! Mistracking can be overcome to a large extent by increasing the tracking force on the



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'As an aside, it is worth noticing that cartridges are to an extent sensitive to the electrical loading put on them by the amplifier.'

cartridge, and there is an approximate inverse relationship between compliance and required tracking force. Not only does mistracking sound bad, it also damages the record very rapidly and must be avoided – so don't be tempted to reduce tracking force too far, you'll do more harm than good.

As for the generator, this must as already mentioned be very linear, capable of coping with both high levels and high frequencies. Two types of generator are commonly used: the moving coil (MC) and the fixed coil, the latter more generally called a moving magnet (MM). In MM cartridges a magnet at the rear of the cantilever moves and induces an electric current in a stationary set of coils, while in MC cartridges the magnet is fixed and the coils move. Advantages of MCs include lower effective mass and better high frequency response, but the stylus assembly must be fixed to the cartridge – so when the stylus wears out the cartridge must be returned to the manufacturer for re-tipping.

The voltage output of an MC cartridge is usually low (except for special 'high output' types) and requires a high gain amplifier (a pre-amplifier or MC phono stage) or step-up transformer. There is a popular misconception that moving coil cartridges are noisier than moving magnet types; in fact the reverse is true but the superior noise performance is only realised with a particularly quiet amplifier or a transformer.

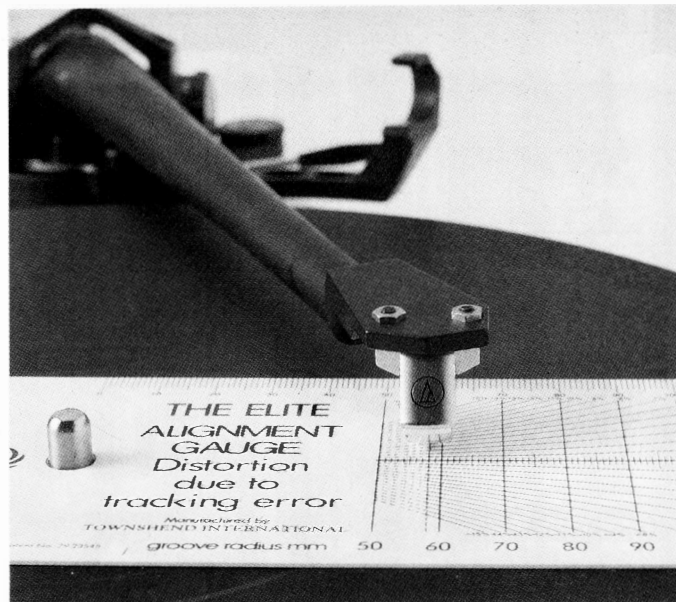
As an aside, it is worth noting that cartridges are to an extent sensitive to the electrical loading put on them by the amplifier. Moving magnet types require a high impedance load, and moving coil cartridges a lower impedance, but there is debate over exactly how low. Work done by various researchers has shown that best linearity is achieved from moving coil cartridges (probably moving magnets too) when they are run with a short circuit load. As this is not possible with conventional amplifiers, a low impedance is a good compromise, where 'low' means between half and twice the cartridge's internal impedance – the lower the better, but also the noisier. In these reviews, all low output moving coil cartridges were normally terminated with 10ohms.

Finally, the cartridge body must be as non-resonant as possible, since if it resonates the generator within the body is sure to pick this up and the result will colour the output signal. A cartridge may not seem to have much room for resonance, but on a scale of single atoms (about the ultimate resolution of a good cartridge) you can't be too careful!

The tests

Listening and measurements were carried out on a Pink Triangle *PT TOO* with SME 309 arm, with a *Rock/Excalibur* also used for listening to most cartridges (not the Dynavectors). Alignment was carried out by a mixture of listening and lab testing. An important part of the listening tests was comparison of a record with a copy of the master tape used to make the record, which is a useful way of ironing out at least some of the inconsistencies arising from using records 'sight unseen', as it were.

One result not presented here is Vertical Tracking Angle; this is not because it isn't important (it is) but there is little one can do with a numerical result for it. Any cartridge must be aligned for VTA by ear – and remember, it interacts with tracking



For accurate performance, correct alignment of the pickup cartridge is critical. One of the best tools for the job is the Elite Alignment Gauge. Vertical tracking angle (VTA) is best set by ear.

force, so do always experiment with arm height and tracking force when setting up a new cartridge or arm.

Absolute phase was also checked and mentioned when found to be wrong; this can be important, but only about 70 per cent of records are actually 'correct' – there's no professional standard for it!

Running briefly through the measurements as presented:

Compliance was calculated from the arm resonance (**LF res.**), as measured using an Ortofon Test Computer. Resonance figures refer to the cartridge mounted on the SME 309 (effective mass 9.7kg) and the height of the resonance peak is also given as an indication of the degree of cantilever suspension damping. Opinions on additional damping vary; the present author (a habitual *Rock* user) advocates it. **Tracking ability** was also measured with the Test Computer, 80µm being the maximum measurement and an indication of adequate performance.

Output, channel balance and 1kHz separation are spot figures taken via the Test Computer, and averaged across the channels. Stereo separation is dependent on cartridge azimuth, which was

aligned using this figure.

Broadband separation was measured using pink noise signals cut one channel at a time; a brief description only is given.

Tip resonance was measured using square waves cut at 33rpm and played back at up to 150rpm, until clear resonance was observed on an oscilloscope – a crude but highly effective technique!

Intermodulation distortion measurements, shown as a spectrum plot, used SMPTE tones but at a lower level of +2dB. Second order IMD (3.6 and 4.4kHz) is harmless and due to geometric effects; third order indicates cartridge nonlinearity and should be practically absent.

Frequency response was measured using pink noise and Fast Fourier Transform techniques. Measuring this really accurately is probably impossible (there are so many variables that one can't calibrate the system absolutely) but pink noise is a very informative way of doing it and I believe these results are accurate to about 0.75dB up to 25kHz, 1.5dB to 40kHz and 3dB to 50kHz.

Little wiggles in the plots are due to the random nature of the test signal, but trends are important. Low frequency response is dominated by arm resonance and was not plotted.



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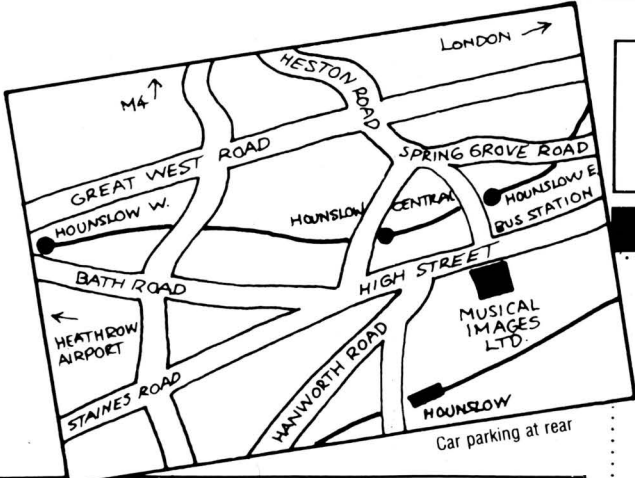
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Housed in its smart, red-anodised aluminium body, the 404i-L looks almost understated in comparison with some of its competitors. It is apparently made in Japan for the American Audioquest company, and boasts a boron cantilever. A higher output (by 10dB) version is available as the 404i-MH.

On Test

Although the instructions with the 404i recommend a tracking force of 1.9g, over 2g was required to obtain tracking performance better than 80 microns – perhaps not surprising in view of the slightly low compliance. With a tip resonance as high as 60kHz, effective tip mass is clearly very low (around 0.2mg) and the response at lower frequencies is pretty close to flat. Distortion and channel separation seem fine, and everything else is in order.

The extra tracking force was clearly audible as an improvement on auditioning. Even so, the sound never lost a certain edginess at high levels, as if mis-tracking were not many decibels away.

The sound of the 404i is certainly very immediate, and images have an impressive solidity. At low levels, detail is up with the best of 'em, but on any programme material severe modulation leaves this Audioquest very slightly out of its depth. The master tape test showed a lack of weight on piano notes, which could be related to limited tracking; the 'weight' is apparently conveyed as a low level, low frequency component in the sound which is all too easily masked by the least problems with the sharp attack of the note. However, this particular lack is only slight and not noticeable on certain sorts of music – ie heavy rock.

Conclusion

Although it is undoubtedly a revealing cartridge with good performance in many areas, the 404i's lack of confidence with high level programme is a limitation that it is hard to overlook given the proliferation of good trackers which lose nothing in other areas. It therefore misses recommendation by a narrow margin.

Dynavector XX-1

DYNAVECTOR SYSTEMS LTD., 32 READING ROAD, WOODLEY, READING, BERKS RG5 3DB. TEL: (0734) 699159.

The most immediately noticeable feature of this cartridge is the small switch on the front; what on earth is it? It's labelled 'flux damper', and is supposed (when switched in) to reduce fluctuation of magnetic flux in the generator assembly, in conjunction with 'softened magnetism'. Neither of these innovations are described in very much detail in Dynavector's brochure, but it seems the effect of the flux damper is akin to that of running the cartridge into a zero impedance load.

The XX-1's body is very large and rather heavy, and in fact could not be used on a Rock turntable as it hit the damping trough! Most arms should manage to balance it, though.

On Test

This high output version of the XX-1 did not quite achieve the performance of its low-output brother (XX-1L – see below), especially in the matter of ultrasonic response. Presumably due to the extra mass of the higher-output generator, tip resonance is relatively low at 40kHz and

is not well damped. In-band response is also not quite flat, with a dip in the upper treble (8kHz-ish) and a rise to 20kHz. Crosstalk and distortion are good.

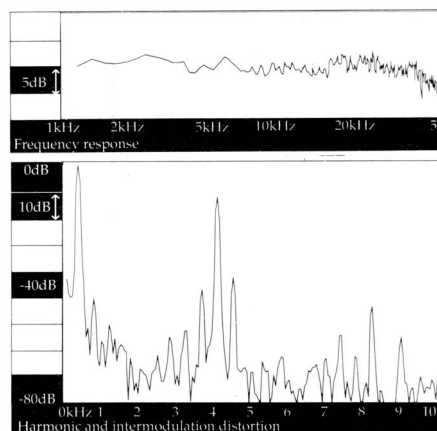
Sound follows test results in being good but not quite up to the standard of the -1L. Detail is good but not outstanding, while surface noise seems very slightly more obtrusive. On some music the sound can become almost brash, and although it never loses its inner detail, it seems less informative.

Conclusion

It is worth noting that the output of this cartridge, expressed as power, is in fact only 3dB higher than the -1L. Therefore, with an ideally quiet head amplifier or a transformer there will be a similar level of noise from both. On the other hand, head amps and transformers cost money. This makes the XX-1 somewhat better value, but assessed as a competitor for its brother it is still distinctly the lesser performer. Against the rest, its high output doesn't quite increase its merit to recommendation.

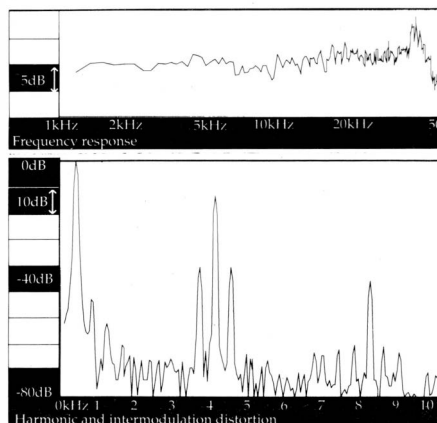
TEST RESULTS

Type, body mass	Moving-coil, 8.8g
Compliance, vert/lat	12/12 mm/N
Tracking force recommended/test	1.9/2.1g
Tracking ability, L/R	>80/>80µm
LF res., vert/lat	11Hz @ 14dB/11Hz @ 13dB
Output at 5cm/s	0.60mV
Separation at 1kHz	28dB
Separation broadband	Better than 20dB
Impedance	9.8ohm + 30µH
Tip resonance, damping	60kHz, quite good
Typical price	£400



TEST RESULTS

Type, body mass	Moving-coil, 12g
Stylus type	Micro ridge
Compliance, vert/lat	12/12 mm/N
Tracking force recommended/test	1.9-2.3/1.9g
Tracking ability, L/R	>80/>80µm
LF res., vert/lat	10Hz @ 17dB/10Hz @ 18dB
Output at 5cm/s	2.3mV
Separation at 1kHz	31dB
Separation broadband	Around 20dB above 3kHz
Impedance	270ohm + 370µH
Tip resonance, damping	40kHz, poor
Typical price	£680



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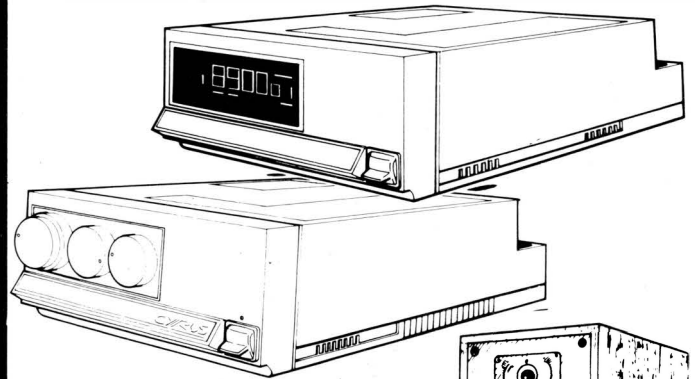
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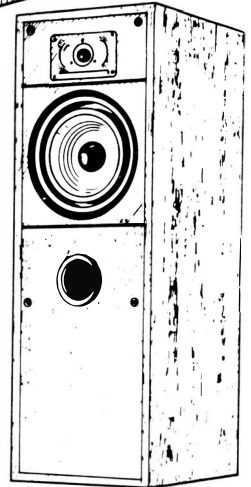
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Dynavector XX-1L

DYNAVECTOR SYSTEMS LTD., 32 READING ROAD, WOODLEY, READING, BERKS RG5 3DB. TEL: (0734) 699159.

Dynavector has always been keen on high output cartridges, and I gather this version was developed after the *XX-1*. Externally identical, it has a boron cantilever with micro-ridge stylus and the distinctive flux damper switch.

On Test

Frequency response appears quite flat to about 10kHz, but rises to a distinct peak around 20kHz of rather alarming magnitude for a top-notch cartridge. Tip resonance is quite high at 52kHz and its damping is pretty good. Distortion and crosstalk show nothing to worry about. Experimenting with the flux damper confirmed Dynavector's statement that it has no discernible effect on frequency response, nor indeed on any other readily measurable parameter.

One might expect the extreme treble lift to be audible, but on auditioning the *XX-1L* (before and after measurement) no give away signs were found. Indeed, one comment specifically referred to the cartridge's detailed but not over-bright treble. If there is a problem, it is a degree

of bass 'woolliness' which suggests that arm damping might be beneficial, although the resonance peaks don't seem too bad. In the midband and treble, however, the *XX-1L* sounds exceptionally clear and detailed, and has no hint of harshness or distress when tracking high levels of modulation. Subtle ambience information is well preserved and stereo imaging is very solid.

When compared with the master tape sound, the *XX-1L* was found to be one of the few cartridges to convey the weight and transient speed of a piano and the fine detail of a violin without making the listener feel too close to the performers for comfort. The flux damper switch had only a small effect; the sound was marginally preferred with it switched in.

Conclusion

This is a very clear and neutral cartridge which, notwithstanding the 20kHz lift, sounds balanced and non-fatiguing. It seems to be considerably the better of the two versions and is therefore Recommended.

Goldring Eroica

GOLDRING LTD., 8 GREYFRIARS ROAD, BURY ST. EDMUNDS, SUFFOLK IP32 7DX. TEL: (0284) 701101.

This is a high output moving coil, compatible with any normal moving magnet input but with a moving coil's advantages of low impedance and corresponding low noise floor (about -92dB referred to 5cm/s). Because it uses a small metal 'slug' in the coil to concentrate the magnetic field and increase output, the other big advantage of most moving coil designs - low tip mass - is not fully realised, although at 0.5mg this is still fairly low.

On Test

The tip mass is only sufficient to bring the tip resonance down to 41kHz - perfectly acceptable - but in-band response seems a little uneven. Crosstalk is quite good across the band, but as with the *LX* version of the *Eroica* there is some third order intermodulation visible on the plot, as well as various orders of harmonic distortion. Compliance is rather unsymmetric, and the lateral resonance is at quite a high level. Damping is recommended.

Sonically, the *Eroica* tends to err

towards a hard-edged sound, with roughness sometimes showing up. Detail is generally good, but there are colorations in the upper midband which show up as undue prominence on certain notes and as a 'quacky' or 'reedy' quality, depending on the programme. Transients can sound over-bright and show signs of ringing. This coloration can make the sound seem rather shut-in and difficult to grasp, especially in lightly scored music.

At the other extreme, electric guitars and drum kits, although not terribly clean, sound quite raunchy and powerful, an effect which can in some cases act against the emasculation of many recordings and which is therefore popular with some listeners.

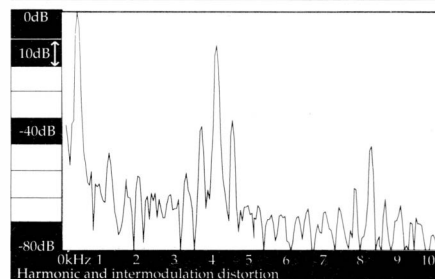
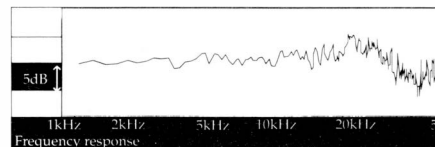
Conclusion

Reactions to the *Eroica* will vary widely according to musical tastes. Ultimately it is too coloured for general recommendation but at this price it may still be worth checking out, especially if you like the heavy stuff.

Recommended

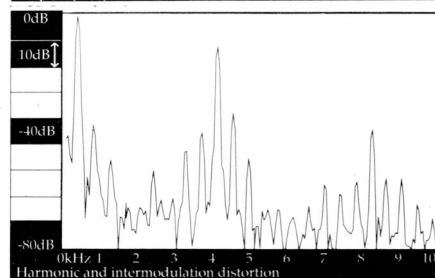
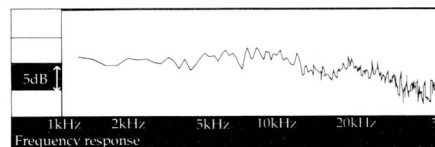
TEST RESULTS

Type, body mass	Moving-coil, 12g
Stylus type	Micro ridge
Compliance, vert/lat	14/14 mm/N
Tracking force recommended/test	1.9-2.3/1.9g
Tracking ability, L/R	>80/>80µm
LF res., vert/lat	9Hz @ 12dB/9Hz @ 14dB
Output at 5cm/s	0.25mV
Separation at 1kHz	32dB
Separation broadband	30dB to 5kHz; better than 18dB above
Impedance	5.5ohm + 5.3µH
Tip resonance, damping	52kHz, quite good
Typical price	£680



TEST RESULTS

Type, body mass	Moving-coil, 5.4g
Stylus type	Gyger2
Compliance, vert/lat	14/21 mm/N
Tracking force recommended/test	1.5-2.0/1.8g
Tracking ability, L/R	>80/>80µm
LF res., vert/lat	11Hz @ 10dB/9Hz @ 21dB
Output at 5cm/s	2.4mV
Separation at 1kHz	28dB
Separation broadband	Decreases to 20dB at 15kHz
Impedance	98ohm + 125µH
Tip resonance, damping	40kHz, moderate
Typical price	£100



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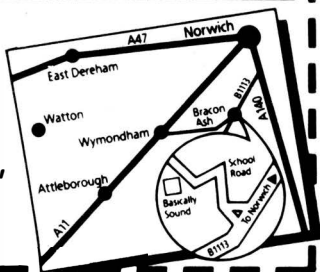
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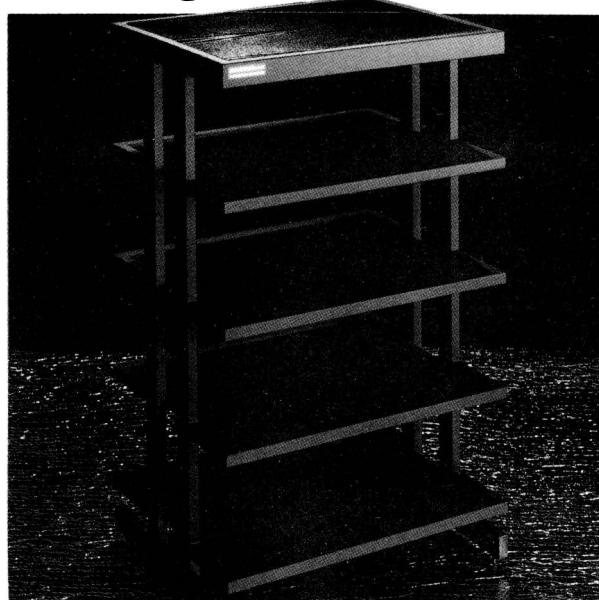
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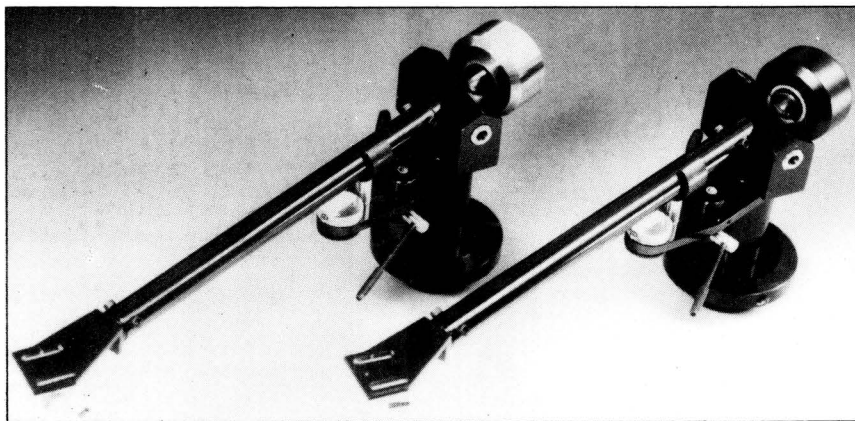
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Goldring Eroica LX

GOLDRING LTD., 8 GREYFRIARS ROAD, BURY ST. EDMUNDS, SUFFOLK IP32 7DX. TEL: (0284) 701101.

The low output member of the pair, this version of the *Eroica* is distinguished by a silver body but is otherwise externally identical to the standard *Eroica*. However, the lower output generator adds less to the effective mass of the tip, so Goldring is able to quote improved high frequency specifications.

On Test

Frequency response of the *Eroica LX* is very creditable, with only a small very high frequency lift to comment on. The tip resonance is out of harm's way and is quite well damped. Crosstalk performance is also good; however, third-order intermodulation artefacts are evident, indicating some non-linearity. Tracking is not quite what it should be at lower tracking force settings, but improves (with no apparent sacrifice in other parameters) just above Goldring's recommended maximum downforce.

On any music programme it soon becomes apparent that the *Eroica LX* does not exactly major on subtlety. Although detail is good in quiet pas-

sages, the sound becomes almost crude at times, for example on solo trumpet or saxophone. In addition, percussion sounds less clear than it should, and there is often the feeling of a veil having been drawn over the sound. Ambience, in recordings that have it, is not always apparent, while there sometimes seems to be a subtle haze of coloration.

Against master tape, the *Eroica LX* sounds just a little hard and lacking definition. In its favour, though, it can be a very exciting performer with programme such as upbeat rock music – it just isn't neutral enough and as a result comes off less well in recordings of acoustic instruments.

Conclusion

The *Eroica LX* tries hard, but some listeners may find it a bit on the hard-sounding side – and it does seem to suffer from body resonances. On the other hand, given its price it is still good value for money and will please many listeners.

Recommended.

Kiseki Blue Goldspot

PRESENCE AUDIO LTD., THE OLD POST HOUSE, PLUMMERS PLAIN, HORSHAM, W. SUSSEX RH13 6NU. TEL: (0403) 891777.

Kiseki has the rather dubious distinction of making the world's most expensive cartridge, the *Lapis Lazuli*. At £450 the *Blue Goldspot* is its cheapest model.

Reading the Kiseki literature brings back memories of the golden days of Japanese analogue esoterica; the cartridge is made using hand-selected parts, special OFC wire, etc. . . and, best of all, the stylus is apparently polished using pieces of human hair! Said stone sits at the end of a cantilever made from aluminium overlaid with boron. The large alloy body has five pairs of tapped holes for compatibility with almost any arm that will take its weight.

On Test

The *Blue's* frequency response proved to be essentially flat, with a small rise in the near ultrasonic and a well damped tip resonance at 52kHz. Crosstalk and distortion are good, and the only problem was with tracking; 2.2g downforce was required to achieve 80 microns, at which force the cartridge body is within an ace of hitting the record.

First impressions were of a small degree of 'spit' in the upper treble, which emphasises sibilance and surface noise rather, and contributes a harsh character to sounds like massed strings or woodwind. Further down the spectrum, however, bass is very good and certainly clear, and in general there is good resolution of ambience. Stereo imaging is a strong point, and the balance between instruments is never tampered with.

On the master tape test, a degree of 'cuppy' coloration was found to affect the piano, and this was also noted on solo saxophone. It is possible that the limited tracking ability is related to these artefacts, although body resonance could also be to blame.

Conclusion

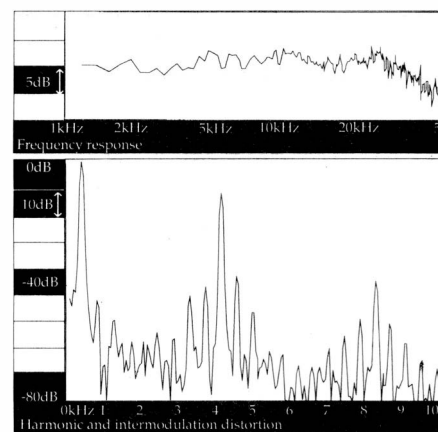
Whatever its cause, the harshness of the *Blue Goldspot*, though slight, is irritating and the good detail and bass do not quite balance out the flaw.

It is good . . . but not quite good enough.

Recommended

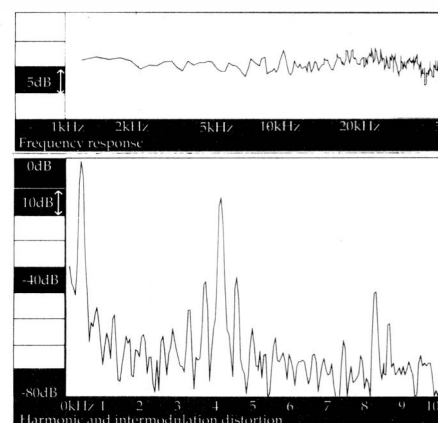
TEST RESULTS

Type, body mass	Moving-coil, 5.1g
Stylus type	Gyger 2
Compliance, vert/lat	14/17 mm/N
Tracking force recommended/test	1.5-2.0/2.1g
Tracking ability, L/R	>80/>80µm
LF res., vert/lat	11Hz @ 12dB/10Hz @ 11dB
Output at 5cm/s	0.44mV
Separation at 1kHz	32dB
Separation broadband	Better than 20dB
Impedance	5.1ohm + 8.4µH
Tip resonance, damping	50kHz, moderate
Typical price	£115



TEST RESULTS

Type, body mass	Moving-coil, 10.4g
Stylus type	Elliptical, 7µm x 18µm
Compliance, vert/lat	13/16 mm/N
Tracking force recommended/test	1.6-2.2/2.2g
Tracking ability, L/R	>80/>80µm
LF res., vert/lat	10Hz @ 10dB/9Hz @ 13dB
Output at 5cm/s	0.33mV
Separation at 1kHz	37dB
Separation broadband	Decreases to 16dB at 10kHz
Impedance	5.4ohm + 5.0µH
Tip resonance, damping	52kHz, good
Typical price	£450



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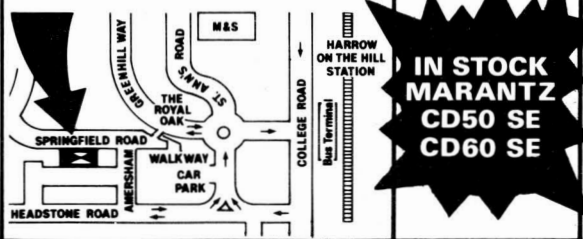
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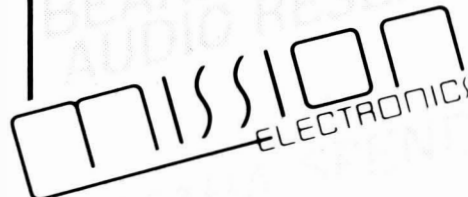
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London Super Gold

PRESENCE AUDIO LTD., THE OLD POST HOUSE, PLUMMERS PLAIN, HORSHAM, W. SUSSEX RH13 6NU. TEL: (0403) 891777.

This top version of the London cartridge now has a van den Hul tip, but is basically the classic Decca 'Positive Scanning' design, distinguished by its lack of a cantilever. This feature is claimed by the cartridge's many committed admirers as its major virtue, the stylus being coupled all the more immediately to the generator assembly. The generator is unusual in being a sum-and-difference type with three coils, but the cartridge works as a normal-output moving magnet type.

On Test

If the measurements are taken at face value, the London is barely 'hi-fi' at all. Frequency response is nicely flat up to 12kHz or so, but the tip resonance at 21kHz (low) is badly underdamped – so badly indeed that 21kHz ringing dominates square waves or pink noise and shows on music signal (although this resonance peak can be largely equalised out by loading the cartridge with 4000pF/11kohm). Linearity is not good (although tracking is OK), and vertical compliance is high. Arm damping is

recommended if not mandatory.

