

# HI-FI CHOICE

THE WORLD'S No. 1 GUIDE TO BUYING HI-FI

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The Collection

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# HI-FI CHOICE

ISSUE NUMBER 60: JULY 1988



Cover photograph of the Kiseki Lapis Lazuli by Chris Stevens. See page 53.

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Where to find the best hi-fi and service in your area.

# MENU

They didn't tell me when I was appointed Editor of *Hi-Fi Choice* that I'd be taking over PM's chair halfway through production of *The Collection*. Traditionally the weeks leading up to publication of *The Collection* are fraught with problems in the *Choice* office – as I've just discovered the hard way. There's no difficulty choosing which products to include, of course, but deciding which products not to include is a nightmare. Space considerations inevitably result in many fine components not getting a look in. *C'est la vie*.

The products we've covered in this year's *Collection*, however, undoubtedly represent some of the finest hi-fi components money can buy. Please, we don't want to receive any irate letters pointing out that much of the equipment is beyond financial reach. We've concentrated our attentions unashamedly on high-end audio this time around, stars of the show including the £3,500 Kiseki *Lapis Lazuli* cartridge pictured on the front cover, and the recently launched *Crystal Reference* turntable from Oxford Acoustics. The 1988 *Collection* is all about the stuff of which dreams are made – and there's no harm in dreaming once in a while.

Talking of dreams, no, you didn't imagine you read somewhere that we're planning a report on in-car players. That's coming next month (we promise!), along with some in-depth reviews on 'one name' systems from manufacturers as diverse as Meridian and Philips, Mission and Sony, A&R Cambridge and Kenwood. Assembling a collection of separates to build a successful system can be a laborious and expensive task. It's not which components you select that determine the end result, but rather how well they interact. A first-class system can often be better than the sum of its constituent parts.

Maybe the answer is to let the manufacturer do the hard work for you. Surely if your system's components all come from the same stable they're bound to work well together – aren't they? We thought it time *Choice* investigated to see whether you really do get your money's-worth when taking the easy route to system building.

John Bamford

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 Telex: 8954139 DENNIS G. Fax: 01-636 5668. Company registered in England. REPRO: Graphic Ideas. TYPESET by: Time Graphics Ltd., PRINTED by: Riverside Press. DISTRIBUTED by: SM Distribution, 16 18 Trinity Gardens, London SW9 8DX Tel: 01-274 8611

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Infinity Reference Standard V    IRS Beta

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Kappa 9



Kappa 6  
(optional pedestal)

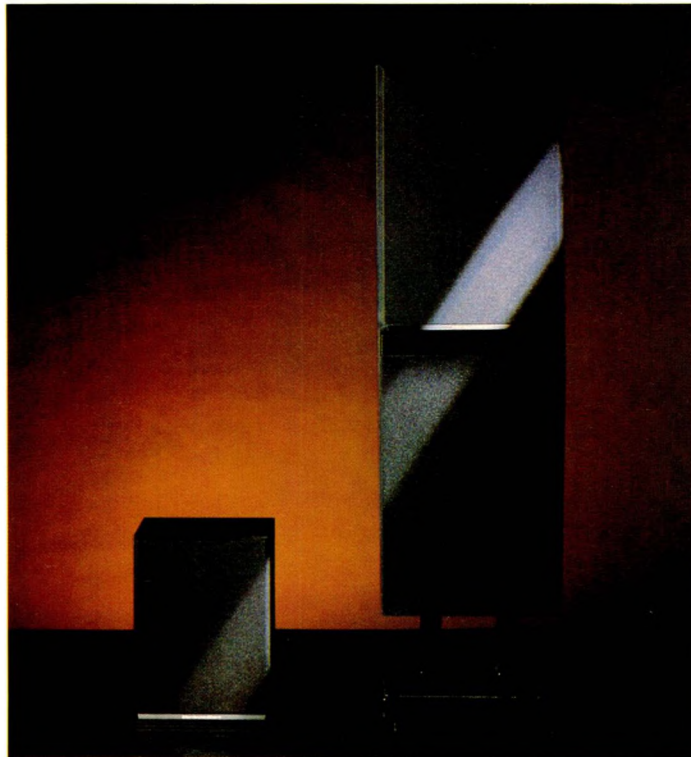


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## PRODUCTS

### LONG STAND

Three years of research has seen the arrival of a new loudspeaker stand from Monitor Audio. The £100 *DS300* is an 18-inch high decoupled steel stand which has been bred to support the *R852/MD* and *R300/MD* loudspeakers.

Both top and base plates are decoupled from the central pillar which is itself filled with sand – to make it “acoustically dead”. Mo Iqbal, MA's MD, describes the stand as “a high definition tune machine”. Neoprene gaskets have been used to decouple the steel base and top plates, while a steel rod, attached to the top plate, runs through the centre of the pillar allowing the plates to be tightened up against the gaskets. This makes the spiked *DS300* stand rigid yet inert, according to the makers.

*Have a few Red Stripes with this: Monitor Audio's new stand under an 852 MD*



### SURE-SHOT STEREO

Cameras to business equipment Japanese multinational Canon is not a name one normally associates with hi-fi. However, one Hirokazu Negishi, Canon's European representative of its Advanced Technology Department, has both a personal interest in the hobby, and a bright idea for applying optical theory to the intransigent problem of creating high quality stereo images across a wide listening area.

The 'Wide Imaging Stereo' speaker system was demonstrated in prototype form during the recent Canon Expo Europe '88, held in London, but the company plans to proceed with research (co-operating with Danish and UK engineers, allied to the Eureka project) and go forward into production, marketing under the Canon brand to both domestic and professional (sound

reinforcement) markets.

Stereo works (up to a point) because the ear uses two main cues in locating sound: intensity (loudness) and arrival time. The Canon approach manipulates the former by means of acoustic lens/mirrors to compensate for the latter and produce balanced perception of a stereo soundstage from well off-axis.

The loudspeakers used for demonstration started out as Sony *APM66s*, but are rebuilt into a futuristic-looking cylindrical cabinet surmounted by two inverted (rectangular) cones. No attempt is made to change the behaviour of the bass unit, but the midrange and tweeter are relocated, the former off-centre in the top surface of the larger cone. Both fire upwards at the inward nearside of the cone apices, so the curved cone surface acts as mirror/lens to direct a controlled intensity pattern out into the listening room.



Hampered by a feelingless dem studio with high background noise, the system certainly sounded promising, giving wide stereo for mid and treble content. That said, there is clearly much more development to be done, for example in the application of CAD (Computer Aided Design) to optimise the lens profile, and in the elimination of unwanted secondary reflection effects.

### ROCK AND ROWEN

Acoustic Research has teamed up with Swiss company Rowen Research to introduce a range of four high-end dipole loudspeakers. The speakers, carrying the Rowen name, are priced from £750 to £1,500 and come in a variety of finishes including marble and granite, as well as the more standard black or oak. They utilise AR drive units but are designed by Rowen. The speakers will be fairly unobtrusive as they can be positioned close to walls.

*Two from the Rowen range: using Acoustic Research drivers*



*The photographic approach to hi-fi, an omni directional speaker (cf sorts) from Canon*

### HUMDINGER?

The latest filly from the Audio Research stable is the *D125* stereo power amplifier. The *D125* is a “reference amplifier incorporating the latest hybrid technology,” says Ricardo Franassovici of Absolute Sounds who import ARC. It is the second

*Top Drawer: ARC's new amplifier features a "tube life-saving kit".*



hybrid power amplifier from Audio Research and uses the technology discovered through designing the top-of-the-range M300s.

The *D125* uses FET inputs and valve outputs giving 120watts per channel. It also features a special tube-saver kit which will "not only prolong the life of the tubes but will also prevent any amplifier damage if the tubes were to go", according to Ricardo.

Price? You'll do business for \$4,575.

## AGE CANNOT WITHER

As a tribute to his friends, and partly due to pressure from them, Koetsu designer Ysoiki Sugano has produced his state-of-the-art cartridge. The Onyx bodied Koetsu is being made in limited edition and commemorates Sugano's 80th birthday last year. In fact only 80 are being made.

The cartridge is apparently a year late because of the death of Mr Sugano's wife; but the importers Absolute Sounds say it is well worth waiting for. The 80th Birthday Cartridge will have five times the mileage of any other moving coil, they claim. And Mr Sugano is said to have put all his expertise and experience with materials into this no-compromise flagship Koetsu model.

Absolute Sounds are hoping for a sizeable percentage of the edition which is due midsummer at a price of \$2,550.

## HOT TRIPLETS

The first of a new range of valve amplifiers has been launched by Audio Innovations of Brighton.

Named The First Audio Amplifier, the \$1,199 seven-and-a-half watt Class A stereo power amplifier is heralded by the manufacturer as the first stereo triode amplifier ever made. A direct heated triode (three electrode valve) is said to be the best device for amplifying signals from 6Hz to 250kHz (the audio band and above) while maintaining linearity and low distortion. (*Really?* - C.Ed.)

Altogether seven new models in the Audio Amplifier range are to be introduced in the near future.

*Sony Visual World Band Receiver can receive and hard-copy satellite weather maps - purchase around \$3,000, use probably illegal.*

## MOVING ON UP

As a major extension to business activities which have hitherto concentrated on the 'mass market' (if such exists) of budget and mid-priced specialist hi-fi, Rotel UK is about to begin the distribution of a number of upmarket exotic lines.

The Infinity distribution deal announced quite recently could turn out to be just the tip of a far-reaching iceberg. On the surface Infinity's budget loudspeakers (like the \$130 *RS2000*, rated Best Buy in our June *Loudspeakers* issue) make a logical accompaniment to Rotel's own electronics. But Infinity's three-range line-up is the broadest in the world, and products like the *IRS* variants have a substantial slice of UK high-end action.

Now it is confirmed that Rotel will be bringing in a number of these expensive models to help spearhead their new upmarket initiative. Where the budget *RS* series have four models below \$350, there are four *Kappa* models selling between \$650 and \$2,250, plus the high-end *IRS* series models starting from \$4,750 (a pair). All bar the top \$45,000 *IRS V* will be available from stock, and the \$10,000 *Beta* is already appearing in dealers around the country.

The *Kappas* are attractively shaped and distinctively presented, with flat fronts and backs by semicylindrical sides made up from slatted wood veneers à la rolltop desk. Three are floorstanding models, the fourth needs a stand; Rotel and



Infinity are discussing floor-keying spike and stand arrangements to suit the UK market. Five high-tech drivers range from mineral-loaded polypropylene bass units via 3in and 5in dome midranges to two planar tweeters. The top-of-the-range *9 Kappa* is a five-way system using seven drivers including a rear-mounted tweeter.

The *IRS* series advances similar driver technology another notch by means of planar

midrange units, and has exceptionally elegant cabinets. *Delta* and *Gamma* look identical, but the former is passive for normal (stereo) amplification, while the latter requires bi-amping, and incorporates a servo-feedback bass control system. *Beta* (pictured) actually uses separate cabinets for bass and mid/treble, allowing each to be positioned for optimum room matching (for the former) and stereo imaging (for the latter).

No less exotic or highly

## BROWNE OFF

Middle of May, regular as clockwork, the sun comes out prematurely to beat down on inappropriately dressed electrical retailers who pound the pavements between a couple of dozen Central London hotels. This is the Brown Goods Trade Show, originally intended as an opportunity for the major TV/

radio manufacturers to get feedback from independent dealers on, and take orders for, the products which will be on the market before the end of the year.

It's not the sort of place for the hi-fi enthusiast. Hi-fi is there, in a sense, but on the second desk behind such first violins as colour TV, VCR, portable audio, 'stacker'

and midi systems. Though roster of hi-fi brands is far from comprehensive, it's important nonetheless: Technics, JVC, Sony, Philips, Hitachi, Aiwa, Onkyo, Sansui, NAD, Sharp, Denon, Pioneer, Goodmans, Portofolio, TEAC, Dual, HW International, and Zenonlec. Plus all manner of others involved in downmarket stacker systems and midi systems.

As might be expected, CD is still the focus of attention, with particular emphasis on its increasingly important role as part of the midi system. The boundaries between upmarket portables (now featuring remote control), 'stackers' (one-piece music centres), and the bottom end of the 'systems' market (casseivers and CD-casseivers rather than true separates) are becoming increasingly hard to find.

'Never mind the quality, it's got CD hasn't it - and feel the gaps between the components' reflects many attitudes towards



respected Stateside is the Rowland Research range of amplification, which will shortly UK debut as the electrical muscle for power hungry Infinitys. In the US, Rowland is seen as a competitor to other highly regarded solid state brands such as Krell and Mark Levinson. The first over here will be the 2-box *Coherence 1* pre-amp, targeted at c\$4,000, the c\$4,000/pair *Model 3* 100w monoblocks, the 150W stereo *Model 5* (c\$5,500), and the 350W monoblok c\$10,000/pair *Model 7*. Rotel are clearly pitching for the £10,000+ system market. All power amplifiers feature balanced inputs, but the quoted prices are only estimates.

To our certain knowledge negotiations are already far advanced with another internationally respected high-end brand. Sworn to silence until matters are fully resolved, we will report in due course. But this is further evidence that Rotel are serious in making a concerted and strategically planned campaign, rather than simply using an existing sales force to dip a toe in the water.

With typical Rotel product selling in the under-£1,000 system bracket, and the new exotics coming in at more than ten times that figure, there is clearly a yawning gap between the bread and butter and the proposed jam. Expect the 'lower high-end' (or whatever one calls it) to start receiving the Rotel treatment before too long.

Questioned whether he was intending to sell Rowland

monobloks to every dealer who stocks the *820BX3*, Rotel's Tony Morpeth explained he was planning to start amongst the currently established high-end dealers, and is not going to rush into building a countrywide network.

He reckons the keys to the success of the new venture will come from combining competitive pricing with the efficiency and professionalism of the existing distribution set-up. When Rotel took over they slashed price of Infinity loudspeakers to only two thirds of what had stood before. *TM* believes comparable price reductions on other high-end lines could help increase the overall size of this market significantly.

## IN BRIEF

RPM, of Clapham, are holding Linn clinic come musical evenings on the 28th and 29th June. Some Linn personnel and all Linn's products promise to attend.

Shrewsbury has a new hi-fi dealer. Creative Audio provides a single speaker demonstration room facilities where Linn, Naim, A&R, Mission and Heybrook products (among others) can be heard.

Basingstoke hi-fi dealers AVT have been bought by Absolute Sound and Video. The shop in Feathers Lane, Basingstoke Old Town, has been revamped with a single speaker dem room.

## LARGE QUARTERS?

Canton Loudspeakers have introduced a new range of passive floor-standing models.

The new wood-veneer speakers, which when polished look like an admiral's dining table, come in four sizes. The two smaller models, the *CT80* and *CT90*, are priced at £1,000 and £1,350 per pair. The *CT80* stands 80cm high and the *CT90* 90cm high. Canton say these models

are suitable in rooms up to 55 and 80 square metres.

The £1,890 *CT100* and £2,400 *CT120* measure 105cm and 120cm high and can be used in rooms up to 100 and 120 square metres respectively. All the models have a nominal impedance of 4ohms.

The CT range is available in black, white, walnut, oak or mahogany veneers and can be bought polished or plain. We have quoted the polished prices.

*Speakers' corner: the new Canton range.*



## C PLUS

Three years since their predecessors' introduction, KEF is using the June Chicago CES to launch an all-new C-series range of popularly priced loudspeakers. Details are sparse prior to the show, a tight-lipped David Inman mentioning the need to finalise

patents, but rumour suggests the new models will be as radical as their predecessors were conventional. Some of the existing C models will remain available for some time, the new models starting UK deliveries in August.

hi-fi separates. But the sector is still strong commercially, and manufacturers are working to preserve the perceived full-width distinction between midis and 'true' separates, while steadily trying to upgrade the latter.

Inevitably there were several complete new ranges of separates, showing mild facelifts over the previous generation but little else. Often pre-production or mock-up samples, detailed description can wait until stocks become available later in the year.

One noticeable trend is the proliferation of digital amplifier – not just amongst separates (where UK enthusiasm has hitherto been underwhelming), but also as a key new sales feature for the more upmarket packaged systems – a feature that would have been more logical had DAT not stuttered into a limbo of postponement.

Technics and Sony will both have such systems on their books before long. And JVC showed

some clever Digifine separate D-in amplifiers, which also use digital technology to operate in class A without creating excessive waste heat – and lay claim to audiophile credibility by (nearly) omitting all the tone controls. (A tiny knob provides the mega-bass necessary for those heavy metal moments.)

JVC are also looking to the future of combined audio and video with surround sound receivers (for one end of the market), and a highly complex digital surround sound processor to satisfy the button-pushing urges of a deprived Digifine amplifier owner.

Most CD player makers (including Philips) are rapidly incorporating 3inch tray indents for the Sony-sponsored audio only CD single, which seems to be up and running already (in marked contrast to CD Video).

Pioneer in particular is champing at the latter bit and anxious to get started – this October for PAL it's reckoned,

though on the NTSC Japanese home market the company already has a hierarchy of four models, distinguished by features such as on-board framestores, and multi-disc changers.

Multi-disc conventional CD players are starting to spring up everywhere – Philips and Sansui being new arrivals, the latter's machine accepting two 6-disc magazines at the same time. Predictably, no-one was particularly forthcoming about inter-brand magazine compatibility, probably because they neither know nor care.

Sony thoughtfully pointed out that their turntable-based changer was of course 3inch-ready – and in the next breath showed with little embarrassment a new separate vinyl turntable! The latest feature on 18-bit 8 times oversampling ES CD players is called Custom File, which looks suspiciously like FTS with alphanumeric knobs on, enabling the truly enthusiastic to key in

short 'custom' messages to come up on display when the disc is played. And then there were the Walkmen with mega-bass; next year flying pigs perhaps?