At best, the London *Super Gold* can produce sound of good impact and detail, which may appeal greatly. However, its 'detail' is full of the cartridge's own character, and it makes any recording sound dirty and coloured. Although the midband is pleasant up to medium levels, bass is lumpy in the absence of heavy damping and treble is 'quacky' and coarse, not helped by the plastic body's strong sonic character. This ties in with the poor frequency response and high distortion. What is more, a test record played a few times with this cartridge showed definite signs of damage in the form of increased level around 21kHz; it seems the heavy stylus cuts a new groove as it resonates!

Conclusion

Devotees of the London cartridge's dynamic sound will doubtless not be swayed, but it is hard to find anything very positive to say about a £300 cartridge with worse response, distortion and resonance than a £15 MM.

Ortofon Quasar

ORTOFON UK, HAYDEN HOUSE, CHILTERN HILL, CHALFONT ST. PETER, BUCKS SL9 9EW. TEL: (0753) 889949.

The *Quasar* is the top member of Ortofon's recently introduced 'Q' family of cartridges, the others being the *Quartz* and the *Quattro*. This one is fitted with the latest Ortofon development in styli, the Replicant (similar to that on the MC3000). A fairly heavy item at 10g, the *Quasar* has an all-metal body with attractive gold finish on the top plate. The cantilever is aluminium.

On Test

The *Quasar's* response seems to rise very slightly in the treble, before falling off rapidly above about 30kHz. Tip resonance is at a respectably high frequency and is quite well damped. Distortion is good but not outstanding and the crosstalk spectrum shows better than 25dB separation across most of the audio band – a good result. Tracking is very good, 80 microns being achieved with ease.

A hint of brightness in the *Quasar's* sound seems to tally with the response curve, but otherwise there is little to criticise. Orchestral recordings are very well served; the *Quasar* has good resolution of

detail within complex textures and excellent delicacy where appropriate. Comparison with master tape confirms the feeling of brightness, and the performers seem to be brought forward somewhat with a slight loss of ambience information. The scratch of a violin bow on the strings is emphasised but not sufficiently to be annoying, and piano tone is very clear without any suggestion of ringing on the attack of notes. With full-blooded rock'n'roll the *Quasar* is also quite at home, conveying plenty of power and impact without becoming confused or harsh.

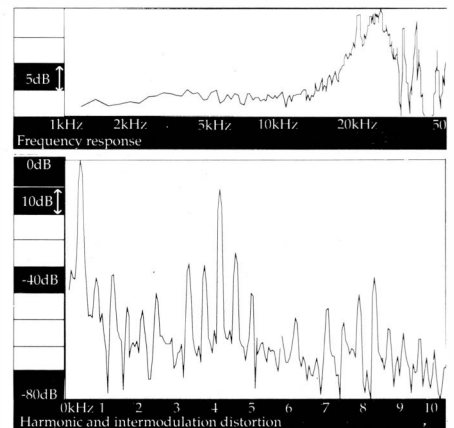
Conclusion

Ortofon's *Quasar* comes across as a very competent all-rounder with a combination of strengths in detail, neutrality and ease, with no obvious areas of weakness. The brightness may possibly manifest itself in already top-heavy systems, but is not such as to offend in most applications.

Highly competitive within its price bracket, and Recommended.

TEST RESULTS

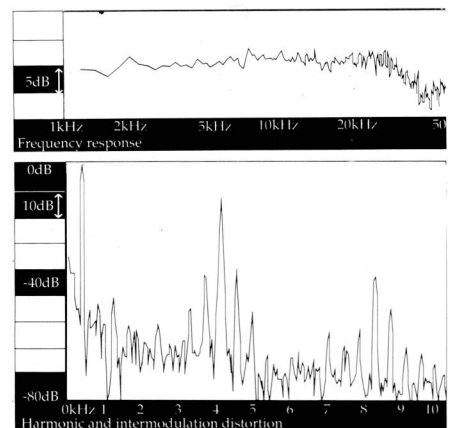
Type, body mass	Moving-magnet, 6.0g
Stylus type	van den Hul (fixed)
Compliance, vert/lat	4/26 mm/N
Tracking force recommended/test	1.6-2.0/1.8g
Tracking ability, L/R	>80/>80µm
LF res., vert/lat	20Hz @ 17dB/8Hz @ 25dB
Output at 5cm/s	3.2mV
Separation at 1kHz	25dB
Separation broadband	Around 20dB/10dB at 8kHz
Impedance	2400ohm + 53mH
Tip resonance, damping	21kHz, very poor
Typical price	£300



Recommended

TEST RESULTS

Type, body mass	Moving-coil, 10.5g
Stylus type	Ortofon Replicant, 5µm x 80µm
Compliance, vert/lat	10/16 mm/N
Tracking force recommended/test	1.6-2.0/1.8g
Tracking ability, L/R	>80/>80µm
LF res., vert/lat	11Hz @ 13dB/9Hz @ 16dB
Output at 5cm/s	0.25mV
Separation at 1kHz	31dB
Separation broadband	Better than 23dB
Impedance	5.2ohm + 7.2µH
Tip resonance, damping	52kHz, quite good
Typical price	£300

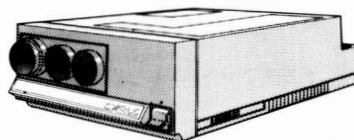


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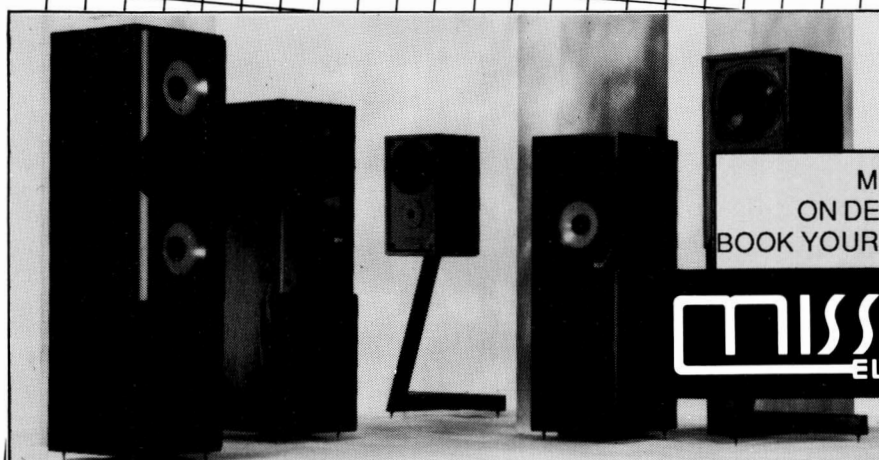
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E & O E

Ortofon MC3000/II

ORTOFON UK, HAYDEN HOUSE, CHILTERN HILL, CHALFONT ST. PETER, BUCKS SL9 9EW. TEL: (0753) 889949.

This 'improvement on perfection' has already been written up in these pages, but a formal review and comparison with its peers still seemed worthwhile. In case you missed it last time round, the MC3000 MkII is Ortofon's current flagship cartridge, distinguished by an Ortofon Replicant 100 stylus (one of several said to be 'the closest to the cutter profile') and its sintered alumina body. It also has a phenomenally powerful magnet for grabbing screwdrivers.

On Test

Frequency response is pretty much flat and in-band aberrations do not exceed 1dB. Distortion and tracking are what they should be, and the only surprise with the 3000 was the lowish degree of tip resonance damping, although it's probably high enough in frequency to be but a small drawback.

On audition, the body's lack of resonances caused a rapid reappraisal of the structural integrity of every other cartridge, and this trait really must be heard to be believed. It's undoubtedly another

veil removed from the sound.

In general, the MC3000/II is one of a select few cartridges whose sound on a good deck and arm is sufficiently close to master tape to cast as many doubts on the record as on the playback equipment. Comments centred around its clarity, detail, cleanness of attack and revelation of ambience. Its sound is delicate or full-bodied as the source demands it. Tracking of difficult material is completely assured, even at the bottom of the cartridge's recommended downforce range. Low impedance loading makes a particularly big improvement in purity of transients and is strongly recommended.

Conclusion

If you want an 'exciting' cartridge, look elsewhere. If you want an accurate one that allows the music to be exciting for itself, audition this one for sure.

That great chimera, 'the best pickup cartridge in the world', it may not be; 'one of the best' it undoubtedly is. Recommended.

vdHMC One Super

VIPER, P.O. BOX 13, LONDON E18 1EG. TEL: (0268) 511166.

As 'the man who invented the stylus profile', A. J. van den Hul produces his own range of cartridges, in which this is by no means the top model. A development of the standard MC1, the Super uses a vdH Type 1 tip on the end of a boron cantilever. The metal case is screwed together and has tapped lugs which make mounting a safe and hassle-free exercise, although cap-head bolt enthusiasts will probably strip the threads out.

On Test

Like many top cartridges, the MC1 is supplied with a frequency response calibration, in this case taken from measurements using pink noise (as per our tests). This showed response aberrations of only 0.5dB which could not be duplicated either by Ortofon Test Computer or pink noise methods. Instead, the trend seems to be a dip around 12kHz. Tip resonance is lower than some at 40kHz, but apart from this everything is rosy, with tracking no problem and distortion low. Absolute phase was

reversed on the review sample, which was corrected (for what it's worth - see *Choosing & Using . . .*) at the cartridge.

Subjectively, the response dip correlates with a very slight softening of transients and the tone of orchestral strings. Detail is very good and the cartridge produces a great feeling of naturalness, particularly in quiet passages. A low level of internal resonances is indicated by the good reproduction of the tone of woodwind instruments, always a telling test of coloration, and there is never any feeling of strain or harshness in any music.

Conclusion

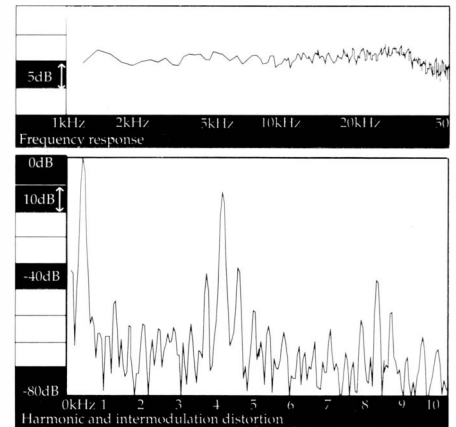
This is a fine cartridge with only one real flaw in the response dip and many good attributes. However, for this sort of price a cartridge should be really outstanding, and the MC1 doesn't quite sound like the improvement on the best of the £500 class that it should be.

It thus misses formal *Choice* recommendation by a short head but is still well worth hearing and should please many hi-fi listeners.

Recommended

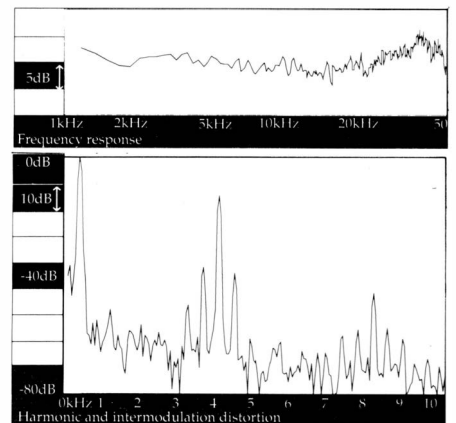
TEST RESULTS

Type, body mass	Moving-coil, 9.7g
Stylus type	Ortofon Replicant 100, 5µm x 100µm
Compliance, vert/lat	10/13 mm/N
Tracking force recommended/test	2.0-2.5/2.0g
Tracking ability, L/R	>80/>80µm
LF res., vert/lat	12Hz @ 13dB/10Hz @ 16dB
Output at 5cm/s	0.13mV
Separation at 1kHz	32dB
Separation broadband	Better than 21dB
Impedance	6.1ohm + 2.3µH
Tip resonance, damping	58kHz, moderate
Typical price	£850



TEST RESULTS

Type, body mass	Moving-coil, 7.1g
Stylus type	van den Hul Type 1
Compliance, vert/lat	13/23 mm/N
Tracking force recommended/test	/1.9g
Tracking ability, L/R	>80/>80µm
LF res., vert/lat	11Hz @ 14dB/8Hz @ 14dB
Output at 5cm/s	0.50mV
Separation at 1kHz	31dB
Separation broadband	Better than 20dB
Impedance	9.8ohm + 19µH
Tip resonance, damping	40kHz, moderate
Typical price	£800



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KENT

JOHN MARLEY HI-FI CENTRES, 2 Station Rd West, Canterbury. (Canterbury) 69329. Also at Dover - (0304) 207562. B&W, Heybrook, Magnum, M.Y.S.T., Nakamichi, Pink Triangle, Rotel, Sansui. Technics. Quad. Dem and home trial fac. Mon-Sat 9-5.30 closed Thurs. Free install. Credit to £1,000. Access, Visa, Creditcharge. Service dept.
PHOTOCRAFT HI-FI, 40 High St, Ashford. (0233) 624441. No. 1 in Kent for Linn, Naim, Rega, Roksan, Exposure, Onix, Epos, Royd, Creek. But before you choose equipment choose where to buy it. Dem room, appts. necessary. Home trial and free installation. Visa, Access, Bada Chargecard. 9-5.30 Mon-Fri (Wed & Sat to 5 only). Service Dept. **3A2A**
PROGRESSIVE AUDIO, Rainham, Kent. (0634) 389004.

Alphason, Audio Innovation, Conrad Johnson, Proac, Raymond Lumley, Rock Reference, Snell, TDL, Voyd and others. Dem by appt., please phone. Home trial. Free installation. Access, Visa.

TONBRIDGE HI-FI, 31 High Street, Tonbridge Wells, Kent TN1 1XL. (0892) 24677. If your interest is music pay us a visit + find out what we do. **3A2A**
VJ HI-FI, 29 Guildhall St, Folkestone. (0303) 56860.
Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Quad. Dem and home trial facilities, free installation, credit to £1000. Amex, Diners, Visa, Access. Service dept.

LANCASHIRE

MONITOR SOUND, 54 Chapel St, Chorley. (02572) 71935. A&R, Dual, Mission, Quad, Rogers, Rotel, Spendor, Thorens, Nakamichi, Yamaha, etc. 2 dem rooms. Open Mon-Sat, closed Weds. Free installation. Credit to £1,000. Access, Visa. Service dept.

LEICESTERSHIRE

MJS HI-FI, 80 Stapleton Lane, Barwell, Leicester LE9 8HE. (0455) 46977. The Rock, Audio Innovations, Kelvin Labs, Snell, Helius, Sugden, Ruark, Concordant, Valdi, JPW. Dem and home trial facilities. Mon-Sat 9.30-7.00. Free installation and service dept. Visa, Access.

THE LEICESTER HI-FI CO, 6 Silver Walk, St. Martins Square, Leicester LE1 5EW. (0533) 539753. Arcam, Creek, Marantz, Mission/Cyrus, Musical Fidelity, Nakamichi, QED Hi-Fi, Quad, Rogers, Roksan, "and oodles more". 2 dem rooms, home trial arranged, free installation service department, credit facilities, Hi-Fi Markets, Access, Visa, Diners, Amex. 6 days 9.30-5.30.

SOUND ADVICE, Duke Street, Loughborough LE11 1ED. (0509) 218254. Arcam, Creek, Linn, Epos, Mission, Cyrus, Naim, Rega, Rotel, Yamaha etc. Dem facilities. Appts required. Free installation. Service dept. Credit facilities, Access, Visa, Amex. Mon-Sat 9.30-6.

LINCOLNSHIRE

BOSTON HI FI CENTRE, 65a Wide Bargate, John Adams Way, Boston, Lincs PE21 6SG. (0205) 65477. Quad, Nakamichi, Creek, Ariston, NAD, Denon, Marantz, Castle, JPW, B&W. Separate demo studio. Home trial, free installation, service department. Access, Visa, Hi-Fi Markets Chargecard. Tues-Sat 9-5.30 pm

LONDON

A.T.LABS, 190 West End Lane, London NW6. (071) 794 7848. Mon-Sat 10-6. 2 dem rooms. Access/Visa. Sony Hi-Fi News Best Dealer '86 & '88 (National). **3A2A**
CORNFLAKE SHOP, 37 Windmill Street (just off Tottenham Court Road), London W1. (071) 631 0472. Mon-Sat 10-7. Rega, Roksan, Naim, Monitor Audio, Koetsu, Marantz, Yamaha, SME, DNM, Epos. Three dem rooms. Delivery and installation service. Credit facilities. Access, Visa

DIN, 25 Melcombe Street, London NW1 6AG. Tel: (071) 224 4413. Roksan, Quad, Denon, Meridian, Mission, Celestion, Krell, Apogee, Arcam, Nakamichi. Full dem + delivery. Free install. Access, Visa, Amex, Diners.

DOUG BRADY HI-FI, 14-18 Monmouth St, London WC2H 9HB. (071) 379 4010. Wide range of top specialist hi-fi from Britain, America and Japan. 3 Dem rooms. **3A2A**

GRAHAMS HI-FI, Canonbury Yard, 190a New North Rd, London N1 7BS. (071) 226 5500. Winner Sony/HPN Greater London Dealer Award 1986-1989. Linn, Naim, Rega etc. £300-£3,000. **3A2A**

HI-FI CONFIDENTIAL, 35/37 Marsham St., London SW1. (071) 233 0774. Open Mon-Fri 10-6, Sat 10-3. Creek, Denon, Hafler, Kelvin Lab, Musical Fidelity, Oracle, Quad, Rotel, S.D. Acoustic, S.M.E. etc. Large single speaker dem room. Limited home trial facilities. Export worldwide.

JUST MUSIC, 52 Upper Tooting Road, London SW17 7PB. (081) 767 1233. Aiwa, Dual, Denon, Marantz, Quad, Rogers, Thorens, Musical Fidelity, Sugden, Heybrook and many more. Dem facilities. Appts can be arranged. Home trial. Free installation available. Access, Visa, Amex, Hi-Fi Markets, Chargecard, Creditcharge, finance arranged. 10am-7pm Mon-Thurs, 10-6 Fri & Sat.

KAMLA ELECTRONICS, 251 Tottenham Court Road, London W1. (071) 323 2747. Amadens, Ariston, BLQ, Gale, Incatech, JPW, Linx, Mordaunt Short, SME, Systemdek, Thorens, Townshend, Ruark, Wharfedale.

KJ WEST ONE, 26 New Cavendish St, London W1M 7LH. (071) 486 8262/63. Fax (071) 487 3452. Arcam, Audio Research, Acoustic Research, Apogee, Arcam, Audiobal, Creek, Epos, Linn, Meridian, Musical Fidelity, Pink Triangle. Appts. nec. Home trial. Free installation. Service dept. Major credit cards. Mon-Sat 10-6pm. (Late night Thursday til 7pm.)

NICHOLLS HI-FI, 430 434 Lee High Street, Lewisham, London SE12 8RW. (081) 852 5780. Sony, Technics, Harman, JBL, Mordaunt Short, Kenwood, Panasonic, Hafler, Sumo, B&W. Dem facilities. Home trial. Free installation. Service dept. Credit available. Visa, Access. 9.30-6 Mon-Sat, Thurs till 1 o'clock.

ORPHEUS HOME DEMONSTRATIONS. (081) 299 0075. Alexander, Alphason, Cadence, Castle, Kiseki, Moth, Proton, Thorens, Townshend, Systemdek. Home demonstrations only. Appts. necessary. Home trial, free installation. Service dept. Three month interest free credit. Open 24

hours. All goods guaranteed two years.

RICHER SOUNDS, 2 London Bridge Walk, London SE1 2SX (on walk way over Duke St. Hill, not in A-Z). (071) 403 1201/4710. Virtually every major name, small busy store, with big discounts and numerous special offers. Facilities: expert advice, free 48 page hi-fi guide, and monthly newsletters. Mail order, part exchange. Mon-Fri 10-6, Thurs and Fri late til 7pm, Sat 10-5. Access, Visa Richer Card. Cheques up to £1,000 (subject to simple clearance).

RICHER SOUNDS, 25 Northways Parade, College Crescent, Swiss Cottage NW3 (bottom of Fitzjohn's Avenue). (071) 722 3359. Friendly North London store stocking the A-Z of popular hi-fi at amazing discount prices. Facilities: expert advice, free monthly newsletters. Mail order, part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer Card. Cheques up to £1,000 (subject to simple clearance).

THE SOUND SHOP, 58 The Broadway, Mill Hill, London NW7. (081) 906 3364. Denon, Kenwood, JPW, Marantz, Monitor Audio, Musical Fidelity, NAD, Ruark, SD Acoustics, Tannoy etc. Home trial. Free installation. Service department. Access, Visa, Amex, Diners. Credit facilities. £1000 instant credit. 10-6 Mon-Sat.

MIDDLESEX

A.T.LABS, 159 Chase Side, Enfield, Middx. (01) 367 3132. Mon-Sat 10-6. Two dem rooms. Car Park. Access/Visa. Sony/Hi-Fi News Best Dealer '86 & '88. **3A2A**

A.T.LABS, 173-175 Station Rd, Edgware, Middx. (01) 952 5535. Mon-Sat 10-6. 2 dem rooms. Access, Visa. Sony/Hi-Fi News Best Dealer '86 & '88 (National). **3A2A**
HARROW AUDIO, 27 Springfield Rd, Harrow. (01) 863 0938. Mon-Sat 9.30-5.30. A&R, Audiobal, Cyrus, Denon, Dual, Heybrook, Linn, Monitor Audio, Musical Fidelity, Quad, Rotel, Tannoy etc. **3A2A**

UXBRIDGE AUDIO LTD, 278 High St, Uxbridge, Middx UB8 1LZ. (0895) 30404 (Multi-line). A&R, AR, Ariston, Creek, Cyrus, Denon, Dual, JPW, KEF, Manticore, Meridian, NAD, Nakamichi, Quad, Rotel, Wharfedale, Yamaha, etc. 2 dem rooms. Mon-Sat 10-6. **3A2A**

MERSEYSIDE

W.A. BRADY & SON, 401 Smithdown Rd, Liverpool L15 3JJ. (051) 733 6859. Largest selection of specialist Hi-Fi in N.W. £100-£20K. All credit cards. 3 dem rooms. Closed Monday. **3A2A**

IN CONCERT HI-FI, 144 Seaview Road, Wallasey, Wirral, Merseyside. (051) 630 5055. Denon, Kenwood, QED, Alexander, Spica, Shan Acoustics, Systemdek, Musical Fidelity, Audio Dimensions, Voyd. Single speaker dem room. Home trial + free installation. 10-6 - closed Mon. Access + Visa.

PURE SOUND - Birkenhead 051 645 6690 24hrs. Acoustic Energy, Aragon, Audio Technica, Beard, Celestion, Deltac, Denon, Michel, Cyrodec, Ortofon. Home demonstration a pleasure, plus evenings and weekends (Sundays by appointment).

RICHER SOUNDS, 99 Renshaw Street, Liverpool L1 2ST. (051) 708 7484. Virtually every major 'budget' name - small store with big discounts and special offers. Facilities: expert advice; free monthly Newsletters; mail order; part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard and cheques up to £1,000 (subject to simple clearance).

NORFOLK

BASICALLY SOUND, The Old School, School Rd, Bracon Ash, Norwich NR14 8HE. (0508) 70829. Arcam, Linn, Naim, Denon, Spendor, Heybrook, Audio Technica, Creek, Rega, Epos, etc. 2 comprehensive dem rooms. Home trial. Free installation. Visa, Access. HP facilities. Tues-Sat 9.30-1, 2-5.30

SOUND APPROACH, 161 Unithank Road, Norwich. (0603) 622833. Kuzma, Ariston, Castle, Denon, Exposure, Ion, Royd, NVA, Roksan, Ruark, etc. etc. Dem and home trial facilities. Mon-Sat 9-6.30. Free installation. Credit to £1,500. Visa, Access, Diners Club. Service dept.

NORTHAMPTONSHIRE

CLASSIC HI-FI + VIDEO, School Lane, Kettering, Northants. (0536) 515766. Cambridge Audio, Marantz, Creek, Trio Kenwood, Harman Kardon, Onkyo, Kef, Celestion, Bose, Wharfedale and many more. Home trial, free instal, service dept. Access, Visa, credit facts. 9.30-5.30pm.

SOUND PRINCIPLES, 52 Queen Street, Wellingborough, Northants. (0933) 441907. Aura, Heybrook, Marantz, Mission, Nakamichi, QED, Quad, Roksan, Rotel, Spendor, Systemline, Yamaha and others. Demo room. Home demo's by appt. Appts advisable out of hours available. Free installation. Access, Visa + credit scheme available. Mon-Fri 10-6, Sat 9-5

THE AUDIO SHOP, Coffee Tavern Court, High St, Rushden. (0933) 56651. Audio Technica, Denons, Goodmans, Rotel, Tannoy, Ion Systems, Thorens, Gale, BLQ, Royd. Dem room. Home trial and free installation. Mon-Sat 9.30-5.30 (Thurs 9.30-2). Service dept.

NOTTINGHAMSHIRE

CHANTRY AUDIO, Chantry Walk, 18a Eldon Street, Tuxford, Newark, Notts NG22 0LH. (0777) 870372. Pink Triangle, Royd, JPW, Rotel, BLQ, NVA, Michell, Art Audio (valve), Kelvin Labs, Thorens, + much more. Single

speaker dem room. Appts preferred. Home trial, free installation. Access, Visa + credit facilities and mail order. Mon-Fri 10am-4.30pm. Sat 9-30-5.30. Sun home dem by appt. Closed Weds.
DEFINITIVE AUDIO. (0602) 813562. Voyd, Audio Innovations, Snell, Helius, Systemdek, Revox, Deltac, JPW, Pirate, Loewe Audio Visual plus more. Home dems throughout Notts and E. Mids. Free install. 10-7, 7 days. Tel: (0602) 813562 for further info + appt.

WEST MIDLANDS

ALTERNATIVE AUDIO Ltd, 93-95 Hobs Moat Rd, Solihull. (021) 742 0254 (sales), 0248 (service). The widest range of quality hi-fi and CD in the West Midlands. Tues-Sat 10-6. **3A2A**

AUDIO CENTRE MAINWAY, Sharing Asda Car Park, High Street, Bloxwich, Walsall, W. Midlands. (0922) 473499. Linx, Ariston, Aura, Arcam, Cambridge Audio, Linn, Denon, Musical Fidelity, Regents, etc. The Midlands most exclusive Hi-Fi Centre with private listening studio. Open evenings by appointment. Home trial. Free installation. Own service department on premises. Instant credit, Chargecard. Interest free. Access, Barclaycard. Mon-Sat 9-5.30.

BRIDGE HI-FI, 3 Tudor House, Bridge St, Walsall. (0922) 640456. NAD, Dual, Yamaha, Kenwood, Technics, Pioneer, Mission, Celestion, Denon, Mordaunt Short. Appts required. Home trial and free installations. Access, Visa, Diners, Amex. Credit to £1,000. 9.15-5.30 Mon-Sat. Service dept.

FIVEWAYS HI-FIDELITY LTD, 12 Islington Row, Edgbaston, Birmingham. (021) 4550667. Alphason, Arcam, Denon, Meridian, Musical Fidelity, Quad, Revox, Spendor, TDL, Thorens, etc. Dem facilities. Tues-Sat 9.30-6. Free installation. Access, Visa. Service Dept.

GRIFFIN AUDIO LTD, 94 Bristol Street, Birmingham. (021) 692 1359/(021) 622 2230. Castle, Creek, Cyrus, Denon, Linn, Marantz, Naim, Quad, Rega, Rotel. Tues-Sat 10-6. **3A2A**

HORTON ELECTRONICS (1987) LTD, 8-9 Lower Temple St, Birmingham B2 4JD. (021) 643 0972. Aiwa, Dual, Marantz, Goodmans, JVC, Mission, Sony, Technics, Wharfedale, Sennheiser. Dem facilities. Credit to £1000. Access, Visa. 9-5.30 Mon-Sat. Service dept.

MIDLAND RADIO SUPPLIES, Maypole Lane, Birmingham B14 4PG. (021) 430 7817. By appointment only - listen quietly and hear everything through Croft valve amplifiers and Tannoy speaker systems.

RICHER SOUNDS, 12 Smallbrook Queensway, Birmingham B5 4EN. (021) 643 6664. Popular esoteric hi-fi for upgrades, monthly special offers. Dem facilities, expert advice, free local delivery/installation (£500+), 2 Yr G'tee. Hi-fi Guide and monthly Newsletters; part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard. Service Dept.

RICHER SOUNDS, 10 Smallbrook Queensway, Birmingham B5 4EN. (021) 643 1516. An A Z of affordable, popular hi-fi; no-frills environment. Facilities: expert advice; free monthly Newsletters; part exchange. Mon-Fri 10-6, Sat 10-5. Access, Visa, Richer ChargeCard. Service Dept.

OXFORDSHIRE

ASTLEY AUDIO LTD, 3 Marketplace, Wallingford. (0491) 39305/34349. Technics, Panasonic, Pioneer, Kenwood, Sony, Yamaha, Denon, Dual, Mission, Tannoy. Home trial, free installation. Service dept. Access, Visa, Amex, Diners. Instant credit. Tue-Fri 9-5.30, Sat 9-5. Records & CDs stocked.

HORNS OF OXFORD LTD, 6 South Parade, Summerton, Oxford. (0865) 511241. Alphason, Ariston, B&W, Celestion, Marantz, Nakamichi, Pink Triangle, Quad, Sony, Technics. Free installation. Service dept. Access, Visa. 9-5.30. Closed Thurs. **3A2A**

OXFORD AUDIO CONSULTANTS LTD, Cantay Hse, Park End Place, Oxford OX1 1JE. (0865) 790879. Oxford Acoustics, Audio Research, Krell, Magneplanar, Apogee, Aragon, Stax, Marantz, Wharfedale, Cambridge Audio. Home trial and free installation. Instant Credit. Access, Amex, Visa. 10-6 Tues-Sat. Service dept.

WITNEY AUDIO & VIDEO, 28 High St, Witney, Oxford. (0993) 2414. A&R, Aiwa, Akai, Bose, Denon, Dual, Goldstar, JBL, Mordaunt-Short. Dem facilities. Mon-Sat 9-5.30. Free installation, credit to £1,000. Access, Visa. Service dept.

SHROPSHIRE

CREATIVE AUDIO, 9 Dogpole, Shrewsbury. (0743) 241924. Marantz, Meridian, Linn, Naim, A&R, Mission, Nakamichi, Revolver, Castle, Audio Technica. Dem room. Home trial and free installation. Credit to £1000. Access, Visa. Tues-Sat 9.30-5.30. Service dept.

MID SHROPSHIRE AUDIO, 2 Holland Court, High Street, Dawley, Telford, Shropshire. (0952) 630172. Cambridge Audio, Marantz, Onkyo, Rubric, Tannoy, Alexander, Apollo, Ion Systems, Audio Innovations, SD Acoustics. 2 dem lounge. Home trial. Free Installation. Service dept. Access, Visa. Credit facilities available. Instant credit subject to status. Mon-Sat 10-5 evenings/Sunday by special arrangement.

SOMERSET

WATTS RADIO - the engineers, Jim Badman, 1 West Street, Somerton. (0458) 72440. Castle, Dual, Denon,

THE CHOICE DEALER DIRECTORY

KEF, Mordaunt-Short, Ortofon, Quad, Rogers, Thorens, Yamaha. Dem and home trial facilities. Mon-Sat 9-1, 2-5.30, Wed 9-1. Free installation. Credit to £1,000. Access, Visa. Service dept.

STAFFORDSHIRE

ACTIVE AUDIO, 29 Market Street, Tamworth, Staffordshire. (0827) 53355. Arcam, Ariston, Celestion, Denon, Heybrook, Kef, Cyrus, Musical Fidelity, Marantz, Revox, Rotel, Rogers, etc. etc. The only BADA Member in Staffordshire. Full demonstration and home trial facilities. Account and credit cards. Ring for opening times and free 'Fact Pack'. **3024**

GRANGE HI-FI LTD, 153 Branston Road, Burton-on-Trent DE14 3DQ. (0283) 33655. Audio Innovations, Arcam, Creek, Systemdek, Snell, Spendor, Rotel, Pink Triangle, Quad, Voyd, etc. 2 dem rooms. Mon, Tues, Thurs, Fri, Sat. 9-6. Closed Wed. Free installation. Credit facilities. Visa, Access. Service dept.

MUSICAL APPROACH, 137A Newport Road, Stafford (above Royal London Insurance). (0785) 55154. Linn Products, Arcam, Creek, NVA, Revolver, Audiotec, Onix, Epos, Marantz, Rotel and more. Home trial. Free installation. Service dept. Credit facilities available. Access, Visa. 9.30-5.30 Mon-Sat.

SUFFOLK

EASTERN AUDIO 41 Bramford Rd Ipswich. (0473) 217217. Quad Audio Lab Denon Dual Marantz Mission NAD Nakamichi Technics Arcam. Mon-Sat 9.30-6. **3024**

SURREY

PJ HI-FI - the Hi-Fi Shop, 3 Bridge Street, Guildford, Surrey GU1 4RY. Tel: (0483) 504801. 9-6 Mon-Sat. Linn, Creek, Arcam, Quad, Revox, Musical Fidelity, Rotel, NAD, Nakamichi, Marantz. **3024**

ROGERS HI-FI, 13 Bridge Street, Guildford (0483) 61049. Ariston, Acoustic Research, Akai, Denon, JPW, Mordaunt-Short, Marantz, Onkyo, QED, Tannoy etc. Mon-Sat 9.30-6. Dem. facilities. Instant Credit. Access, Visa. Service dept.

SPALDINGS HI-FI, 352.4 Lower Addiscombe Rd, Croydon, Surrey. (01) 654 1231. 3 dem rooms + home dem. Free installation. credit. Mon-Sat 9-6, Tues to 8. Closed Wed. Service dept. **3024**

SURBITON PARK RADIO, 48 Surbiton Rd, Kingston-Upon-Thames, Surrey. (01) 546 5549. Quad, Dual, Denon, Kenwood, Nakamichi, Mission, Mordaunt-Short, Nakoaka, Sony, Technics. Dem. facilities. Free installation. Service dept. 0% finance. Access, Visa. Mon-Sat 9.30-6

TRU-FI SOUND AND VISION, 10 Church St, Leatherhead, Surrey. (0372) 378780. Sony, Technics, Panasonic, Mitsubishi, Ferguson, Aiwa, Pioneer, Sanyo, B&W, Mission. Free installation. Credit facilities. Access, Visa. 9.15-5.30 Mon-Sat. Closed Wed. Service dept.

UNILET HI-FI, 35 High St, New Malden, Surrey KT3 4BY. (01) 942 9567. Kef, Mission, Musical Fidelity, NAD, Nakamichi, Quad, Rotel, Tannoy. Dems. Amex, Access, Visa, etc.

SUSSEX (EAST)

DEFINITIVE AUDIO BRIGHTON, 8 Dyke Road Mews, 74-76 Dyke Road, Brighton BN1 3JD. (0273) 208649. Voyd, Systemdek, Audio Innovations, Helius, Audionote, JPW, Snell, Pirate Stands, Goldring etc. Home dems throughout Sussex. Credit facilities. Visa.

HASTINGS HI-FI, 33-35 Western Road, St. Leonards, E. Sussex TN37 6DJ. (0424) 442975. Linn, Musical Fidelity, Quad, Nakamichi, Arcam, Celestion, NAD, Denon, Yamaha, Tannoy. 2 listening rooms. Home trial. Free installation. Service dept. All credit cards welcome. Instant credit up to £1,000, written details on request. 9-6pm Mon-Sat.

JEFFRIES HI-FI, 69 London Rd, Brighton, East Sussex. (0273) 609 431. 2 dem rooms, closed Mon, late night Wed. Parking, bus route. Credit facilities. **3024**

JEFFRIES HI-FI, 4 Albert Parade, Green St, Eastbourne, East Sussex. (0323) 31336. 2 dem rooms, closed Mon. Late night Wed. Parking, bus route. Credit facilities. **3024**

LASER SOUND & VISION, 72 Terminus Road, Eastbourne, East Sussex BN21 3LX. (0323) 640911. Marantz, Cambridge, Kenwood, Denon, Rotel, Infinity, Tannoy, Michell, KEF, Heco etc. Dem room. Home trial. Free installation. Service dept. Visa, Access. 9am-6pm Mon-Sat.

SUSSEX (WEST)

ALTERNATIVE SOUNDS, 10 Eastgate Square, Chichester PO19 1JM. (0243) 784710. Rotel, Musical Fidelity, Nakamichi, Marantz, JPW, Yamaha, Tannoy, Cambridge Audio, JBL, Kef. One hi-fi dem room, one surround sound dem room. Home trial. Free installation. Service dept. Credit available. Access, Visa. 9.30-5.30 Mon-Thurs, 9.30-6.00 Fri/Sat.

BOWERS AND WILKINS Ltd, 1 Becket Buildings, Littlehampton Rd, Worthing. (0903) 64141. B&W, Nakamichi, Castle, Denon, Dual, JVC, Mordaunt-Short, Philips, Quad, Sony, Technics. 3 dem rooms. Mon-Sat 9-5.30, Weds 9-1. Home trial facilities, free installation, credit to £1,000. Access, Visa. Service dept.

CHICHESTER HI-FI, 7 St Pancras, Chichester, W. Sussex PO19 1SJ. Tel: (0243) 776402. Linn, Naim, Rega, Creek, Nakamichi, A&R, Denon, Roksan etc. Tues-Sat, 10-1, 2-5.15 (closed Mon). **3024**

TYNE & WEAR

RED RADIO SHOP AND HI-FI CENTRE, 11 Olive St, (Off Park Lane) Sunderland. (091 567) 2087. Castle, Denon, Bose, JVC, Kenwood, Mordaunt-Short, Michell, Teac, Tannoy, Shure. Dem room, large with comparator facility. Free install. Service dept. Interest free credit and no deposit interest free credit. 9am-5.30pm daily.

WARWICKSHIRE

AUTHENTIC AUDIO, 25 Henley Street, Stratford-upon-Avon, Warwickshire CV37 6QW. (0789) 414533. Linn, Quad, M.F., Denon, NAD, etc. Dem room. Home trials. Part-ex. Service dept. Mon-Sat 9.30-5.30.

YORKSHIRE (NORTH)

ELITE HI-FI, 178 Kings Road, Harrogate HG1 5JG (0423) 521 831. Voyd, Valdi, Avalon, Systemdek, Helius, Audionote, Goldring, Audio Innovations, Sugden, Marantz. Mon-Sat 9-5.30. Free installation. Service dept.

RICHER SOUNDS, 66 Walmgate, York YO1 2TL. (0904) 645535. Probably the smallest hi-fi store in York; but stocks the A-Z of popular budget hi-fi at special discount prices. Facilities: expert advice; free monthly Newsletters; mail order; part exchange. Mon-Fri 10-6, Sat 9-5. Access, Visa, Richer ChargeCard and cheques up to £1,000 (subject to simple clearance).

SCARBOROUGH HI-FI CENTRE, 53 Dean Road, Scarborough YO12 7SN. (0723) 374547. Cambridge Audio, Rotel, QED, Denon, NAD (incl. Monitor series), Thorens, Onkyo, Tannoy, Marantz, Ruark. Dem Room. Appts preferred. Home trial facilities. Mail order and part exchange. Visa, Access, Diners, Hi-Fi Markets Chargecard facilities. Open 10-6 Mon-Sat.

SOUND ORGANISATION YORK, 16 Gillygate, York YO3 7EQ. Tel: (0904) 627108. Linn, Naim, Rega, Roksan, Sony, Arcam, Mission, Denon, Ion, Rotel. 2 single speaker dem rooms. Appts. preferred. Home trial. Free installation. Service dept. Access, Visa. Instant free credit available. 10am-6pm Tues-Sat. Sony dealer. Award nominated 86, 87, 88. **3024**

YORKSHIRE (WEST)

AUDIO PROJECTS, 45 Headingley Lane, Leeds. (0532) 304565. A&R, Audioblab, Creek, Heybrook, Linn, Musical Fidelity, Naim, Quad, Rega, etc. Tues-Fri 9.30-6, Sat 2.30-5.30. **3024**

ERRICKS, Hi-Fi Experience, Fotosonic House, Rawson Square, Bradford (0274) 309266. Dem facilities. Sales/service agents for A&R, Linn, Quad, Exposure, Nakamichi, Mission etc. **3024**

HUDDERSFIELD HI-FI CENTRE, 4 Cross Church St, Huddersfield. (0484) 544668. B&W, Kenwood, Denon, Dual, Arcam, Musical Fidelity, Quad, NVA, Audio Lab, Philips, Mission, etc. Dem facilities - appointment reqd. Mon-Sat 9-5.30, Thurs 9-8. Closed Wed. Free installation, credit facilities. Access, Visa.

IMAGE HI-FI Ltd, 8-10 St Annes Rd, Headingley, Leeds. (0532) 789374. AR, Audio Lab, Denon, Linn, Marantz, Meridian, Mission, Monitor Audio, NAD, Quad. **3024**

RICHER SOUNDS, 55 The Headrow, Leeds LS1 6LR. (0532) 455717. Affordable special deals on every big budget line from Akai to Yamaha; separates & systems. City centre store opposite Lewis's. Facilities: expert advice; free monthly Newsletters; mail order; part exchange. Mon-Fri 10-6, Sat 9-5. Access, Visa, Richer ChargeCard and cheques up to £1,000 (subject to simple clearance).

SELECTIVE AUDIO, The Forge Cottage, 19 Crossgate, Otley. (0943) 467689. Exclusively handles Alphasan, Roksan, NVA, ProAc, TDL, JDI, in the area and other minimalist British designer products for the discerning listener. Dem facility. Member of the Cognoscenti. Mon-Sat 10-6.

NORTHERN IRELAND

LYRIC HI-FI, 163 Swanmilus Road, Belfast. (0232) 381 296. Linn, Naim, Rega, Arcam, Denon, Rotel, Musical Fidelity, Revox, Mission etc. Mon-Sat 10-6, Late night Thurs. **3024**

EIRE

CEOL PRODUCTS, 185 Lower Rathmines Road, Dublin 6. Tel: 0001 975984 961358. Alphasan, Audio Innovation, Exposure, Linn, Marantz, Monitor Audio, Mordaunt Short, Musical Fidelity, Rega, Roksan. Single Speaker listening rooms. Free installation. All major cards. Mon-Sat 9.30-6.00.

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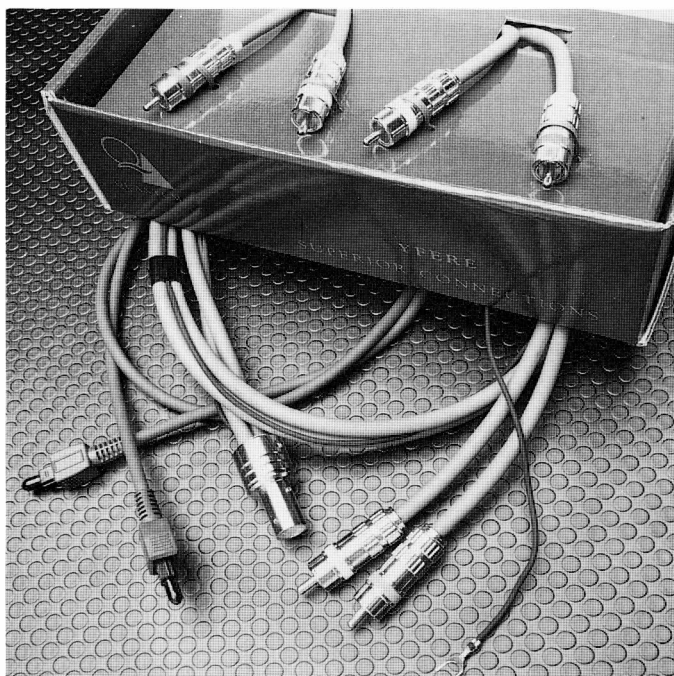
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For digital aficionados there is also a high quality fibre optic cable (yes, cables really do make a difference even in the digital domain). And the analogueophiles looking to get the best from their record collection might care to upgrade their arm cable with the *Superior* tonearm cable which uses YFERE's Quad wiring.

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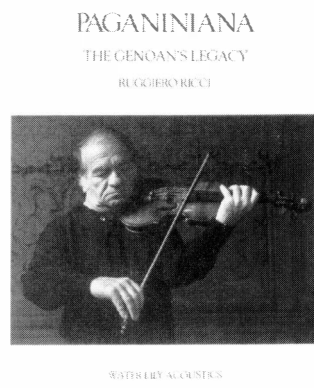
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Our mail-order service allows Hi-Fi Choice readers to buy some of the world's best audiophile records and CDs.



As top-quality 'audiophile' recordings seem to be becoming more and more difficult to find in High Street record shops, Hi-Fi Choice is making a determined effort to source some of the best recordings from around the world and make them available to readers by mail order.

You might stumble across one or two of these records in some specialist record shops, but for the most part these records and/or CDs are not readily available in the UK. You certainly won't find them in your local record store!

We expect our catalogue of LPs and CDs to expand considerably during the next few months. In the meantime, we have just come across two fabulous analogue recordings from the late Fifties on the American Discovery Records label featuring the Marty Paich Big Band. (This is Glenn Miller-style jazz, and the sound quality is remarkable.) Also, we've managed to source new stocks (LP and CD) of the essential Dynamics and Depth of Image test discs made by the Swedish independent label Opus 3. These essential discs should be in every audiophile's collection.

RADKA TONEFF: Fairytales

CD: Odin CD03

LP: Odin LP03

The well known audiophile (digital) recording of female voice and piano. An international best seller, despite having been only sporadically available in this country. Worth the asking price alone for the opening song, The Moon's A Harsh Mistress.

ODIN SAMPLER

CD: NJ-4028-2

The Odin record label was established by the Norwegian Jazz federation in 1981. This 75-minute compilation on CD provides a taster from the label's catalogue. Not available on vinyl.

GEMINI/TAURUS SAMPLER

CD: GMCD 6239

A pure jazz label, Gemini records was

formed by producer Bjorn Petersen to record Norwegian jazz musicians who deserve wider recognition. Taurus is a subsidiary label presenting less mainstream music. This 15-track sampler is available only on CD.

SMITH/RICCI: Paganiniana

CD: CJCD

LP: CJLP

Breathtaking purist analogue audiophile recording of classical works performed on piano and violin. On the Water Lily Acoustics label, sponsored by Conrad-Johnson and imported from America. An essential addition to any audiophile's record collection.

TOTTI BERGH: I Hear A Rhapsody

CD: GMCD 48

LP: GMLP 48

On the Gemini label, saxophonist Totti

Bergh plays a selection of jazz standards. *Jazz Journal* magazine described this as "A delightful 'wee small hours' album". Relaxing late-night listening.

LAILA DALSETH: A Time For Love

CD: GMCD 51

LP: GMLP 51

Another recording from the Gemini catalogue, this time featuring the golden voice of Laila Dalseth - with Red Mitchell on string bass.

FLIP PHILIPS/KENNY DAVERN/

BJARNE NEREM: Mood Indigo

CD: GMCD 59

LP: GMLP 59

Excellent mainstream playing by three great gentlemen of jazz. A vibrant set, recorded live during the 1987 Oslo jazz festival.

BJORN JOHANSEN: Take One

CD: NJ4021-2

LP: NJ4021-1

Norway's top tenor sax player and his dream band, recorded in a one night session at Rainbow studios in Oslo.

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JON EBERSON: Stash

CD: Odin CD 19

LP: Odin LP 19

An exciting trio session with one of Norway's top guitarists. Featuring Terje Rypdal's rhythm section Bjorn Kjellemyr (bass) and Audun Kleive (drums).

CALEDONIA JAZZBAND: Walkin'

CD: HCRCD 38

LP: HCRCD 38

Genuine New Orleans jazz/calypso/R&B/marching band with Wendell Brunious in the frontline on trumpet.

MARTY PAICH BIG BAND: The**New York Scene**

LP: Discovery DS-844

Featuring Art Pepper, Victor Feldman, Jimmy Guiffre and Bill Perkins, this soundful set includes extended modern stylings of some classic Broadway musical tunes by the likes of Cole Porter and Rodgers & Hammerstein.

MARTY PAICH BIG BAND: What's**New**

LP: Discovery DS-857

Another superb recording of big band 'swing' jazz, this time featuring mostly Marty Paich original compositions. It doesn't seem possible that this was recorded in 1957. Like The New York Scene LP (above), which dates from 1959, the sound is quite breathtaking; vibrant, dynamic, and with a superbly natural soundstage. They knew what they were doing in those days...

OPUS TEST RECORD 1: Depth Of Image

CD: Opus CD7900

Full of unusual musical material 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, containing examples of the work of many of its recording artists.

OPUS TEST RECORD 3: Dynamics

CD: Opus CD-8300

Another compilation on the Swedish Opus 3 label, with musical extracts carefully chosen to illustrate what is meant by musical dynamics and comprehensive liner notes to show you what you should be listening for. How good is your hi-fi system?

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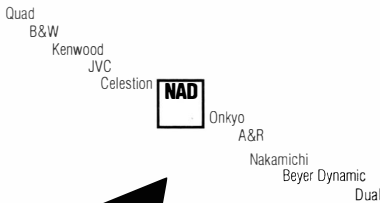
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WHY CLEARSTONE KNOWS MORE ABOUT CHOOSING HI-FI THAN HI-FI CHOICE

What is Hi-Fi for, if it's not for pleasure? And what real pleasure does one get, when even the most esoteric and well set up system is drowned by the constant nagging of one's partner. Simply because the material on the front of the speaker grille doesn't go with the colour of the front-room curtains.

When you serve as many people as we do, these are the kinds of problems we deal with every day. No Hi-Fi publication could possibly handle them 'en masse'. Each requires individual time, care and careful consideration.

At Clearstone, we've built up a reputation for precisely this.

A customer will tell us what he wants. Let's say a Linn LP12, Ekos arm, Troika cartridge, Naim 72, Hicap, 250 and a pair of Kans. He

also explains that he can't

site them near a wall if they're mounted on stands (let alone spike them into the floor) and the only available wall to which they can be mounted is in bad need of repair and won't stand up to the weight and continual vibration.

Initially we'll comment on his choice of equipment (just to ensure he understands the implications of how the match will effect the final sound).

We'll then invite him to make an appointment to listen to whatever is the agreed ideal, and a Clearstone devised alternative which takes into consideration the additional structural problems.

On his return, a highly skilled and experienced member of staff will escort him to one of our single speaker dem. rooms where the two systems will be ready and set up for an A-B comparison.

Invariably the customer goes away satisfied, and most likely we'll want to set it up ourselves.

So when on your travels you next see a new pair of Kans on the floor, away from a wall with a very nice pot plant on one, you'll know two things for certain.

The system is not sounding anything like it should.

And it wasn't bought from us.

CLEARSTONE

CONTROVERSIAL BUT TRUE

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 retail price is placed in its respective category in alphabetical order. For instance the Acoustic Research *EB101* is presently at the beginning of the Turntables and Tonearms section; however, the Ariston *Superior* heads the Motor Units section as it is sold and was reviewed as a separate component – requiring a separate arm. Where there are several products with the same name but different model numbers these are in price ascending order.

Then come 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 – ie 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 it is best to refer to the original review for this, of which more later.

The next column(s) 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 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 meritworthy. 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. 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 (especially the electromechanical elements – ie cartridge and speaker) system building is 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.

The Directory is constantly updated with the latest reviews and price changes as well as having discontinued products removed. If a listed product is updated to a 'mark two' form and the alterations are purely cosmetic or not too extensive we sometimes leave the product in with its current model number and an asterisk to denote that it has changed since our original review was published.

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 as strong as ever, and certainly represents the route taken by those who place sound quality first.

Yet those who choose the separates route still have lingering doubts – usually completely unjustified – over the compatibility of components from different manufacturers. Gross incompatibilities are very rare nowadays, only likely to rear their heads amongst the most exotic components. Here the delicate art of 'supercompatibility' really takes over the major role and might be regarded as the key to 'real' hi-fi.

There are now three different pre-recorded music media competing for the attention 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.

There will always be controversy over the relative qualities of LP, CD and cassette. LP is still the choice for ultimate sound quality – particularly for those prepared to spend a substantial sum on a good quality turntable system.

Cassette has never really challenged vinyl's superior quality, but it is a multiple role format, offering 'go anywhere' flexibility, a uniquely useful recording capability, plus a broad catalogue of pre-

recorded music cassette material. As a hi-fi medium cassette suffers from pre-recorded 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 replays best on that machine, which may cause aggravation when upgrading a few years hence.

CD is the latest challenger to these two established media, using a digital instead of analogue storage format. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks, so it is probably fairest to say that CD is fine for most listeners, but may not suit everyone; certainly the lack of background noise, defects and deterioration over time are major strengths.

While there will always be arguments about the different music storage and transmission formats available to the hi-fi listener, there is also controversy over the relative importance of the different components which make up the system chain – by which is meant the source, the amplification, and the loudspeakers (and for the pedantic the room itself, though there's often little that can be done here).

For many years the 'weakest link' theory proposed that the loudspeakers needed the most attention, that amplifiers merely had to have sufficient power, and that turntables were pretty well perfect. However, this perspective has become steadily discredited by an alternative 'theory of precedence', which stresses that no subsequent component can make up for the inadequacies of its

predecessors – all it can do is supply its own additional degradations. In such a context it is not uncommon to find more than half the system budget allocated to the record player, with scrimping and saving made on amplifiers and loudspeakers.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Good turntables and loudspeakers both benefit to a surprising degree from proper support – from stands that enable them to give their best performance, whether floor- standing or wall mounted.

Siting of components within a room can play a significant role, as can the room itself. Some people may prefer an acoustically more 'live' room than others, but most will agree that the larger it is the better, because this tends to provide smoother and better extended bass reproduction. All rooms create reflections and standing waves, and the effects of these are more severe if all opposing walls are parallel, similar distances apart, and with hard reflective surfaces.

Provided that the loudspeakers can be placed fairly symmetrically, slight asymmetry elsewhere in the room is usually helpful.

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 similar immediate acoustic environment, unencumbered by other furnishings and structure, and a similar distance from listener, 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 being closely mechanically coupled via proper stands to the floor.

Mixing and matching the components of a record player to get optimum results can be something of a black art, over and beyond the fairly simple business of choosing a cartridge of roughly the right compliance to suit the arm effective mass. Certainly the combining of turntables and tonearms is not a simple matter, and this is where a good specialist dealer will come into his own, both in terms of recommending good combinations from the models he holds in stock, and then in correctly carrying out the sometimes tricky set up procedures which are often required to get the best results.

The key to getting the best results from a separates 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 demonstrate some likely alternatives.

The Directory has been compiled so that it can be used by *Choice* readers as a buying guide. A guide in the sense that you should use the information in it to make a shortlist of equipment suited to your needs and budget, and then audition it at a dealers before taking the plunge. Because tastes inevitably differ it would be unwise to buy purely on the basis of our recommendation and dealers are the most experienced people around when it comes to making systems work as a whole.

THE DIRECTORY

TURNTABLES & TONEARMS

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 mechanically compatible cartridges (see cartridge listings).

INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research EB101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Solo/Xenon MCS £420/£300	Average+ Good	The deck is warm and euphonious with high levels of clarity. Wow artefacts occasionally just audible.	3 point suspended motor unit, optional quartz PSU/speed change 13g		67
Alphason Sonata/HR-100S MCS/atlas £720/£480/£340	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 Q-Deck £165	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	BB*	67
Ariston Icon £215	Good Good	A thoughtful and efficient design that offers good sound, excellent value and semi-automatic operation too! Good vibration isolation eases siting	Belt drive, suspended, semi-automatic, 10g	BB	79
Ariston Forte £350	Average— Average	Heavy on engineering, short of soul? The Forte almost makes it, losing out only because of some residual pitch variations and a lack of bass power. The arm is modestly good	Manual 2-speed belt drive player and detachable arm, 10g		67
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 CS505-3 £160	Very Good Good	Continuous steady improvements have kept this model at the forefront of the budget market. Practicality is excellent and the deck has excellent timing bass/mid and stereo imaging	Semi-auto belt drive, 8g	BB	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
Goldmund ST4 £4,589	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard objective and subjective performance at £2,000 less, in a neatly integrated though bulky package.	Solid subchassis, direct drive, parallel arm, detachable headshell	R	60
Heybrook TT2 turntable & arm £424/£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, belt drive, 14g	R	67
JVC AL-FQ555 £170	Below Average Poor	Clear midband sound but woolly 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
Kenwood DP-990 £400	Average Average	Smart, slick and massive player suitable for low compliance cartridges only. A good but not inspired performer.	Semi-auto 2 speed direct drive, 16g		67
Kuzma Stabi/Stogi £699/£399	Average+ Stabi: Good; Stogi: Excellent	Stabi is powerful, spacious but not sufficiently subtle. Stogi is an excellent all rounder with even spread of abilities.	Manual, belt drive, subchassis, 12.5g	Stogi: R	60
Linn Axis/Akito £399	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 Sondek/Ittok/Troika* £549/£483/£669	Excellent Very Good	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full. Arm has since been upgraded	Manual subchassis player, belt drive, 14g	R	60
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
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
Omega Point Silver/Black £895/£295	Good Good+	An avowedly stripped down turntable that lacks even an on/off switch, the Omega Point Silver offers fine midrange clarity and good stereo, but some HF compression and a lack of 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Opus 3 Continuo/Decca London International (Revised)* £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
Rega Planar 2 £155	Average+ Good	A remarkable product at the price, surprisingly articulate and confident	Manual, 11.5g	BB	48
Rega Planar 3 £207	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 £169	Average— Average—	Fat, assured and forward presentation, but ragged and subjective speed stability problems. With a little further development, it will be a winner	Manual, 2-speed belt drive inc cartridge, 13g		67
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, prefitted cartridge		55
Roksan Xerxes/Artemiz/Shiraz £695, £595, £655	n/a Very Good	Imaginatively designed, sophisticated front-end system, a little drier than some perhaps, with superior stereo, resolution and presence	2-speed manual, MC cartridge, 9g	R	72
Rotel RP-855 £189	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 IIX £248	Good Average+	Poised, clean sounding deck, forward and explicit in character. A good value deck under £250, and a relatively cheap and satisfactory suspended model	2 speed belt drive manual turntable and arm, 11g	R	67
Technics SLBD-22 £90	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
Technics SL-DD33 £110	Average Average	As with the QD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 13

THE DIRECTORY

INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Technics SL-L20 £115	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 £140	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
Thorens TD 280 Mk II £180	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 166 Mk V £200	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 316 Mk II £220	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 TD320 Mk II £350	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 £1,800/£650	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
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

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ariston Superior £598	Good+ Good	Good but slightly damped sound quality, with powerful and stable bass. The pro quo is a certain lack of pace, energy and resolution	Belt drive, subchassis, electronic		55
CEC ST930 £599	Good 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 £80	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 Syncro £265	Good Good	A particularly 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
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
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 Alexandria Mk III £995 – £1095	Very Good Very Good	One of the most beautifully presented players made, and fully supported by superb separation, dynamics and a euphonious style of delivery.	Manual 2-speed belt drive	R	67
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, 33 $\frac{1}{3}$ rpm only, solid plinth/subchassis		79
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, 33 $\frac{1}{3}$ rpm only, suspended subchassis		79
Oxford Acoustics Crystal Reference £2395	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery	Manual, belt drive, subchassis, stand	R*	60
Pink Triangle Little Pink Thing £345	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
Pink Triangle PT T00 £650	Very Good Excellent	Uniquely clear sound, uncoloured, free from ringing and with good bass. Very close to master tape, given a good arm and cartridge	Belt drive, external PSU, suspended subchassis	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
Roksan Xerxes £695	Excellent Very Good	This unique design cuts a swathe through the conventions of turntable design, providing superb resolution and stereo. Power supply has since been upgraded – see issue 78 for our latest report	Manual, belt drive, solid/decoupled	R	67
Systemdek IIXE £248	Good Very Good	Fine, honestly specified and well built player which easily betters its closest stablemate, the IIX. Frankly, at the price it's a sonic bargain	Manual 2-speed, external PSU	R	67
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
VPI HW-19 £1,317	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
Voyd Valdi £680	Good— Good+	Slight 'one-note bass' effect and lack of pitch stability compromise the performance of this well-made deck	Belt drive, suspended subchassis, electronic PSU		79
Voyd "The Voyd Plus" £2,777	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, so we've dubbed it The Voyd Plus. Superb build and finish; colourful, dramatic performance. A thoroughbred	Belt drive, 3 motors, subchassis, outboard PSU	R	72

TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Airtangent 1B £1990	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	This
Alphason Opal £130	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Delta £190	Good Average+	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £240	Good Good+	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Alphason HR100S £420	Good++ Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll

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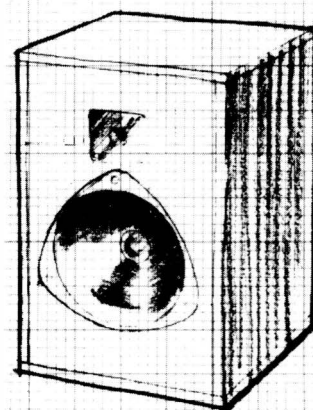
Wilmslow's NEW Total Kit for the very popular KEF Constructor series. The CS3 design is now supplied with split X-over network plus 8 x 30 amp binding post connectors so that Bi-wiring is possible without any modification.