Sony were one of many introducing 'intelligent handsets', which can be preprogrammed by the user to provide single handset operation of more than one item of equipment – the CTV, VCR and midi system perhaps. Nifty, even essential devices for the future, at least competition is already bringing down the prices somewhat.

However, gimmick of the show must have been Sharp's 'talking handset' – a last desperate attempt to teach the typical British consumer how to preprogramme his/her VCR? (It might have been had one been able to understand the squawks coming out of the bulky box.) Also at Sharp, a possible revival of the Optonica brand name. This once graced the company's hi-fi separates, but is now seen on a



Teac's 'world's most expensive' £4,500 two box P-11D-1 CD player.

VCR which incorporates surround sound Dolby processing.

Amongst more specialist hi-fi companies, TEAC is introducing a new £399 '870 cassette deck, retaining the performance but stripping off some of the frills of the fine '970, at a £100 saving. The company is also planning to bring in what should be comfortably the most expensive CD player on the market, a beautiful champagne silver P-11/D-1 two-box sculpture that costs £4,500 (there's a matching DAT player at the same price, but this isn't yet scheduled).

Portfolio is introducing a neat new £100 made-in-Europe tonearm from Thorens, with lockable magnetic bias compensation, a detachable headshell, and a clever height adjustment for VTA fiddlers.

HW International is about the only company formally marketing DAT in the UK, under the Luxman banner, primarily at present in response to demand from the professional sector. A wide range of electronics from reputable US brand Carver was on display in this room (along with the outrageous Scintilla lookalike loudspeaker that could carry a £1,750 UK pricetag), with a much better than even chance of UK availability soon.

Xenon is a new name, but could become important soon. Distributed by the ex-Ortofon UK team, it's the brand name chosen by major Japanese company Kyocera to pitch for the European hi-fi market. Kyoto Ceramic's technology can match

Technics' new ST-G90LK flagship tuner.



the best, but to make up for a (very) late start the prices for some very attractive CD players look outrageously tempting.

Though it could hardly be described as a classic show (particularly to one who visited Berlin and Tokyo in '87), there was enough of interest to recompense the shoe leather. A final note that offers hope for the future is that black finish may at last be slipping from favour. Alongside an increase in exotic separates going shiny again, Sony's new Compact (casiever) Systems have faded to a refreshing charcoal grey – and there's an off-white one for the bedroom too. Sometimes change is wonderful for its own sake.

## TECHNOLOGY

### RECORD CD

The Tandy Corporation are the latest company to claim to have cracked the technical problems of making a low cost re-recordable optical disc system that is fully compatible with existing CD players.

An announcement from US head office anticipates rapid growth in audio applications, with recorders below \$500 'in the early years'. Data storage requiring greater precision is expected to follow subsequently. However, a great many questions are left unanswered, such as playing times, disc costs, technology used and likely timescales involved.

Reverse compatibility with existing CD players is claimed, which bodes well for commercial acceptance but is bound to raise hackles amongst licensors Philips and Sony, who are themselves expected to make a similar announcement soon.

### HOUSE OF LORDS – "OK TO DUB"

An action against Amstrad plc, by three record industry companies, claiming that a fast-dubbing facility on twin-cassette decks

was illegal, has been thrown out by the House of Lords with costs awarded to Amstrad.

CBS, EMI and Chrysalis Records began suing Amstrad in 1984 claiming that the company was marketing machines which might encourage or facilitate illegal home taping of records and cassettes. Amstrad would be liable to the record industry if the practice were carried out by people who bought the machines, they argued.

Amstrad's argument that it was bringing technological advances to the consumer and that it did not infringe the rights of record industry members was vindicated on May 12 by Lord Templeman in his summing up recommending that the current law, rendering home taping illegal, should be repealed.

## BUSINESS

### HIGH STREET ELITE

High street hi-fi retailers Laskys are cultivating a more upmarket image with a point of sale campaign featuring acclaimed products. They are using new window displays in 51 shops which feature equipment that has been recommended by *Hi-Fi Choice* and *What Hi-Fi?* magazines. The aim of the campaign is to make customers aware of the quality and value for money offered by the goods stocked in Laskys stores. They have dubbed the featured range of products 'Elite': the window displays urging people to "Experience Laskys Elite".

## TRADING PLACES

It's all change amongst some familiar British consumer electronics names. First, Caparo Industries announced that it was to discontinue manufacture of Fidelity televisions in the UK, and soon after that the brand name was bought by Amstrad.

Caparo are setting up Intersound Consumer Electronics plc to handle the rundown and after sales obligations of what used to be Fidelity product. Amstrad in turn plan to use the Fidelity brand to distinguish Amstrad Leisure audio and video consumer electronics products from the business-oriented computer side of the business.

In an entirely independent move, Alba have purchased the Bush brand, and plan to revive this once famous name in a position a little upmarket from Alba's own slot.



Coming soon to a window near you: Laskys' social climbing into proper hi-fi.

## REVOLUTIONS IN SOUND

An exhibition of gramophones was opened by HRH Princess Margaret last month to commemorate one of the centenaries of music reproduction. *Revolutions in Sound* features many early gramophones and traces the development of home equipment from 1888 to present day CD players.

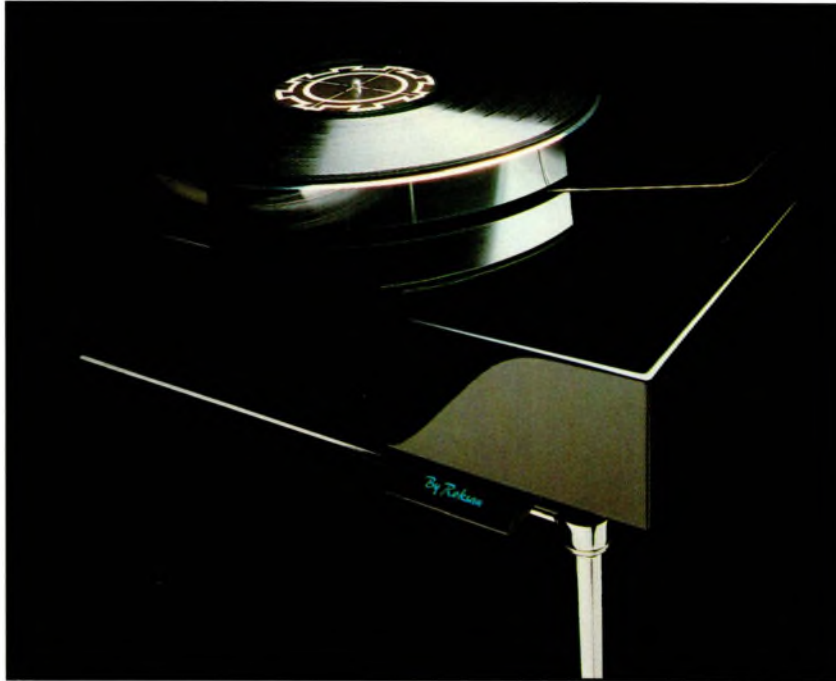
Emile Berliner first demonstrated his 'flat disc recording and reproduction machine' in Philadelphia on May 16 1888 – visitors to *Revolutions in Sound* will be able to compare the quality of sound from his *papier mache* horn with that of modern machines (watch out CD!). The exhibition will run over the next few months at the Kensington home of the National Sound Archive, and, like listening to any of their 750,000 records, it is free. Doors are open from 9.30am to 4.30pm Monday



A petal-horned Edison-Bell Primaphone: from an era when equipment was actually made to suit your home.

through Friday with late opening (8.30pm) on Thursday evenings. National Sound Archive: 29 Exhibition Road, London SW7.

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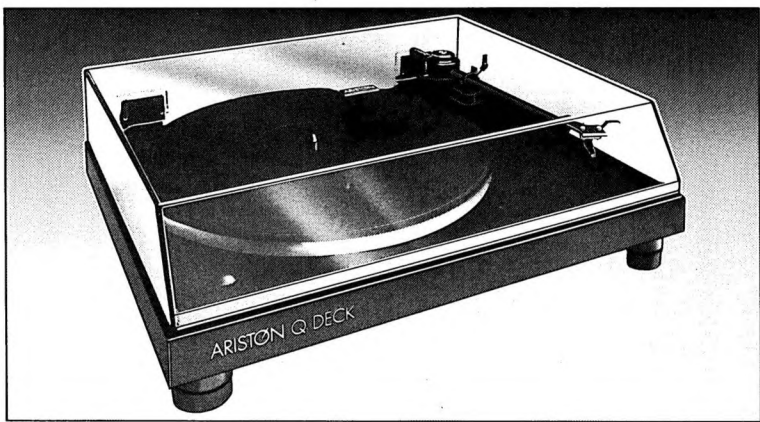
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# EXPERIENCE

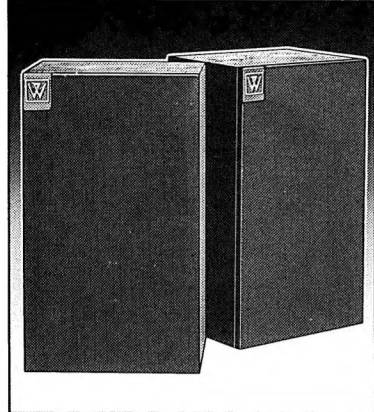
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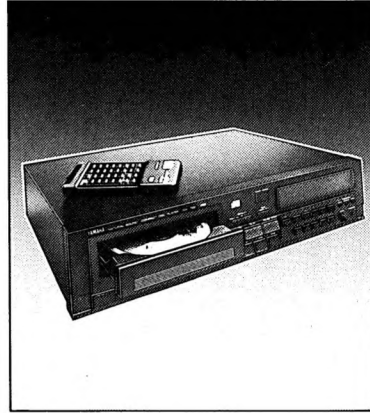
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# ASPIRATIONS

*Prerequisites for the Earl of Chichester's system were a superb sound and discreet equipment. Dan Houston visits his Wiltshire home; Ian Dobbie photographs.*

## UNDERSTATED

# Excellence

A favourite pastime of the Earl of Chichester is to listen to records while reading the accompanying score. He may then play the same music by a different conductor "to see how their interpretation of the piece differs".

Such attention to detail has resulted in a system the Earl believes to be pretty close to the state of the art of music-reproduction. The art of music-making is something at which he is both expert and experienced, and he takes music very seriously. In the early sixties, he studied theory of music and composition under Professor Overhoff at the Mozarteum in Salzburg, Austria, playing the clarinet and piano, and as a member of the Covent Garden Opera Board he attends many concerts. Knowing the voice of Spanish tenor, Jose Carreras, has enabled him to choose the system best suited to recreate that

voice from vinyl he told me, but it has also been easy to hear how many systems get the original sound wrong. The Earl's approach therefore, was to go for an accurate and honest reproduction of the original as he knows it. And this approach is rewarded when professional musicians, both singers and instrumentalists visit Lord Chichester and are "very impressed" with the system.

The 44-year-old Lord Chichester lives in a stately early Georgian manor house near Salisbury. On entering its black and white tiled hallway portraits (some lifesize) of the Earl's Pelham family ancestors greet you and a Greystoke staircase carries the eye up to a wallsize tapestry hanging on the second floor. Of the two ground floor reception rooms his drawing room houses the hi-fi where only the panel loudspeakers and turntable are on permanent display. As the room is full of antiques and books, the usual array of black or silver-fronted boxes would have compromised its style and tenor. So instead the amplifiers, tuner and cassette deck are all housed in cupboards below bookshelves.

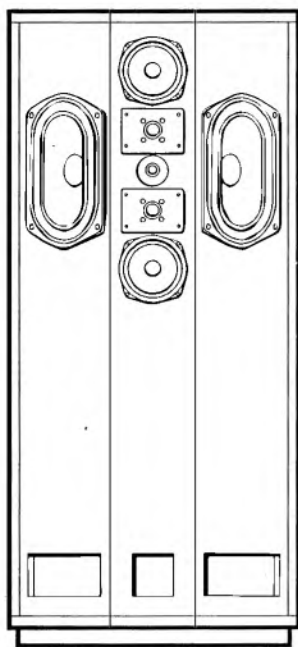


*Left: Lord Chichester in his drawing room. Right: To the manor installed: the Earl's hi-fi in the bookcase with whitewashed brickwork showing where the SP11s were made to fit.*

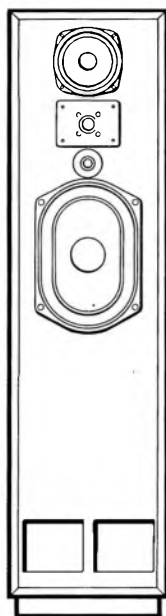




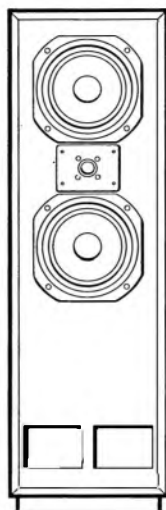




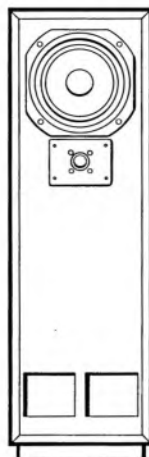
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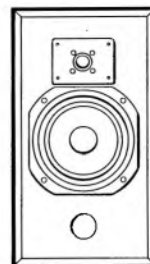
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STUDIO 3 TLS



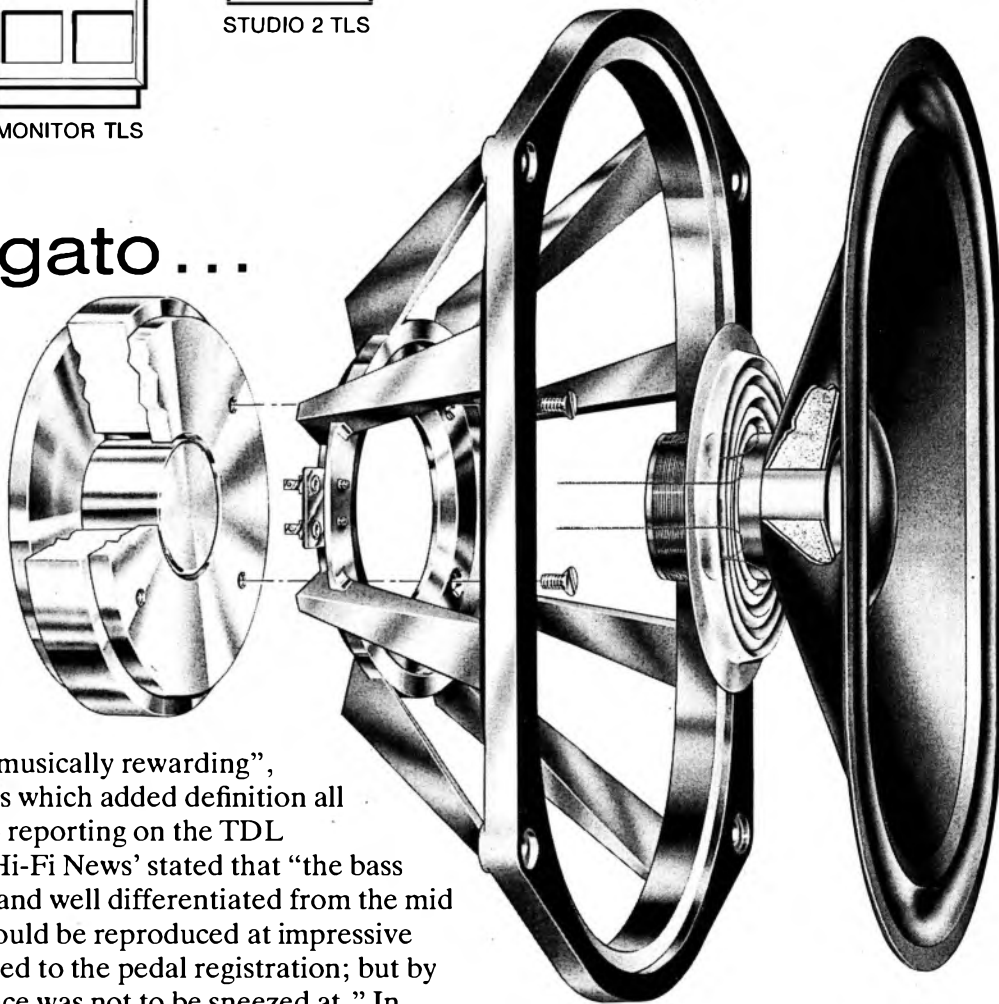
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## bass obbligato...

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The 18th Century manor, whose walls made way for Audio Research.

The back of the Earl's drawing room where some of his classical record collection is kept.

A pair of taupe-coloured Apogee *Caliper* ribbon loudspeakers stand in front of two long windows with a view across the gravel drive and lawns. Some visitors have mistaken the speakers for heaters according to the Earl but as he had Quad *ESL 63s* before them he has become used to the comment!

The seating of two sofas and armchairs is centred around an original Adam fireplace above which hangs the largest painting in the room – a Dutch scene of a beach under stormladen clouds. Other Dutch and Flemish old masters surround the walls at head height making the room inert even though the ceiling is very high. Soft furnishings, bookshelves and the pink wool carpet also help reduce any echoes or 'liveness' that such a ceiling would give. The colour schemes are varied, plush and 'busy' in a Regency style, but based upon the pale pink theme of the carpet, curtains and bookshelves. The taupe *Calipers* blend unobtrusively whereas Apogee's other colour – grey – tends to need a more modern or Spartan environment.

Most of the system has been imported by Absolute Sounds and installed over the last few months by Brian Rivas of the Andover-based Pinewood Music Company. From the 'front' the set-up runs as follows: Koetsu *Red Signature* cartridge, Airtangent air-bearing tonearm, Oracle *Delphi III* turntable on a Sicomin Isolation board, Audio Research *SP 11* preamplifiers, two Krell *KMA 100* power amplifiers and then through Absolute Wire *Force Four* speaker cables to the *Calipers*. Kimber Kable interconnects are used between pre- and power amplification stages. The Earl had "on approval" a Microseiki *CDM2* compact disc player. This is one of Rivas' favourite high-end CD players though as yet the Earl has not invested in the CD phenomenon; and



the size and varied nature of his classical record collection (with many foreign pressings) means that vinyl will continue to be his prime software in the years to come.

Making high end audio equipment discrete should be listed as a modern equivalent to one of the seven labours of Hercules! In this case the *SP 11s* were found to be four inches too deep for the cupboards in which they were to live. To cater for the AR corpulence Brian Rivas told me they originally planned to bring in a carpenter to have the cupboards brought out into the room. But this would also have meant enlarging the cupboards on the other side of the fireplace to maintain symmetry. In the end, hammer and chisel in hand, he solved the problem by getting house to make way for system: hollowing out a niche for the VIPs (Very Important Preamplifiers) by taking away the plaster, laths and chunks of the Earl's 270-year-old wall!

The *SP 11s* were that necessary.

But in some ways this is characteristic of Rivas' and Lord Chichester's approach (not hammer and chisel in hand of course!) in creating a bespoke system. Brian has made some eight or nine trips to the manor, auditioning equipment in its potential setting and installing it "not only to his satisfaction, but to mine as well".

Choosing the right cartridge, for instance, was the last stage in the operation. "I don't like a client to choose a cartridge until he has the system set up in his room; the cartridge might not be easy to live with," said Brian who brought out several for the Earl and his wife; to decide which was best in the system, the room, and therefore the ear. Indeed, after initial auditioning to determine a customer's taste Brian always prefers to go to the customer's home and let them listen to the equipment there; sometimes over a few days. It's a lengthy but exacting approach, with no corners cut.

Getting the right balance with components of this kind is similar to running a Ferrari (to use Brian's phrase), and tuning takes time and skill. "Fifty percent of the battle is in setting up the system. People often say high-end audio is very expensive, but then you don't get a Ferrari for Mini-Metro money," he explained.

To liken this system to a Ferrari of audio may be accurate in terms of the sheer brake horsepower available from the Krells but I never felt that it might lose control of the mostly-operative program we listened to. And of course there is no inclination to paint it red! There had been reservations about the imaging of the *Calipers* – there is furniture between the

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*Gramophone, March 1988*



## The DCD 1500 Mk II

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*CD Review, December 1987/January 1988*



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listener and most of their area, and even Brian Rivas described them as 'fairly insensitive'. But they sounded well-placed and produced the orchestra in front of one so that the ears focused on cellos to the right, horns behind etc.

There is this sense of power though, from Krells through Apogees, that leads one to feel that Wagner's *Die Walkure*, or some similarly apocalyptic piece would be just the same as a chase over the Alps with Italy's famous auto-daughter. However, we didn't really crank them up thus. The Krells do have the power though, to satisfy the demanding nature of Apogee where very few amplifiers are bruiser enough to cope. And this, according to Brian, is typical of the American approach to hi-fi. "There are no holds barred; it's really well-designed and great to listen to," he commented, "there always seems to be a compromise somewhere with British Audio equipment. They use smaller chassis and there is this minimalist ideal where people think that if an amplifier has more than a volume control it can't sound good.

"Listening to most hi fi is like having a grope in the back seat of a car – it's exciting but you feel there should be more to it," he expounded later, "but listening to top quality American audio is like being with a woman who makes love in a way you only ever dreamed about." He makes his point.

A potential problem, often associated

with the Airtangent arm, is the noise from its fish-tank pump air supply. The arm is supported on a beam through which air is pumped *via* a dozen or so tiny air holes to buoy it up for near-frictionless motion. The cartridge travels hubwards on a record pulling the arm along the beam. The problem often complained of is that sometimes during the quiet moments in music the spell is punctured by this pump gurgling away in the background. In this system the pump is enclosed in a cupboard and damped by a rolled up towel and foam rendering it virtually inaudible. The Earl said he could just hear it but that it did not bother him. The Krells use fans to keep them cool and during listening the cupboards have to be left open to allow the air to circulate, but these fans are also virtually inaudible and could not be heard from the main sitting position.

So the system is gorgeous to listen to; no whistles, no pops and always in control... yet giving a sense of just reining in that equine power available from the Krells. And it is discreet. Even the waist-height *Calipers* suit the room perhaps better than stands and boxes. A woman dreamed about? Well surely that depends on the dream...

Dreaming apart this is a superb system, enhanced only by the charismatic setting which an old English country house gives to the best that classical music has to offer.

*Above left: One of the Krells (minus handles) and the Microseiki – the system disappears when the cupboards are closed.*

*Above right: The Oracle Delphi III and Airtangent arm enjoy perpetual prominence in their niche among the Earl's books.*

*Below: Mother and child look on. The Calipers can reproduce some of the best in choral music.*



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## PART TWO

By offering a rigid and vibration-controlling platform, tables and isolation stands can greatly improve the sound of your hi-fi system. However, hi-fi furniture is all too often starkly functional, resembling a purely mathematical product from a welder's shop – it may work for your system but it doesn't always harmonise with your living-room environment. So *Choice* is giving away a complete set of designer hi-fi furniture from the Daniel Lamb Collection which will set off any sound system with its elegant tubular black steel structure and massive marble slabs. Each unit's support columns are finished with a 24 carat gold plated dome, and the marble shelves in point contact with the

frame are adjustable for correct support. The first prize winner will receive six pieces from the range comprising:

The *AR1* album rack (£275.95) has storage space for 150 albums and is designed to support any audio unit on its 69cm-long marble shelf. The *SP1* speaker stands (£439.88 a pair) are 63cm high and will support a range of loudspeakers with maximum base area of 30 x 28cm-wide. The *B1* support (£612.95) stands 92cm high and has three rigid shelves for turntable, CD player and pre- or integrated amplifier. And finally the *MB2* tables (£344.95 a pair) for monoblok power amplifiers can also be used for many floor-standing loudspeaker models. The total retail cost of the set is over £1,600.

This month's questions are:

1. The designer of Vecteur cables also designed a rather attractive French amplifier – which one?
2. Which *Choice* Recommended turntable features two motors?
3. Name the Dutchman who designed the acclaimed MC One and MC10 cartridges.
4. Which alternative loudspeaker is considered to be a suitable partner for the Celestion 6000 sub woofer system?
5. What range do the record level meters on the Denon *DR-M44HX* cassette deck have?

### COMPETITION RULES

- 1) All entries must be on the entry forms provided. Photocopies will not be accepted and only one entry per reader will be considered. Entrants must submit completed entry forms in a single envelope. Incomplete entries will not be considered.
- 2) There is no cash or other alternative to the prize.
- 3) Employees of Dennis Publishing Ltd and associated companies, or their agents, or of the manufacturers and suppliers of the prizes or their relatives are not eligible to enter the competition.
- 4) The competition is not open to readers living outside the United Kingdom.
- 5) The prizes will be awarded for the first two sets of correct answers opened. The Editor's decision shall be final and binding. No correspondence whatsoever will be entered into regarding the competition.
- 6) All entries must be received by Friday, August 19th 1988. The winner will be notified by post and the results will be announced in the November 1988 issue.

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**NB** Please send this completed entry form along with Part One (June issue) to:  
HI-FI CHOICE COMPETITION, 14 RATHBONE PLACE, LONDON W1P 1DE.



## SECOND PRIZE

The runner-up will receive a pair of *Red Line* loudspeaker stands (£258.95) described as "the realisation of a four year project to produce the perfect loudspeaker stand." The *RL1* consists of a triangular top plate on a sturdy steel column with another triangular base which couples to the floor *via* three steel cones. To enter this competition all you have to do is answer the five questions in this and last month's edition of *Hi-Fi Choice* and send the completed entry forms together to us. The prizes will be awarded to the first two correct sets of entries to be opened.

# PERSPECTIVES

*If you thought the easy route to assembling a successful system was simply to throw money at it, then think again. As Paul Messenger explains, manufacturers of high-end audio gear have yet to agree on the definition of hi-fi's fundamental objectives.*

HIGH END

## Navigation

**I** sometimes envy the midi system buyer. Not for him the angst of choosing between panel, box or horn loudspeakers; between valve and transistor amplification; or the mixing and matching of umpteen possible combinations of turntable, tonearm and cartridge. As soon as one moves out of the cosy midi world, populated by brand names familiar from TV set or Walkman, the range of options starts to multiply – slowly enough with systems costing under £1,000 or so, but increasingly rapid thereafter. By the time one gets even halfway towards the 'high end', bewilderment sets in hard.

The remarkable diversity of specialist hi-fi is both strength and weakness. Wide choice in a competitive market is by all accounts the engine of this country's current economic health, and should therefore be deemed desirable for its own sake. But it is also symptomatic of difficulties in defining hi-fi's fundamental objectives.

It's not that serious hi-fi lacks direction – it wouldn't be growing so quickly if that were the case. The problem is that there are too many directions. Carefully choose

components that work together coherently and the results should be many hours of contented listening. Unwisely combine those of rival philosophies and the result may approach midi system mediocrity – at considerably more than midi system prices.

Examining the routes taken to achieve the former rather than the latter is the essential theme of this feature. It is a task worthy of Big Thought and several millenia of the IGSTC (intergalactic space/time continuum). It is undertaken rashly by yrstrly in the certain knowledge that it will never be accomplished to the full satisfaction of either writer or reader – but that someone, somewhere needs to try and create some sort of order out of the chaos.

### INFLUENCES

Historically hi-fi began in Britain and the US around fifty or sixty years or so ago. Three distinct spheres of influence spread out from the UK and the US East and West Coasts, based largely on objectives that arose from the expectations of the individual designers and enthusiasts involved.

An alternative and uniquely Japanese approach has also developed steadily over the past forty years.

Paradoxically, considering Japan's increasing dominance of mass market consumer electronics, it is the US and UK specialist hi-fi companies which have been most influential at 'internationalising' serious hi-fi over the past decade or two. And the spreading global awareness is now bringing many other worthwhile contributions, from Europe, America and Australasia.

While national identities become increasingly blurred, identifiable characteristics and traditions may still be discerned. Predictably the US goes for large loudspeakers – frequently panel-type designs, and usually with large amplifiers to drive them – reflecting their generally larger rooms. The Japanese – perhaps surprisingly in view of their much smaller rooms, but maybe related to the flimsier structures involved – retain great affection for large British horn loudspeakers that originated in the 'fifties. And high horn efficiency works well with the low power 'vintage' valve amplifiers which are also highly regarded in Japan. These are just a couple of the more obvious examples; there are dozens of other instances of national fashion and taste, but for brevity's sake this feature will concentrate on the UK market.

### A PEOPLE BUSINESS

The search for the state of the hi-fi art is essentially a story about individual people. Most of the small companies active in specialist hi-fi are led by one or two individuals who combine creative design and development skills with the managerial and marketing expertise necessary to run

*Linn Sondek – one of the UK's most timeless products.*





a business effectively. The most successful are those motivated by a personal vision of what hi fi ought to be capable of, and the energy required to pursue such a goal. And the distributors and dealers themselves – certainly the best ones around – are also driven as much by personal enthusiasm as the pursuit of profit.

In that context it is not surprising that the best and most timeless products are frequently the result of one man striving for the unattainable, lavishly fuelled by patience and dedication. Nor is it curious that such products quite clearly reflect the musical taste – if not the whole personality – of the individual concerned. The alternative – design by committee – removes soul and leads inexorably back to the midi system.



*Hi-Fi is a story about people. Audio guru A.J. van den Hul has been responsible for much work on cables and high-end cartridges.*

The buzz that comes from listening to music is an intensely personal thing, part emotional, part intellectual and different for every individual. Leading designers have used such different criteria as the sex appeal of Ella Fitzgerald's voice, or the precise focus and location of a singer on an operatic stage when demonstrating their hi-fi to me; some listen to rock music, others to string quartets. No one approach is right or wrong, but each will create a certain constituency of appeal to like-minded enthusiasts, whether 'end users' or dealers. The consumer's key to hi-fi satisfaction lies in identifying which route suits his/her taste better than the alternatives.

## THE SOUND OR MUSIC?

Introducing a dichotomy – splitting philosophies into yin and yang, drawing analogies with left and right wing politics or



*State-of-the-art amplifiers come expensive. Audio Research's SP11 two-box preamp costs £5,350.*

whatever – may be a somewhat glib way of categorising different approaches to hi-fi. But it's useful nonetheless, because there is one distinction which is fundamental. Hi-fi design may be oriented first and foremost towards the reproduction of sound *per se* – and hence by implication the reproduction of music. Or it may place musical values in the driving seat and let the sound sit in the back.

This is basically a McLuhanesque dialectic, relating to the relative importance of medium and message (or of style versus content to give it an 'eighties update). Most 'real' and/or high-end hi-fi companies claim to embrace both *desiderata*, and to some extent succeed in so doing. But there do seem to be certain areas of mutual exclusivity, and the unavoidable compromises of any hi-fi design process tend to reveal the direction in which a company is leaning.

The sonic approach certainly has the more effective intellectual appeal. It is both eminently justifiable and indeed relatively straightforward to compare hi-fi components on the basis of an ability to resolve the detail of a stereo mix. Modern electronic music may create some difficulties, but when a live performance has been properly captured in its acoustic setting, the best such systems can provide an uncannily effective 'window' onto the whole recorded soundfield.

There is also some persuasiveness in the argument that transmitting the maximum

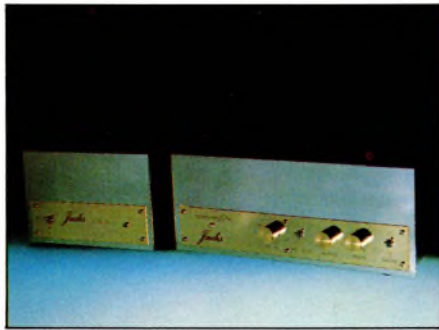
sonic detail automatically conveys the musical message, but in my view this may be a *non sequitur*. Part of my own musical experience involves concentrating on the structure and architecture of a work, but another part is undoubtedly a raw and largely subliminal reaction for which no real vocabulary exists. It is tied in with feelings of 'realness' and 'naturalness', and has much to do with a system's ability to avoid causing irritation at the subconscious level over a period of time when *not* actively concentrating.

Simplistically, every enthusiast (like every manufacturer, dealer, or even journalist) has thresholds of acceptance of these two basic criteria. At what point does the quality of presentation interfere with the enjoyment of a system; and what degree of emotional quotient (EQ would be an unfortunate acronym) does the listener need for his emotional satisfaction? Or more mundanely, how much of the available budget goes into the emotional fix, how much into the intellectual?

## SUBJECTIVE DICHOTOMY

Assembling *The Collection* provides a good excuse for me to get some up to date experience of the latest high-end products, and put them into some sort of perspective with my (now practically antedeluvian) tri-amped *Isobarik* Linn/Naim sys-

tem. On this occasion I borrowed several recent 'critic's choices', including a pair of Celestion *SL700s* plus Musical Fidelity *MX* pre- and *A370* power amplifiers, with a couple of the tasty MF *MC2* loudspeakers thrown in for good measure (sorry, sound). Using mainly MF-bi-wired *700s* and my familiar Linn and Naim turntable and tuner, I was mildly flabbergasted by the increase in detail resolution and particularly focus and image precision over my normal expectations, though I struggled a bit with some other aspects of the alternative system.



However, in retrospect the overall change may have been a bit too great. I learned great respect for the *700s* as a remarkable loudspeaker by any standards, and a redoubtable monitoring device to boot. Although the massive *A370* could drive them to pretty impressive levels, I was not entirely comfortable under these conditions, and I suspect loudspeaker miniaturisation would have to be forced on me by threats of divorce proceedings – I miss the sheer energy delivery capabilities of bigger boxes.

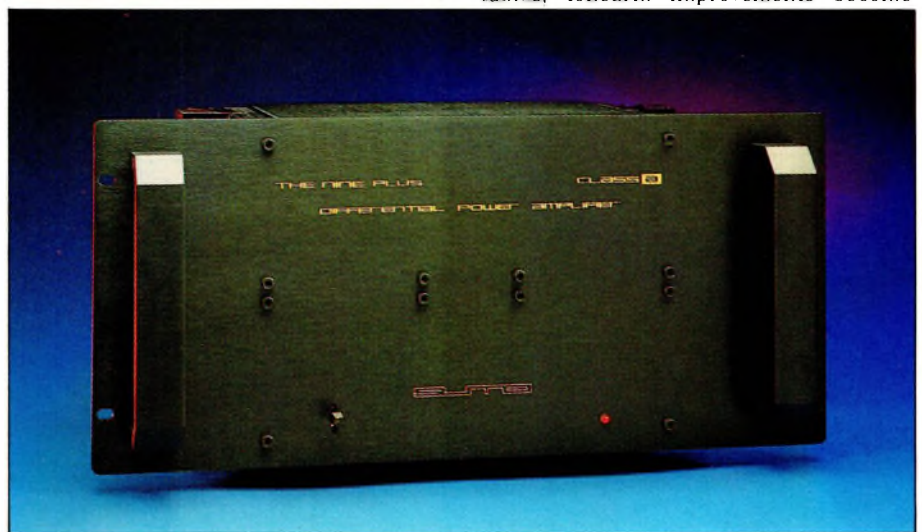
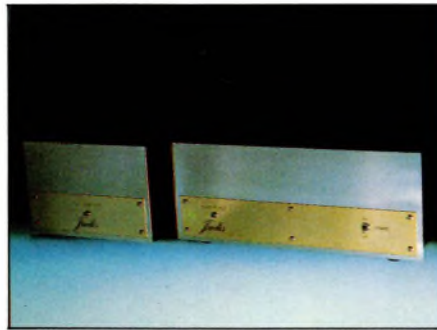
Returning to my Naim amplifiers (used passively) after a period with the MFs was a curious experience indeed. The subtlety that absolute phase selection can have on a precisely defined stereo image became an irrelevance in the substantial defocusing of said image, and the general reduction of separation detail. Yet through a somewhat soup-like acoustic, the Naim ably demonstrated the sheer nimbleness and coherence that has made it a modern classic. Sonically wanting, I nonetheless found that a sense of ease had returned with the Naim that I had missed with the MFs – and which is subliminally sufficiently satisfying to postpone changing my amplifiers yet again. All of which provides a pretty clear illustration of the dichotomy mentioned earlier.