Some components have been uprated and to improve this highly regarded speaker still further, Wacooustic panels are used to reduce cabinet induced colouration to an absolute minimum.

The kit comprises bass and treble units, assembled crossovers, wadding, grille fabric etc. plus flatpack cabinets.

(Accurately machined from smooth MDF for ease of assembly)

Dimensions:
 526 x 286 x 237 mm
 Response:
 55HZ - 20 KHZ +/- 3dB
 AMP Suitability: 15-100w
 Impedence: 8 ohms
 CS 3 (bi-wire) Total Kit
£187.00 per pair + carriage/Ins. £13.50
 CS 3 Upgrade Kit
 (bi-wire, crossovers and binding posts to upgrade existing CS 3's)
£59.00 +P&P £3.00



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Telephone credit card orders welcome



THE DIRECTORY

TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Ariston Enigma £99	Average Average +	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1130 £186	Good Good	Well suited to most cartridges including high compliance ones, the AT is smooth and tonally neutral, if slightly lacking in 'balls'	8.5g	R	67
Decca London International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48 Summary
Eminent Technology £1000	Good + Good + +	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	48/Coll
Goldmund T3F arm £4400	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll 2
Grace G707 £299	Good Good +	This venerable is still capable, if not competitive with modern alternatives	7g		48
Helius Orion 2 £490	Very Good Very Good	Excellent engineering with rigid bearings, free from slack. It remains expensive but the level of performance deserves Recommendation	12g	R	48
Kuzma Stogi Reference £699	Very Good Very Good	A large, solid and well-made arm that holds the cartridge firmly, giving exceptionally clear sound with just a hint of brightness	12g	R	79
Linn Ekos £895	Very Good Very Good	Superb, state of the art design which builds significantly on Ittok's strengths	9g	R	67
Mission Mechanic £900	Good Good +	Nearly right, but inconsistency with level and vague imagery spoil what is otherwise a firm, powerful advocate for black vinyl	11g		55
Moth Arm £78	Good Good +	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	60
Rega RB300 £115	Good + + Good + +	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
Roksan Artemiz £595	Average Good	Interesting design which works a treat on the Xerxes deck. Fits Rega cut-out. See issue 72 for up to date assessment	8g		67
SME 3009 Series IIIS £165	Good Average +	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £229	Good Average +	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £291	Average + Average +	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME 309 £495	Very Good Very Good	Beautifully made, finished and presented, this arm is fully and easily adjustable and a highly neutral performer	10g	R	79
SME Series IV £810	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1206	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60
Souther Tri-Quartz £895	Average Good	A unique parallel tracking arm that makes up for what it lacks sonically in its unusual appearance	3-4g		48

* rating refers to original tested model

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 (see Turntable & Tonearm entries)

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
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'	3-8g 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
Audionote IQ2VDH £895	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity', needs a transformer	8-18g Very low, MC	R	43
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
Audioquest AQ 404i-L £400	Good + + Good +	Slight harshness detracted from the performance of this otherwise clear-sounding and detailed cartridge	8-16g Low, MC		84
Audio Technica AT95E £18	Average – Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio Technica AT-420E OCC £31.50	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-430E OCC £44.50	Average + Average	A rising high frequency response yields something of a treble sting, not a good all-rounder	3-7g Normal, MM		67

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 13

THE DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
Audio Technica AT-F3/OCC LE £74	Average+ Good	Though the 'limited edition' badge is a trifle tongue-in-cheek the 'F3 still offers excellent value	8-15g Low, MC	BB	67
Audio Technica AT-F5/OCC LE £106	Average Good+	This latest sample demonstrated some technical weaknesses but its spacious, fluid sound quality still represents a benchmark at this price	4-10g Low, MC	BB	67
Audio Technica ATOC7 £265	Good+ Good+	The OC9 is better if you can afford the extra. But OC7 is at least a taste of the high-end at a sensible price	6-13g Low, MC	R	54
Audio Technica ATOC9 £400	Average+ Very Good	Tonal colours are reproduced faithfully and it rarely puts a foot wrong. Slightly less transparent than more costly MCs but it has got real wellie. Good value (really!)	6-14g Low, MC	R	60
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
B&O MMC5 £24	Average+ Average	Cheapest in the family – smooth treble and good focus, but the bass was left in the wings	5-15g Normal, MM		38 (Summary)
B&O MMC4 £43	Good Average+	Solid and well balanced in the midrange, the '4 lacks bass impact	5-15g Normal, MM		48
B&O MMC3 £57	Good Average	Slightly "laid back" sound quality but a good performer for the price. Best suited to B&O equipment	5-15g Normal, MM		48
B&O MMC2 £87	Good Average+	Only a modest improvement on its cheaper brothers (and sisters)	5-15g Normal, MM		48
B&O MMC1 £112	Very Good Good	Great clarity and detail at high frequencies but a slightly plodding bass. It may appeal more to the classical enthusiast	5-13g Normal, MM		48
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
Clear Audio Gamma £295	Average Average+	Brimming over with enthusiasm, the unusual-looking Gamma is more than an audio oddity, but it lacks a little subtlety at times	4-11g Low, MC		54
Clear Audio Delta £450	Average+ Good	Midway between the Gamma and exotic Pradikat, the Delta sounds like neither! Nevertheless, it delivers the goods	6-17g Low, MC	R	54
Clear Audio Signature £995	Average+ Good	This latest MC to emerge from Clearaudio features yet another graded version of its proprietary generator. Its sound strikes a balance between the Delta and Prad	4-11g Low, MC		72
Clear Audio Pradikat £1225	Average+ Very Good	Sounded absolutely glorious, creating a full sense of scale and a large well-focused soundstage – but watch for record wear	8-18g MC		Coll
Clear Audio Accurate £2,000	Good Excellent	A remarkable cartridge, not only by virtue of its effortless and highly neutral sound quality but also because this has been achieved with the same basic design as Clearaudio's cheapest MCs	4-11g Low, MC	R	60
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 DL 103 £99	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low, MC	R	48
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		48
Dynavector DV10X IV £125	Average Average+	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g 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	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	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 800 Mk II £33	Good Average	This very high output MM appears to be based on the classic Ortofon VMS series. A trifle uninspiring overall	7-17g Normal, MM		67
Empire MC-5M £110	Average+ Good	A very low compliance renders this MC best suited to heavy tonearms while its sweet, non-aggressive sound quality earns it a recommendation	13-20g Low, MC	R	67
Empire Benz Micro MC-2 £600	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 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	Systems
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 GMC20E £129	Average Average	You could try haggling but we thought the makers of this number were demanding too much lucre for their product	3-6g Low, MC		48
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 Elan £16	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 Epic II £26	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 £100	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 £115	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 £500	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
Grace F9E II £240	Good Good	For lively presentation, excellent separation and generally satisfactory sonic delivery – consider this model	5-10g Normal, MM		48
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

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

THE DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
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
Highphonic MCA3 £360	Very Good Good+	Exquisitely crafted by a group of ex-Denon engineers, this superb tracker had a sweet and seductive (if rather bright) treble	5-12g Low, MC		43
Kiseki Blue Goldspot £450	Good++ Good+	Good bass and imaging, but hints of spit and coloration let the side down slightly	8-15g Low, MC		84
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		Collection
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 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
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 K5 £32.50	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 £81	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	48/Coll
Linn Asaka £299	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	48/Coll
Linn Karma £465	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	48/Coll
Linn Troika £669	N/a Very Good	Ex-Karma users have been seen with glazed expressions indicating smug self-indulgence the morning after fitting a Troika	8-18g Low, MC		Coll
London Maroon £149	Average Average+	Now manufactured under the London brandname this Decca cartridge is as iconoclastic as ever	9-20g (damp) 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, damp Normal, fixed stylus MM		84
Milltek Aurora £249	Good+ Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	48/Coll
Milltek 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
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 OM5E £15	Average— Average—	The OM10 is a hi-fi cartridge – the OM5E is not	5-16g Normal, MM		43
Ortofon OM10 £20	Average Average	One of the leading "cheapies", this gives a fine level of sound quality for the price, with good matching compatibility	5-15g Normal, MM	BB	48
Ortofon OM20 £45	Average Average+	This turned out to be the listening panel's favourite among Ortofon's moving magnet models	5-16g Normal, MM	R	48
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 X1 £50	Average Average	The cheaper X1 scored higher marks with our listening panel than the X3, but both were a disappointment	6-15g Normal, MC		48
Ortofon MC10 Super £70	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low, MC	BB	48
Ortofon X3 £70	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but uninvolving	5-15g Normal, MC		48
Ortofon OM40 £90	Average Average+	Highly competent engineering, secure tracking and decent sound quality are major strengths. But it's a little cold, a little polite	3-8g Normal, MM		48
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 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	48/Coll
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
Ortofon Quasar £300	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 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
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
RATA RP70vdH £99	Average+ Good	Able to retrieve bags of musical detail (thanks to the vdH stylus), RATA's top cartridge ranks as one of the most articulate MM's available	11-18g Normal, MM	R	67
Rega Bias £34	Average Average+	Difficult to mount in some arms due to its shallow build, the bias offers a gentile, 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 protection. A firm budget buy	8-16g Normal, MM	BB	67

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THE DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
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 (Summary)
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 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 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 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 (Summary)
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 (Summary)
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 (Summary)
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 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 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
Stilton/AT-F3 £110	Good+ Good+	At a premium of some £40 this modified AT-F3 offers a startlingly refined performance and is strongly recommended	8-18g Low, MC	R	67
van den Hul MC10 £499	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 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 MC1 Super £800	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 MC Two £899	Good Very Good	Connected directly to any standard MM input the vdH MC Two rewards with a highly detailed yet fluid and musically convincing portrayal	6-13g Normal, MC	R	72

* rating refers to original tested model

AMPLIFIERS

The amplifier sits at the heart of the system, processing the outputs from all the various music sources as necessary and then driving the loudspeakers. These two (quite separate) functions are integrated into a single box at the low-to-middle price points; separated pre- and power amplifiers become increasingly common as one moves upmarket. At the upper end of the specialist market, valve amplifiers provide a popular alternative to the transistor types amongst enthusiasts.

There is a substantial difference between specialist (sound quality oriented) amplifiers and the consumer electronics style models. The former

are bleakly simple, avoiding all unnecessary features to provide the most direct signal path in the interests of best sound quality. The latter range from models with just basic tone controls and tape recorder switching, to those with elaborate facilities such as graphic equalisers, remote control (including volume), surround sound options etc. etc.

Lab measurement provides some useful data, particularly in regard to an amplifier's ability to drive a wide range of different types of loudspeakers, but this is only obliquely related to sound quality. We also include our measured power output (RMS, 8ohm load, 1 channel driven) – but

again, paradoxically, this doesn't necessarily correspond to the loudness capability of the amplifier, which has as much to do with the elegance of the overload characteristics within a given system (valve amplifiers invariably sound more powerful than their rating would suggest). The listing of features provides some indication to the complexity of an amplifier: many users prefer to retain the option of tone controls to 'shape' the overall sound according to taste; many others have found living without tone controls surprisingly easy, with additional benefits in terms of transparency.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research A03 £160	Average+ Average	New slimmed down version of the A04 with less power and facilities but also a slightly 'fuzzy' sound	38W, MM disc, CD direct and 3 aux inputs		74
Acoustic Research A07 £299	Very Good Average+	Relatively smooth but ineffectual sound quality that lacks some weight and impetus at very low frequencies	75W, 4 line, 2AV and MM/mc inputs		68
ADC A-2080E £400	Good+ Average+	Clean and neutral sound but one that lacked depth and spaciousness; MM input favoured above MC or CD	108W, logic sw. for 5 line and MM/mc inputs		68
Aiwa XA-005 £130	Good+ Average—	A technically competent amp with big, friendly but not overly engrossing sound quality	61W, MM 5 line inputs, source-direct		80
Akai AM-52 £230	Average+ Average—	Basically equipped, this amplifier offers a comfortable but hardly over-detailed sound	95W, MM/mc disc, 5 line inputs, loudness		74
Akai AM-65B £299	Good Average	On-board 18-Bit DAC's actually give better sound than standard CD inputs! Punchy via MM disc	101W, MM, 6 line, digital inputs		80
Akai AM-93 £550	Average Average—	Unfortunately Akai's on-board D/a converters were less successful than its conventional analogue CD input.	112W, coax and optical dig inputs MM/mc		68
Amadeus Silver £270	Average— Good	Limited headroom via disc but still offers a sweet, lush sound. Limited current delivery	37W, MM/mc, 3 line inputs	R	80
Amadeus Gold £360	Average— Good	There is some indication of instability but otherwise sounds very rich, warm and musical. High-ish IMD.	56W, MM/mc plug-in cards, 3 line inputs	R	74
Aragon 4004 £1795	Good Good	Despite its imposing bulk the Aragon is something of a softy at heart. It can deliver oodles of power but its musical presentation is more laid-back	231W power amp		72
Arcam Alpha II £180	Good Good+	Very confident, convincingly musical and punchy sound that sets the standard for other budget amps	41W, 4 line and MM inputs	BB	68
Arcam Delta 60 £280	Good Good+	Very refined and highly detailed sound via MM and CD without any of the hardness noted via the MC stage	59W, 4 line, MM/mc inputs, no tone controls	R	68
Arcam Delta 90.2 £400	Average+ Average+	Dark but slightly dead or conservative sounding version of the original Delta 90. Improved disc stage	73W, MM/mc, 4 line inputs, tone bypass, bi-wire	R	74

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

THE DIRECTORY

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ariston Amp £219	Average Average+	Slightly veiled and thin sound but proved suitably attractive in the listening tests	32W, full logic control, MM and 4 line inputs	R	68
Audio Innovations Series 200 £429	Poor Good++	Like most Innovations valve power amps, compatibility with other brands is unpredictable. Hardly a powerhouse, but nicely 'open', transparent and dynamic sound in small(ish) systems	12W	R	77
Audio Innovations Series 300 £479	Poor Good++	Something of an anomaly the 300 is an integrated valve amp that looks awful in the lab but sounds remarkable in a system	10W, MM, 6 inputs	BB	63
Audio Innovations Series 400 £625	Poor Good++	Superior styling and better build quality than the Series 300 make for a very attractive integrated valve amp. Capable of fine results in the right system, but can sound too 'thin' and lacking in welly	12W, MM and 4 line inputs	R	77
Audio Innovations Series 1000/2nd Audio Amplifier £1379/£2579	Poor Excellent	This valve combination offered awesome dynamic range with superb transparency and power to match. Compatibility with other brands is unpredictable	15W, MM, 6 inputs, monobloks	R	63
Audiolab 8000C £325	Excellent Good	A well established preamp with a highly controlled sound, though it could do with more life and depth	MM/mc, 5 inputs, hdp, tone controls	R	62
Audiolab 8000A £350	Very Good Good+	Exceptionally detailed, tactile and transparent via CD but slightly more clouded via disc. A stalwart design	72W, MM/mc, 4 line and full record out selection	R	74
Audiolab 8000P £495	Excellent Good+	A dynamic powerhouse, load tolerant and sonically reliable	100W	R	62
Audion CD-1 £399	Average+ Good++	Nicely presented valve (line-only) preamplifier with fine bandwidth and enjoyable, musical sound. Great - if you can justify the cost. Well worth hearing	5 line inputs		77
Aura VA-40 £189	Average Average+	Based on ITL's earlier MA80, this amp sounded slightly withdrawn or 'dead' if inoffensive	55W, MM 4 line inputs, MOSFET output		80
Beard Audio CA35/P35mkII £695/£895	Fair+ Very Good	Good build quality and a very smart finish combine with a characteristic valve sound to make a first class amplifier capable of giving hours of musical enjoyment	35W, MM/mc, 4 inputs	R	63
Beard 506 £1195	Good+ Good+	A versatile valve preamp - the bass sounded lively if a touch softened while the treble was detailed but lacked a little sparkle and air.	4 inputs MM/mc	*	50
Beard M70 £1995 pair	Good Good+	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W	*	50
Bryston 0.5B/2B £695/£695	Very Good Good	Very rugged Canadian pre/power combo that sounds cool confident and punchy. Headamp available to suit MC cartridges	65W, MM and 4 line sources, overload LEDs on power amp	R	74
Bryston 12B/4B £1295/£1395	Good+ Good	Bryston's massive 4B power amp stood out as the backbone of this combo, the preamp sounding a trifle unbalanced between MM and MC inputs	272W, bridgeable to 800W. 6 line, 2 disc inputs, subsonic filter		68
Cello Audio Suite £4300	Excellent V Good/Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
Concordant Excelsior £856	Good++ Excellent	Cottage industry styling might not inspire confidence, but sonically this preamp is tremendously vivid and detailed. Real high-end performance. We loved it!	MM plus 3 line inputs. External power supply	R	77
Conrad Johnson PV10 £1,395	Excellent Excellent	Pricey, yes, but a fabulous preamplifier which confirms C-J's high reputation in the States. Beautiful imaging, superb detail, plenty of gain on the phono stage - classy build quality too.	MM plus 4 line inputs	R	78
Conrad Johnson MV50 £1995	Good+ Good+	Coupled with the PV5, this CJ power amp performed well on audition	50W		Collection
Conrad Johnson Motif MC-8 £1995	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/mc	R	50
Conrad-Johnson Premier Seven £8995	n/a Excellent	Price has increased since we tested it - but at this price who cares? The 'Seven' is designed without compromise, and it's clearly one of the finest (valve) preamplifiers money can buy. Absolutely gorgeous!	MM, 4 line inputs, sep. Rec Out, versatile cartridge matching	R	72
Creek CAS 4040 S2 £179	Good Good	More neutral than its predecessor tonally, substantial improvements in transparency were also noted, while the lively punchy, character is retained	30W, MM, 4 inputs, tone controls	BB	62
Creek CAS 4140S2 £219	Average Good	Disc headroom still poor but the open and detailed, if slightly bright, sound wins through	40W, MM/mc, 3 line inputs, mono and mute	R	80
Creek CAS-5050 £399	Average Good	Strong RF IMD compromises the sound of the CD input which contrasts with the delightful performance via MM/mc	72W, MM/mc, aux CD and video + pre/power mode	R	74
Croft Super Micro A £549	Average+ Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs	4 inputs, MM, straight line	R	57
Croft Series IV(S) £850	Good Good	The original IV is still available now supplemented by the higher price and power (S); both are fine performers	40(60)W channel	R	57
Croft Series IVSA £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
Cyclone Catalyst £1995	Good+ Very Good	Exceptionally load tolerant and very refined in delivery. Extra options available in future	74W, external MM or MC stages, 3 line inputs	R	80
Deltec DSP-50S DPA-50S Pre/Power £675/£825	Excellent Very Good+	Remarkable pre/power combo based around the highly linear DH-OA32 hybrid op-amp. Unmatched detail resolution, control and transparency	63W, external feedback wiring. 3 line, MM/mc no tone controls	R	68
Deltec DPA 100S £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
Denon PMA-250II £140	Good Good+	Spacious yet tactile and gutsy sound via all inputs. Worthwhile upgrade over original PMA-250	53W, MM 3 line inputs, source-direct	R	80
Denon DAP-2500 POA-4400A Pre/Power £549/£599 pr.	Very Good Good	Denon's fully-fledged preamp also incorporates D/A converters that did not improve the sound of our £299 CD player. The power amps are brilliant!	172W, monobloks Opt/Coax dig + 2 tape, 4 line and MM/mc inputs		68
Denon POA-6600 £1,000/pair	Excellent Very Good	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles	250W monoblok, remote power	R	60
DNM 3A From £1000	Good+ Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/mc twin vol controls	R*	44
E.A.R. 802/509mkII £1098/£1868	Average Very Good	Extremely well made and combining the sonic strengths of both transistors and valves this EAR combo warrants attention	100W, MM, 6 inputs, monobloks	R	63
E.A.R. 549 £3,298/pair	Very Good Very Good	A valve monoblok that measures like a solid state amp is itself an achievement, but exceptional power delivery and bass 'slam' is not fully matched by delicacy and transparency elsewhere	200W monoblok, bias setting		60
Exposure VII/VIII £430/£470	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/mc, 3 inputs, straight line		62
Exposure VI/VII Dual*/VIII Pre/Power £320/£500	Good Very Good	An established company like Exposure could do more to improve the 'look' of these amps which, nevertheless, sounded confident, dry and musical. Dual version no longer available	63W, Super mod. 4 line and 2 disc inputs with full rec-out switching	R*	68
Exposure XI/XII/VIII Super £1600	Good Very Good	New preamp and improved power amp led to a smooth and refined sound, MM/mc less transparent than CD	61W, MM/mc, 5 line inputs	R	80

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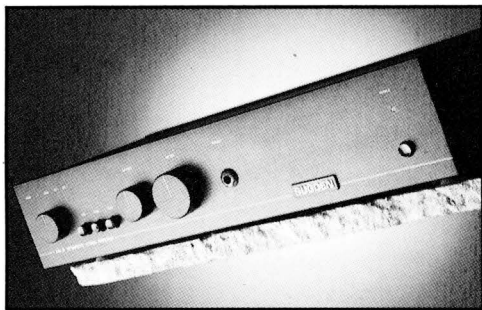
THE DIRECTORY

AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Grant 660AMS £948 pr.	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monobloks 8ohms	R	57
Hafner DH120 kit form £295	n/a Fair	We didn't build one; see below	60W		44
Hafner DH-110/XL-600 £360/£1,145	Very Good Very Good	Preamp is available in kit form. Both sound remarkably open, transparent and inherently "musical". XL-600 is tremendously powerful and very compatible	426W in stereo mode, 1.5kW in bridge, 2mm, tone + processor loop	R	74
Hafner DH120 assembled £360	Very Good Fair	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
Harmon Kardon HK6100 £159	Good Good	Re-packaged version of the popular PM635. Still offers very up-beat and exciting sound	47W, MM, 5 line inputs, tone controls	R	80
Harman Kardon Citation 25/22 £599/£899	Good Average+	Not as outrageous as previous Citation amplifiers but neither as punchy nor exciting in the sonic stakes. A good all-rounder but lacks sparkle	138W, MM/mc full range of input and record out		74
Jadis JP30/JA30 £4,145/£4,200	Fair Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound. Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at frequency extremes, in lab, and re cartridge matching	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R*	60
Jeff Rowland Coherence One/ Model 7 £3750/£9900	Very Good Very Good	The technical design of these amps is very elaborate but ensures they achieve an extraordinarily transparent and potent sound. However, the CD i/p is clearly superior to the disc inputs	448W monoblok MM/mc with variable loading options. Balanced topology	R	72
Kelvin Labs Absolute Zero/M30 £395 + £295/£595pr.	Good+ Average+	Latest versions of the M30 offers a true 30W Class A and a slightly muddled but very comfortable sound. MC preamp is a very linear design	33W monoblok MC only + 4 line inputs. Separate L/r balance	R	74
Kelvin Integrated £395	Good+ Very Good	A true 20W Class A amp with lush, detailed and very musical sound to match. Watch out for re-style	18W, MM/mc, 4 line inputs	R	80
Kenwood KA-550D £130	Very Good Fair	Having dropped its moving coil input, this latest version has British style dynamics and rhythm but is not first grade yet	35W, MM, 4 inputs, hdph, tone controls	R	62
Kenwood KA-4010 £170	Good Average+	A flexible design at moderate cost. Smooth and cultured sound if slightly lean in balance	81W, MM/mc, 4 line inputs, source-direct	R	80
Kenwood KA-5010 £210	Good Good	Offers a slightly bass-light but very smooth, fresh and alive sound. Well built and sensibly equipped	101W, MM/mc, cd 3 tape, tuner, aux + direct	R	74
Kenwood KA-7010 £300	Average+ Average+	More powerful version of the 5010 but less successful in the listening tests. RF IMD is the likely cause.	123W, as above plus — 20dB mute facility		74
Klyne SK5a £2590	Very Good Very Good	Beautifully made and presented this American thoroughbred has a good lab performance, but although versatile, is rather expensive for the quality of sound offered	Balanced output, versatile cartridge loading		72
LFD £2,995+	Very Good Excellent	Can set the subjective standards that others merely aspire to, but this outstanding if unconventional multi-box preamp needs careful matching to ancillary components	MC (with care), passive line extra	R	60
Lectron JH50 £2,300	Average Very Good	Sexily presented valve power amplifier from France. Lovely valve sound too, with delicate and airy top end. Not especially powerful and rather expensive — but very desirable!	50W		78
Linn LK1/LK280 Pre/Power £495/£645	Good Good—	A very modern, logic-controlled amp with distinctive and inoffensive sound quality. Its restrained sound could do with extra insight and zip.	84W, compact amp CMOS sw. for 2 tape, 2 line and MM/mc. xlr sockets.		68
Marantz PM-50 £230	Good+ Average+	One of Marantz's new breed, the PM-50 has a big and beefy sound yet one that lacks refinement	92W, MM/mc, 4 line inputs, source-direct		80
Marantz PM-75 £500	Good Average	More successful than most amps with on-board DACs but still not as balanced as other Marantz products	136W, opt/coax dig inputs, 6 line + MM/mc		68
Marantz PM94 £1,200	Very Good Good	At 23kg the PM94 is no lightweight in either physical or sonic respects. A very powerful and comprehensively equipped amplifier	140W MM/mc tone controls (switchable)		60
Marantz PM-95 £1,800	Very Good Average+	Beautifully constructed, this amp was less convincing via its digital i/p than via line. Class A option best suited to sensitive speakers. Costly	151W with 30W available in Class A. Opt + coax inputs		74
Meridian 201/205 £599/£425 each	Very Good Good+	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/mc 6 line inputs remote capable straight line	R/—	62
Mission Cyrus One £200	Very Good Good	A red hot class winner, which caused the whole issue to be re-rated! It's even well built — however, the headphone socket will only take a 3.5mm jack	30W, MM/mc, 5 inputs, hdph, straight line	BB*	62
Mission Cyrus PSX £230	Very Good Very Good	The PSX does make the Cyrus Two sound better, and also improves the PCM II CD player giving more wallop and clarity	Auxiliary power supply	R*	62
Mission Cyrus Two £330	Very Good Very Good	Also a top performer in its group with fine moving coil and compact disc sound. Since our review Mission has omitted the headphone socket on the Cyrus Two	50W, MM/mc, 5 inputs, straight line	R*	62
Mordaunt Short MS-A5000 £350	Very Good Good	With a recognisable pedigree, Mordaunt Short engineers have made a good job of this one. A musical all rounder	50W, MM/mc, 6 inputs, hdph, tone controls	R	62
Musical Fidelity B1 £200	Average+ Good+	The subject of much controversy, this 50W wonder offers a very deep, solid and powerful sound	50W, MM/mc, 5 line inputs, tape monitor	R	80
Musical Fidelity A1 £269	Good Good++	Fine-ranking in terms of overall sound quality for money, the excessive heat output could be hazardous to your vinyl if you're careless	20W MM/mc 4 inputs straight line	BB	56