## SYSTEMS

Though exploring the interactions of components from different manufacturers is one of the delights of the die-hard hi-fi enthusiast, even the high-end has seen something of a shift towards 'packaged systems' in recent years. Besides obvious cosmetic considerations, there is clearly some benefit from choosing products which share a common design philosophy, even if one decides to customise the end result by introducing a 'better mousetrap' made

elsewhere as one of the links.

Linn and Naim were early protagonists of the 'real hi-fi' systems approach, with their now overlapping ranges of expandable disc-playing packages running from about £1,000-£10,000. Although the various components can be treated as separates, they do seem to work most predictably well when combined. At lower prices a number of other predominantly UK manufacturers – Mission, Meridian, Heybrook, plus AR and Rotel, for example – also produce competitive well-matched packages that have been known to outper-



form poorly-matched assortments that may have cost far more.

High-end importer Absolute Sounds is equally conscious of the need to put together components sympathetically. Handling a large number of brands, AS's opportunities for mixing and matching to suit particular tastes are practically unequalled. And relative newcomer Audio By Design seems to be deliberately adopting a Linn/Naim-like 'closed loop' approach, based on carefully selected UK and overseas components such as Voyd turntables, Snell loudspeakers and their own Audio Innovations valve amplifiers.

Although component matching has become an increasingly important part of achieving high quality hi-fi, the mechanisms at work are still largely elusive, and achieving the state of 'supercompatibility' is often a matter of trial and error. One should not overlook the importance of expert setup and installation – setting up a top turntable takes quite a long time, even if much can be done before leaving the shop. And remember the need to devote a

reasonable part of the budget to the cables and support furniture, which are essential components in the overall equation.

## COMPONENTS

It is now generally accepted that the record player, consisting of turntable, arm and cartridge, is the most important part of the hi-fi chain. Much credit is due to Linn Products, whose fervent campaigning eventually succeeded in persuading the sceptical that turntables really did matter. But the *Sondek* has gained both credibility and competition from the many rivals that have appeared since, notably Pink Triangle, Roksan and *The Rock* in the UK, but with plenty of others besides. Belt drive rules the roost, but the range of options available make turntable comparison indisputably the most fascinating and rewarding element in the hi-fi lobby.

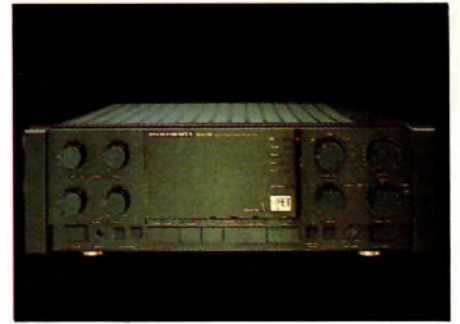
Tonearms have received just as much attention. Fixed headshells and near-rigid bearings are now mandatory at even quite modest prices. Given the advances in turntables, tonearm improvements become

*Jadis prepower (above) and Sumo Nine Plus power amp (below) – high-end alternatives from France and the US.*

that much more worthwhile, and that much more tempting for the customer. The current crop of exceptional designs can have as much influence on the sound of a system as the loudspeakers, so careful matching of turntable and arm is vital.

Cartridges too have evolved, though more slowly and sanely as a rule. The moving-coils were always with us – it's just that the more primitive turntables, arms and amplifiers prevalent a decade ago were much less able to use them to their best advantage. Now the moving-coil principle has become the rule rather than the exception, along with lower compliance for better system optimisation.

The hi-fi world seems quite able to accept and live with an extraordinary variety of totally different devices designed for the apparently simple task of amplifying the signal. Though arguably less important than the turntable, the amplification system is often more expensive, and there is



Marantz PM94 (above) and Quad ESL63 electrostatic speakers (left)  
 Turntables are fascinating. Below is the new Crystal Reference – see review on p.35

rent 'common denominator' connotations.

One could spend pages discussing the compromises inherent in the various approaches to loudspeaker design, between valve and transistor amplifiers, or between different forms of turntable and tonearm construction and cartridge *modus operandi*.

Yet to a degree at least it's just so much bullshit. The end result is all that really matters. A real hi-fi system should do its level best to give you something less than, but along the same lines as, the buzz you get from live music, whatever that may be. And the first step along the road could be to try and find a dealer who shares your particular taste. This fortunate individual should ideally act as sympathetic guide rather than attempt to impose his own prejudices. And should be able to prove his worth by actually demonstrating various alternative approaches to 'high end' hi-fi in a straightforward manner.

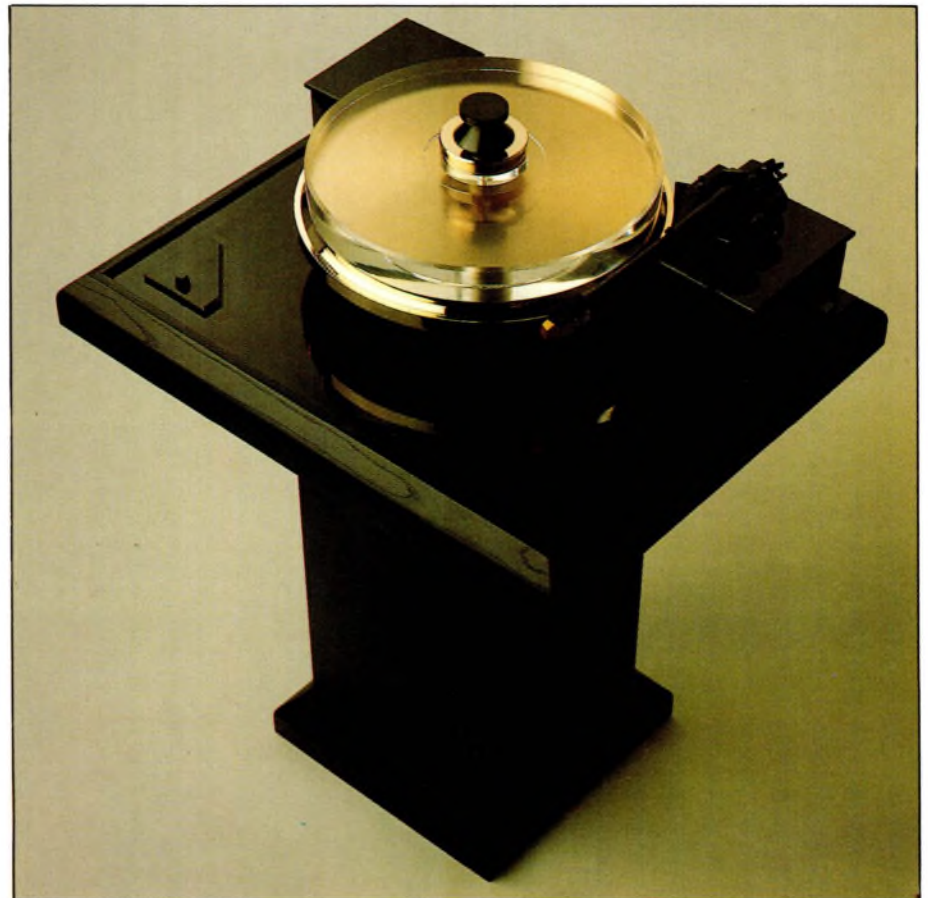
no avoiding its pervasive subjective influence sitting at the heart of every system. About ten years ago the transistor appeared to have conquered all, but there was the fluttering of a revival of interest in valve designs. This flutter faded, rallied, and has recently grown stronger and stronger.

Despite the attention focused on turntables and amplifiers in recent years, there is no shortage of exotic, varied and interesting loudspeaker systems. Expensive loudspeakers show much greater variation than cheap models; each possesses a personal collection of compromises which is usually more extreme than that found under the design constraints of a simple two-unit box. Many UK manufacturers tend to go for comparatively compact full-range box loudspeakers, in keeping with our smaller rooms. US makers have specialised in tall dipole panel and ribbon drive systems, which constitute a completely different ball game in sonic presentation.

The fact that these solutions are so radically different at least gives the customer a viable series of options. Some people become so totally smitten by panels (or horns) that all other factors become secondary. Others place high priority on bass extension and power, or accept the constraints that domestic harmony place on loudspeaker size. Somewhere amidst the confusion, there is probably a system just right for you!

Tuners, cassette decks and CD players remain peripheral to high-end activity – largely through limitations in software

quality. That said, genuine live radio broadcasts can rival the best of vinyl, even though most of radio output is inherently sub-hi-fi quality. CD software improves gradually if not too steadily, but sufficiently so as to hint that this new digital medium could eventually outgrow its cur-



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A W Kleiser  
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England

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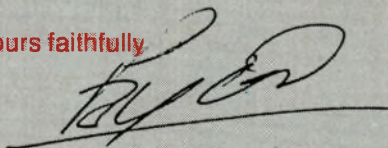
Your after sales service was also impressive. The system was delivered to my (previous) home in Camberley and was set up with courtesy, patience and understanding.

I was originally recommended to your shop by a friend. How right that advice has turned out to be. I in return commend your staff and their attitude and would have no hesitation in making an unequivocal recommendation should the situation ever arise. Indeed, please feel free to quote from part or all of this letter.

Once again my sincere thanks for the way in which you have handled this matter. I wish your company continued success in the future.

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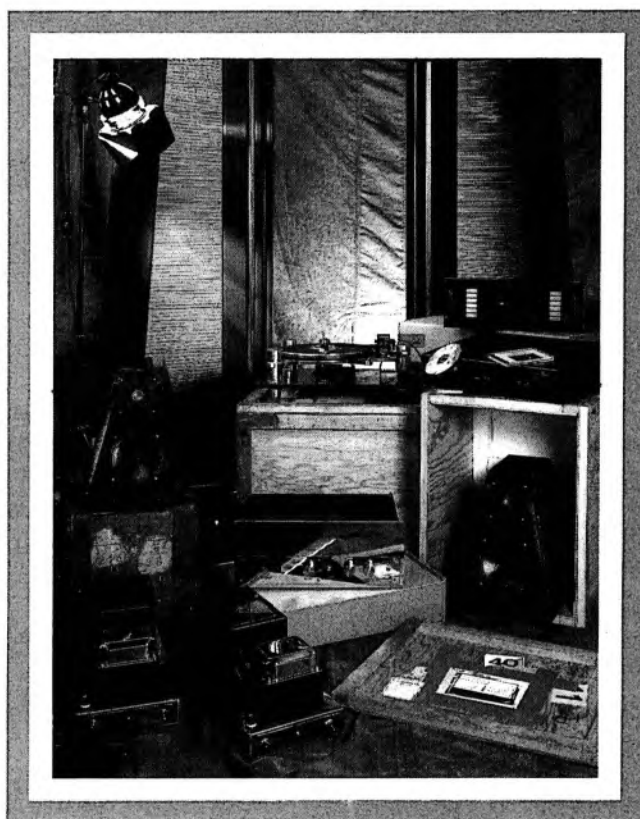
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# The Collection



## TURNTABLES AND TONEARMS

*Alphason Sonata/HRI00S-MCS 33 • Airtangent II 34 • Crystal Reference 35 • Goldmund Studio 36 • Kuzma Stabi/Stogi 39 • Linn LP12/Ittoki/Troika 40 • Moth Arm 41 • NVA 42 • Oracle Delphi III 43 • Rega RB300 45 • Roksan Xerxes 46 • SME IV 47 • SME V 48*

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## CD PLAYERS

*Arcam Delta Black Box 109 • Denon DCD-1500 MkII 110 • Kinergetics KCD 30 111 • Marantz CDA94 113 • Meridian 207 114 • Philips CD880 115 • Sony CDP-333ESD 116*

## CASSETTE DECKS

*Aiwa AD-WX909 119 • Denon DR-M24HX 120 • Denon DR-M44HX 121 • Nakamichi CR-7E 123 • Nakamichi Dragon 124 • Sony TC-K700ES 125 • Sony (WMD6C) ProWalkman 127*

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# MARKET RESPONSE

*This month Dan Houston takes an overview of high-end audio asking dealers and importers about their experience of the marketplace.*

**H**igh-end audio is (usually expensive) equipment made by companies who take a specialised approach to hi-fi in order to attain the highest standards of sound reproduction. You can spend anything from £5,000 to £100,000 in an attempt to recreate the music making process in your home without the bother of employing a chamber orchestra.

The high-end audio market is still relatively new in Britain, having begun in the late seventies with imports of American products. Many argue that the Americans still lead the field (because they got a head-start) but the science is becoming less esoteric as the notion of owning such equipment pervades the ken of music enthusiasts. Of course it follows *ipso facto* that the midi-system just doesn't get a look in here.

During this survey one of the names which often cropped up was Ferrari. Of course, Ferrari don't make hi-fi, but the sports car manufacturers were linked to high-end equipment as being the equivalent for car enthusiasts. "Everybody knows about Ferrari but they don't see high-end equipment in the same way," was a common complaint. Dealers told us people often didn't believe it was possible to achieve significant sonic improvements by spending such high sums of money and they agreed there was ignorance and therefore apathy on the part of most of the population who (even if they can afford it) believe the midi-system concept and CD sound is still the latest thing.

A lot of high-end equipment is very big – strings of boxes as cumbersome as lobster pots often invade the room forcing the need for cupboards or a complete change of style. Gone are the days of the beautiful Pye radiogram blending in with your Queen Anne desk. Today's offerings from the leaders in the field are cased in silver or black and demand a

galactic outpost interior if you are to have your hi-fi on show while maintaining any aesthetic dignity.

But music lovers who have money often also own antiques. So there has sprung up a whole installation service with dealers offering to hide the system (or at least blend it into the room) as well as setting it up to play to its best potential. Installing expensive hi-fi is something of an art because of the restrictions of the equipment. For instance, speakers cannot always be stuck on a wall and amplifiers need air circulating to keep cool. One dealer told us of a customer who had commissioned an interior designer to install the hi-fi. "They'd got a pair of Quad ESL 63 electrostatic loudspeakers and had concreted them into the wall. God knows what they sound like," he bemoaned.

What makes a high-end piece of equipment? According to Ricardo Franassovici, boss of Absolute Sounds who import high-end equipment from all corners of the globe, it is: "first and foremost a high-end company, people who are able to design and service equipment over the years and not use the customer as a guinea pig." Ricardo levels criticism at "eight out of ten companies which are run from cottages or garages, making six of this and ten of that resulting in a complete shambles while the customer gets a poor deal." Equipment should not just sound good according to Franassovici, "it must last within the structure of what is going to come and what has gone before it." Thirdly, it must be well-designed, finished and be reliable; "if not, it's not a product but a prototype".

## WHO BUYS IT?

One can safely say that not every Ferrari is bought by a motoring enthusiast. Some comment that when men buy such cars it is merely as a conveyance of

generative magnitude! Happily the same cannot be said about high-end audio; it is neither status nor sexual symbol. Only one dealer mentioned that status was affecting some of his customers. The most common answer was 'music lovers'. According to John Ferguson, of Suttons, this pursuit of excellence was divided into two groups, "the first buy high-end audio because they are an equipment rather than music fan and want the latest and best. The second is someone who is also after the best one can have, who likes music but is not necessarily a concert-goer."

We did hear that favourite term yuppie once or twice, but mostly dealers said their customers were from all walks of life whose hobby was reproducing fine music. All walks of life, according to John Smith of Audio T, included people "from a headmaster to a BBC worker to a working class guy living at home with his parents".

Derek Aston-Darker, of Aston Audio felt that one of the problems facing high-end audio is its low profile, "not many people are aware they can buy such systems," he told us. But Brian Rivas, of The Pinewood Music Company said that overspending was sometimes a problem for his younger customers. "I occasionally have to be realistic with people and not let them commit themselves to paying too much," he said. This comment sheds light on the trusting relationship between the high-end seller (or consultant) and the buyer. Several dealers continue selling their customers equipment over many years as they upgrade, and would therefore reap rewards from good advice and service at an early stage.

## THE MARKET

Most dealers we spoke to felt that business was increasing at the moment, but many agreed that

where the high-end was concerned, there had been a 'quiet patch' after the stock market crash. Several reasons were given for this and a couple of Southern dealers even mentioned the Great Storm as influencing trade, tying up capital while insurance companies dithered on pay outs. Dealers felt it wasn't that customers had lost money in the crash but that the economy itself had been threatened, so that buying a luxury like a hi-fi system had been postponed while things stabilised. But the word at present is growth, and various figures from 15 to 60 per cent were given as rates. One dealer actually mentioned a 68 per cent growth rate in high-end audio sales over the past year. Dealers were very aware of the different approach needed when dealing with such expensive commodities, and many cited the high-end business as their favourite custom, not just for the extra commission they earned but because of the relationship with the customer and the skill involved installing and setting up the equipment. Roger Dawson, of Doug Brady Hi-Fi, described selling high-end equipment as being like a high class tailor, fitting a system to suit a customer rather than just giving him something 'off the peg'.

Sadly the high-end market seems to appeal more to men than women but this trend runs through the whole of hi-fi. And it is something dealers are trying to change, making their shops more attractive and cutting down on the sheer amounts of daunting equipment on show. However, it's easy to see how the fairer sex may be put off hi-fi when one considers the following events, again relayed by Roger Dawson. A woman had entered his shop after a trip down Tottenham Court Road, where in one hi-fi shop she was told she couldn't audition a turntable as it would wear out the needle! Asking to

hear a cassette deck she was told OK, and that although this would wear out the heads – no-one would notice. This sheer stupidity on the part of a salesman can only rebound and one wonders how many ladies are put off altogether by such disgusting Cro-Magnon attitudes.

## CD SOUND

Although dealers felt that for sheer quality of sound CD players had not evolved to a sufficient level of sophistication, several told us that high-end buyers were investing in the machines. The Microseiki *CDM-2* was the player mentioned by four dealers as a best selling machine and there were also mentions for the Meridian *207*. However Tony Lisle, of Elite Hi-Fi, said his customers were not buying anything more expensive than a Marantz *CD 94*. "CD doesn't compare with analogue", said Mr Lisle who reckoned his top selling combination of Voyd turntable, Helius *Cyalene* arm and Audionote cartridge, through Audio Innovations amplification and Snell speakers is best for 'realistic sound'.

According to several dealers CD just sounds different; one cannot get the same sense of presence of musicians as is possible from vinyl. It is therefore pointless spending heaps and heaps of money on a medium which has yet to prove itself against the finest that analogue has to offer.

Peter Qvortrup, who runs Audio Innovations, couldn't agree more. When we asked him about high end CD he said: "It's like a 50-year-old woman who goes to have her hair done. She's still a 50-year-old woman underneath. It's a waste of time." However, in the interests of not appearing ageist or sexist we would translate this as being like a man, of any age, who wears a toupé – fooling nobody but himself. We should mention that Mr. Qvortrup markets the Voyd

turntables and so has a commercial interest in keeping analogue thriving, but then we couldn't find a dealer who said where money was no object CD could sound better. CD players are also recognised as less reliable than record decks which "go on and on playing" with few components to wear out.

## RELIABILITY

If you buy into the high-end you also buy into superlative service. So the whole question of reliability changes since dealers are usually very keen to maintain good relations at all costs. However, it was mentioned (the Ferrari syndrome again) that with highly tuned equipment of this kind upkeep and servicing are on-going concerns. And as Roy Gregory, one of KJ Westone's consultants pointed out: "It's crazy to spend thousands of pounds on a system and then not have it working at its peak." Where amplifiers are concerned many need time to 'burn in'. John Smith of Audio T said there was a remarkable improvement in sound from the Audio Research *SP9* preamplifier after it had 'burnt in'. But he added it could take six to eight weeks to get it functioning at its best.

Valves have a finite life depending on how much you use your system. Dealers' advice varied, depending on whether the system was used often or not. It was said that valve amplifiers should be left on all the time if the system was much used to avoid the harmful current surge when switching on. But of course, if you only listen at weekends then such practice is pointless. Audio Research amplifiers were singled out by several dealers as having output tubes which blew regularly. One dealer mentioned that at £40 or £50 a pair he found it impossible to charge the customer if his system was new.

Other problems encountered were said to be with Cambridge Audio's *CDI* CD player,

Counterpoint's *SA 20* amplifier and some of the big Musical Fidelity amplifiers (though someone mentioned MF as being better recently). When things go wrong we heard that most companies were very fast at giving back up and so breakdowns didn't constitute much of a problem. We heard none of the heartache stories we've had in other surveys where customers end up without music for months. Dealers also agreed that if a product needed to be taken in for repair they would lend a shop model for the period. However, most equipment in this price area does seem to have reliability as a built in feature.

## STATESIDE BUYING

Anyone with a protracted interest in high-end equipment will notice that not much of it has come down in price with the tumbling dollar. Sumo and Quicksilver amplifiers, from the US of A are about the only ranges to be reduced in price. And the fact that you can buy a pair of Apogee *Scintillas* for around 4,000 US dollars Stateside while they cost £4,990 here is sufficient to give pause for thought. Jacob Zelinger, of Automation Sciences pointed out that VAT and freight accounted for some 25 per cent of his company's mark-up. But he also admitted that the prospect of buying direct from the States was very attractive for potential high-end customers. And he hazarded a guess that five per cent of business (£250,000) was lost to the retail trade in this way. "People can just pick up the 'phone and order direct from a dealer in the US," Jacob told *Choice*, "they can save anything between 10 and 100 per cent on the price. They just send the cheque and get stuff shipped over; it's perfectly legal."

However, not one of the dealers we spoke to recommended this approach. It was pointed out that if anything went wrong then a Stateside

buyer would get pretty short shrift from the dealer and importer whose service is mostly free to pukka buyers. And he would not have a guarantee. A Stateside buyer would also have to set up his own equipment (something regarded as an art) and would have the added disadvantage of being responsible for its journey – it's well known that dockers treat audio the same way they treat potatoes. But the main cause of horror and disdain was that the Stateside buyer was just not playing cricket. And here we have it – high-end audio is a sport for gentlemen, and cutting corners destroys the ideals involved.

This survey is a distillation of dealers' views on audio in the high-end. The average dealer in this survey relies on high-end sales for 39.25 per cent of his business; some have less although The Pinewood Music Company rely entirely on high-end sales. We draw on the dealers' experience to compile it and as such it is more a poll than an exact picture of the market at the moment.

## PARTICIPATING DEALERS

Our thanks to the following dealers for taking part in this survey:

Aston Audio, Alderley Edge, Cheshire.  
Audio T, London NW6.  
Doug Brady Hi-Fi, London WC2.  
Elite Hi-Fi, Harrogate, Yorks.  
KJ Westone, London W1.  
Pinewood Music Company, Andover, Salisbury.  
Radlett Audio, Radlett, Herts.  
Studio 99, London.  
Subjective Audio, Palmers Green, N. London.  
Suttons, Bournemouth, Hants.  
The Music Room, Glasgow.  
Unilet Hi-Fi, New Malden, Surrey.

**NB Any hi-fi dealer who feels aggrieved he is not on this list, and who would like to be consulted in the future, either regularly or intermittently, please write to us at 39 Goodge Street, London W1P 1FD, or telephone 01-631 1433.**



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# Alphason Sonata / HR 100S - MCS

**C**leaned up for series production (it was originally a test bed for arm design purposes), the astonishingly heavy *Sonata* is civilised, even discreet. The wood line conceals the bulk, the top plate has a bronzed appearance, and the lid is of fine quality. The functional design is based on a massive one-piece subchassis, armbase and main bearing which is suspended from three very long springs inside the three black towers. The natural suspension frequency is low and scarcely damped.

The platter is a one-piece proprietary synthetic material which is 'dead' when rapped. The record is placed straight on the hard platter surface, and heavy weight is lowered on top to act as a clamp. The drive system is based on two quartz-locked synchronous motors, which apply torque symmetrically to the opposite sides of the drive hub (machined at the base of the platter). In this way the springs (and gravity) are the sole determinant of suspension dynamics (leaving aside the arm cable).

There are still a few rough edges to the product, however: the spindle seemed very slightly over-size: the cueing lever of the arm was very close to one of the suspension towers; and the base is boxed in by a resonant panel. Driving electronics are built inside, with on/off and speed change using two push buttons on the front.

The *HR-100S-MCS* is the top of the line Alphason arm. The most important feature is a light and stiff S-shaped titanium arm tube headshell which is made in one piece up to a point just in front of the gimbal bearings. The bearings themselves are strong and rigid, using ceramic surfaces said to be ten times harder than conventional metals. The arm base is Linn compatible, and the arm cable on this *MCS* version is pure silver, linear-crystal, from van den Hul.

Not all the answers are right. The vertical bearings are not in line with the record plane, so the orientation of the cartridge changes as it rides warps. But this is still amongst the most elegant arms around.

## Lab Report

The disc edge shock plot showed what looked like a platter rocking mode, but in fact a lot of gain was needed before anything showed. Spectral analysis of the same event uncovered one resonant peak around 200Hz, but



again at a very low level.

The Alphason resists feedback well, especially at very low frequencies where other turntables are at their weakest, while shocks applied *via* the base are well suppressed. Rumble and electronic noise are fairly clean, though the rumble figure wasn't particularly low. Wow and flutter levels were excellent, but the deck ran about 0.5 per cent slow. Applying extra loading to the motor, however, resulted in no further change, so dynamic wow should be negligible.

Superb control over structural resonances was revealed in the arm plot. Various modes could be seen, some attributable to the counterweight and all well damped. The arm has a low enough effective mass to match relatively compliant cartridges as long as they don't weigh too much. The bearings are free from slack, and have low friction.

## Sound Quality

This is without question a top quality combination. The system sounds characteristically open, dynamic yet relaxed. So much so that playing records at extremely high volumes is surprisingly unstressful, yet the inherent clarity and focus is such that music also sounds satisfying even when played very quietly.

The arm does impose a slightly 'shrill' character on the sound, yet it doesn't obscure detail, and I was consistently able to hear further into records than with most others – the intelligibility of the whispered section near the start of *Carmina Burana* (EMI/Previn) was a useful test here. At the same time, the bass is big and forceful. As a whole, the Alphason combination has a lot of presence, whilst stereo imagery is well resolved in all

planes and big in scale.

The combination of high levels of perceived resolution, large effective dynamic range and a usefully wide frequency response makes this a very effective combination, and one of the few that can be regarded as eligible for the label 'state of the art'. Criticisms are few and mild, nevertheless the bass end could usefully drive rhythms a little more effectively – sometimes it seemed almost in danger of being swamped during busy passages – and the arm still sounds a little 'metallic' at times.

## Conclusions

This is an impressive combination. Both turntable and arm are ambitious, capable products that in unison – and with sympathetic systems erected around them – offer all but unrivalled clarity, dynamics, weight and openness.

## Test Results

<b>Motor section</b>	
Type	manual motor plus arm
Platter mass/damping	4kg
Finish and engineering	excellent
Type of mains connection leads	2 core + earth
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.06%/0.12%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.12%/0.04%
Absolute speed error	-0.51%
Speed drift 1 hour/load variation	-0.025/none
Start up time to audible stabilisation	7 secs
Rumble DIN B Wtd L/R	-71/-70dB
<b>Arm section</b>	
Approximate effective mass inc screws, exc cartridge	10gm
Type/mass of headshell	integral, fixed
Geometric accuracy	excellent
Adjustments provided	overhang/offset/height
Finish & engineering	good/excellent
Ease of assembly/set-up/use	good/good/good
Friction (typical) lateral/vertical	10mg/20mg
Bias compensation method	thread pulley & weight
Bias force, rim/centre (set to 1.5gm elliptical)	250mg/200mg
Downforce calibration error, 1gm/2gm	uncalibrated
Cue drift	negligible
Cue rate ascent/descent	instant/1 sec
Arm resonances	good
Arm damping method	none
Load capacitance	80pF
<b>System as a whole</b>	
Size (h x w x d)/clearance for lid rear	16 x 45 x 267/cm
Ease of use	good
Typical acoustic breakthrough and resonances	very good
Subjective sound quality of complete system	excellent
Hum level/acoustic feedback	average/good
Vibration sensitivity/shock resistance	very good/very good
Estimated typical purchase price	£595/£740 + £412
<i>Reprinted from issue No. 55 by Alvin Gold</i>	
<i>Rating: Recommended</i>	
Alphason, 190-192 Wigan Road, Euxton Nr, Chorley, Lancs	
PR2 6JW Tel: (02572) 75625	

# Airtangent II

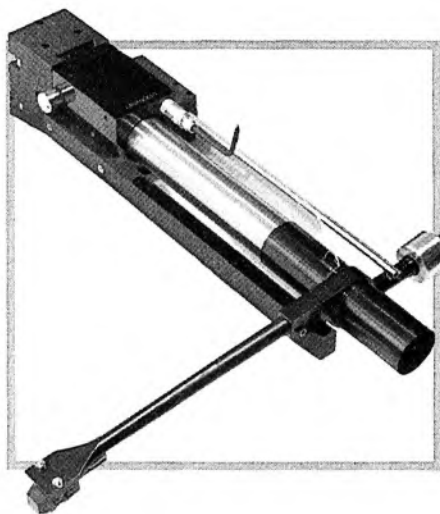
There's nothing like a bit of experience to help dissipate prejudice. Prior to having heard any high grade parallel tracking air bearing arms under decent listening conditions, I was firmly of the opinion that they were simply a quirk of the already rather strange US audiophile industry. I changed my mind on testing the Eminent Technology arm on a Roksan, a combination that did things – important things – no pivoted arm I had heard was able to do.

The Airtangent II, which comes from Sweden, does everything the ET can do and more, but in a rather more user friendly package. But 'user friendly' is a relative term. Not all decks will accept such a bulky arm, but even if this difficulty is overcome there is still the problem of what to do with the big, noisy air pump. The optimum answer by the way is to put it in the next room. The pump is supplied with a long length of miniature plastic air hose for this purpose.

The practical engineering difficulties in translating the parallel tracking concept into a working product, however, are undoubtedly very hard indeed. Air bearings, which rely on high pressure air to allow the arm freedom to slide along and rotate around its carriage, need to be very finely engineered if seizing or excessive play are to be avoided.

It is precisely here that the Airtangent shows its calibre. The part of the cartridge carrier that slides along the arm carriage shows less movement than some conventionally pivoted arm even when the air pump is switched off! With the air switched on, there is no detectable play in the system at all, and for all intents and purposes the system is both rigid and entirely free of friction (though the leadout wires exert some torque). One key advantage of the air bearing is the enormous effective bearing area, which is no less than 78cm<sup>2</sup>. This, along with incredibly tight tolerances, helps explain why the bearing is so free of slack.

The cartridge carrier itself is a short tapered magnesium tube, with a simple rear counterweight to set tracking weight, the arrangement giving relatively low effective mass at the stylus position. Laterally, of course, the arm has to shunt the entire arm carrier and counterweight; here effective mass equals the weight of the assembly, leading to a very low lateral resonance, well down in the warp region. Happily, the arm is rarely excited laterally at these frequencies; warps energise the arm in the vertical plane where the arm is less susceptible. The staggering of lateral and vertical resonances damps down subsonic resonant behaviour, and silicone damping is available using a trough near the main carriage to further inhibit the low fre-



quency arm/cartridge resonance due to lateral excitation.

Installation is not difficult, but requires painstaking care, and the complete turntable needs extremely accurate levelling and arm lead out wire dressing to avoid the arm pulling laterally in one direction or other. Arm cabling is now Siltech silver wire on both sides of the small outboard junction box into which the amplifier leads plug using standard phono plugs. With the Airtangent it's also feasible to set up more than one cartridge on different carriers with tracking forces preset. Unplug the leadout wires (a single high grade miniature connector is used) and the carrier and cartridge can be withdrawn and replaced in seconds.

Changes for the new version include the fitting of a battery powered lift/lower device. Arm liftoff is triggered automatically at the end of side or by switch at any other time. The wiring from the arm tube exerts less torque than before. VTA adjustment is much easier and more solid – the old one was apparently rather flimsy. Finally, the main arm tube has been upgraded, by incorporating an internal taper and more effective damping.

## Sound Quality

The Airtangent was auditioned on an Oracle *Delphi III*, and also on an Oxford Acoustics *Crystal Reference* turntable.

Performance in a suitable system is state of the art. Most of the testing involved using Koetsu *Red*, *Red Signature* and Ortofon *MC3000* cartridges. Remarkably none of them benefited especially by being damped, though other cartridges may well sound better damped, especially if they are of medium to high compliance, or if the alternative

heavier counterweight is used to achieve balance.

The Airtangent offers a near unrivalled insight into the music, to which it brings a supremely high level of transparency. High frequencies have a sense of light and air that is surprisingly Rega *RB300*-like, but the bass and midband are much more meaningful, with greater transient ability and superior tunefulness, defined here as the ability to follow complex, even hidden bass lines. The separateness and distinctiveness of individual strands of the music were fully articulated, and dynamics were allowed full rein.

Particularly impressive, however, were three features. One was the power and speed of the bass, which is leaner in balance but less diffuse than most. Next there was the superbly stable stereo soundstaging, both in specificity and overall image scale. Finally there's the integrated quality of the arm – everything pulls together, and achieves real focus (which can be disturbed by relatively small changes in setting up, for example of VTA in the case of the Ortofon). This is a primary reason for the arm's transparency, of course.

## Conclusions

The Airtangent II is extremely well made, and although it is demanding of turntable and alignment quality the procedure by which setting up is accomplished could not be more straightforward. The arm is well behaved with low compliance cartridges, and the range of applications can be extended towards higher compliance models by suitable application of damping. Ultimately, however, the Airtangent exists for the highest grade of (mostly) low compliance moving coils, and for use on the finest quality turntables. In such combinations it is capable of a range and subtlety beyond most other tonearms.

## Test Results

Approximate effective mass inc screws, exc cartridge	see text
Type/mass of headshell	fixed
Geometric accuracy	excellent
Adjustments provided	overhang, downforce, azimuth, pillar height
Finish & engineering	excellent/excellent
Ease of assembly/setup/use	good/average/good
Friction (typical) lateral/vertical	zero
Bias compensation method	none required
Bias force, rim/centre (set to 1.5gm elliptical)	not required
Downforce calibration error 1gm/2gm	not calibrated
Cue drift	none
Cue rate ascent/descent	average
Arm resonance	n/a
Arm damping	optional
Estimated typical purchase price	£1998
<i>Reviewed by Alvin Gold</i>	
<i>Rating: Recommended</i>	
Absolute Sounds Ltd., 318 Worple Road, London SW20 8QU.	
Tel: (01) 947 5047.	