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AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Musical Fidelity B200* £349	Very Good Good+	Running cooler than other MFs, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/mc 4 line inputs straight line	BB	62
Musical Fidelity A100 £459	Good+ Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/mc 5 inputs straight line	R	62
Musical Fidelity MA-50 £875 pair	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	62
Musical Fidelity P270 £1,399	Very Good Very Good	If the hot-box aspect is not a deterrent, this is something of a bargain. A big amplifier scale of sound which is just a little rough-edged	135W	R*	50
Musical Fidelity MVX/a370 £2399/£2399	n/a Excellent	In its latest guise, the A370 confirms its status alongside the MVX as amongst the best indigenous components for both sound and presentation	MVX – mm/mc/4 line/phase invert. A370 – 150W	R*	72
NAD 3020e £130	Good Fair	A little light in balance and "weight" but superior to run-of-the-mill budget amplifiers	20W MM/mc 4 inputs	R	50
NAD 3225PE £150	Average+ Average+	Light and detailed if not as rich or weighty sounding as others. MM input sounds warmer than CD	42W + 70W dyn. headroom; soft-clipping, MM only	R	68
Naim NAIT 2 £339	Average+ Fair	Well built with good load tolerance the NAIT delivered a fully competitive sound in spite of its modest measured power output. Recent modifications as yet unchecked	15W pc MM 3 inputs	R*	50
Naim Separates £560-c£8,000	Very Good Good	A consistent and coherent series of 'building blocks' for conventional passive or active operation. Sound quality ignores conventional audiophile standards of presentation, but achieves fine musical communication	40-70W, MM/mc etc	R*	60
NVA P70MC/a60 £830	Fair Average+	NVA's speaker cables are a must, the amp offering well-integrated but not particularly crisp sound	68W, MC, 3 passive line inputs		80
Oakley S £499	Good Very Good	Much improved version of the original Image preamp from Yugoslavia. This one won't disgrace itself even in top-notch systems. Image Six model (£100 more) is really fabulous	MM plus 3 line inputs	R	78
Orell SA-040 £359	Good Good+	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/mc, 4 line inputs, straight line	R	56
Philips FA-880 £200	Good Average	A new and cheaper design from Philips that sounds best via MM disc. Can appear soft and unbalanced via CD	108W, MM/mc source-direct tone		74
Philips FA960 MkII £300	Good+ Average	The MkII '960 still failed to grasp our listeners' attention but it remains a competent amp nonetheless	122W, 6 line & 2 disc inputs + tone controls		68
Philips DFA-888 £300	Good Average	As above but including a modified disc input and onboard DAC. Sounds tight but also slightly thin	107W, as above + opt and coax digital inputs		74
Pink Triangle PIP £2670	Excellent Excellent	This state-of-the-art preamp is one of the few truly high end products to come out of this country this year. It will most certainly worry the competition	MM/mc, 4 inputs, battery supply	R	62
Proton 520 £115	Average Average	Very well equipped budget amp with a slightly flat and undynamic sound – acceptable at the price though	31W, MM/mc with variable MC gain, 4 line inputs	R	74
Proton AP-1000/AA-1150 £250/£395	Good+ Average+	Bags of headroom available from this pre/power combo, but can seem bloated or unrefined via MM	67W, MM/mc, adjustable MC gain, 5 line inputs		80
QED A240 CD II £179	Good+ Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A240 SA II £239	Good++ Good+	Redesigned 240SA represents a significant allround improvement over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/mc 5 line inputs straight line	BB	62
QED A270 £349	Good+ Good+	Building on the strengths of the '240, the '270 sounds weighty, fast and dynamic. A bit 'lumpy' via MC	51W, 5 line and 2 disc inputs, pre-out	R	68
Quad 34 £299	Very Good Fair	This well-built durable preamp has useful filtering and above average tone controls but was found lacking in sound quality (viz: detail/dynamics)	4 inputs MM/mc tone controls		44
Quad 405 £389	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
Ray Lumley Model 75 £1,995 pr	Average Good+	Monstrous valve monobloks which represent good value. What they lack in musical subtlety they make up for in sheer muscle. And these are Lumley's small monobloks!	75W monoblok		78
Revox B150 £1,047	Very Good Average+	Beautifully constructed but hampered by Revox's convoluted logic control. Open and smooth sound. Still costly.	117W, CMOS sw. for 3 line, 2 tape and MM		68
Revox B250 £1,467	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/mc system/house remote tone controls		56
Rose RV-23 £395	Good Very Good	Beautifully built classy British 'hybrid' preamplifier. You can spend more to get a more transparent sound – but it's hard to criticise the Rose given the competitive price	MM plus 3 line inputs	R	77
Rotel RA810A £119	Very Good Fair	As a cut price RA820AII this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W, MM, 5 inputs, hdph, tone controls	BB	62
Rotel RA-820AX £150	Very Good Very Good	The spacious, detailed and very musical performance of this budget amp is almost too good!	47W, MM, 4 line inputs	BB	80
Rotel RA-840BX4 £249	Good Good+	Very sedate and controlled in presentation but must check phasing for optimum stereo effect	63W, MM/mc, 4 line inputs, passive tone	R	80
Rotel RA870BX £329	Very Good Good+	A powerful blockbuster with solid and well focused sound, good versatility and fine load tolerance	85W MM/mc 7 line inputs tone controls	R	56
Rotel RB/rc850 £160/£140	Good++ Good+	Quality separate pre and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/mc 4 line inputs tone controls	BB	62
Rotel RC-870BX/rb-870BX Pre/Power £219/£230	Excellent Good+	Reduced price makes the 870 combo better value but, despite mods to the preamp, it is the power amp that must take the lion's share of credit	128W or 208W in bridged mode. CD direct, 4 line, 2 tape and MM/mc	R	68
SAE P102/A202 £499/£599	Average+ Average+	Microprocessor-controlled pre and power amp that sounds much better at low rather than high volume levels. Pro-oriented aesthetics	151W, MM/mc + CD tuner and 2 tape tone memory, spk switching		74
Solen Tiger B50 £870	Average+ Good+	Stylish French hybrid with a very rich, melodic and beguiling sound. Not so hot with complex recordings	45W, optional disc, 5 line inputs		80
Sony TA-F200 £130	Average+ Average	Over-ambitious protection circuit is hardly in keeping with modern amp design. Lean but 'dead' sound quality.	74W, 2 tape, 3 line and MM/mc inputs		68
Sony TA-F400 £200	Good Average+	Some lack of integration across the frequency range but still offers a more open and detailed sound than the 'F200	76W, 2 tape, 3 line and MM/mc inputs, Rec-out		68
Sony TA-F530ES £300	Good Average+	Chunky UK-oriented design that offers a rich, smooth and full sound. Slight loss of focus via MM/ mc disc	120W, MM/mc, 4 line sources + record out + tone	R	74
Sony TAF 500ES £349	Good+ Fair	Not too hot at the price, lacking in bass action, rating poorly on vinyl, and only marginally improving on CD	75W hdph tone controls MM/mc		50
Sony TA-F630ESD £350	Good Average	Based on the '530 but equipped with PDM D/a convertor. Amp is competent but DAC sounds truly magnificent!	130W, as above + opt. and coax digital inputs	R	74

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NAME PRICE		LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Sony TA-F730ES £450	Very Good Good		A very stable and coherent amp but one that lacks a crucial sense of involvement	133W, MM/mc, 3 tape, 2 line, full rec-out		80
Sony TAF 700ES £500	Good+ Fair		Scoring higher than the 500 but still not offering the sort of standards set by the competition. But many buttons to push	100W MM/mc tone controls		50
Sumo Athena/Polaris £695/£695	Very Good Very Good		Very good value US pre/power combo with transparent, detailed and gutsy sound via all inputs	128W, MM/mc, 2 tape and 3 line inputs	R	80
Sumo Nine+ £1200	Very Good Excellent		Macho styling of this class. A stereo power amp conceals a sonic subtlety that is exceptional for the price, limited by lots of waste heat and a noisy fan on our sample (being improved)	65W	R	60
Sumo Andromeda £1585	Very Good Very Good		Well made with lots of power from a sensibly sized box. It was good in the lab and demonstrated a sound which offers a fine blend of performance at an almost reasonable price	200W, balanced input	R	72
Tanoy SR-840 £1713	Very Good Good		A "muscle" power amp, capable of impressive levels into difficult loads while remaining quite subtle and revealing	250W		50
Technics SU-V660 £250	Good Fair		Chunky build but integrated output stage infers a weak, insubstantial and rather monophonic sound	107W, MM/mc, cd aux, tape + tuner + power amp-direct		74
Technics SE-M100 £550	Very Good Good+		An unusual disc-less poweramp with volume control. Standard line input sounds very open and clean. Digital input is harsher and less convincing	123W, coax and opt digital inputs, var and direct CD no MM or MC disc	R	74
Vacuum State FVP £999	Good Very Good		This well thought out valve preamplifier is designed for optimum musicality and transparency, a goal which is handsomely achieved	5 inputs, MM, straight line	R	57
Yamaha AX-330e £130	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
YBA Model 3 pre/power £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. Separate L/r volume controls		72
YBA 2 pre & pwr £1395/£1695	Good+ V Good/Excellent		Superbly finished French audiophile 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 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 1 power amp £2995	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

* rating refers to original, tested model

LOUDSPEAKERS

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 similar 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	BACK ISSUE FULL REVIEW
Acoustic Energy AE1 £696	Good Very Good	To the author's knowledge, the most awesomely dynamic and articulate miniature ever made	29.5 x 18 x 25cm semi-open space	88dB/w 60Hz	R	59
Acoustic Energy AE2 £1138	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 in free space	88.5dB/w 45Hz	R	66
Acoustic Energy AE4 £1800 (stands £552)	Good Good	Magnificent but also seriously flawed, the AE4 possesses tremendous dynamic realism but a very mid-dominant balance. Large rooms and wallets only need apply.	54 x 32.5 x 44cm own stands in free space	90dB/w 40Hz		71
Acoustic Research Red Box £100	Average Average	Lively and balanced if a bit crude and uneven, this under-£100 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
Acoustic Research AR112 £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 AR122 £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 AR132 £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 wall	87dB/w 50Hz		66
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 mar good detail and clarity, and price is a little high	40.5 x 12 x 15cm ALS stands near wall	82dB/w 50Hz (in room)		78
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 competition	52 x 14 x 17.5cm stands close to wall	86dB/w 25Hz (in room)	R	82
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 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 wall	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 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' both a bit lacking; need very costly amplification	122 x 59-70 x 6.5-28cm floor, free space	81dB/w 30Hz (in room)	R	81
Arcam Three+* £150	Average+ Average—	Arcam's baby speaker did not delight our listeners, but it might do better in less expensive systems	34 x 18 x 23cm close to wall at head height	88.5dB/w 95Hz		53

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Arcam Alpha £199	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 for money as well	46 x 26.5 x 26cm stands close to wall	89dB/w 30Hz (in room)	BB	82
Arcam Two + * £280	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "balsy" character though lacking weight . . . a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/w 55Hz		59
Arcam One + £380	Good Average	Provides a solid, weighty and rich sound, but is a little raw in the treble and indefinite in the midband	22.3 x 28.1 x 37.8cm open space, on stands	88.5dB/w 60Hz		59
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
Audio Electronics TC10 II £599	Good— Good+	Oddball appearance is rescued by a respectable technical performance, interesting and impressive engineering and fine sound quality at a realistic price.	70 x 33.5 x 33.5cm low stands in free space	87.5dB/w 40Hz	R	68
B&W Vision DS1 £99	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 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 £200	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 CM1 £345	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 Matrix 801 £2500	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 stereo imaging	77/99 x 56 x 43cm floor or stands, free space	86dB/w below 20Hz (in room)	R	81
BLQ Q2 £275	Average— Average	Nearly a good loudspeaker, the basic balance is good, but the midband is very uneven and there are severe losses of resolution, 'space' and dynamics	43 x 25.1 x 24.5 semi open on stands	87.5dB/w 70Hz		59
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
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
Boston A4011 £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	91dB/w 28Hz (in room)	R	82
Castle Clyde £159	Average + Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/w 64Hz	R	46
Castle Warwick £179	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 wall	88dB/w 50Hz		66
Castle Durham £209	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 £229	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
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
Celef CF2 Nimbus £230	Good— Good—	Nicely balanced overall but a little uneven with it, this lively and dynamic large bookshelf model came close to Recommendation	46 x 25.2 x 24cm stands in free space	88dB/w 55Hz		71
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 DL6 Series Two £159	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 Two £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 £579	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 of walls	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 matching stands in free space	82dB/w 52Hz		68
Celestion SL700 £1349 inc stands	Good Good	Very sophisticated, mostly smooth and accurate transducer, with fast but not very deep bass and a rather bright treble	37.5 x 20 x 23.5cm free air on tall stands	83dB/w 45Hz		60
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
Doxa 5 – 2 £900	Average Good	The high sensitivity and seductive midband makes an obvious partner for valve amplifiers, though obtaining a good room match may prove a little tricky	98 x 21 x 28cm floor well away from walls	91dB/w 30Hz (in room)	R	82
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 40 free standing away from walls	92dB/w 48Hz	R	65
Duntech PCL1000 Crown Prince £6120	n/a Very Good +	Immensely 'listenable', refined sounding speaker capable of creating lifesize musical images. Not overly transparent to source, but very civilised nonetheless	180 x 30.5 x 43.5 free standing away from walls	90dB/w 42Hz	R	72
Energy 22 Pro Monitor £600	Good Good	Presentation is a bit rough for the price, but this Canadian entrant is an impressive sonic allrounder that will appeal to most listeners	62.5 x 27 x 30cm stands in free space	87dB/w 40Hz	R	66
Goodmans Maxim Two £90	Average + Average	More wham-bam-thankyou-mam sound that imitates much bigger speakers when you let these babies yell. (A well-controlled yell)	26 x 17 x 19cm near wall on shelf or stand	86dB/w 85Hz	BB	59
Goodmans B-Max/Maxim Two £90 + £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 M300 £99	Average Average—	Conveying much of the charm and life which has made the Maxim 2 so popular, the M300 is sensitive, but also significantly hampered by upper bass cabinet coloration	38.5 x 21.5 x 17cm stands close to rear wall	89dB/w 50Hz (in room)	R	82
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
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 stands	87.5dB/w 65Hz		59

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Heco Interior 90S £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 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 430s £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 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
Heybrook Point 5 £139	Average Average	"Uncouth yet still satisfying", the Point 5 gives good dynamics and bass for a compact wall-mount, but is burdened by a somewhat unhappy treble	37.5 x 23 x 24cm high stands against wall	85dB/w 32Hz (in room)		78
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 wall	85dB/w 60Hz		68
Heybrook HB1 £199	Good Average+	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation	47 x 29 x 23cm on stands near wall	88dB/w 61Hz	R	46
Heybrook HB100 £255	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 £319	Average Good	Convincingly communicative but a bit colored 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 wall	89dB/w 42Hz (in room)		82
Heybrook HB200 £399	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
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
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 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 space	89dB/w 33Hz		72
Jamo Concert 2 £230	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
JBL TLX12 £149	Good— Average	This smart near-miniature has a 'boppy', lively bottom end, but beware of the fizz in its top	37 x 23 x 23cm stands 0.5m from rear wall	87dB/w 55Hz	R	71
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 performance	80 x 25 x 21cm floor, 1ft from wall	89dB/w 48Hz	R	82
JBL LX44 £340	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
JPW Minim £79	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
JPW Sonata £99	Good Average+	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 P1 £139	Good Average+	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 AP2 £165	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 stands	89dB/w 65Hz	R	53
JPW AP3 £219	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
KEF C15 £99	Good Average	One of the tiniest around delivers a surprisingly 'big' and well balanced sound, with excellent stereo from free space siting	26.5 x 18 x 14cm stands in free space	85dB/w 60Hz	R	71
KEF C25 £139	Average+ Average—	Very safe and competent, but rather short on inspiration, the '25 lacks the brio and flair of its smaller C15 brother	34 x 20.5 x 17cm high stands near wall	87dB/w 60Hz (in room)		78
KEF C55 £219	Good Average+	Similar to but less good value than C75, the '55 provides Uni-Q stereo stability but not real wood veneer or good low frequency room match	48 x 24.5 x 25cm stands, free space	91dB/w 30Hz (in room)		82
KEF C75 £349	Good Good	Compact floorstanding model's Uni-Q driver provides fine crossover integration, giving stable stereo and fine dynamic range within a slightly 'rich' balance	72 x 24.5 x 25.5cm floor in free space	90dB/w 45Hz	R	71
KEF R102 £365	Very Good Very Good	High class near-miniature with expressive, articulate midband and clean, accurate bass and top. The sound quality of the Kube circuitry, however, is suspect	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/w 60Hz	R	59
KEF C95 £599	Good Good	Rich and lazy, but nonetheless very endearing in a cosy sort of a way, the '95 is a lot of speaker for the money, and delivers a big sound with grace and subtlety	88.5 x 24.5 x 31cm floor in free space	90dB/w 28Hz (in room)	R	78
KEF 103/3 £680 inc. stand	Good+ Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper components, and good in a large room	56 x 27 x 30cm supplied stands free space	90-95dB/w 35Hz		53
KEF 104/2 (inc KUBE equaliser) £895 (£994)	Very Good Good++	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound levels	90 x 28 x 41.5cm floor standing in free space	92dB/w 50Hz	R	60
KEF 107 £2025	Very Good Good+	A welcome sense of ease and lack of strain at most normal levels. Minor criticisms included a dulling in the extreme treble. Excellent bass extension	116.5 x 33 x 45cm on floor in free space	87.5dB/w 20Hz	R	60
Linn Helix £279	Average+ Good	Attractive presentation is coupled with an attractively lively sound which is more neutral if less committed than earlier Linn loudspeakers	51 x 25.5 x 28cm stands 1ft from rear wall	88dB/w 53Hz	R	66
Linn Kan 2 £339	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 wall	82dB/w 35Hz (in room)		78
Linn Nexus £379	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 supplied stands	89dB/w 60Hz		59
Linn Kaber £989	Average Good+	Discreet wall-mount package trades sensitivity for fine bass extension and midbass performance, can be a little reluctant but has prodigious dynamic capabilities	93 x 19 x 28cm floor against rear wall	86dB/w 28Hz (in room)	R	82
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
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 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 MG11a £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
Marantz LD20 DMS £170	Average Average	Recommended more for CD users than vinyl keepers, soundly engineered and built but should be heard before bought	36 x 23 x 24cm free space on 45cm stands	86.5dB/w 55Hz		53

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Marantz LD500MS £200	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	42.5 x 27 x 28cm stands in free space	87dB/w 50Hz	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
MB Quart 220 £270	Average— Average	The elaborate and pretty enclosure in a wide range of finishes works better than the drivers and crossover, which impose a lumpy balance	30 x 22.5 x 21cm stands in free space	87.5dB/w 80Hz		74
MB Quart 280 £340	Average— Average	Despite redoubtable build quality and good dynamics, the 280 has a rather 'obvious' mid bass and a balance that adds rather too much of its own character	44 x 27 x 29cm	88dB/w uncritical		78
MB Quart 390 £469	Below Average Poor	An aggressive, messy sounding design whose uncouthness undermines the positive level of detail	52 x 31 x 30.5cm open space, on stands	89.5dB/w 60Hz		59
Meridian M30 £775	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 761 £130	Average Good	One helluva speaker for the price, if a shade small and short of subtlety and refinement – should prove a worthy successor to the 70 and 700	38 x 21 x 21cm stands near rear wall	87dB/w 60Hz	BB	66
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 Cyrus 781 £250	Average+ Average+	Superb build, finish, presentation and engineering for the price, this romantic sounding Cyrus needs careful system matching to achieve good results	43 x 22.5 x 28cm medium stands near wall	88dB/w 40Hz (in room)		78
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 40Hz	BB	68
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
Mission 764 £450	Good Good—	Large floorstander has fine bass extension but limited dynamic range, and sounds 'lazier' than Best Buy 763	86 x 25 x 32cm 0.5+m from rear wall	86dB/w 43Hz		71
Mission 767 from £2500	Very Good Very Good	Magnificent and massive part-active monoliths have fine acoustic subtlety and impressive loudness capability, ultimately limited by partnering (Cyrus) electronics	138 x 29 x 43cm floor, flexible	91dB/w below 20Hz (in room)	R	81
Monitor Audio Monitor 7 £150	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 £190	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	84dB/w 40Hz (in room)		78
Monitor Audio R300/MD £250	Average Average—	An attractive 'large bookshelf' model that's handicapped by poor crossover and integration between paper cone bass and metal dome tweeter	47.5 x 25 x 30.5cm stands in free space	88dB/w 50Hz		71
Monitor Audio R352/MD £299	Average+ Good	A good value large box that sounds more engaging than subtle, providing a good compromise between bandwidth and sensitivity	64 x 25 x 32cm stands in free space	89dB/w 45Hz	R	66
Monitor Audio MA700/Gold £349	Good Average+	Lacks bass authority and timing, but could suit the smaller room, at the end of a CD-based system used primarily for classical music at modest levels	35 x 21.5 x 25cm stands, free space	87dB/w 48Hz (in room)		82
Monitor Audio R852/Gold MD £449	Good Good	Luxury build and 'high tech' tweeter or not, this compact model offers good refinement and detail on an open soundstage	45 x 25 x 26cm stands in free space	86dB/w 50Hz	R	66
Monitor Audio 1200 Gold MD £799	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/Gold £1299	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
Mordaunt-Short 3.10 £100	Average Average+	Probably the liveliest and most communicative miniature around, this beautifully presented design is probably better suited to budget 'real hi-fi' than the blandness of the midi system	28.5 x 17.5 x 20cm high stands near wall	84dB/w 50Hz (in room)	BB	78
Mordaunt-Short MS 3.20 £130	Average Average+	All the charm of its BB-rated £99 baby 3.10 brother, plus a smidgeon more bass for those in a suggestible frame of mind	35.5 x 18 x 20cm open stands against wall	85dB/w 50Hz (in room)	R	82
Mordaunt-Short 3.30 £180	Average Average+	A little too mid-forward for neutrality or formal recommendation, this attractive, good-sized model nevertheless has more than enough appealing qualities to merit serious consideration	46 x 23.5 x 27cm high stands 1-2ft from wall	87dB/w 38Hz (in room)		78
Mordaunt-Short MS100 £189	Average+ Average+	A 'mid forward' tonal balance is its main drawback but other aspects such as ambience, transparency and stereo depth compensate	32.5 x 22.5 x 21.5cm stands near wall	85dB/w 80Hz	R	46
Mordaunt-Short MS300 £319	Average+ Average+	Not considered particularly competitive in its class, though it has good power handling and stereo focus	54 x 22.5 x 25cm on stands near wall	89dB/w 65Hz		46
Mordaunt-Short 442 £1150	Good+ Good++	A resounding success with the listening panels. Make sure your room can accommodate the bass	95 x 26 x 38cm floor standing in free space	87.5dB/w 40Hz	R*	60
Musical Fidelity Reference 2 £199	Good— Good—	This compact wall-mount design with advanced drivers has good dynamics, balance and stereo, plus flashy styling and some midband 'boxy' coloration	38 x 25 x 20cm stands near rear wall	88dB/w 50Hz		71
Musical Fidelity MC-2 £299	Very Good Good++	This exceptionally clean and clear design offers real subtlety and finesse. Bass quality is light but exceptionally clear, the treble is smooth if slightly shallow	48.5 x 25.5 x 16.5cm open space and stands	87.5dB/w 65Hz	BB*	66
Musical Fidelity MC-4 £499	Very Good+ Good++	Achieving a very high standard, the MC-4 sounds detailed and coherent like the MC-2, but with more bass depth and solidity, and large image scale	56.5 x 26.9 x 29cm open space on stands	87.5dB/w 60Hz	R*	59
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 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 Cubix £1,100	Average Good	Too idiosyncratic for formal recommendation, the Cubix possesses remarkable bass extension for its size, but is tricky to optimise and has some aggressive tendencies	60 x 32.5 x 32.5cm low stands against wall	88dB/w 20Hz (in room)		78
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
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 bookcase	86.5dB/w 45Hz		66
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 and mechanical development	93 x 33 x 33cm on floor in free space	87dB/w 30Hz (in room)		78
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 stands, free space	85dB/w 28Hz (in room)		82
QLN Signature £1,100	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

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Quad ESL-63 £1690	Good+ 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 wall	84dB/w 34Hz	R	60
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 £180	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 £219	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 LS7t £399	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 Studio 1a £579	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
Rotel RL850 II £140	Average+ Average+	Strongly recommended. Well-balanced, clear, with decent focus and fine stereo, but tendency to 'heaviness' needs decent stands and space	44 x 25 x 24cm free space on 40cm stands	86.5dB/w 50Hz	BB	59
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 wall	86dB/w 75Hz	R	53
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 rear wall	87dB/w 85Hz	R	66
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
Ruark 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
SD Acoustics OBS £695	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 walls	92dB/w 30Hz (in room)	R	82
SD Acoustics SD1 £1150	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 Ribbon £2000	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 from walls	91dB/w 30Hz (in room)		81
Shan Shimna £280 (stands £75)	Average+ Good-	Pretty little miniature in cast mineral/plastics has limited dynamic range and could sound smoother, but integration is good and box effects slight	31 x 16 x 17cm stands near rear wall	84dB/w 65Hz	R	71
Snell Type C £2350	n/a Very Good	Pricey, yes, but an extremely capable loudspeaker. Musical and transparent; excellent bass extension	112 x 38 x 33 free standing away from walls	90dB 35Hz	R	65
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 in open space	86dB/w 52Hz	R	71
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 large room, free space	88dB/w 30Hz (in room)	R	78
Sony APM-181ES £300	Very Good Average	Big and beefy but also somewhat fat and bass heavy, this well engineered three-way has notable strengths but lacks transparency and sounds better at lower levels	57.5 x 29 x 36cm stands in open space	87dB/w 40Hz		71
Sony APM 66ES £700	Average+ Average+	Powerful heavyweight sound with a brilliant midband - clear articulate and transparent. But the bass is on the boomy side and the treble can sound grainy	66 x 38 x 36.5cm open space, low stands	89dB/w 60Hz		59
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 free space, stands	87dB/w 45Hz	R*	59
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 in open space	85dB/w 41Hz	R	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
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
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
Sugden CL £275	Average+ Good-	A thoroughly impressive and likeable near-miniature, the CL is prettily and properly built, and needs a good driving amplifier	35.5 x 18 x 26.5cm high stands in free space	86dB/w 35Hz	R	78
Tannoy E11 £129	Average Average-	Fundamentally turgid and slow, thanks to leaden upper bass and 'shut in' treble, though stereo images are convincing, as are the reasonably uncoloured vocals	39 x 21 x 22cm stands, free space	87dB/w 45Hz (in room)		82
Tannoy M15 £170	Good Average+	Somehow lacking the magic of its predecessors, the M15 remains a fine value compact that needs careful set-up to give optimum results	50 x 25 x 21cm Blu-tack to stands 1-2ft from wall	88dB/w 40Hz (in room)	R	78
Tannoy DC1000 £200	Average Average-	The smaller of two DC models with dual concentric drivers, the '1000 is much less well balanced than the larger, floorstanding '2000	50 x 24 x 25cm	91dB/w 53Hz		71
Tannoy DC2000 £300	Good Good	Remarkably high sensitivity from unique dual concentric driver that has an involving but characteristic sound. Bass could be better	68.5 x 26 x 27cm floor in free space	93dB/w 55Hz	R	66
Tannoy DC3000 £600	Good Good	Giving new meaning to terms like dynamic range and headroom, the magnificent '3000 is a must for those who enjoy high-level monitoring. But spare a thought for the neighbours	94 x 26 x 31cm floor 1ft+ from wall	94dB/w 30Hz (in room)	R	78
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 corners	96dB/w (manuf.)	R	Coll
TDL Studio 1 £549	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 low stands in free space	84dB/w 25Hz (in room)	R	78
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
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
Technics SB-RX50 £500	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
Toshiba SS33-M £100	Average Average	Providing a benchmark for budget loudspeakers, this Toshiba-inspired but UK designed and manufactured model is a lot of loudspeaker for the money, if a shade on the cheap	40 x 26 x 21.5cm stands in free space	86dB/w 55Hz	BB	68
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 soundstaging	91.5 x 28 x 46 free standing in room corners	88dB 27Hz	R*	65

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
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 Delta 30 £80	Good Average	Very clear and surprisingly neutral for the price, with good dynamics and stereo within limited volume ceiling	37.9 x 20 x 16.9cm near wall on high stands	88.5dB/w 80Hz	BB	59
Wharfedale Delta 50 £100	Average+ Average—	"There's nothing obviously wrong, but it seems a bit mundane," is what we said when the Delta 50 was £129. But since then the price has dropped by 30 per cent, making it great value	48 x 27 x 19cm near wall on 40cm stands	88dB/w 55Hz		53
Wharfedale Diamond III £100	Below Average Average—	This latest version of the long running Diamond sports a better tweeter, but bass, though deep, is soft, and the midband is indistinct and uneven	24 x 18.5 x 20.5cm near wall, stands	86.5dB/w 75Hz		59
Wharfedale Super Diamond £140	Average Average—	Although there are improvements on the basic "legendary" model, listening panelists did not get airborne about this upgrade	24 x 19 x 19cm close to wall at head height	88dB/w 57Hz		53
Wharfedale 504/2 £150	Average Average	Not strictly accurate, this musically involving miniature sounds unusually coherent and well integrated, if a shade dull in balance	29 x 18.5 x 19cm stands against rear wall	84dB/w 60Hz	R	68
Wharfedale 505/2 £180	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 507 £220	Average+ Average—	Generous in size but uningratiating sonically, the 507 doesn't seem to gel in the way the smaller 505.2 does, finding a good in-room balance difficult to achieve	49 x 25.5 x 29.5cm high stands 1ft+ from wall	86dB/w 35Hz (in room)		78
Wharfedale Coleridge £499	Average Good	Compact, beautifully finished and extravagantly engineered box sacrifices bass extension in the cause of high midband sensitivity; communicative, but can be a little unforgiving	48 x 26 x 26.5cm stands 1ft from wall	91dB/w 48Hz (in room)	R	82
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

* rating refers to original, tested model.

CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs

to be taken in choosing the best tapes for a specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.) Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price.

All modern hi-fi decks have Dolby B and the majority have Dolby C besides; the very worthwhile

HX Pro system is becoming steadily more widespread. Remote control remains rare, though sometimes it is available as a system option. Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research RD-06 £280	Average Average+	Acceptable middle market player with very simple facilities and cramped control section, but unusually good looks	Dolby B/C hx pro, fine bias, counter memory, repeat		69
Aiwa AD-F270 £90	Average Average+	An excellent budget machine, adequately equipped and satisfactorily built. Sound quality is in severe danger of transcending the price category	Dolby B/C, fine bias adjust	BB	75
Aiwa AD-F370 £130	Average Average	Adequate but uninspiring recorder with detail shortcomings but good control layout and successful sounding with recorded musicassettes	Dolby B, C, HX Pro, bias adjust		63
Aiwa AD-R470 £150	Average Good	For once, an auto-reverse deck with the performance of a decent unidirectional one at a similar price. The Aiwa is modern in concept and execution, and has good, transparent electronics	Dolby B/C/hx pro, auto reverse, cue & review, bias adjust	BB	69
Aiwa AD-WX777 £179	Very Good Very Good	Excellent, middle price dual deck with quick side change and a living, breathing sound – though prerecorded tapes sound bright	Twin auto-reverse, one records. Dolby B/C, fine bias	BB	75
Aiwa AD-F700 £199	Good Average—	Somewhat less than the sum of the (most fine) individual parts, this deck has an artificial quality which spoiled the efforts of a fine transport	Dolby B/C/hx Pro, fine bias, CD Direct input		75
Aiwa AD-F800 £249	Good Very Good	Close to first class performance – and superb value. The Aiwa is purposeful and finely engineered. It provides a near irresistible blend of good mechanics and electronics	3 head, dual capstan, Dolby B/C/hx Pro, tape calibration	BB	75
Aiwa AD-WX888 £249	Good Good	Inaccurate set-up spoils metal tape operation, but with other tapes the deck works well. This deck offers fine engineering, facilities and sound	Dual auto-reverse twin deck, Dolby B, C and HX Pro	R	75
Aiwa XK-007 Excelia £400	Good Good	Downmarket version of XK-009 with simplified bias/equalisation adjustment section and more forgiving but less informative sound. Still good, but less exciting than XK-009	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment		63
Aiwa AD-WX909 £400	Good Good	Convenience meets sound quality, and both win. An essentially clean, positive recorder which works alongside an auto-reverse player of lower standard – a sensible compromise	Dual deck, auto-reverse, track search, Dolby B/C/hx pro, bias adjust, 3 Head	R	57
Aiwa XK-009 Excelia £550	Very Good Very Good	Excellent detail, stable articulate midband and slightly obvious treble. The most interesting Aiwa for yonks	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment, CD direct	R	63
Akai GX-32 £170	Average Poor	Constrained and smeared sum this deck well. It has poor bass and treble definition alike, though it proved well aligned for prerecorded cassettes	Dolby B/C, variable bias, headphone out, track search		69
Akai GX-52 £250	Very Good Very Good	Well finished and a pleasure to use this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track locate features	BB	57
Akai GX-65 £299	Poor Poor	Uneven sounding deck with poor bass reproduction and dynamics. A pity this, because the deck looks and feels good	3-head, Dolby B/C/hx pro, optional remote		81
Akai GX-6 £330	Good Good	There is a strong sense that someone has really thought this one through; it has an indefinable 'specialness'	Real-time counter, track search, Dolby B, C, bias adjust	R	52
Akai GX-95 £400	Good Very Good	Well designed and finished cassette deck with features well judged to please the audiophile – especially switchable Dolby HX Pro and switchable panel display. The calibration system is simple and effective, and the deck sounds great	Dolby B/C/hx pro, 3 head, manual tape set-up	R	69
Denon DRM-400 £140	Poor Poor	Messy, confused sound terminally lacking in detail and space under all conditions of use due to high mechanical flutter levels.	Dolby B/C, memory stop, track search		81
Denon DRM-500 £180	Good Very Good	Powerful, refined and detailed sound, and an excellent transport are keys to the success of this cleanly styled addition to the range – but why no timer standby?	Dolby B/C/hx pro, variable bias	BB	75

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Denon DRW-750 £250	Good Good	Polished and articulate, the only significant shortcoming is poor performance with prerecorded material	Dolby B/c/hx pro, twin unidirectional, one records	R	69
Denon DRM-700 £250	Good Very Good	Sloppily executed (though attractive) user interface contrasts with a high standard of music making belying its modest price	3 head, Dolby B/c/hx pro, record return	R	81
Denon DRM-800 £330	Good Very Good	There are some niggling faults and limitations (no timer standby is particularly annoying), but as a means of recording music it sets a very high standard	Dolby B/c/hx pro, off tape monitoring, dual capstan	R	75
Goodmans GSW-5200 £90	Poor Poor	Musically unimpressive but at least it's cheap!	Dolby B, twin, one records		69
Grundig Fine Arts CCT-903 n/a (system component)	Good Good—	[Competent part of complete Grundig system]. Solid and well engineered deck with small but significant problems preventing it scoring highly. Basic design generally – and transport specifically – are excellent	Dolby B/c, twin auto reverse, one records		69
Harman Kardon CD491 £695	Good Good+	Excellent audio engineering and tremendous flexibility make this an audiophile cassette deck 'par excellence'	Real-time counter, auto reverse, track search, Dolby B, C, HX Pro, bias adjust	R	52
Kenwood KX-440HX £130	Average+ Poor	Uneven, unstable sounding player with limited resolving power, but good control layout and finish	Dolby B, C, HX Pro, intro scan		63
Kenwood KX-3010 £170	Average+ Average	Minor ergonomic shortcomings notwithstanding, this is a workmanlike deck that only misses recommendation due to an azimuth problem leading to very dull sound with prerecorded tapes	Dolby B, C, HX Pro, auto bias		75
Kenwood KX-4520 £260	Good+ Very Good	Some high frequency Dolby misalignment and obscure minor functions aside, this is a vital and engaging performer	Dolby B/c/hx pro, 3 heads, various search functions	R	81
Kenwood KX-5010 £270	Very Good Excellent	This important new middle price deck is a well thought through and thoroughly developed design which eschews gimmicks for the sake of musical excellence	Dolby B/c/hx pro, auto tape calibration, track/intro search	BB	69
Kenwood KX-9010 £400	Very Good Average+	Clean, detailed but flat and overtly hi-fi-ish sound quality makes the 9010 a little less than the sum of its parts.	3-head, auto tape calibration, Dolby B/c/hx pro, remote control		75
Marantz SD-40 £170	Average Average—	Transitory sounding electronics mar a basically good recording machine. Prerecorded material suffers from effects of Dolby pumping	Dolby B/c/hx pro, bias adjust		81
Marantz SD-50 £220	Good Very Good	Fine, exacting all-rounder offering good stereo, precision and focus. Good with prerecorded tapes too.	Dolby B/c/hx pro, track & intro search, variable bias etc	R	81
Marantz CP230 £300	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz SD585 £300	Average Average—	Sound quality is a little sat upon, and control ergonomics are somewhat opaque, though the twin auto-reverse/recording capability makes this a powerful machine	Dolby B/c, twin auto-reverse & record, parallel recording etc		69
Marantz SD-60 £350	Good Very Good	A first rate, highly capable deck offering energetic yet refined sound largely due to good electronic design	3-head, Dolby B/c/hx pro, variable bias & sensitivity	R	81
Memorex SCT-84 £200	Average+ Average+	The playback only transport is a little disappointing, but the record one is a quality item and the deck works well. Ergonomics are good, but styling and control feel are decidedly tacky.	Dolby B/c, fine bias, twin with auto-reverse record, unidirectional play	R	69
NAO 6300 £550	Very Good Very Good	Solid and homogeneous sound quality and very good replay compatibility thanks to 'play trim'. Distinctive, musical – and costly	Dolby B, C, HX Pro, 3 Head, bias adjust	R	63
Nakamichi CR-1E £345	Very Good Good	Modestly equipped by any standards, the CR-1E stands or falls by its build quality, which is high, and sound which is highly competent	Dolby B & C		57
Nakamichi CR-2E £395	Very Good Good+	Ordinary to look at, in some respects rather awkward to use (tape switching especially), the CR-2E sounds very slightly better than the CR-1E, and therefore ranks well. But it doesn't come cheap	Dolby B & C, bias adjust, remote control	R	57
Nakamichi RX-202E £545	Good Very Good+	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control system	Auto reverse, Dolby B, C, 2 Head	R	63
Nakamichi CR-3E £595	Very Good Very Good	The user interface is a little clumsy, though conceptually straightforward. Sound quality approaches the CR-4E, and is amongst the best at the price.	Dolby B & C, bias adjust, remote control	R	57
Nakamichi CR-4E £745	Very Good+ Very Good+	High class deck with a reasonably full range of features and superb sound at a slightly unlikely price	Dolby B & C, bias adjust, remote control, 3 Head	R	57
Nakamichi CR-5E £995	Excellent Excellent	A slightly simplified version of the all-conquering CR-7, the CR-5 has a very similar standard of audio performance – the best	Dolby B/c, fine bias, 3-head	R	69
Nakamichi CR-7E £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	Real-time counter, track search, Dolby B & C, tape alignment adjust, bias adjust, remote control, 3 Head	R	60
Nakamichi Dragon £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for musicassette replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote		60
Onkyo TA-2120 £130	Average+ Good	Clear, vivid sound with good timing and resolution when using Type II tapes without Dolby. The controls are less inspiring – the meters in particular are plainly inadequate	Dolby B/c, auto tape sensing, block/side repeat	R	63
Philips FC566 £179	Average+ Average+	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable – with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
Philips FC870 £250	Average Average	Disappointing at the price, this is a well equipped deck with off-tape monitoring, but a somewhat listless, smeared musical style	Dolby B/c/hx pro, 3-heads, track/intro search etc		81
Philips FC567 £279	Average Poor	Well equipped but ergonomically substandard; sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
Pioneer CT-225 £100	Average+ Average—	At last – a cheap Pioneer with auto-tape select! Well specified ultra cheapie, but poorly set up, especially for commercially recorded material	Dolby B/c, track search		81
Pioneer CT-335 £150	Average Average	Mostly satisfactory mainstream deck, at its worst with prerecorded material which sounded edgy. It made very good Type II recordings	Dolby B/c/hx pro, track search		81
Pioneer CT-445 £180	Good Good	Exactly engineered and fine sounding deck with a strict emphasis on function. Best with good Type IIs	Dolby B/c/hx pro, electronic counter	BB	81
Pioneer CT-656 £250	Good Good	Well conceived and executed low cost 3-head recorder. It benefits from and makes good use of metal tapes, but is never less than couth and stable sounding – even with ferric tapes	3 heads, off tape monitoring, fine bias, Dolby B/c/hx pro	R	75
Pioneer CT-737 Mk II £350	Good Average+	Easy to use and sensibly equipped, the CT-737 is much improved, but sound quality is still a tad lacklustre	3-head, Dolby B/c/hx pro, manual record bias/sensitivity		75
Pioneer CT-91a £500	Very Good+ Very Good+	Superb, near state of the art recorder with an excellent dual capstan transport and very capable electronics. At the price, this one is a mould breaker	3-head, tape calibration, Dolby B/c/hx pro	R	75
Revox B215-S £1,826	Very Good Very Good+	This is a superbly engineered deck with a classically fine performance that almost transcends the stereotypes. Ergonomics are flawed but the user interface is both powerful and flexible	3-head, dual capstan, Dolby B/c/hx pro, auto calibration	R	75
Rotel RD-845 £130	Below Average Good/Poor*	Extremely fine transport and clean sounding electronics for the price. Bass lacks weight, but deck works remarkably effectively with chrome tapes. *See text	Dolby B/c, manual tape selector	R	81
Rotel RD-865 £200	Good Very Good	Fine, architecturally solid sound quality in a package with a low gimmick count and strong audiophile appeal	Dolby B/c/hx pro, fine bias	BB	75

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CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
SAE C102 £549	Average+ Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dolby B & C		52
Sansui D-X301i £180	Average+ Good	Lively, informative and well equipped basic deck, if rather obscure operationally	Dolby B/c/hx pro, variable bias, track search	R	69
Sansui D-X501 £230	Poor Poor	Unhappy mixture of good looks, excellent ergonomics and mediocre, sometimes poor sound	Dolby B/c, random track search		81
Sansui D-X701 £340	Average Average	A little flat and smeared under some conditions, this design is at its best with metal and prerecorded tapes	Dolby B/c, 3-head, variable bias & output, track search		81
Sony TC-FX110B £90	Poor+ Poor+	Woolly bass and scrappy treble combine to make a meal of many music types, despite accurate response shapes with most types of tape. Prerecorded material sounds dull	Dolby B/c		75
Sony TC-TX55 £150	Average Average+	The sound quality ranking is a good one for an auto reverse machine at this price level. Clean, sharp sound, only slightly let down in the deep bass.	Auto reverse, Dolby B, C & HX Pro	R	75
Sony (WMD6C) ProWalkman £249	Good+ Very Good	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket"	Dolby B, & C	BB	60
Sony TC-RX60ES £250	Average Average	For once a stable sounding auto-reverse deck but sound quality is rather 'dirty' and compressed, especially with Dolby C	Auto-reverse, Dolby B/c/hx pro, auto tape recognition		63
Sony TC-K630ES £300	Average- Average	Acceptable-to-good sounding deck despite some measured shortcomings. At its best with metals; lacks vitality with lower bias tapes	3-head, Dolby B/c/hx pro, bias adjust		81
Sony TC-RX80ES £350	Average+ Good	Clean, powerful and detailed sound, especially without Dolby C. Stable pitch - but prerecorded cassettes sounded disappointing	Auto reverse, Dolby B/c/hx pro, bias/level adjust	R	63
Sony TC-K730ES £500	Very Good Very Good+	First rate cassette deck that scarcely betrays it is a cassette deck on audition. Features and control wise, it feels a little dated	Dolby B, C, bias and equalisation adjust	R	81
Teac V-270C £89	Average- Average-	Not quite cheap enough to compete solely on price, the V-270C is a rather messy and unstable sounding deck	Dolby B & C, bias adjust		63
Teac V-480 £129	Average Average+	A rather utilitarian model, the V-480 just makes it on to our recommended list by virtue of a clean, open sound that to an extent transcends the measurements	Dolby B/c/hx pro, fine bias	R	75
Teac V-470 £129	Average- Average	A low grade transport is allied to respectable electronics to give sound quality ranging between acceptable and good. Prerecorded tapes sound bright	Twin deck, one records, Dolby B/c, intro-search		75
Teac V-870 £349	Good+ Good	Cut-down V-970X for the proletariat. Expensive and carefully engineered with mostly very good but slightly cold sound quality	Dolby B, C, HX Pro, 3 Head, manual tape calibration	R	63
Teac V-970X £449	Very Good Very Good	An excellent sounding deck with useful features (tape calibration etc) that fully justifies the price	Real-time counter, track search, Dolby B/c/dbx & Dolby HX Pro, bias adjust, remote control, 3 Head	R	57
Teac W-990RX £445	Good Good	A mess with dbx, but taut and articulate otherwise. The 990, though expensive, has a powerful range of features, making it one of the few really ambitious decks to successfully straddle both sets of requirements	Dolby B/c 9 dbx, dual auto-reverse/record, parallel & sequential recording, remote	R	69
Teac R-919X £489	Very Good Average	Superbly equipped, yet usable - and well built too. But sound quality is something of a disappointment at this price level, being appropriate for a model about half the price	3-head auto-reverse, tape calibration, Dolby B/c/hx pro/dbx		75
Technics RS-B555 £160	Good+ Good+	Very good value. Resolution, stability and quality of set-up are strong points, a slightly strained, synthetic quality is sometimes apparent	Dolby B/c/hx pro, bias adjust, track search	BB	81
Technics RS-TR255 £160	Average Average	Neat, sensibly designed middle of the road dual transport recorder, suitable where the ability to dub tapes is a particular priority	Twin transports, one records and auto-reverse, Dolby B/c	R	75
Technics RS-B655 £200	Good Very Good	Excellent middle price deck, well equipped with a not over-refined but highly articulate and crisply defined style of musical presentation	Dolby B/c/hx pro, bias adjust, track search	BB	81
Technics RS-TR355 £200	Average Average	Serviceable middle market dual deck without serious fault but with some annoying inadequacies, notably an inability to play side A and B and then stop	Twin auto-reverse, one records, Dolby B/c/hx pro		75
Technics RS-TR555 £300	Average+ Average	Sound quality varies with mode of use, but is rarely less than competent, and is often highly enjoyable. dbx is best avoided	Dual auto-reverse/dual record/Dolby B/c/hx pro & dbx	R	81
Technics RS-B905 £350	Good Good	Good, well set up cassette deck with a clean, accurate sound but some compression. dbx circuit sounds poor	Dolby B, C, HX Pro, dbx, bias adjust, 3 Head		57
Yamaha KX-230 £140	Average+ Average+	A strong near-budget performer, the strengths include good overall sound, excellent search aids. Weaknesses: ergonomics, soggy bass with prerecorded material	Dolby B/c/hx pro, variable bias	R	75
Yamaha KX-300 £160	Average+ Average-	Uncommonly well equipped and adequately made and presented, this model turned out to be a disappointingly uncertain proposition on audition	Track search, Dolby B, C, HX Pro with 'play trim', bias adjust, remote control		57
Yamaha KX-500 £210	Very Good Very Good	An accomplished performer, strongest in the areas of pitch and spatial stability, but slightly rough around the edges	Real-time counter, track search, Dolby B/c/hx pro with play trim, bias adjust, remote control	R	57
Yamaha KX-630 £300	Good Very Good	Well equipped and immaculately presented, offers fine, articulate music making with a bias towards high bias tapes, especially metals	3 head, Dolby B/c/hx pro, optional remote	R	81
Yamaha KX-800 £330	Good Average	The present Yamaha range seems oddly inconsistent. This sophisticated model sounds fine (almost) but came a clear second best to the KX-500	Real-time counter, track search, Dolby B, C, HX Pro with play trim, bias adjust, 3 Head		57
Yamaha KX-1200 £500	Excellent Average+	A veritable rats' nest of buttons and dials, albeit well laid-out. This is nearly a great recorder, but lacks simplicity of sound	Real-time counter, track search, Dolby B, C, dbx, HX Pro, bias adjust, remote control		52

DAT RECORDERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa Excelia XD-001 £1300	Very Good Very Good	Clear and very listenable recorder roughly comparable to but slightly sweeter sounding than the Sony DCT-1000ES - but with an inferior front panel design	Track ID and search, remote	R	63
Grundig Fine Arts OAT-9000 n/a (system component)	Good Good	Conventional DAT recorder offering standard facilities. The deck is well made and equipped, and is engineered to a satisfactory quality standard. It performs to an acceptable standard, though it is not state of the art	2/4 hour recording, mic inputs, digital in/out		69
Luxman KD-117 £1499	Good Good	Slightly soggy, earth-bound sound quality, this model trails the other DAT decks tested so far	Two analogue inputs, remote twin address		63
Sony DTC-M100 £799	Very Good Very Good	Clean, clear sounding 2nd generation model with most of the features and sound of the DTC-1000ES	Mid-width, alpha-numeric display, remote, optical interfaces	R	63
Sony DTC-1000ES £1299	Very Good Very Good	Fine, consistent performer with accomplished tape handling and good build quality	Standard track ID and search, remote	R	63

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THE DIRECTORY

CD PLAYERS

This all-digital music source is well established, despite still high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise with automatic and programmable play, plus track skip and fast music scan – frequently under full remote control. However, many vinyl enthusiasts find CDs sound less involving than

top quality vinyl replay

Introduced five years ago at around £500, CD players now average less than half that price, and for the main offer improved performance besides. Even cheaper players may have the latest decoding chips and the most useful play features; extra money can buy remote control, remote volume control, audio 'tweaks', plus improved build and component

quality control.

Compared with many hi-fi components, CD players give impressive lab performance, though there are differences between players nonetheless. **Sound quality** variations are even more marked, particularly in a good quality system. As it behaves very like a preamp, there are no problems connecting a player to a normal amplifier

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
ADC CD 2000E £330	Good + Fair +	One of the slimmest players in the business but nothing special inside. Nice ergonomics but overpriced	Remote, timeshared 16 bit		64
Aiwa OX-M45 £149	Fair Fair	Cutdown Philips technology, but results are quite good for this British made machine	Manual	R	64
Aiwa XC-005 £280	Average Average +	Very comprehensively equipped including double digital and audio outputs. The average performance was still sufficient for recommendation at this price	Power vol, edit-dubbing, shuffle 2 digital op	R	76
Aiwa CD-001 £300	Good Good	Pretty close to Recommendation, delivering a respectable sound quality and lab performance from an ergonomically attractive package, but ultimately failed to excel in any particular respect.	Track entry/volume remote, direct recorder connection etc.		58
Aiwa XC-007 £499	Very Good Good	Creditable sound despite inverted output, high tech engineering with very good lab performance. A worthy contender but not cheap	Remote, keypad, timer, digital output, pseudo 20 bit, dual DAC		64
Akai CD 558 £230	Good Average-	Budget model which fails to compare with the CD52	Remote, hdph, Good programming		83
Akai CD-52 £249	Good Good	A nice surprise from Akai, genuinely good sound from this mid-priced model. Better linearity will help further	Remote, digital output, headphone socket	BB	64
Akai CD-62 £330	Fair Very Good	Looks, build quality and the technical specification are right up to date. As it stands it sounds very good but if the indifferent lab performance could be improved, it would probably sound even better.	Remote, programme, hdph, comprehensive display etc	BB	70
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
Akai CD93 £700	Good Very Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation – though that's not to dissuade lovers of black lacquer wood finish.	Track entry remote, menu display etc.		58
Arcam Delta Black Box £260	n/a Very Good	This rich, powerful and articulate sounding DAC transforms the majority of medium price CD players	Needs D-out CD players	R	60
Arcam Black Box II £300	Very Good Very Good	An addition to the BB I, it also offers improved sound and more inputs	Optical and wired input digital decoder	BB	76
Arcam Alpha £375	Very Good Very Good	Arcam's new star, its best CD player yet and great value	Remote, hdph, etc, coax dig. out	BB	83
Arcam Delta 70 II £600	Very Good Good	Now in Mk II form a further improvement is seen in features, performance and sound quality. Solidly built and British	Now adds simple remote vol + std features; also display off	R	76
Arcam Delta 170 Transport £600	Very Good Very Good	While no bargain, this is a well made metal boxed transport providing clean digital data for outboard decoder/processors	Transport only, display off, usual programming	R	76
Carver TL 3100 £340	Average Average-	The sound quality did not live up to the excellent fascia. Carver's DTL did not aid the indifferent sound	DTL sound shaping, usual facilities, remote, memory		76
Carver TL-3300 £700	Good + Poor	Carver needs to listen critically to CD sounds; in our opinion, DTL does not improve the recipe	DTL, remote, programming, digital output		83
conrad johnson DFI £1,995	Average- Good +	Setting a decent standard and including an FET line preamplifier, the unusual DFI is worth investigating	Line preamp built-in, simple remote facilities		76
dbx DX5 £640	Good Poor	Sound quality proved a single disappointment, though it's refreshingly unique in providing semi-pro post-production facilities that some users will undoubtedly relish.	Track entry/volume remote, compression, impact recovery, ambience etc		58
Deltec PDM-One £500	Average Very Good	A no frills audiophile bitstream converter at an affordable price	Coax-in, special cable and mains filter options	R	83
Denon DCD 620 £180	Average + Average-	Not competitive on performance though feature pack is good	Hdph + vol, edit, remote		83
Denon DCD820 £270	Average + Average-	A powerful combination of features and build for the money ensures recommendation. The sound is just good enough	Well equipped, power vol, edit etc, digital out	R	76
Denon DCD 920 £320	Good Average +	Highly featured and well presented but unexceptional performance	Everything! inc remote volume		83
Denon DCD1420 £400	Very Good Average	Superbly equipped with a fine lab performance, this modern player needs a touch more sonic spice to get recommended	20-bit, very comprehensive, remote, power volume etc		76
Denon DCD-1520 £550	Very Good Very Good	High tech, high profile, high gadget content, good sounding player at an almost affordable price	Programme, hdph socket, remote, track entry, optical digital output	R	70
Denon DCD 3520 £1000	Very Good Good +	Built like a battleship this new model takes its place at the top of the Denon range with a smooth and powerful sound, quite free of graininess	Composite 20-bit DACs, full programming features	R	72
Ferguson CD007 £130	Good Fair	The cheapest recommendation in the test group; don't expect the earth but the value is good	Manual, digital output, headphone socket	R	64
Ferguson CD008 £150	Fair Fair	Not as strong as its relatives, sample fault perhaps? Though performance is fair enough overall	Remote, midi digital output, 2x 0/s, timeshare 16 bit		64
Goodmans GCD300 £129	Average Average	It may be adequately made, but with cheap good sounding players available this particular Goodmans isn't quite good enough	Programmable, skip, search, repeat		70
Goodmans GCD530 £140	Good Poor	Old fashioned sound, cheap and cheerful, includes remote	Simple remote, basic controls and programming		83
Goodmans GCD550 £199	Average + Fair +	A slow autochanger with a weakish lab performance but the sound is fair enough, the features good and the price is low	Remote, 6 disc autochanger, 2x 0/s	BB	64
Goodmans GCD555 £219	Average Average-	Scores approval on grounds of low price. You must pay more for better sound and a faster mechanism	6 disc changer, 32 track memory, remote etc	R	76
Grundig CD9000 £1000	Good Good	Aimed at a market which puts external styling above sound quality. Although this player is of slightly above average competence in most departments it is expensive	Remote, programme, hdph socket, calendar display etc		70
Harmon Kardon HK7300 £199	Average Average-	Budget low bit technology, does not deliver enough for a recommendation	No remote, no digital out; basic control features		83