# Crystal Reference

Oxford Acoustics was formed in May 1986, and has been trading successfully since that time selling limited quantities of turntables *via* a small coterie of specialist dealers, here and abroad.

The *Crystal Reference* is the mainstay product. There's a more expensive model which features an even more elaborate suit of clothes; predictably it's called the *Signature*. Soon there will be a cheaper cut down model too, along with a range of amplification and some add-ons which will be available for building into the turntables (either at time of sale or as retrofits) including an RIAA module and remote volume and headphone facilities.

The *Crystal* comes in a choice of two plinth designs: a free standing one, and one that is designed to be bolted to a structural wall (not examined). Lids are optional extras. Finish can be specified, though normally it's black ash. Setting up is unusual but not impossible, I found.

A high level of information retrieval is a key claim for the design, and to this end the deck offers a well defined path for energy transmission, and a rigid but well damped structure achieved by using materials in intimate combination (eg bronze and acrylic for the platter, acrylic and aluminium in the armboard, Medite and aluminium in the sub-chassis, etc) – and lots of them.

There's a suspension of sorts, but it has very limited compliance in rotation, and even vertically it's so thoroughly damped it's scarcely noticeable under most circumstances. Everything else is bolted solidly together, even the 24volt Papst motor (as used in the *Gyrodec*), leaving platter inertia and belt compliance to flatten motor noise. The centre spindle is decoupled in the vertical plane only by rubber (think of Roksan) and is removable for centreing, though not with the record in place. The round section belt rides on a machined black acrylic disc attached below the phosphor-bronze main platter. The platter is topped by an enormous acrylic top section which is slightly dished and has a centre label recess. A brass and acrylic clamp holds the record in place.

The main platter alone weighs 15kg/33lbs. The appropriately Herculean bearing is an inverted single point design, with a tungsten-steel ball running in a hardened steel thrust-plate, immersed in an oil bath.

The plinth section, which is skinned in medite with steel top and baseplates, sits on adjustable feet (3 pads and one spike) and is heavily mass loaded with sand. It is also home to the quartz referenced two speed power supply, and provision has been made for other electronic modules.



## Lab Report

Solid (eg concrete) floors are recommended, but I couldn't find any, and the optional wall mounting version was turned down for obvious reasons – Oxford Acoustics proposed taking the deck away afterwards! Fortunately, however, my test area does have a concrete floor; it was not practical to float the *Crystal* free of its environment, and this will have adversely affected some of the measurements. So too will the lack of time for running in. Barely 24 hours could be spared for this, due to late delivery of the turntable; the massive bearing certainly requires a lot longer. Probably as a result rumble levels were higher than has been measured elsewhere using similar procedures.

The *Crystal* was also rather susceptible to low frequency vibration and acoustic breakthrough in the region below 100Hz or so. The disc impulse response however was excellent, with very mild excitation which is quickly damped. The other plots too all suggested that the *Crystal* behaves in a linear fashion, with no sharp discrete resonances. Electrical noise is low too, with some mild effects noted mainly at 50Hz and 100Hz.

Speed accuracy was near perfect, with near zero drift and very little slowing under load, as expected. Weighted wow and flutter was just 0.06 per cent. The unweighted flutter contribution to this was essentially negligible, but low rate speed variations which show as wow were not especially low, though nothing audible could be directly pinned to this. Optical sensing of platter speed will be incorporated in due course (retrofitable for existing owners), and this may trigger a reduction in wow levels.

## Sound Quality

Oxford Acoustics mention the Rega *RB250/300* as being particularly well matched. This would also make a good starter combination while saving up for an Airtangent, which seems to be their other favoured combination. The *Crystal* was tested with the latter, and the combination worked magnificently as well as looking a million dollars.

I had anticipated sound quality of some stature. In the event, the *Crystal* easily exceeded my expectations, managing to sound faster and yet less pointedly 'obvious' than many other heavyweights, but with all the power and drive that such turntables usually provide.

The most noticeable characteristic of the *Crystal* was its tantalisingly solid imaging. The soundstage was wide and deep, with very specific image placing combined with a spacious, free breathing quality. Clearly the Airtangent arm shares some of the credit for this, but equally plainly it's a joint effort.

The extraordinarily three-dimensional ability is accompanied by a range of qualities, including a tuneful and potent bass, utter consistency with changing volume levels, and an unobtrusive but still very clear-cut kind of presentation.

## Conclusions

For the filthy rich, appearance alone should be good enough reason to buy the *Crystal*. And it should provide Rolls-Royce style pride of ownership – though more money can be spent even faster on a Goldmund. More to the point, the *Crystal Reference* is a winner musically, with wide ranging abilities in all key areas. A thoroughbred.

## Test Results

Type	belt drive 2 speed turntable with integral stand
Platter mass/damping	15kg/excellent
Finish & engineering	excellent/excellent
Type of mains connection leads	3 core
Speed options	33/45rpm
Wow & flutter (DIN peak Wtd)	0.06%
Wow & flutter (Lin peak Wtd 0.2Hz – 6Hz/6Hz – 300Hz)	0.14%/0.04%
Absolute speed error	0.0016% fast
Speed drift 1 hour/load variation	negligible/0.06%
Start up time to audible stabilisation	11 sec
Rumble DIN B Wtd L/R Average/L + R (see spectrum)	–66dB/–65dB
Size (h x w x d)	72 (w/o lid) 55 x 45cm
Ease of use	excellent
Typical acoustic breakthrough and resonances	average/excellent
Subjective sound quality of complete system	excellent
Hum level/acoustic feedback	low/low
Vibration sensitivity/shock resistance	good/excellent
Estimated typical purchase price	£1995
<i>Reviewed by Alvin Gold</i>	
Rating: Recommended	
Oxford Acoustics Ltd., 156 Choumert Road, London SE15 4AA	
Tel: (01) 732 2785	

# Goldmund Studio

**H**i-Fi Choice first encountered Goldmund turntables a year ago, when we reviewed the c£6,000 *Studio/T3F* turntable/arm combination while preparing *The Collection II*. The elaborate *T3F* tonearm accounted for nearly two-thirds of that total price, an apparent imbalance perhaps explained by the fact that it is also part of the £20,000 *Reference* turntable system, but also an opportunity for Goldmund to produce a more reasonably priced package based on a cheaper tonearm.

And this is precisely what has happened. The *Studio* motor unit has been essentially retained, but a much simpler *T4* derivation of the *T3F* is now an integral part of a £4,000 package. Similar in appearance with its bulky box gantry, the arm now travels front to centre rather than right to centre. Economies have been achieved by omitting the bulky arm control electronics which were housed in a separate rack-type unit, and integrating such automatics as remain, along with a common power supply, in the main body of the large plinth.

Basic turntable switching, arm cueing and speed change is controlled from an indented section of the plinth front, while the arm must be positioned manually over the disc. The plinth itself is unusually large, and so may require a specially made top plate for whatever table support is used. As one might expect, set-up is a nightmare – but it comes with the price and is therefore not your nightmare but someone else's. Expect a skilled technician to spend some time ensuring correct arm alignment.

**Turntable:** Unconventional in many respects, the turntable uses a Japanese-sourced direct drive motor with integral

bearing. The lead-loaded acrylic platter is coupled to the motor on three brass studs, and decoupled from the motor shaft by a PTFE sleeve. A form of subchassis construction is adopted against vibration: the whole top plate, motor, platter, arm and armboard is decoupled from the main plinth in a carefully controlled manner above 2.5-5Hz.

Goldmund claim origination of the concept of using acrylic materials because of their mechanical similarity to vinyl, and most of the turntable is constructed in perspex, including plinth and platter – it looks solid black, but a strong light reveals a deep purple tinge of translucency. The 3kg platter has 10 lead inserts around the periphery to ensure maximum inertia, and has a slightly concave profile, with the intention that a clamping system is used.

To encounter a direct drive specialist hi-fi turntable these days is something of a rarity, so complete has been the return to belt drive over the past decade. But rules are made to be broken, and history has rammed home the message that application is far more important than technique, stereotypes notwithstanding. In this instance a damped 2nd-order servo drives a well shielded multi-pole design, speed being monitored by a contactless magnetic sensor system, referenced by quartz oscillator to 33⅓ and 45rpm. This gives outstanding absolute speed accuracy, and only slight (0.1%) speed under- and overshoot was encountered under test loading. Any cogging effect should be negligible by the time normal speed is achieved, and the careful bearing design should produce exceptionally low rumble figures.

**Tonearm:** The *T4* tonearm is a powered parallel tracking type, which in essence con-

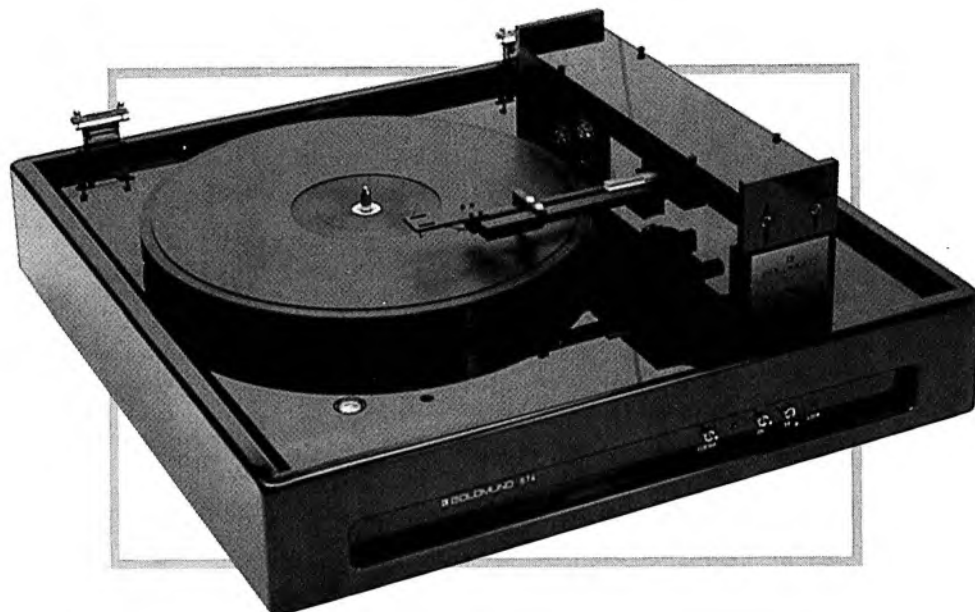
sists of a short but fairly straightforward high quality pivoted arm mounted on a carriage which is driven across a gantry under optical servo control. In fact a second fixed arm comes out from the carriage alongside the tonearm itself, and the end of this contains the optical sensors which monitor the movement of the headshell and instruct the appropriate carriage movement.

Lateral tracking error correction is claimed to be accurate within 0.1 degrees, though a minor disadvantage is that the servo drive only operates towards the centre of the record, so if the arm follows a 'swinger' (a disc with off-centre centre hole) inwards, it will not move back out on the other part of the cycle. Still, such errors are comparatively small in any case. The advantages of parallel tracking arms have more to do with avoiding the modulation bias created in conventional pivoted arms, so ensuring the stylus stays centred in the groove.

The main gantry is milled to lathe bed precision from aluminium, supporting and constraining the carriage which runs on low friction PTFE rollers. All but one of the gantry tracks has thin felt damping, presumably to avoid 'chatter' and define the mechanical path from arm to gantry.

The shorter arm length permitted by linear operation reduces the risk of compromising rigidity in seeking to keep the arm mass low, and allows the luxury of a detachable headshell system of sorts. The *T4*'s effective mass is rather lower than the *T3F*, at a nearly ideal c10g, ensuring good compatibility with 6-12 cartridges in the low-to-medium (8-16cu) compliance range.

Because this is fundamentally a conventional arm on powered carriage drive, the



undesirably high lateral inertia of passive linear tonearms is avoided. A corresponding disadvantage lies in the complexity required for powered drive – in the number of components that will be susceptible to vibration, and in the inevitable vibration caused by any motor system, however sophisticated. Trough damping is available if desired, and could help in this respect.

### Lab Report

The arm bearings feel encouragingly tight, with plenty of mass to counter unwanted carriage movement. Typical bearing friction values of 15/50mg are higher than pivoted and air-bearing types, but still low enough to matter little.

Calibration and alignments were excellent throughout. The arm resonance graph showed well controlled first breaks at a high 1-2kHz, which implies a well balanced character with quite good control – not dissimilar to the air-bearing models but slightly less 'tidy'. And whereas the cue descent for the *T3F* was a frustratingly tardy 4secs, the *T4*'s 0.8secs is too quick for comfort – which at least proves Goldmund is human after all.

The turntable delivered a generally outstanding set of measured performance parameters, state of the art in terms of speed accuracy and stability. The full rumble spectrum showed no problems, and the disc impulse test showed exemplary platter damping and control. One weakness was detected in a mild platter rocking mode, another proved to be vibration transmission through the rather crude 'bed springs' used for the main subchassis suspension. These showed slight shelf-borne breakthrough around 250Hz which could cause some mild

audible coloration.

### Sound Quality

Great reputations tend to breed scepticism and result in disappointment, but this was not the case with the *ST4*. The original *Studio/T3F* combination forced a re-appraisal of the capabilities of vinyl disc, and the *ST4* matched it closely overall, albeit with minor subtle variations in presentation.

The sound as a whole is remarkably 'easy' and unstrained, while maintaining excellent resolution at all strata of vinyl's considerable available dynamic range. Surface noise defects seemed unusually absent, and good control was maintained well out towards the bandwidth extremes. In stereo imaging terms the *ST4* does concede a little to the more expensive Goldmunds with their tighter toleranced *T3F* tonearms, but is exceptional by any other standards, with fine and precise width, depth and perspectives.

The presentation might be a little 'laid back' for some tastes, and although the bass showed fine speed and authority, it might prove a touch on the heavy side in some system combinations – larger loudspeakers or smaller rooms, for instance. The treble portrayed plenty of detail, with no worries of exaggeration, though the *T4* did lack a little of the silky 'airiness' encountered elsewhere.

### Conclusions

The sonic differences between the new *ST4* and the earlier *Studio/T3F* are more a matter for debate than dogma, and while it is true that the latter probably still retains the slightest of edges, it is equally true to say that Goldmund have achieved a \$2,000 price cut at very little sacrifice in sound or perform-

ance – or for that matter convenience, as the *T3F* arm automatics were never that clever. Regrettably it's difficult to see where a further \$2,000 could be saved to bring Goldmund performance into the ranks of the almost affordable, so in the meantime the *ST4* deserves confident Recommendation, for the fortunate few.

### Test Results

<b>Motor section</b>	
Type	direct drive, quartz, solid sub-chassis
Platter mass/damping	2.9kg/excellent
Finish and engineering	excellent
Speed options	33⅓, 45rpm
Wow and flutter (DIN peak wtd sigma 2)	0.02%
Wow and flutter (lin peak wtd 0.2-6Hz/6.300Hz)	0.09/0.07%
Absolute speed error	0
Speed drift, 1 hour/load variation	0/0.1%
Start-up time to audible stabilisation	2 secs
Rumble, DIN B wtd, L/R average (see spectrum)	-77dB
<b>Arm section</b>	
Approximate effective mass, inc screws, excl cartridge	10g
Type/mass of headshell	detachable
Geometric accuracy	excellent
Adjustments provided	overhang, height, tilt
Finish and engineering	excellent
Ease of assembly/set-up/use	difficult/pretty good
Friction, typical lateral/vertical	15/50mg
Bias compensation method	not needed
Cue drift, 8mm ascent/descent	none, 1.5s/0.8s (too fast)
Arm resonances	very good
Subjective sound quality	very good
Arm damping	optional trough
<b>System as a whole</b>	
Size (w x d x h)	50.5 x 50.5 x 11cm
Ease of use	good
Typical acoustic breakthrough and resonances	very good
Subjective sound quality of complete system	excellent
Hum level/acoustic feedback	very good
Vibration sensitivity/shock resistance	good/very good
Estimated typical purchase price	£4000
<i>Reviewed by Martin Colloms</i>	
<i>Rating: Recommended</i>	
Absolute Sounds Ltd, 318 Worple Road, London SW20 8QU.	
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# Kuzma Stabi / Stogi

Available in small quantities in the last year or so in some European countries, the Yugoslavian *Stabi* is now available in the UK. The *Stogi* arm has been available for a few years, but has been significantly updated. Both items are designed to have near universal application. The *Stogi's* weight has been reduced to a little over 700g and it will work with any deck configured for an arm with a Linn base. The match to the Roksan is said to be particularly propitious, but I wasn't able to confirm this. To be honest I could hardly even spell it.

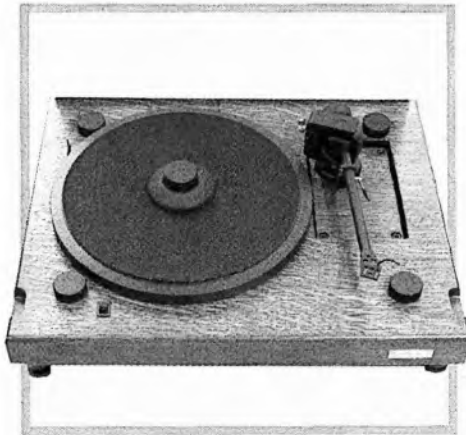
The Kuzma *Stabi* features extensive use of high grade solid timbers which simply could not be done at this price in the UK.