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Harmon Kardon HK7500 £299	Average+ Average	Decided improvement over 7300 in all respects. Still fairly unimpressive sound	Remote, hdph + vol, remote vol, good programming, A-B repeat etc.		83
JVC XL-Z1010 £499	Good Average—	Despite some high tech design and a good lab result this model did not deliver good sound quality	32 track prog., disp off, auto fade, 2 digital op		76
Kenwood QP-8020 £500	Excellent Very Good	Fine build and finish, a fine performer in the lab, and in sound quality	Comprehensive remote inc volume, display off, opt & coax digital output, versatile	R	83
Marantz CD50SE £330	Very Good Very Good	Souped up CD50 delivers reference performance in its class. Worthy successor to the '65SE legend	Full remote, power (7 step) volume. Hdph, (fixed). FTS disc memory. Good programming	BB	83
Marantz CD60SE £380	Very Good Very Good	Luxury '50SE with superior remote volume and variable headphone socket; a fine performance all round	Optical digital output, full remote, power vol. FTS, hdph	BB	83
Marantz CD12LE £2800	Very Good Excellent	This top of the range two-box player may be very expensive but it is very well made. Technical performance is very good and the sound is the best from Marantz yet	Two box, digital processor, FTS, optical connection, hdph socket, comprehensive display, balanced output etc	R	70
Meridian CD206 £800	Very Good Very Good	Fine build, finish and styling, very good sound, classy	Good programming, remote, coax digital output	R	83
Meridian CD208 £1490	Excellent Excellent	State of the art CD sound combined with a decent preamp and full remote control	Opt & coax dig. output, fixed and variable output. Hdph + remote level. Programming, phase invert	R	83
Micromega COF1 Classic £1400	n/a Very Good	A very well made and stylish player from France, the COF1 is a CD player for analogue lovers or as close as we've come across	Basic remote, digital output, suspended chassis	R	72
Micro Seiki CDM100 £3850	Very Good Good	One of the hernia inducing bricks of hi-fi, the Micro is extravagantly styled, finished and built. The good lab performance led to an 'only good' sonic display when the price demanded excellent	Balanced output, remote, display blanking		72
Mission Cyrus PCM II £400	Very Good Good+	Improvements in price and performance keep this classic remote player in the running	Remote vol, phase inv, display of, dig op. PSX option	R	83
NAD 5320 £169	Average— Average—	A low cost player devoid of features but at this low price it should still offer better sound	Budget facilities, 20 track program		76
NAD 5220 £230	Average— Poor	Conforms sonically to a stereotype of the medium that most players have grown out of. Hard, thin and raw sound with poor stereo and resolution.	Time/track display, memory		62
Nakamichi OMS-1E £395	Good Good	This neat enough player doesn't really follow the Nakamichi tradition of providing exceptional sound quality while at the same time perpetuates that of selling at an above average price	Simple remote etc.		58
Nakamichi COP-2E £495	Very Good Good	It's ergonomically superior and has above average sound, but it isn't cheap. The standard of build quality and finish is first class which isn't quite matched by the sound quality	Programming, hdph, remote track entry, digital output		70
Nakamichi OMS-4E £1200	Very Good Very Good	Solidly controlled and comparatively simple this clearly represents one of the major benchmarks for CD sound quality, though the midrange sounded a touch thin	Skip and scan, headphone socket		51
Nakamichi OMS-5EII £1500	Good+ Very Good	"... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price..."	Skip and scan, simple track programming, manual control		51
Nakamichi OMS-7EII £2000	Good+ Good	The only serious criticism here is of the price. And in our not always humble opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry keypad programming, headphones		51
Onkyo OX-1500 £170	Average Fair	Ruled out on the grounds of its poor DAC filter, but it's not so bad really given the price	Manual, 2x 0/s, timeshared 16 bit		64
Onkyo OX-7500 £490	Good Very Good	This comes close to the state of the art performance in many areas. It has lots of facilities and is well made too.	Key pad remote, memory, hdph, comprehensive display, optical output etc	R	70
Philips CD610 £160	Average+ Average	Built down to the price the sound is OK while the package performance and features constitute fine value	Remote, hdph, programming etc	BB	76
Philips CD630 £250	Very Good Good	Large clear display with an international flavour. Strong Philips style, high value CD player	FTS, digital op, versatile programming, remote, remote vol (7 steps) hdph (fixed)	R	83
Philips CDC875 £300	Average+ Average—	The changer works well and this machine is very well equipped. The sound quality is below par but may not matter too much in its likely 'muzak' application	6 disc changer/dig op remote, hdph, memory, shuffle		76
Philips CD840 £350	Good+ Very Good	Philips best yet and bitstream too! Very versatile programming and easy to Recommend. Fine stereo imaging for price	FTS, hdph + vol, full remote programming	BB	83
Philips COV185 £350	Average+ Average	Hard to value with the video singles facility but it all works well enough for a recommendation	Video singles + CD scart + digital out etc	R	76
Pioneer PD9300 £499	Excellent Average	A mid price flagship of excellent build and lab performance but only average sound – interesting though	Remote, 24 track programming, 2 digital op		76
Pioneer PD-91 £899	Excellent Very Good+	Close to state of the art in nearly all areas – soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player	Track entry remote, calendar display, index search, etc.	R	64
Proton AC-120 £180	Average Average—	Fine styling, low price but barely average performance	15 track memory, simple design, remote, hdph		76
Revox B126 £649	Very Good Good	Made in Switzerland so the build quality and technical performance is high but then so is the price and the sound quality is only good	Programming, Revox remote system compatible		70
Revox B226S £840	Good Average	Top quality build and finish for the Revox system enthusiast. For high value sound look elsewhere	Remote vol, hdph, 19 track memory, digital op		76
Rotel RCD855 £250	Good Good+	Stripped for action this well built Philips technology player delivers fine performance and sound First rate value	Remote, 20 track prog, 1 audio op, 1 digital op	BB	76
SAE D102 £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved, though styling is unusual.	Remote (inc volume), skip, scan etc.		58
Sansui CD-X711 £550	Excellent Very Good	Luxury features, finish and sound from this classy Sansui; no excuses required here	Balanced and normal op, Digital; opt & coax; hdph + vol, remote full programming	R	83
Sharp OX150 £129	Fair Fair	This is a none oversampled player which is rather outclassed for technical and sonic merit by the vast majority of the competition. Pretty enough but would you want to put discs in it?	Programmable, skip, search, repeat		70
Sharp OX750 £179	Fair Fair	It has a remote control but it's too like the 150 which is rather outclassed for technical and sonic merit by the vast majority of the competition	Remote, programmable, skip, search, repeat		70

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Shure Ultra D6000 £495	Average+ Fair	Ergonomically well thought out with full function remote control, but not really scoring sonically considering its price	Remote control (full function inc volume)		51
Sonographe SD1 (by CJ) £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player	Full search programme and timing	R	51/Coll
Sony COP-M47 £160	Good+ Average-	Clean styling, rock bottom price, near music centre performance	remote, hdph + vol, edit-fader, good programming. No digital op		83
Sony CDP-770 £200	Average Average	Very well equipped player with good ergonomics belying the moderate price. Average overall performance	Remote, remote vol, hdph + vol, edit, fade etc	R	83
Sony COP-228ESD £400	Very Good Average+	Good value, this is Sony's best mid price design and comes superbly equipped	hdph, remote, rem vol, custom file	R	76
Sony COP-338ESD £600	Excellent Good	Only a bit better than the 228 the 338 is a good machine, but not quite good enough for formal recommendation at the price	Custom file, remote, rem vol, hdph, shuffle etc, 2 digital op		76
Sony 557ESD £1000	Excellent Good+	Superbly built flagship model that produced excellent lab results and very good sound. Many luxury features though not that good value	Full remote, disc directory, digital output, power volume, 8x O/s, 18 bit		64
Sony CDP-X7ESD £1300	Good+ Average	A Sony flagship, build and finish is exemplary, styling is unusual but the sound is just average	Custom file, remote, 2 digital op, balanced audio + phonos		76
Sony CDP-R1/DAS-R1 £5000	Very Good Excellent	Sony has aimed high with the R1 and in some ways has created the reference player. Build quality is amazing and it offers a high level of facilities. One or two faults were revealed in both the lab and the listening, but it's generally excellent	Two box, dual optical connection, digital processor, FTS, remote		72
Stax Quattro £2995	Very Good Very Good	Now in mkII guise this substantial player recreated exceptionally strong and convincing bass lines together with a beguilingly musical midband	18-bit DACs, 20-track memory, full IR remote, variable o/p	R	72
Teac PD470LE £279	Average Average	With the LE upgrade the 470 has improved to a just average position	Remote, hdph, 20 track prog		76
Teac ZD880 £450	Good Fair	Decent enough in most respects with a very good build and finish. Its sound isn't competitive enough to inspire any real enthusiasms	Remote, track key access, auto space, comprehensive display, hdph socket etc		70
Technics SL-P227A £160	Very Good Average+	High value, budget priced, yet well equipped and finished, a strong example in its group	Remote, programming, hdph + level. No BB digital op.		83
Technics SL-P550 £220	Very Good Average	Superb, slick presentation, well equipped, average sound, fine build	Remote vol (6 steps) hdph + var, remote programming, edit/fade, digital optical only		83

CD MIDI SYSTEMS

So you want a hi-fi, but you don't want to make a fuss about it. A pre-packaged system with everything matching up and no aggravation may not rank with carefully chosen separates on **sound quality**, but there's no denying the attractiveness or popularity of this approach – the market for pre-packaged component hi-fi systems is at least as big as that for separate items, even ignoring the vast numbers of low-cost single unit stacker systems. The arrival of compact disc led to a new fashion for shelf-standing compact systems, or 'midis' as

they are known in the trade, as a replacement for earlier floor-standing rack systems (themselves the upmarket development from music centres). Only some 330mm wide, midis can more or less match full-size (430mm) rack components for performance, and are certainly cheaper to make, ship, sell and buy.

Whereas specialist hi-fi is moving steadily towards ultra-simple 'no frills' components, midi systems tend to be sold on a feature count at a price point, usually with little opportunity for

demonstration and comparison. Our test programme includes extensive auditioning and lab testing, while making allowance for the different aspirations of designers and expectations of users. Key features valued highly by customers include system remote control, automatic switching, double 'dubbing' cassette decks, and elaborate equaliser tone controls. And the top end of the market is developing with surround sound audio/video-ready packages.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa X-D80K £550	Poor Poor	Congested and harsh sound quality, the cassette deck, amp and loudspeakers being well below par. The built-in timer adds some operational flexibility	Auto-reverse, CD synchro record, remote, timer		77
Aiwa X-D100 £1000	Average- Fair	Very fully equipped with wide ranging in and outputs but poor upgradeability. Sound quality is reasonable on the whole	Digital & optical in/outputs, dual auto reverse, disc file CD etc		77
Ferguson HFD28 £300	Poor Poor	Similar to Goodmans 5000 system but with greater power and marginally superior sound	One-piece, semi-remote		77
Goodmans 5500 £320	Poor Poor	It offers the basic features (but no Dolby or magnetic cartridge) and rough and ready sound	One-piece, remote		77
Goodmans 5300CDM £400	Average- Average+	Crisply styled system with gutsy amplifier and sophisticated speakers. CD player works well, other sources are variously mediocre	Combined cassette/tuner/amp, plus T/t and CD with remote	R	65
Goodmans Maxim-Midi System £520	Average Average+	De-luxe version of 5200 system – very good value for money and readily upgradeable. Sonics rough but OK and speakers good; CD crude	All separates with twin cassette	R	54
Grundig Studio Line 1 £330	Poor Average+/ Poor	Intriguing package with warm, woolly but attractive sound let down by poor attention to detail and suspect cassette deck. Amplifier appears to be inadequately protected	CD/cassette tuner plus preset equaliser		77
Hinari DK200 Disc Deck £300	Poor- Poor-	Confused user interface is matched to inadequate electronics. Poor – and poor value	Single unit, two cassettes, CD, tuner, remote		77
JVC Midi-W900CD £1111	Good Good+	A competent allrounder, with important convenience related features, and powerful linked recording facilities. Less strident speakers would be appreciated	Separates system, equaliser, auto-reverse cassette	R	65
JVC Midi-W91CDM £1111	Good- Average	Very well equipped (viz. multi-disc player, powerful tape related features) with acceptable but rather nondescript sound	Multi-disc player, twin auto-reverse cassette, equaliser		77
Marantz MX493AVCD £549 with LD20 speakers, £449 without	Average Mixed	Good source components (ex cassette) let down by poor amplifier. Flexibility is strong point, and the system may prove attractive where the A/v possibilities can be fully utilised	Twin auto reverse, opt speakers, surround processor etc	R (with LD20)	77
Marantz MX583 £750	Average- Poor	The system has potential in an A/v context, but is patently lacking in a purely audio one. Only the CD excels	Component system with A/v amp, no speakers		65
Marantz MX673CD System £900	Average+ Average	Tremendously flexible audio/visual system. Sound quality is satisfactory at best and ergonomics a mess	Various A/v inputs, remote, speakers optional		54
Pioneer S-11 £510	Average- Average-	Fine lower middle market system, with one useful extra – the built in timer. Only the record deck is disappointing	Twin auto reverse cassette, built in timers, one piece amp/cassette		77
Pioneer S-330D £1080	Very Good Very Good	High standard of reproduction on all sources, though mistracking with Dolby C was a limitation. There are few gimmicks and plenty of fine engineering	Dolby C/hx pro, multi-disc, amp with DAC etc	R	77
Proton AI-3000 £550	Good Good	There are a host of minor problems, including no LW, but the unit is attractively packaged and can be made to sound very good despite a woolly sounding amplifier	One piece CD, cassette, tuner and amp, remote	R	65

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CD MIDI SYSTEMS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Sanyo 39CD £260	Poor Average-	Acceptably compromised basic low end system, offers broadly respectable if unambitious music making for those on a tight budget	One piece + CD, non-remote, manual tuner		77
Sanyo 49CD £300	Poor Average-	Similar to 39CD, but with Dolby B, preset tuning, remote control and more power. Audio wise, it's more of the same, but there's greater stature when loud and cassettes are helped by Dolby B	One piece + CD, partial remote control, digital tuner	R	77
Sanyo 59CD £380	Average- Average-	Adequate performance overall, though endemic lack of pitch integrity takes edge from tape and records. Some inconsistencies in control system too	As 49CD, + full remote, auto source select, separate turntable		77
Sharp CD-X17E £550	Average Average+	Highly specified miniature with detachable speakers. AC mains power only. Good sound let down by crude upper midband and treble. Expensive for what it is	CD luggable with dual cassette & tuner, detachable speakers		77
Sony Compact 301CD £400	Average- Average	Mainly crisp, articulate sound and excellent ergonomics offset by modest FM results and lack of pitch integrity on cassette	Twin unidirectional cassette, equaliser, 30 preset tuner etc		77
Sony 501CD £500	Average Average	Fair all round performance except noisy FM. Ergonomics and visuals good, but no auto source select, tuner stereo defeat	Twin auto-reverse, 3-band tuner, equaliser etc	R	77
Sony Compact 701CD/711CD £700/£800	Average+ Good	Sound quality good all round, though cassette pitch accuracy is below par. Features average but system control is weak	Twin auto-reverse, graphic equaliser (711 only), 30 preset tuner	R (701CD)	77
Technics X900CD £470	Average Average-	Good build and mostly good sound is offset by mediocre amplifier and loudspeaker and some operational oddities	Main cassette/tuner/amp, separate T/t and CD		65
Technics X1 £500	Good Good	Superb value for money from a system with solid straightforward engineering at an attractively low price	Auto-reverse record transport, auto-disc/tape editing, surround sound, remote	BB	77
Technics X5D £800	Very Good Very Good	A mainstream system offering considerable flexibility and power in a traditional suit of clothes, and embodying values that place music first	Twin auto-reverse, tuner/timer, auto record deck, digital amp	R	77
Yamaha AST-C10 £600	Average+ Very Good	Brilliant if flawed luggable with weighty, powerful bass, and a rare combination of expressiveness and clarity unprecedented from such a small package. Good features.	Mains portable twin cassette/CD/radio system detachable speakers, remote	R	77

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 receiving 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) across

the 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.)

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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 £120	Good Average+ +	Attractively classic British analogue tuner with sound quality comfortably better than most	FM/am analogue	BB*	50
Arcam Delta 80 £300	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
Harman Kardon TU920 £299	Good Average	Rather weak sound quality for the price despite good lab test results	16 presets, AM/fm, digital auto scan, active tracking		55
Harman Kardon Citation 23 £559	Good Very Good	Fine performance, interesting features and ease of use are this tuner's forte, and the sound quality is top notch	FM/am seek/manual adjustment muting 16 presets remote control	R	60
Kenwood KT-66DL £130	Fairly Good Fairly Good	You get your money's worth of gadgets and the radio's basically sound although programming is complicated. AM - fairly good	Timer, clock, all bands	R	65
Kenwood KT-1100D £300	Good+ Good+	Behind a gaudy and rather useless display the radio is much better than you might first think. AM - good	Firework display, FM/mw bands only	R	65
Linx Theta £400	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 ST35L £125	Good+ Average-	It works well enough but the sound could be better for the money	16 presets, AM/fm, digital auto scan, active tracking		55
Meridian 204 £525	Good+ Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, clock timer		55
Musical Fidelity TI £300	Good+ Very Good	Top class FM stereo sound on good signal strengths from this audiophile model. Watch out for local CB!	FM only, analogue box dial, manual tune, signal meter	R	55
NAD 4020 £139	Good Average+	Not the quietest or most sensitive tuner tested, it still provided good sound for the money, being "musical and ambient"	Analogue FM/am	BB	50
Naim NAT 01 £1098	Very Good Very Good	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, Schotz enhanced sensitivity, auto time digital		55
Onkyo T9090 II £590	Very Good Very Good	It has most of the facilities you could possibly want and more beside. Lab performance and sound quality are both good enough to ensure recommendation even at this price	FM only, digital, 20 presets, auto scan etc.	R	72
Pioneer F91 £350	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

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TUNERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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 £289	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 £918	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
Rotel RT-830AL £110	Good+ Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	55
Rotel RT-850AL £160	Good+ Good+	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/am, digital	BB	50
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-S300L/ ST-S100L £140/£100	Good Good	A reasonable entry point, not for difficult areas. AM – poor	All bands	R	65
Sony ST 500ES £200	Good++ Average-	Disappointing sound quality but good lab performance. (Includes long wave)	10 AM/fm presets, auto scan digital		55
Sony ST-S 700ES £299	Very Good Very Good	First class in every respect including FM sound quality. Even AM was well above average	FM/am, 10 presets, digital scan	BB	60
Yamaha TX-L400 £130	Good++ Good+	Good FM sound, let down by poor AM but otherwise good value	16 presets, auto scan, digital, FM, MW, LW	BB	55
Yamaha TX-500 £150	Average+ Average	Under a gaudy coat, this sensitive tuner gave reasonable stereo results. However, the AM had again been thrown down a well	20 presets (10 buttons) digital		50

Rating refers to original, tested model

HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jecklin and Stax models. The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit via a

bypass switch to the loudspeakers

The more down to earth models feature dynamic drivers in circular open-backed designs. The advantage of open backs seems to be a correspondingly open sound and a less claustrophobic feel to the music. One can also of course hear external noises and irritate people on public transport

The third category are closed-back designs,

which are useful in situations where it is necessary to block out background noise.

Another means of distinguishing different types is the way they sit on your head or ears. There are three styles: circumaural models enclose the ear and rest on the side of the head; supra-aural designs press on the outer ear (pinna); and intra-aural types rest inside the ear and are popular amongst users of personal stereos.

NAME PRICE	COMFORT SOUND	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Aiwa HP-X30 £30	Good Good-	A flashy personal stereo phone which alternatively could be used at home. A slight LF tonal preference slightly colours the response, but it ain't a bad can	Supra-aural, closed-back, dynamic		75
Aiwa HP-V99 £50	Good- Average+	Horn loaded in-ear miniatures with plenty of guts but not enough transparency or bass to compete with the headbanded competition	Intra-aural, closed-back, dynamic		75
Aiwa HP-X80 £50	Good Good	A headphone that's highly suited to non acoustic music and portable sources, nicely made and slickly finished. Sound quality doesn't quite match the price	Supra-aural, closed-back, dynamic		75
Aiwa HPEX-200 £90	Good Good	Modern looking and well finished the Excelias, as they are dubbed, had meaty bass and sounded reasonably open for the type	Circumaural, closed-back, dynamic		63
AKG K135 £35	Poor Fair	Despite a very appealing design the K135s don't live up to the usual AKG standards, though they do have the ability to reproduce rhythm well	Supra-aural, semi-open, dynamic		63
AKG K145/S £58	Good+ Good+	Electrostatic tweeters combine with a dynamic mid/bass unit to create very confident sounds in a comfortable headphone. Balance is on the bright side	Supra-aural, semi-open, electrostatic/ dynamic	R	75
AKG K240 Monitor £60	Very Good Good	Something of a classic these AKGs are very user friendly in all respects; sonically on the warm side of neutral	Circumaural, semi-open, dynamic	R	63
AKG K280 Parabolic £110	Good Very Good	A very revealing and unusual twin driver design that uses the same principle as a satellite dish to beam sound into the ear	Circumaural, open-backed, dynamic	R	63
AKG K340 £136	Good Excellent	Heavyweight cans in most respects, the K340 with its electrostatic tweeter is a very revealing headphone. Gives the total electrostatics a good run for their money	Circumaural, closed-back, electrostatic/dynamic	R	75
Audio Technica ATH 909 £55	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 £65	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 £75	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 £30	Very Good Fair	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 £45	Good Poor	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
Beyer DT550 £69	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 £90	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 £119	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 £200	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 Model One £79	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
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

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HEADPHONES

NAME PRICE	COMFORT SOUND	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
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 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
Koss K/6X Plus £30	Fair 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
Pioneer SE-72 £30	Good + Average -	Neat, nicely made personal stereo oriented 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 £40	Good Fair	Whilst not as seductive as their PMB25 predecessor the 30s are reasonably neutral and do improve on some of the competition - though not stunning	Circumaural, semi-open, dynamic		63
Quart PMB 25II £40	Good Good	Despite a somewhat unconventional suspension system the 25s put in a convincing and enjoyable performance with warm yet lively balance	Circumaural, open-back, dynamic	BB	55
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 PMB 65 £70	Good Good	Quite revealing and neutral albeit with the usual closed back sound, this competes well with more established models	Circumaural, closed-back, dynamic	R	55
Quart PMB 85 £90	Fair Very Good	These more expensive Quarts bear a striking resemblance to the Jecklin Float models and use two drivers per ear. Sound is a bit bass heavy but not bad overall	Circumaural, open-backed, dynamic		63
Realistic Pro-X £25	Poor Average -	Robust, unanimously uncomfortable and heavily veiled in sonic terms - not a great success	Supra-aural, closed-back, dynamic		75
Ross RE2530 CO £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 CO £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
Ross RE-2760 £35	Poor Fair	Stylish white cans from the only British firm in the business. Unfortunately sound quality is not up to par in this price range	Supra-aural, closed-back, dynamic		63
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 HD450 £35	Good Fair	Modern, simple and lightweight phones that are remarkably robust and which turned in a relaxed if weighty performance that was at worst pleasant	Supra-aural, semi-open, dynamic	R	63
Sennheiser HD480 £45	Good Fair	Using the same shell as the 450s, the 480s were a little softened and unrevealing by comparison with their competitors	Supra-aural, semi-open, dynamic		63
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
Sony A21L £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 V3 £30	Fair Good	Portable stereo oriented phones that are very nicely made and combine clarity with a pleasant lack of distortion	Supra-aural, closed-back, dynamic	BB	63
Sony MDR-V5 £50	Very Good Average +	A nicely made comfortable headphone let down by a limited ability to reproduce music in a natural fashion	Supra-aural, semi-open, dynamic		75
Sony MDR V7 £70	Very Good Very Good	Classy sounding cans that are very slick and work well with all types of music, setting the standard in their price range	Circumaural, closed-back, dynamic	R	63
Sony MDR-CD999 £120	Good + Very Good	A very nice headphone in all respects, the 999s are worthy of the best headphone outputs and high quality sources	Supra-aural, semi-open, dynamic	R	75
Sony MDR-R10 £2500	Excellent Very Good +	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 SR34 £140	Fair 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
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 SR Gamma £299 (inc. SRD-6 Adaptor at £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 £545 (inc. SRD-7SB Mk 2 Adaptor at £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 £360/ SRM-1 energiser £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 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
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

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PERSONAL STEREOS

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 Discmen going for £300.

Despite their diminutive size personals attempt to incorporate as many gimmicks and features as

possible, cassette players often incorporating tuners, graphic equalisers and Dolby noise reduction. CD players are still relatively expensive and don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Most models come with a mains adaptor and some include remote control.

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. 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 NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa HS-PL300 £110	N/a Average	Good looking, simply laid out player with a sensible selection of features and reasonable sound quality for a small player of this price	Dolby NR, chrome/metal eq, remote		78
Aiwa HS-PX303 £150	N/a Good	Chunky and macho styling combines with comprehensive features and a half decent transport to make a powerful personal	Dolby B & C, chrome/metal eq, remote	R	78
Panasonic RQ-P505 £100	N/a Poor	Very attractive and neat little player with nicely designed controls and XBS bass boost, but sonically it's limited by distinct wow and flutter	Dolby, chrome/metal eq, remote		78
Panasonic RQ-P525 £120	N/a Average+	Fitted with what is effectively a bass only tone control and harbouring all the necessary features the 525 also has a knack with tape replay	Dolby B & C, chrome/metal eq, remote	R	78
Philips D6658 £30	Very Poor Poor	The low price limits sound quality, and this is not a spectacular machine, but it does a reasonable job nonetheless	Graphic EQ, AM/fm		56
Saisho PS90R £40	Poor Poor	A bit of a jumble of features and gadgets, the PS90R has on-board speakers, an extending aerial and even records, but sound quality is dubious	Graphic EQ, types I, II & IV, AM/fm, recorder		56
Sharp JC-270E £130	N/a Average-	Slightly old fashioned design combines with a basic feature count and mediocre sound quality to make an apparently uncompetitive player	Dolby, chrome/metal eq, remote		78
Sony WM-BF65 £90	N/a Average+	Regular size radio/clock/cassette player with a bright even open balance and Sony's forward facing phones. Not as glamorous as slightly more expensive models but sonically not bad	Dolby, chrome/metal eq, radio, alarm clock	R	78
Sony WM-701C £150	N/a Good-	Beautiful little machine with all the necessary buttons'n'switches and a fundamentally exceptional sound quality, marred unfortunately by wow and flutter	Dolby B & C, chrome/metal eq, remote, folding phones		78
Sony Walkman Pro £249-£289	Good+ 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
Toshiba KT-4549 £80	N/a Poor	Fully equipped with 10 preset radio and alarm clock the KT-4549 is a bit aggressive on the sonic side and the bass boost system lacks balls	Dolby, chrome/metal eq, radio, alarm clock		78

PERSONAL CDs

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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-77 £270	Good+ Very Good	Very chunky and well made, the DPC-77 is the only player to include a digital output and sounds very good through its analogue output – a suitable domestic alternative	12.8 x 3.5 x 14.5cm, 750g, digital output, mains & in-car adaptors	R	66
Philips D6800 £130	Average Average-	A competitively priced and reasonably attractive looking player whose sonic performance is somewhat marred by a rather grainy top end	13 x 4 x 17.5cm, 516g, 3" ready, twin hdph sockets		66
Sanyo CP-12 £260	Fair 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-20 £150	Average+ Fair	Not bad for a machine at this price, it's nicely designed and reasonably robust, with reasonable sound quality	13.8 x 3.8 x 15cm, 450g, mains adaptor	R	66
Sony D-88 £300	Average- Fair+	A stylish and 'cultish' object, the D-88 is very small and has an adjustable disc drive for three and five inch discs. Sound quality doesn't quite match appearance	9.4 x 3 x 9.8cm, 300g, 3" ready, mains adaptor, no line out		66
Sony D-150 £300	Fair+ Very Good	One of the most enjoyable machines encountered, sounding informative and sweet and looking very tasty to boot. Comes complete with a tough carrying case	12.6 x 2.1 x 13.5cm, 420g, 3" ready, mains adaptor	R	66

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CD PORTABLES

CD Portables or Yuppie Blasters as we classified them are basically portable stereos gone digital, ie a compact disc player is included alongside the usual AM/fm radio and single or double cassette deck. Compact disc is a novelty that seems to add a fairly hefty premium onto the price of the standard ghetto blaster, but the improved sound quality over standard cassettes may justify this for some. In virtually every case a CD output socket is

fitted which means that it's possible to play silver discs through a domestic amplifier and loudspeakers, thus they are some sort of substitute for standalone mains machines (as are the personal CD players). One drawback with having a CD player on board is that batteries are gobbled up even quicker than usual, up to ten batteries being required in some cases. Neither are the units particularly light, the heaviest weighing eight kilos!

However they do all run off the mains too, and come with an appropriate lead for this purpose. Other useful features common to most are spare input sockets to record from an external line source such as a preamplified vinyl disc signal, and microphone sockets for recording live events (although the usual lack of record level adjustment is a nuisance).

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa CSD-XL25 £150	Poor	It's cheap, cheerful and not too low on features but sound quality from disc is frankly uninspiring	Twin headphone sockets		73
Bose Acoustic Wave £750	Very Good	Not exactly a CD portable as it doesn't play discs, but a highly versatile and stylish radio cassette player that has bass	Input sockets, Dolby NR, PA capable etc	R	73
Grundig RR9000CD £300	Average	Relatively slick machine with full CD function and volume remote control, low on features for price and unspectacular sounding	Remote, motorised volume pot, condenser mic		73
Philips AZ8394 £200	Average—	Stylish in a wasp like fashion, unfortunately the disc playing lets it down somewhat but otherwise it's OK	Twin decks, graphic eq., bass boost, condenser mic		73
Sharp QT-CD43 £280	Average	Quite a beefy box that comes complete with remote control for volume and CD functions. It even has a surround sound option which enhances imaging	Clock, speaker outputs, powered volume pot		73
Sony CFD-D73 £280	Good	The model we received was intended for the Japanese market and thus may not be entirely representative but it made reasonable sounds and has novel features	UHF bandwidth, input sockets, graphic eq., Megabass	R	73
Sony CFD-DW83 £300	Average	A macho looking beast capable of highish levels, but unimpressive sound for the price. Nice styling and good for scratching	Clock, timer, balance, input sockets, graphic eq.		73
Toshiba RT-8089 £200	Poor+	Square and long but rather drab on the sound quality front, as well equipped as most but rather tinny in many respects	Clock, twin decks		73

STANDS AND SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two

broad schools of design. The most common is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be. The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses

spikes at the base but Blu-tack or the like for coupling with the speaker cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Appolo A820 £44	4 leg Fair	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Appolo A10 £52.50	4 leg Fair	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old	19 x 19cm 44cm	R	58
Audio Dimensions Classic 2 £110	4 leg Average	Built in the heavyweight tradition and damped with chalk. Solid, stable, tactile sound	20.3 x 20.3 x 52cm	R	83 supp
Foundation Fred £70	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Sir Fred £80	2 leg Good	Upgraded 'Fred' with special in-fills. Sweet sound but one that also lacks bite and edge	19 x 19 x 46.5cm		83 supp
Foundation Maggi £159 to order	Pair Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £269 to order	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/53cm	R	58
Goldring Black Satin £65	1 leg Very Good	Screw together stand tastefully hewn from medite. Some loss of bass but still pleasantly rhythmic	18 x 20 x 46cm	R	83 supp
Heybrook Point 5 £55	3 leg Very Good	An unusual triangulated open frame stand that can help certain speakers sound more transparent and fluent — a good value stand	23 x 21.5cm 47cm	BB	58
Heybrook HBS1 £99	4 leg Very Good	With its new aluminium base frame the HBS1 fared very well in the listening tests. It allowed much of the speakers own 'sound' to remain intact.	23 x 21cm 47cm	R	58
Linn Kan II £79	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers.	19 x 16cm 59cm		58
Linn Sara £85	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Monotrak Engineering M1 £58	1 leg Good	The M1 gave the mid and treble a commendably smooth and detailed presentation but bass sounded rather lacklustre and muddy.	19 x 18.5cm 48cm		58
Monotrak Engineering M4 £58	4 leg Very Good	Begging comparison with Heybrook's HBS1 the M4 maintained much of the openness and forthright detail of that model.	23 x 21.5cm 53cm	R	58
Monotrak Engineering M4S £58	4 leg Very Good	Its stature and stability would seem to mark it out as most suitable for smaller, lighter cabinets. The M4S possessed an open midband and clear treble.	20 x 17.5cm 53cm		58
Origin Live Three Leg £89	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R*	58
Origin Live Advanced £145	3 leg Good	One of three related tripod-like stands. Stable sound with good sense of depth and power	22 x 20.6 x 44cm		83 supp

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LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Partington PP4 £60	1 leg Good	The PP4 offers a rather mixed performance, though when damped with sand infill it was less ready to embellish the overall sound and low frequencies became tauter and quicker.	18 x 16.5cm 48cm		58
QED TS22 Tristand £60	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband.	19 x 17cm 45/50/58cm	BB	58
Stand Design Z20 £70	1 leg Excellent	Well built and finished with optional sand in-fill. Ideally suited to Wharfedale 505.2's	16.5 x 19 x 50cm	R	83 supp
Target T-40 £48	2 leg Very Good	Not very stable, tends to infer a slightly forward, ragged sound with diluted pitch	19 x 19 x 40cm		83 supp
Target HS20 £60	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the sound accordingly.	19 x 16.5cm 53cm		58
Target HJ15/3 £100	3 leg Very Good	Sound quality was basically very good though without the sand infill some loudspeakers may sound a little unbalanced as both bass and treble regions are subjectively exaggerated.	28 x 28cm 40cm	R	58

EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Alphason New Concept £99	Rack Good	A heavyweight structure with stressed MDF shelves, ideally suited to the Sonata turntable	82 x 60 x 39.5cm	R	83
Audioquest Sorbothane Feet £40 for four	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS6 £60	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		57
Foundation Stable Table £100 (with Super Board)	Table Good	Similar to Stand Design's table though less well finished and certainly less stable	64 x 46.5 x 36cm		83
Origin Live Skyline Super £100	Table Good	An asymmetric table that helps provide a quick, lucid and solid sound with most decks	41 x 50 x 40cm	R	83
Roksan Equipment Table £169	Rack Good	An upgradable/expandable system suited to Roksan's Xerxes if not other competing turntables	65 x 52 x 38cm		83
Sound Organisation Table £55	Table Very Good	A deceptively simple structure that just happens to be engineered in a thoughtful, and ultimately successful manner.	37 x 45 x 35cm	BB	57
Sound Organisation Wall Stand £40	Shelf Very Good	The first of its ilk and still amongst the best, this simple framework represents a vast improvement over standard furniture shelves.	27.5 x 43 x 35cm	BB	57
Sound Organisation 2022 £97	Table Excellent	A small but costly table made from thin steel tubing. Suited to the LP12 but not other decks	49 x 45.5 x 36cm		83
Stand Design Duplex £75	Table Very Good	Well made and nicely finished, this table is broadly compatible with most heavy turntables	63.5 x 46.5 x 36cm	R	83
Target TT1 £46	Shelf Excellent	This rigidly braced shelf offers both good sound quality and material value for money.	26 x 46.5 x 35.5cm	BB	57
Target TT2 £55	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'.	52 x 46.5 x 35.5cm	BB	57

* rating refers to original tested model

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 interested 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 plugs yourself.

The features column contains information on the material make-up of the different cables with the following abbreviations: OFC – oxygen free copper, OFHC – oxygen free high conductivity (Audionote define the HC as high crystal), PC-OCC – pure copper by ohno continuous casting, LC-OFC – linear crystal oxygen free copper.

INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Audioquest Livewire Topaz £35	Good Fair	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end.	Gold-plated plugs, OFHC copper		59
Audioquest Livewire Ruby £49	Fair Good	Smother 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
Audio Technica AT6115 £40	Very Good Fair	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional.	PC-OCC copper coaxial		59
Audionote Copper ANC £44	Fair 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
Audionote Flexible Silver ANS £99	Fair 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
Audionote 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
Budget Patch Cords see text	Fair Poor	As thrown in gratis with cassette decks and the like – frequency extremes were restricted and performances were veiled.	Thin coaxial		59
Budget OFC circa £7	Fair Fair	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads.	OFC		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		83 supp.

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INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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
Deltec Black Slink £152	Excellent Excellent	Inherently neutral the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of tactility.	8 silver plated OFC strands PTFE dielectric	R	59
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.
Denon LC-OFC N/a separately	Very Good Fair	Supplied with Denon's dearer CD players this cable introduced a peculiar 'twangy' coloration at high frequencies, and a slightly soft bass.	LC-OFC, non-magnetic gold plated plugs		59
DNM Solid-core £23	Fair Good	Transparent in the midband and full of sparkling detail in the treble, low bass was slightly curtailed (unterminated price £2.30 per m.)	Single strand nickel-plated copper. Unshielded	R	59
Isoda Electric HC-05-PSR £54	Good Good	A pleasantly lively and fluid sounding cable though softens some subtle, midband detail	Aluminium + brass multistrand cable	R	83 supp
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
Kimber Kable KC-1 £65.55	Very Good Fair	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 KC-AG £390	Good Very Good	Treble detail resolution was perceived in a slightly abrupt if wholly controlled fashion. Depth re-creation and lateral separation were excellent.	Multi-gauge silver, PTFE dielectric	R	59
Monster Interlink 300 £22	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 £32	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 Fair	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 P1-Gold £15.95	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
QED Incon Graphite GP1 Gold £18.95	Fair Fair	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
Sterling £250	Fair Good	Possessing a neutral if faintly rich overall balance it supplies a pleasantly open and transparent perspective. (Reviewed in pre-production form.)	2 silver strands per conductor		59
Supra EFF-1 £60/0.75m	Average Average	A new, costly and mildly disappointing addition to the range. Edgy, smeared sound	Screened, symmetrical dir. cable		83 supp
Thorens SAC 100 £50	Good Fair	Performance is undermined by a slightly coarse and splashy treble, not necessarily bright, simply rather confused – and fine detail lacks resolution.	Silver-plated OFC, coaxial		59
van den Hul MC-D300II £45	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF.	Silver plated single strand VdH plugs	R	59
van den Hul MCD-102III £69	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 £150	Good Fair	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'tizzy' coarseness, bass is tight and dry.	Silver plated 'matched copper'		59
van den Hul MC-Gold £250	Fair 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
Vecteur 8045 £49	Very Good Good	Sounding solid and forthright it might seem slightly cold in some systems but the treble 'edge' is mercifully clean. Very low frequencies were a little lacking in 'slam'.	LC-OFC signal & screen	R	59
Yfere LC-OFC Quad £85	Very Good Very Good	New cable with a very refined sound. Very transparent with good sense of focus and space	Symmetrical, star-quad with screening	R	83 supp

LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Absolute Wire Force 4 £4.75 per metre	Good Fair+	By current standards there was a loss of fine, sharp detail at the frequency extremes, but it has a big and friendly sound	744 OFC strands, PVC dielectric		64
Audio Innovations OR-200 £16 per metre	Fair+ Fair+	Open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies	200 LC strands, polyurethane and cotton dielectric		64
Audionote AN-SP £100 per metre	Average- Excellent	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent nonetheless	15 silver strands, polyethylene dielectric		64
Audioquest Livewire Black £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green	OFHC, surface only – foam core construction	R	64
Audiospec Latitude L4 £3 per metre	Average+ Average+	Warm, ruddy but also mildly muddy sound with some slight emphasis of bass notes	Figure-of-eight multi-strand, PVC dielectric	R	83 supp
Audio Technica AT6120 £10 per metre	Fair+ Fair	Compared to earlier LC-OFC cables this PC-OCC derivative sounded smoother and less aggressive	PC-OCC, PVC dielectric		64
Bellwire 12p per metre	Poor Average-	Broadly speaking it delivered a bright and tizzy sounding treble with a fairly open and detailed mid with little or no bass resolution	0.5mm single strand, PVC dielectric		64
Deltec 8S £144 – 5m pair	Good Good+	The unerring transparency and detail resolution of 8S throughout the midband makes it a far cleaner and more spacious sounding cable than others at the price	4 silver plated OF copper strands, PTFE	R	64
Deltec Gortex Black 16 £528 – 4.5m pair	Very Good Excellent	Improvements in bass resolution, transparency and treble poise maintains status of this cable	Silver-plated OF copper with Gore-tex ins.	R	83 supp
Deltec Black Sixteen £648 – 4.5m pair	Very Good Excellent	Bass was deep and rhythmically secure, the mid tonally pure and free of additional sibilance while the treble was both relaxed, sweet and highly detailed	16 silver plated OF copper strands, PTFE dielectric	R	64
DNM Solid core £3 per metre	Average Fair	A good general-purpose solid-core, though too bandwidth limited for high-end applications. Sounds great in some systems	0.65mm single strand, webbed PVC dielectric	R	64
Exposure £2.50 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs	56 OFC strands, webbed PVC dielectric	R	64
Furukawa FS-2F09 £6 per metre	Good Average+	Some loss of bass weight but otherwise offers a fresh and open sound. Good value	Multi PC-OCC stranding, PVC dielectric	R	83 supp

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LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Furukawa FS-2T15S £50 per metre	Good+ Very Good	An advanced solid-core cable with a highly fluid, detailed and inherently musical sound	Single 1.5mm Super PC-OCC strands	R	83 supp.
Kimber 4VS £7.15 per metre	Average+ Average	Similar construction to 4TC but dissimilar materials infer a slightly tizzy sound	Open-weave, multi-strand with PVC ins.		83 supp.
Kimber Kable 4PR £54 - 5m pair	Fair Fair+	This directionally marked cable benefitted from an open and airy treble quality but seemed notably leaner than 4TC. Bass was well round and satisfyingly taut	4 x 7 copper strands per conductor, PVC dielectric		64
Kimber Kable 4TC £17.65 per metre	Good Good+	4TC made a great impression in the listening tests with an open midband, a smooth and unfatiguing treble with slightly rich but suitably weighty bass	0F copper, PTFE dielectric	R	64
Linn K20 £2.20 per metre	Good Fair	Subjectively it erred on the forward and bright side of neutral but enjoyed an essentially clear and punchy delivery	56 OFC strands, webbed PVC dielectric		64
Marantz ML-55S £30 - 10m	Fair Fair	Subjectively this cable offered a loose and splashy treble which, though not overtly bright, did compromise both tonal and timbral accuracy	30 OFC strands, 3 conductors PVC dielectric		64
Mission Cyrus £2.50 per metre	Average+ Good	Because of its impedance characteristic this cable will deliver a smooth and unfatiguing treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	64
Monitor PC Silverline PC4 £5.75 per metre	Good Average	Sonically it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables	2072 x 0.07mm silver plated copper strands		64
Monster SCI 16-4 £2.50 per metre	Average Average	Not as thick-sounding as early Monster cables but still slightly unbalanced. Versatile construction	4 x 16-gauge conductors, 0F copper strands		83 supp.
Monster Original £4 per metre	Good Fair+	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass	Multistrand		64
NVA LS1 £6 per metre	Average+ Good	A light and breezy sounding cable best suited to short lengths, NVA benefitted from a clear and transparent outlook	7 x 0.25mm silver alloy strands, PTFE	R	64
Origin Live Soli-Core Ordinary £1.80 per metre	Good Fair+	Subjectively it bettered the performance of the costlier Super version, affording a pleasantly detailed and spacious soundstage with firm bass but slightly coarse treble	1.8mm and 0.5mm single strands	R	64
QED 79-Strand £1 per metre	Good Fair	For much of the last decade QED 79-Strand has been the first port of call for enthusiasts on the upgrading ladder, a tradition that should still hold true today	79 strand, PVC dielectric	R	64
QED Incon Graphite £2 per metre	Fair+ Fair+	This graphite version of Incon sounded cruder and generally more heavy handed than the cheaper unshielded type. Overall presentation was mildly restricted and cloaked in a faint aural fog	0FHC, polymeric screen		64
QED Flat 200 £2.20 per metre	Good Good	I detected a degree of confusion at low frequencies but this did not stifle the acoustic atmosphere which remained open and positive	200 strands, flat webbed PVC dielectric	R	64
Rotel Supra 4 £2.57 per metre	Good+ Good	Ideal for both long and short runs, it furnishes a big sound that benefits further from a smooth, unfatiguing treble	1,036 OFC strands, webbed PVC dielectric	R*	64
Rotel Supra 10 £6.91 per metre	Good+ Good	Supra 10 provided a very free and open sound that was unhindered by any excess at low frequencies. Worth its weight in scrap copper!	2,562 OFC strands, webbed PVC dielectric	R*	64
Sony RK-SSES £60 - 5m	Fair+ Fair+	The sound of this cable was also somewhat controlled and over damped. The treble was relatively free and airy but lower octaves, including the midband, were constrained	350 x 0.08mm OFC strands, heat shrink dielectric		64
Solid core mains cable 36p per metre	Fair+ Good	It enjoys much of the smooth treble and articulate midrange usually associated with the better solid core derivatives. Lean but taut and rhythmically coherent	1.5mm square, 3 cores, PVC dielectric	BB	64
Sterling £99 per metre	Fair Fair	This pre-production sample possessed a strangely muddled and reserved sound quality. It suffered from a progressive instrument modulation	Pure Silver, PTFE dielectric		64
Townshend Isolda £400 - 5m pair	Fair+ Good	Isolda possessed a truly dark background out of which rose a very solid and extended bass together with an excellent sense of transparency through the upper octaves	8 coax cables per conductor - very thick	R	64
van den Hul CS-122 £5.95 per metre	Fair+ Good-	Characterised by a driving and powerful bass, CS-122 proved to be a heavy sounding cable. Mid treble detail was refreshingly clear but there was a slightly muted air about the extreme treble	19 x 0.45mm silver plated strands, webbed rubberised dielectric	R	64
van den Hul CS-352 £12.95 per metre	Good Fair+	Subjectively it sounded like CS-122 only more so, the deep rumbling bass tending to overwhelm subtle musical details. It also appeared a trifle peaky in the treble	7 x 0.76mm + 168 x 0.125mm silver plated strands, rubberised dielectric		64
van den Hul SCS-12 £29.95 per linear metre	Good+ Good+	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different gauges, PTFE dielectric	R	64
van den Hul SCS-2 £99.95 per linear metre	Good+ Good+	Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair	665 silver plated matched crystal copper strands, PTFE dielectric	R	64
Vecteur R-CV30 £4.99 per metre	Fair Good	Subjectively the better of Vecteur's three-strong cable line-up offering a neutral overall perspective but with a slight loss of detail resolution at both frequency extremes	4 x 0.8mm LC-OFC PTFE insulated strands	BB	64
Vecteur S-CV90 £6.9 per metre	Fair+ Fair+	It seemed both less transparent and integrated throughout the midband than R-CV30, though both frequency extremes were spruced up with a tighter sharper delivery	6 x 0.7mm LC-OFC strands		64

IN-CAR ENTERTAINMENT

In-car entertainment is an area not usually associated with the esoteric world of domestic hi-fi. However, it represents a source of musical entertainment that many of us are exposed to every day. The majority of new cars are fitted with some form of radio before they leave the showroom and in many cases this usually very basic player is taken for granted and accepted as representative of in-car audio standards

For the price of a budget amplifier or more, there is a wide variety of in-car machines to choose from,

including cassette, CD and even DAT players. The majority of sub £300 players are integrated units featuring a cassette player, AM/fm tuner and amplifier, all in one remarkably compact standard sized box. At this price level the cassette players tend to be fairly basic affairs, although autoreverse and noise reduction systems are both fairly common. Tuners are usually of the digital variety with varying degrees of sophistication in signal tuning and presetting, with some machines featuring as many as 18 FM presets. The emphasis is on the frequency

modulated band and AM often suffers as a consequence, but fortunately for radio enthusiasts there are some exceptions

The amplifier is usually designed to drive two pairs of speakers mounted fore and aft of the vehicle, and a fader is fitted to adjust the balance between the two. The dearer machines feature separate bass and treble controls which can be quite handy given the unusual acoustic of the car environment and the variety in balance and presentation to be had from car speakers

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Alpine 7282L £250	Good Very Good	A very attractive and seductive sounding player. The matt surfaced transparent preset keys are especially sexy	Bass/treble controls, 12 FM 6 AM presets, chrome eq., clock, 8W	R	61
Alpine 7905M/3539 £650/£350	Excellent Excellent	An easy to use and attractive CD/tuner, partnered with a powerful and flexible amplifier to give an effortless source of in-car entertainment	Bass/treble controls, 12 FM, 12 AM presets, slide-out, 150W	R	68

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THE DIRECTORY

IN-CAR ENTERTAINMENT

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Blaupunkt Windsor SQR 38 £275	Good Average	Not very entralling sonically, the Windsor is rather low powered but does have a reasonably stable tape transport	5 FM, 10 AM presets, 3.1W		62
Clarion 916HP £160	Good Average	With its rubbery buttons and touches of white this is a modest looking player let down by a weak cassette	Bass/treble controls, 5 FM, 5 AM presets, 9W		61
Clarion 946HP £250	Very Good Very Good	A good FM side let down slightly by AM performance. This Clarion is particularly nice to use with its nifty SAM tuning system	Bass/treble controls, 12 FM/6 AM presets, Slot-in, 15.1W	R	61
Clarion CDC7000/10028HA £650/£250	Very Good Excellent	Despite a slightly off-beat cartridge system the Clarion combo put in a performance that had the sonic edge over other CD/tuners in its test group	Bass/treble controls, 12 FM, 12 AM presets, security code, 80W	R	68
Goodmans GCE229 £150	Fair Average	If knobs, switches and legends are your bag then the GCE229 is the one for you – a lot of gizmos for the price and it even sounds OK	Bass/treble controls, 6 FM/6 AM presets, Chrome eq., clock, MSS, 10.1W	BB	61
Hitachi CSK-402E £250	Good Good	An attractively designed little player that for once doesn't disappoint when it comes to playing music, and it even has a security system	Bass/treble controls, 6 FM, 12 AM presets, Dolby, chrome eq., music search, 7.4W	R	62
Nakamichi TD-400E/pa-300 II £495/£329	Very Good Very Good	If you want your in-car entertainment to compete on sound quality grounds with your domestic system, this combo offers a very strong challenge	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, chrome eq., Dolby B, C, 75W	R	62
Nakamichi TD-700E/pa-300II £874/£329	Very Good Excellent	For those who appreciate the wonders of analogue there are few in-car players to really compete with this superb cassette/radio. You can even adjust azimuth	Bass/treble controls, 6 FM, 6 AM presets, music search, Dolby, 75W	R	68
Panasonic CQ-497 £117	Fair Poor	The CQ-497 has a traditional style analogue tuning system making it easy to use. AM reception was good but the other sources are less encouraging	Bass/treble controls, chrome, NR, 7W		62
Philips DC680 £180	Average Good	A colourful and musically competent player that despite a gammy volume knob is well worth checking out	8 FM, 4 AM presets 3.5W	R	61
Pioneer DEX-M300/CDX-M100/GM-3000 £300/£450/£280	n/a Very Good	Separate control unit and boot mounted multi play autochanger make this a bit of a hefty installation but it uses the same magazines as their domestic players and sounds fine	Bass/treble controls, 18 FM, 6 AM presets, 80W, removable fascia		68
Proton 214CD/d275 £300/£175	Very Good Very Good	This Proton cassette/tuner offers good power and a level of fidelity appropriate to its price. Musically it has a Decca-like charm that is very appealing, plus a sensitive radio	Bass/treble controls, 8 FM, 8 AM presets, Dolby B/c nr, chrome eq., 85W	R	68
Sharp RG-F816E £200	Poor Average	Nothing if not novel the 816, with its unusual anti-theft system is custom built for the furry dice brigade, but is sonically a bit lacklustre	Four band graphic, 8 FM, 16 AM presets, ASP, Dolby, MSS, 10.9W		62
Sharp RG-F882E £220	Average Average	Again a glitzy full feature machine with a flip out control panel and plenty of lights. However, sound quality is a bit disappointing	Seven band graphic, 5 FM, 10 AM presets, ASP, chrome eq., Dolby, 8.5W		62

RECEIVERS

Purists will look down their noses at the very idea of combining two functions into one box, and indeed they always have done. But unless we're talking about the exotic elite, the creme de la creme of amplifier and tunerdom, intrinsic technical shortcomings simply aren't an issue.

One obvious reason why you should buy a receiver if you were otherwise considering an amplifier and a tuner is that there are savings, ie of

size. Generally you end up with one box in place of two similarly sized boxes, which has got to be a good idea. Receivers are also simpler to operate, in principle anyway. At the very least you save on one power switch, and typically you are presented with an integrated control system that is bound to oil the wheels of ergonomics

But there is one important point to watch. Because receivers don't sell in vast quantities in

this country, and because this is one of the very few countries to use Long Wave for public service broadcasting, many – no, most – receivers on sale in this country cover FM and MW only. Remember that LW is the home of Radio 4, where it can be heard on the all too frequent occasions it is not on FM.

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Harman Kardon HK330Vi £259	Average Average—	No LW, and FM section best suited to strong, local transmissions. The amplifier is quite powerful but favours the treble. Bass is tuneful but lacks weight	5 inputs (inc 2 tape), FM/mw tuner		70
Harman Kardon HK440Vi £299	Good Good	Clear, dynamic, slightly bright sounding design, a little grainy in extremis. Mono switching and LW missing from tuner, which otherwise performs well	5 inputs (including 2 tape) with FM/mw tuner	R	70
JVC RX-777VL £500	Good Good	Sharp, lively but euphonious sound quality from line and phono source is matched to a high grade tuner. However, many half-baked facilities blunt value for money	A/v capable with 6 inputs, equaliser, digital ambience, FM, MW/lw		70
JVC RX-1001V £770	Average Poor	Power output is well below spec, and sound quality is cluttered and messy on all inputs	Digital ambience processing, Dolby Surround, 2/4 speaker, 40 FM/mw presets		70
Revox B285 £1782	Average Average—	Sophisticated and capable tuner is married to a muddled, compressed sounding amplifier, which also has low sensitivity preventing the amplifier being driven fully in many situations	70 watts/ch, 4 inputs (inc 2 tape), 29 FM/mw/lw presets		70
Rotel RX-850AL £230	Good Good	Well built and sensibly equipped receiver with outstanding sound quality for the price via the tuner, phono and line sources alike. It majors on subtlety however, and may not impress the heavy metal brigade	4 inputs (inc 1 tape), FM/mw/lw tuner	BB	70
SAE R102 £599	Average— Average	This is an uneven but mostly good performer. It sounds constrained but musical, but the tuner is weak on both wavebands.	4 inputs (inc 2 tape), FM/mw tuner		70

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

Personal Messages

Which support stand to use with which loudspeaker? As Paul Messenger explains, you just don't know until you try it!

Although the *Mana Sound Table Saga* is by no means finished, I don't propose to rabbit on about it for a third month running. It's time for a change, and a look at the other end of the hi-fi chain – not at the loudspeakers themselves, but at the stands that play an absolutely vital support role.

An essential ingredient if a loudspeaker is to work properly, quite why – and indeed how – speaker stands work remains more than a little mysterious, if not downright controversial. Since loudspeakers currently pass through my reviewing hands at a prodigious rate, I ought to be better placed than most to get some sort of perspective on the stands most of them sit on. However, the more I experiment, the more confusing and difficult the wretched things become.

Several separate incidents sparked off both this piece and a possible longer feature at a later date. First I discovered that *Choice's Directory* entry for the Linn *Kan* stand suggests that it is a good support but of only limited application. My own experience is almost the reverse: the *Kan* stand is actually unusually consistent and predictable, and possibly the safest single under-£100 stand recommendation.

Then there was the problem I ran into last month, failing to get a good sound when mounting my *Isobariks* on Michell cones, even though the loudspeakers seemed to be held very rigidly.

Whilst relating that incident to Martin Colloms, he in turn described a new stand made of slate that he had recently started using with his customised *Celestion SL700s*. The substitution of slate for metal was sufficient to require the crossover to be rebalanced, reducing the tweeter output some 1.5dB. Which is not the sort of thing one expects from a mere(?) change of stand.

Any one of the above three instances show just how

perverse and unpredictable loudspeaker support can be. Secure in my own ignorance, I contacted a few industry acquaintances. It quickly became clear that stands – like equipment tables – are essentially the results of empirical investigations by various individuals.

Various (often contradictory) theories are trotted out to justify one or other approach, and doubtless each carries its own truths, but as with all enthusiast-led hi-fi, there's unlikely to be 'One True Path'. Stands invariably reflect the aspirations and expectations of their designers, and finalising a stand design involves much the same fine-tuning and grappling with the art of compromise as those which preoccupy the loudspeaker or tonearm designer.

On the most simplistic level, stands fall into two types – open frame and central pillar, though a third 'ultra heavy/expensive' category also makes a distinct (if diverse) grouping. The former supports the corners/edges of a top plate with four (or three) tubular legs, and sits on a wide base. Usually fairly lightweight and undamped, classic examples include the aforementioned *Kans* and Heybrook's *HBS1s*.

The stereotype pillar stand lacks the four-square support of the frames, but certainly looks much prettier in domestic surroundings. However, it also presents the option of filling the centre tube, wholly or partly, with some sort of particulate damping material – sand and lead shot being favourites.

Although the 'space frame' approach ought to be more rigid than the pillar, it is equally true to say that neither approach can offer any real rigidity above a few hundred Hertz. Full bandwidth rigidity is just as much a chimera for loudspeaker stands as it is for tonearms, and pursuing it as the sole design goal is equally futile.

What usually seems to

happen in practice is that the speaker fights the stand and the stand fights the floor. The sonic result is inevitably unpredictable.

The deterioration in sound that can usually be introduced simply by slackening off the locknut that secures one floor spike would seem to imply that rigidity of support is the prime purpose of the speaker stand. But that is an oversimplification, as speaker

"the more I experiment, the more confusing and difficult the wretched things become."

stand Archguru Cliff Stone (of Foundation Audio fame) convincingly demonstrated – by raising one spike right off the floor, with no obvious degradation!

Foundation was one of the original pioneers of speaker stands, and Cliff has his own ideas that have less to do with support per se, and much more to do with mechanical/vibration termination and the absorption of some of the unwanted loudspeaker cabinet vibration. To this end, the enclosure is coupled to the stand top plate by four small and well-flattened beads of Blu-Tack, while the pillar or pillars are filled with a specific cocktail of particles in order to achieve the desired termination characteristics.

Cliff claims that both the mix and filling technique have taken years to refine and develop, and are the key to the sonic differences between Foundation and similar looking, less expensive alternatives.

We spent a fascinating day trying out different stands with a number of popular

small loudspeakers. The *Maxim* would prefer one, the *MS3.10* another, according to the sympathy or antipathy of the combination. Most interesting of all was the *Royd Eden*, which is my personal favourite amongst miniature loudspeakers. These worked well enough on the under-£100 *Foundations (FRED, Classic and Sir FRED)*, but sounded absolutely astonishing when placed on the £299, 40+kg *Designer* stand.

The little *Edens* work pretty well on *Kan* stands too, though always sound distinctly bass shy even when close against the wall. The *Designer* stand changed the rules completely, firming up the bass to such a remarkable degree that the balance now seemed about right some eighteen inches from the wall. At the same time coloration seemed substantially reduced and stereo focus was sharpened.

Such was the improvement, I reckon the combination of £300 stand and £235 loudspeaker would be more than a match for *Royd's* floorstanding (£485) *Apex*, despite the latter's transmission line enclosure. And if the *Designers* brought the *Edens* to life with a vengeance, they also put the *Maxim* and *MS3.10* in their places, revealing inherent boxy effects that tend to be (helpfully) masked when used on cheaper stands.

Perhaps what impressed me most at the end of the day is that the *Foundations* seem to work with – rather than fight against – their partnering loudspeakers. I've covered less than half the story so far, and am currently waiting for the next batch of speakers to arrive in order to put them properly through their paces. I've also put my money on the line by ordering *Foundation's Isobarik* stand, and am currently waiting with some impatience to find out how they will respond to what must be one of the toughest challenges any loudspeaker stand is liable to encounter.

UNTIL NOW, REAL HI-FI PERFORMANCE HAD TO BE INCONVENIENT

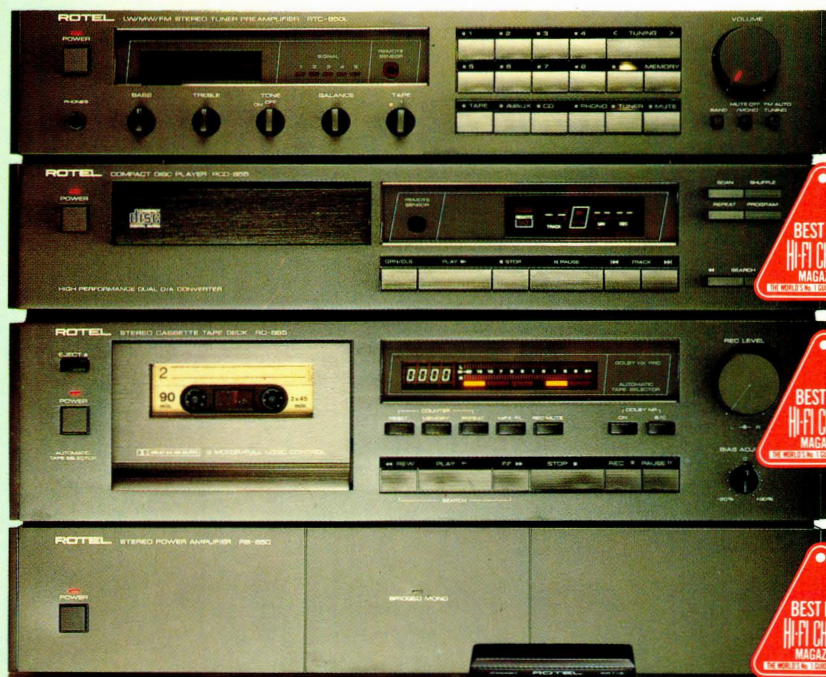
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