The system is extremely heavy (around 20kg), rather large and enormously solid. It's fitted with three adjustable, spiked feet.

As a player, the *Stabi* is relatively conventional, though it's no slavish copy of anything. It is suspended using four springs, with a simple height adjustment from above. The suspension is damped with silicone, but still oscillates freely at about 3.5Hz. The subchassis is a massive Medite member, and the main bearing a large single point device using a composite material for the thrust pad and liners. The platter is a full width magnesium alloy disc with a rubber ring inset to reduce ringing; it sits on top of a subplatter which is driven by an Impex synchronous motor with a brass pulley whose final machining operation is done mounted on the motor. The latter is topped by a twin layer felted mat and the record is normally clamped on top.

A rudimentary bent wire lever switch is fitted for changing the speed, but this can be removed to extract a little extra performance. A Roksan-like power supply incorporating speed change will be available 'by the end of the year' at a 'reasonable price', so the speed change paraphernalia will then be redundant anyway. Early decks will be upgradeable, Kuzma promise.

The arm is derived from the very solidly engineered, fixed headshell Linn fit model reviewed in *Choice* Issue 48. However a thorough programme of modifications has resulted in tighter tolerance bearings being used (the previous ones weren't bad!), along with a modified counterweight with silicone damping both inside and on the central thread. The damped armtube now has thicker walls and a better joint to the bearing housing. The headshell has been lightened and effective mass has actually gone down a couple of grams to about 12.5g. Unfortunately the price has gone in the other direction – up £100 to £349, so the arm isn't quite the bargain it once was.



## Lab Report

Arm bearing friction was clearly very low, and slack undetectable, but it wasn't possible to check these things or structural arm resonances on the test bench in the timescale allowed.

The turntable, however, was measured, with mixed results. Reaction to a shock applied at the edge of the disc showed the platter is very well behaved. After an initial transient, the disc was very quickly damped, with a small effect, possibly a platter resonance, visible at 71Hz. The energy trend was smooth elsewhere. Rumble was very well suppressed at -72dB weighted average, the spectrum analysis showing few peaks not attributable to electrical hum and its harmonics. Susceptibility to vibration and acoustic breakthrough, however, were less effectively handled. The *Stabi* is not especially well isolated from its environment. Wow and flutter are both in the low category, but absolute speed of the test sample (at 33rpm) was a rather excessive 1.3 per cent fast.

## Sound Quality

The *Stogi* arm acquitted itself with something approaching distinction. Within a firmly projected soundstage with excellent width and image scale, the *Stogi* has a potent and outgoing blend of dynamics and refinement, with excellent reproduction of fine detail and the kind of musical coherence that is found only on the minority of arms at any price level. Bass is very well integrated.

The *Stabi* turntable is not out of character with the arm, but perhaps lags a little behind. It is not entirely free of the charge of sounding a little earthbound, even overbearing when reproducing the subtle, delicate

sounds of baroque percussion and wind instruments on one of the test records used.

But if it isn't quite the bee's knees yet, the *Stabi* is plainly a very fine turntable in the making. It offers tremendous dynamic range, gives a warm and atmospheric account of the music, and it blends authority with a surprising neutrality.

## Conclusions

The Kuzma *Stabi* turntable is a little rough around the edges sonically, but warm and potent – and a visual stunner. The *Stogi* arm is a rather more accomplished product, perhaps because it has been developed more thoroughly over a longer period. It is in my view a viable alternative to (and on equal terms with) the *Ittoks*, *Zetas* and *Mechanics* of this world, with a presentation that neatly straddles the divide between the punch, speed and tunefulness of the former and the authority and weight of the other two. It's well priced too, despite the hefty increase. The arm is clearly viable material for recommendation, but we'll take a raincheck on the turntable.

## Test Results

<b>Motor section</b>	
Type	2-speed motor unit, switch speed change, belt driven
Platter mass/damping	3.5kg approx/good
Finish & engineering	excellent/excellent
Type of mains connection leads	2-core, single insulated (see text)
Speed options	33/45rpm
Wow & flutter (DIN peak Wtd)	0.09%
Wow & flutter (Lin peak Wtd 0.2Hz – 6Hz/6Hz – 300Hz)	0.20%/0.05%
Absolute speed error	1.3% fast
Speed drift 1 hour/load variation	negligible/–0.13%
Start up time to audible stabilisation	6 sec
Rumble DIN B Wtd L/R Average/L + R (see spectrum)	–71dB/–72dB
<b>Arm</b>	
Approximate effective mass:	12.5gm
Type/mass of headshell	fixed/—
Geometric accuracy	good
Adjustments provided	pillar height, tracking force, bias
Finish & engineering:	good/excellent
Ease of assembly/setup/use	very good/very good/good
Friction (typical) lateral/vertical	n/a
Bias compensation method:	thread & weight
Bias force, rim/centre (set to 1.5gm elliptical)	n/a
Downforce calibration error 1gm/2gm	n/a
Cue drift	low
Cue rate ascent/descent	average
Arm resonances	n/a
Arm damping method	none
Load capacitance	n/a
System as a whole	
Size (h x w x d)/clearance for lid rear	49 x 51 x 41/20cm
Ease of use	good
Typical acoustic breakthrough and resonances	below average/good
Subjective sound quality of complete system	good
Hum level/acoustic feedback	poor/good
Vibration sensitivity/shock resistance	below average/average
Estimated typical purchase price	£575, £349
<i>Reviewed by Alvin Gold</i>	
<i>Rating for Stogi: Recommended</i>	
Audiofreaks, 15 Linkway, Ham, Surrey TW10 7QT	
Tel: (01) 948 4153.	

# Linn LP12 / Ittok / Troika

In the past we've usually looked at the Linn LP12 and Ittok as separate entities; in this case we've taken the opportunity to assess them as partners, with and without Linn's matching Troika cartridge.

Detail improvements to the current LP12 this year include a new armboard design (a Formica/Medite sandwich), improved springs (again!) to allow easier and more consistent setting up, and a new main bearing liner which is less temperature sensitive, and therefore allows tighter tolerancing.

More significant than the changes, however, is what remains the same. The LP12 is by now almost certainly the longest continuous running high grade turntable on planet Earth. So there is a wealth of experience on tap from a well supported *corpus* of specialist dealers, which makes it an unusually safe long term purchase.

For visiting aliens, however, the major design elements of the LP12 are as follows. The plinth is a solid wood open box structure with a hardboard base and a steel top supported on three sides. The platter main bearing and arm board are attached to a relatively lightweight steel subchassis, hung from the top plate by three springs which have slightly eccentric cam-like actions in rotation to facilitate centering. Both this and height adjustment can be accomplished from underneath - by a trained dealer only, please.

The main bearing spindle, attached to the sub-platter, is beautifully engineered and ground to a concentric 'point'. The motor is a synchronous Impex (Philips) model powered by a smoothed quartz referenced supply (known as *Valhalla*) contained within the base. Inner and outer platter assemblies are substantial Masak castings, engineered to a high standard, the discontinuity between them effectively damping both components. The platter is topped by a thin felt mat.

The Japanese-made Ittok arm has not been changed significantly since last time around in *Hi-Fi Choice*. The main features are a wide diameter straight armtube beam to which a diecast headshell is permanently bolted. The bearings are fully enclosed, and rigidity is of a high order. However, time is beginning to catch up with the Ittok, which now looks rather over-endowed with physical breaks along the length of the armtube; ditto with the wiring. But in manufacturing consistency, longevity and finish, the Ittok still probably matches the best. The bearings are particularly well engineered, though not the strongest around.

## Lab Report

The Ittok is still well enough behaved when assessed for resonant behaviour, but no



longer sets the pace. The first arm breakup mode appears around 1.3kHz, which is good. Above this, however, the arm becomes rather excitable, with several sharp resonant modes suggesting an inherently under-damped structure.

The LP12 rumble is not unusually low, but the spectrum is clean. However, the deck offers poor footfall isolation, reflected in the rising LF trend in the appropriate test. The deck is also rather less accomplished in avoiding feedback-type effects than many. On the other hand, the platter and mat quickly damp energy fed in by the stylus, the disc damping plots showing some initial movement of the suspension, but no resonances. Speed stability is excellent on all counts, including linear wow and behaviour under load.

## Sound Quality

The player was used with and without the Troika cartridge to help isolate the properties of the different items. Although it differed in timbre, balance and midband analysis, the Troika had something of the architectural qualities of the Koetsu *Red Signature*, used amongst others as a reference point for this test. It is a poised, refined and dynamic cartridge, very much in keeping with the Linn.

Stability and scale are properties of the LP12 itself. In combination, the LP12/Ittok/Troika has a blend of life and authority uncommon at even double the price. Current production has acquired greater stature and stability, to judge from the test sample. The bass is sharper and tauter, there is less overhang, and the once slightly diffuse upper bass quality has been honed down into something

more purposeful. From memory I'd suggest that the ease with which low level information can be followed during *fortissimo* passages has been enhanced.

Nothing's perfect of course, and the arm displays a touch of temperament at times. It's a little coarse, though the graininess that results tends to add to the perceived level of detail, and there is absolutely no 'smear'. Careful listening suggests that both deck and arm do lose more information than the best of their competition, which results in a loss of stereo depth and 'air'. But the shortfall is subtle, more subtle than ever.

## Conclusions

Linn aren't resting on their laurels. The LP12 especially is demonstrably evolving, the current version adding usefully to the established repertoire of virtues, not least in the area of low end control and focus. The Ittok hasn't changed, and is just beginning to sound perceptibly dated, but still ranks with the best half dozen arms around. The Troika, finally, is clean, open and authoritative. The three match well and are easy on the ear, especially at low and medium volume levels.

## Test Results

<b>Motor section</b>	
Type	manual motor unit
Platter mass/damping	4 kg/good
Finish and engineering	excellent
Type of mains connection leads	3 core
Speed options	33 (optional kit for 45) rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.06%/0.10%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.13%/0.05%
Absolute speed error	+0.13%
Speed drift 1 hour/load variation	none/-0.04%
Start up time to audible stabilisation	7 secs
Rumble DIN B Wtd L/R	-74.5/-75dB
<b>Arm section</b>	
Approximate effective mass inc screws, exc cartridge	14g
Type/mass of headshell	fixed
Geometric accuracy	average
Adjustments provided	height, lateral overhang
Finish & engineering	excellent
Ease of assembly/set-up/use	very good/very good
Friction (typical) lateral/vertical	< 10mg/< 10mg
Bias compensation method	dial & spring
Bias force, rim/centre (set to 1.5gm elliptical)	160mg/190mg
Downforce calibration error, 1gm/2gm	-0.2gm/-0.3gm
Cue drift	negligible
Cue rate ascent/descent	instant/6 secs
Arm resonances	very good
Arm damping method	none
Load capacitance	107pF
System as a whole	
Size (h x w x d)/clearance for lid rear	15 x 45 x 36/7cm
Ease of use	good
Typical acoustic breakthrough and resonances	average
Subjective sound quality of complete system	excellent
Hum level/acoustic feedback	excellent/average
Vibration sensitivity/shock resistance	below average/average
Estimated typical purchase price	
	LP12 £471/Ittok £399 (Troika £546)

Reprinted from issue No. 55 by Alvin Gold

Rating: Recommended

Linn Products Ltd., Floors Road, Waterfoot, Eaglesham, Glasgow G76 0EP. Tel: 041 644 5111

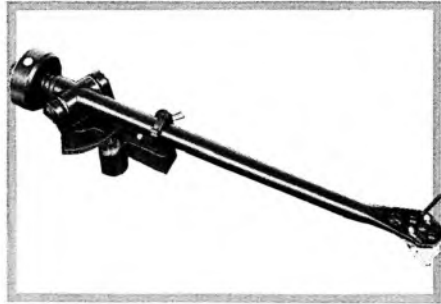
# Moth Arm

The Moth arm is the OEM version of the Rega *RB250*, itself closely related to the *RB300*. The major differences between the two Rega arms are that the *RB250* has higher effective mass due to economies in the counterbalancing, and uses less exactly specified bearings. The arm tube is still die-cast in a single piece from the headshell to behind the main bearing (the threaded counterweight extension is plastic), eliminating structural breaks, and the same applies with the arm wiring. Bias compensation is magnetic. Considering the \$65 price tag, the build quality is superb, although there are minor flaws in the finish. Arm height is fixed, but spacers can be made available.

## Lab Report

The only operational problem concerns earthing. The Moth arm doesn't have an earth separate from the signal screens, and some care (and experience) could be helpful when setting up.

Effective mass is moderate at 12gms. Bearing slack is negligible, yet friction levels are very satisfactory in both planes. The arm resonance plot shows the first main struc-



tural break around 1.5kHz – good for any arm, and exceptional for one so cheap. The arm handles well too, helped by a well designed fingerlift and cueing mechanism.

## Sound Quality

In a nutshell, the sound quality is superb. Although clearly inferior in stereo and detail resolution to Rega's more expensive *RB300*, the Moth arm still equalled or bettered a number of supposedly no-compromise arms at several times the cost. It sounds particularly refined and articulate, and has an almost understated quality that in a low resolution system might be confused for

blandness or lack of transient ability. Nothing could be further from the truth. The Moth arm is simply right – it's unexaggerated, lacking both 'edge' and 'grain'.

## Conclusions

One of the great bargains, like Rega's more expensive *RB300*. If you can't buy one, buy the other – Best Buy rating is mandatory.

## Test Results

Arm	
Approximate effective mass inc screws, exc cartridge	12g
Type/mass of headshell	integral, fixed
Geometric accuracy	excellent
Adjustments provided	overhang
Finish & engineering	very good/very good
Ease of assembly/set-up/use	very good/very good
Friction (typical) lateral/vertical	15mg/<20mg
Bias compensation method	magnetic
Bias force, rim/centre (set to 1.5gm elliptical)	260mg/300mg
Downforce calibration error, 1gm/2gm	0gm/0.1gm
Cue drift	negligible
Cue rate ascent/descent	instant/3 secs
Arm resonances	good
Arm damping method	none
Load capacitance	100pF
Estimated typical purchase price	£65 (spacers £1 each)
<i>Reprinted from issue No. 55 by Alvin Gold</i>	
<i>Rating: Best Buy</i>	
Moth Marketing, 47 Armstrong Close, Wilstead, Bedford	
Tel: (0234) 741152.	

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NVA



There are times when hi-fi products do more than just represent their designer's thinking. Often they betray the designer's very personality, and Nene Valley Audio's turntable provides an excellent example to illustrate this. Richard Dunn, the designer, is about as direct as they come and a purist by inclination. The *NVA* turntable is as bluff and as direct as the man, and purist down to the last adjustable spike.

The *NVA* has been developed over a period of about 18 months, in the first instance using as raw materials a Sound Organisation table and a cannibalised Manticore *Mantra*. The finalised turntable bears a debt to both, but is no copy of either, and as far as I can tell shares almost none of its component parts.

In common with the Oxford Acoustics *Crystal* turntable, the *NVA* is a logical integration of player and support designed for normal floor standing use. There is, however, no wall mounted option. The player is primarily designed for 33rpm operation only. A dual diameter motor spindle is available, allowing manual speed change, but *NVA* say there is some loss of sound quality in this configuration, and the option wasn't tested.

Born of a conviction that conventional plinths handle impinging energy inappropriately, the design of the *NVA* is a simple one. The frame is similar to many equipment tables and is made from square section welded steel tubing with adjustable spikes on the feet. Three upward facing spikes inside the top part of the frame support the top plate of the turntable from underneath, which is a painted aluminium sheet some 3/8 inch thick, chosen for its rigidity and non-magnetic properties.

The subchassis is also made from flat aluminium sheet, and supports another aluminium item, a solidly bolted on arm base, and of course the main bearing. The latter is made from brass and hardened steel, with a ball which is lapped and polished to a high standard of roundness. The platter is made entirely from glass – subplatter as well as main platter. The former is belt driven from an Impex synchronous motor (yes, *that* one!) using a belt from Thorens; the subplatter is an interference fit to the main spindle, which is a hairy piece of engineering but seems to work. The main platter is a full width flat plate which is a close fit around the spindle. The two platter sections simply rest on top of each other and are topped by a felt mat.

Springing is conventional, being based on three suspension points, but without the usual lossy compliant washers which means that suspension behaviour is almost totally undamped. It can go into some quite complex modes at relatively high frequencies when

excited; this is definitely *not* the turntable for an Airtangent or Eminent Technology arm, though it was probably never intended to be. The sides and bottom of the turntable are enclosed within a simple steel box, with abundant access available to all the relevant adjustment points. No arm dressing facilities are provided; *NVA* claim better results if the arm lead is simply led away unobstructed.

That's it, more or less. Finish is in unrelieved black and aesthetics are utilitarian.

### Lab Report

Certain problems were apparent during the bench testing. Pitch stability was just acceptable in weighted terms, but the wow contribution was a little excessive at 0.22 per cent mostly due to a quite severe peak around 6Hz, at the upper end of the wow spectrum. There was no appreciable drift, and slowing under load amounted to 0.008 per cent, which is perfectly satisfactory.

Rumble levels are not particularly low in absolute terms either, the spectrum being uneven and with considerable noise in the 250 – 400Hz band, perhaps due to structural excitation. There's also a severe platter resonance with a period of about 76mS, which corresponds to just under 13Hz, and which showed no sign of dying away during the 500mS measurement window – this appears to be related to the suspension system. The latter is well designed to filter out structure borne vibration, but the *NVA* did prove rather microphonic.

### Sound Quality

The manufacturer's preferred arm from those available for this issue with a Linn type base was the Kuzma *Stogi* (reviewed sepa-

rately). The *NVA* proved painless to set up the suspension being relatively free of settling because it lacks compliant bushes.

The deck proved highly distinctive on audition, mostly in a positive sense. From the outset it impressed by its sheer energy. The *NVA* is propulsive, energetic, involving and tuneful. Quiet instruments can generally be followed in the presence of loud ones, and stereo soundstaging is explicit with good localisation. The bass is quick and tuneful, but lightweight, and there is also a sense in which the midband is rather aggressive and OTT, which whilst superficially attractive – it makes the system sound even livelier and more detailed – is partly an artefact, and actually conceals a certain amount of musical information.

The rattly construction of some of the chassis components is certainly either wholly or partly responsible for this. But the deck goes a long way to meeting its brief, and hopefully will settle down in production to fulfil the promise it already shows.

### Conclusions

Utilitarian to a fault, the *NVA* really sings, which must be the fruit of some well informed listening because in the lab the *NVA* isn't special at all. But if the measurements fail to explain its charm, they amply demonstrate the room that exists for improvement. The deck also seems a little overpriced on a (presumed) materials cost plus basis, but on sonic merit I'd include this deck in my shortlist at this price. At the same time I'd be tempted to wait a few months to see how it shakes down in production.

### Test Results

Type	belt drive, single speed with integral stand
Platter mass/damping	2kg approx/average
Finish & engineering	below average/average
Type of mains connection leads	3 core
Speed options	33 – dual speed capstan available as option
Wow & flutter (DIN peak Wtd)	0.09%
Wow & flutter (Lin peak Wtd 0.2Hz – 6Hz/6Hz – 300Hz)	0.22%/0.07%
Absolute speed error	0.27 fast
Speed drift 1 hour/load variation	0.0016%/0.008%
Start up time to audible stabilisation	3.5 sec
Rumble DIN B Wtd L/R Average/L + R (see spectrum)	–65dB/–67dB
Size (h x w x d/clearance for lid rear)	43 (w/o lid) x 49 x 40/n/a
Ease of use	good
Typical acoustic breakthrough and resonances	below average/poor
Subjective sound quality of complete system	good
Hum level/acoustic feedback	low/good
Vibration sensitivity/shock resistance	poor/good
Estimated typical purchase price	£499
Reviewed by	Alvin Gold
Nene Valley Audio, 1 Church Farm, Hatley St. George, Nr. Sandy, Beds SG19 2EA. Tel: (0767) 50532.	

# Oracle Delphi III

The Oracle *Delphi* has been covered by *Choice* on various occasions in the past. The occasion of this new review is a change from MkII to MkIII versions which occurred at the end of 1987, and our coverage concentrates on the changes. The *Delphi III* was supplied with an Airtangent arm, which is also improved over the version tested previously. The arm was assessed both on the Oracle and on an Oxford Acoustics *Crystal Reference* and these items are covered in depth elsewhere.

The basic ideas that formed the original Oracle remain unchanged to this day. The deck is built onto a thick, Perspex baseplate which is the ground plane for three spring suspension units coupled to a large laminated aluminium/magnesium subchassis of enormous rigidity and quite effective internal damping. The platter is a heavy alloy disc with an inner rim for belt drive purposes and a rubber edge insert to damp energy appearing at the periphery. It is topped by a slightly viscous mat to which the record is held in a slightly dished profile by a screw-on clamp. The arm base takes the form of an appropriately drilled Perspex disc which is held firmly in a ring-like vice that is part of the subchassis.

Improvements have been made to virtually every component. For current MkIII guise, the suspension and main bearing as well as the motor system receive most of the attention. The spring/damper suspension units have been redesigned so that they 'bounce' at the same frequency regardless of the tension they are under. This finally eliminates the need to use graded springs for the three different locations. A gauge is supplied (not with the review sample, though) to enable the resonant frequency to be set as a separate parameter from the height adjustment.

The subchassis has been strengthened by increasing its thickness by about 50 per cent. The main bearing spindle, which now runs wet, is also bigger, with claimed closer tolerances. The motor, formerly a flywheel-smoothed DC type, has been changed to an AC type driven by an onboard two speed supply. There is continuity with the past in the continuing excellence of the Oracle's standard of build and finish.

It is important with the Oracle that the mat stays free of dust and grit (washing is the only way), for which it acts like a magnet, pressing the detritus it collects into the underside of the record being played. Previously the Oracle lid wouldn't cover the deck when it was fitted with the Airtangent; this has now been set to rights, which means the mat can be kept clean much easier. However,



the lid was not included with our turntable.

## Lab Report

The inevitable small differences in the test procedures between now and the last time the Oracle was covered is more than enough to swamp any (presumed) small differences in the way the new model behaves, so the following measurements must stand on their own. By any standards, however, the deck behaves well.

Weighted wow and flutter is exceptionally low, with the 0.13 per cent wow figure being as low as has been measured with the B&K test record used. Flutter levels are almost absent, and slowing under load is low, which wasn't always the case. Signal-to-noise is even more impressive, with measured rumble at -76dB DIN weighted, which on the test jig used is approaching the limit of resolution. The rumble spectrum analysis was clean except for some sharp spikes at harmonic multiples of mains line frequency. This highlights the rather high raw hum level found with this deck. Careful earthing may be required.

The Oracle effectively isolates the record from airborne and structure-borne vibration. Disc edge shocks are also very effectively deadened, only mild suspension modes being visible on the plot after the initial transient had been damped.

## Sound Quality

Sound quality is quite simply excellent. The *Delphi III* has a rock solid bass delivery, with very good pitch resolution and a quick and tuneful feel, an area where previous versions of the Oracle have sometimes sounded a little ill at ease, even unwieldy. Treble was deli-

cate and airy and the midband sounded highly articulate. The overall impression is of refinement and clarity, and an almost absolute sense of stability.

The most impressive feature of the Oracle however is – as it always was – in the area of stereo imagery. This manifests itself not just in explicit image placing, but more pertinently in the way individual instruments relate to each other, and especially their independence when playing in concert with other instruments. Consistency and separation are the requirements here, and the Oracle *Delphi III* is a powerful tool for exploring such relationships.

A comparison to the Oxford Acoustics *Crystal Reference* is an instructive one in this context. Both have a solid and well-bred overall ability, and both offer near holographic soundstaging ability, the primary cause of which is a well judged underlying balance of abilities and a particularly fine midband. Any fudging here results in a softening round the edges and a collapse of image space, though hi-fi systems have many other ways of spoiling good stereo.

Oxford Acoustics' *Crystal* has better bass and a larger image scale (in a straight A-B test using the same arm and cartridge, whilst the *Delphi III* has a perceptibly crisper and airier top. Both proved particularly fine partners for the Airtangent, and represent viable alternatives to each other.

## Conclusions

Expensive but extremely capable, the Oracle sounded excellent in combination with the Airtangent, and is known to work well in other combinations too, including the *SME IV* and *V* tonearms.

## Test Results

Type	belt drive, two speed manual	
Platter mass/damping	2.8kg/excellent	
Finish & engineering	excellent/excellent	
Type of mains connection leads	3 core with power supply in lead	
Speed options	33/45rpm	
Wow & flutter (DIN peak Wtd)	0.05%	
Wow & flutter (Lin peak Wtd 0.2Hz - 6Hz/6Hz - 300Hz)	0.13%/0.045%	
Absolute speed error	0.05% slow as set (adjustable)	
Speed drift 1 hour/load variation	negligible/0.03%	
Start up time to audible stabilisation	9 sec	
Rumble DIN B Wtd L/R Average/L + R (see spectrum)	77dB/75dB	
Size (h x w x d)/clearance for lid rear	16 x 48 x 36/mm/a	
Ease of use	fair	
Typical acoustic breakthrough and resonances	very low/low	
Subjective sound quality of complete system	Very good	
Hum level/acoustic feedback	average (see text)/excellent	
Vibration sensitivity/shock resistance	good/good	
Estimated typical purchase price	£1500	
Reviewed by Alvin Gold		
Rating - Recommended		
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# Rega RB300

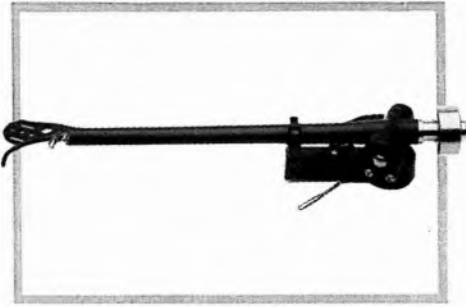
This Rega-made product uses a very rigid one-piece arm beam/headshell, which unusually is constructed from a hollow aluminium casting. No joins are present between cartridge platform and pivot. The bearings themselves are highly pre-loaded and yet mounted to such a high tolerance that friction is negligible while play is physically undetectable.

Rega's traditional magnetic frictionless bias compensator is employed, with a novel touch present in the design of the downforce mechanism. When set to zero, the carefully designed coil spring mechanism exerts a minus force of 3g, so reducing the counterbalance requirements.

The bearing gimbal is itself a substantial casting and the usual adjustable vertical pillar design has been omitted, being regarded as a structural weakness.

## Lab Report

Tests showed the RB300 has some of the finest bearings in the business; furthermore it was very competent in the important area of beam/headshell rigidity. Friction was very low in both planes, without a trace of play,



and while biasing worked well, the calibrated figures were a little on the high side (by about 25%). Downforce calibration was accurate and cue operation fine. Geometric accuracy was to a high standard, while the effective mass was a moderate 10.5g.

The structural resonance picture suggested good control and excellent rigidity. The mild 400Hz mode was probably the counterweight, while the first bending or torsional mode was deferred until a remarkably high 1.5kHz. The treble was also remarkable for its absence of resonances after 4kHz.

## Sound Quality

It was clear after only a few minutes audition, that the RB300 was a top flight performer. Depending on the chosen player, it proved quite comfortable in the company of other reference tonearms in the £250-£400 range.

The sound was notably dry and neutral with excellent control throughout the range. Transients were judged excellent, while it offered a very well-focused sound stage with very good depth. Its only significant failing was a slight muddling of detail on complex musical passages.

## Conclusions

The RB300 is an excellent product of which Rega can be justly proud. Despite its modest price it sets new standards in performance, and a Best Buy rating is mandatory.

## Test Results

Approximate effective mass, inc screws, excl cartridge	10-11g
Type/mass of headshell	non-detachable
Geometric accuracy	very good
Adjustments provided	overhang/offset
Finish and engineering	very good/excellent
Ease of assembly/set-up/use	very good/excellent/very good
Friction, typical lateral vertical	150mg/15mg
Bias compensation method	magnetic
Bias force, rim/centre (set to 1.5g elliptical)	340mg/330mg
Downforce calibration error, 1g/2g	+0.05g/+0.03g
Cue drift, 8mm ascent/descent	negligible, 0.5 secs/3.0 secs
Arm resonances	see graph
Subjective sound quality	very good
Arm damping	none
Estimated typical purchase price	£90

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# Roksan Xerxes



**T**he Roksan *Xerxes* is a 'clean sheet' design which throws many of the clichés of turntable design overboard. Development has been rapid in the last couple of years, and not only is recent production substantially better turned out than before, there have been important engineering changes, notably to the spindly main bearing which is now a meticulously engineered three-piece design. All such mods are retrofittable – at a price. The Roksan is available in many arm fittings (forget armboards – the entire top plate must be changed), and various high quality veneers including rosewood and white ash.

A normal spring suspension is eschewed in favour of a stiffly floating top surface, sawn part through to control panel modes. The felt topped platter is a complex and superbly engineered medium weight structure with high inertia, and the synchronous motor is allowed to rotate about the pulley axis against a spring, but is restrained in other planes. The key idea, which also finds expression elsewhere in the design, is to live with resonances by placing them where they don't matter, rather than attempting to sink them by adding mass (the brute force solution).

The deck is driven from an external quartz referenced power supply, finished in keeping with the turntable. This drives each phase of the motor using its own Class A amplifiers, and runs hot as a result. Uniquely, the centre spindle is detachable to ensure records only contact the mat, not the main bearing directly.

The Roksan is physically large and its aesthetics are plain, but the finish is AI, especially the now diamond turned metalwork.

from rubber stops and counterspringing to replace the friction hinges. Setting up, simple in principle, is fiddly in practice and best left to the dealer (and his stethoscope!).

## Lab Report

Wow and flutter is excellent, the Roksan achieving significantly lower wow than a number of the super-decks with ultra-heavy platters. The *Xerxes* also responded as well as almost any to the impulse and acoustic feedback tests, with a notably smooth energy trend, but some increased 'noise' at the lowest frequencies and to a lesser extent near 500Hz too. The former demonstrates the need for a good, firm isolating platform. Platter damping is relatively poor but resistive, in line with expectations for a non-clamped felt covered platter, and the initial transient was quickly damped in the impulse test. Rumble levels were excellent and the spectrum clean.

## Sound Quality

Sound quality is top class. To start with, the basics are right: the deck runs at the right speed, with no audible dynamic wow, superb pitch resolution, speed and bass integration, and operates with a range of arms. When a note stops, *Xerxes* stops too – it has less overhang than almost any upmarket turntable. Aside from these prerequisites, stereo resolution is particularly fine, with stable soundstaging and explicit depth information in a suitable system. The sense of control is apparent at all volume levels, but never impedes the liveliness of the music. Early samples seemed to compress the dynamic range somewhat, but this criticism no longer applies with the latest production samples.

*Xerxes* works well with a range of arms, including the Mission *Mechanic* and both *SMEs*, but can sound a little lightweight in some situations. However, the Linn *Ituck* is less happily accommodated than on the *LP12*. Conversely the Rega *RB300*, which doesn't sound too happy on a Linn, could have been made for *Xerxes*.

## Conclusions

One version of the state of the art, the *Xerxes* has a remarkable ability to extract music from vinyl and deserves an unequivocal recommendation. Great value with the Rega *RB300* too, but be careful about siting in your listening room.

## Test Results

Motor Unit	
Type	manual motor unit
Platter mass/damping	2.1kg/good
Finish and engineering	excellent
Type of mains connection leads	3 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.07%/0.12%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.13%/0.02%
Absolute speed error	+0.13%
Speed drift 1 hour/load variation	-0.06%/-0.03%
Start up time to audible stabilisation	5 secs
Rumble DIN B Wtd L/R	-78/-80dB
Size (h x w x d)/clearance for lid rear	15 x 48 x 397cm
Ease of use	average
Typical acoustic breakthrough and resonances	excellent
Subjective sound quality of complete system	excellent
Hum level/acoustic feedback	excellent/excellent
Vibration sensitivity/shock resistance	good/good
Estimated typical purchase price	£595

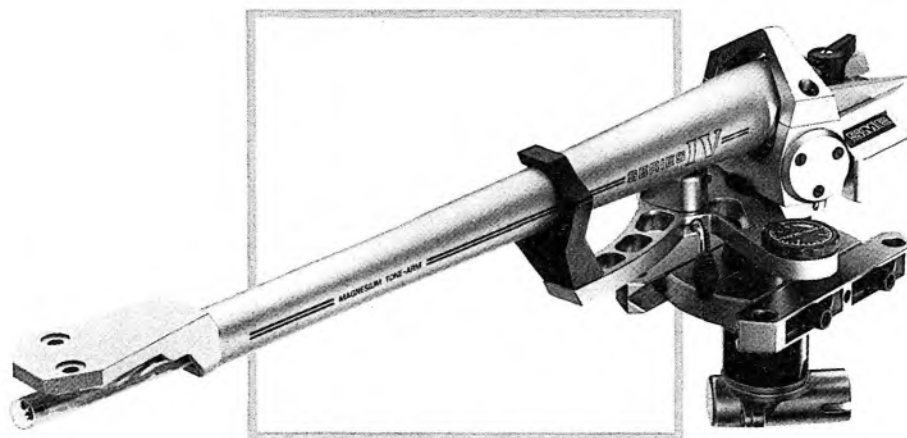
Reprinted from issue No. 55 by Alvin Gold

Rating: Recommended

Roksan Engineering Ltd., 21 Ddole Road, Llandrindod Wells, Powis LD1 6DF. Tel: (0597) 4911



# SME IV



**E**ditorially it was deemed essential to include this important new SME tonearm, but for legal reasons it was not possible for Alvin Gold to carry out the review, so Paul Messenger has stepped (rather reluctantly) into the breach. One consequence is that this cannot be a comparative subjective review in the normal *Choice* tradition, though fortunately the tonearm measurements, carried out in Martin Colloms' lab, pose no such problems.

Furthermore, physical incompatibility with both the editorial turntable (a heavily modified Linn) and cartridge (the three-legged *Traika*) that are in everyday *110k* use provided a further handicap, preventing straightforward substitution. That said, the *Series IV* (like all SME arms) is as nearly universal as anything on the market, and for the purposes of the review it was fitted to a Roksan *Xerxes*, with Audio Technica *ATF5* and Linn *Karma* cartridges.

*Series IV* is the 'budget', simplified version of *Series V*, selling at little more than half the price of its black brother (but still a daunting £675). For which you get a silver version of the best looking and best finished tonearm in the world – a veritable Magnum 45 amongst Berettas.

SME's fixed cartridge screw holes plus sliding base system is a longstanding tradition, ensuring accurate alignment. The base, now operating like a vice, is impressively rigid when locked, and requires an oval armboard cutout. Also traditional is the camera – nay Hasselblad – standards of fit and finish down to the minutest details, plus an exemplary instruction manual (written in real English!).

The crucial feature carried down from *Series V* is the highly complex 'single piece' magnesium casting which encompasses headshell, tapered, wide diameter main beam, bearing housing and counterweight

shafts, providing an exceptional rigidity/mass ratio. Retaining the precisely calibrated underslung counterweight, damped and swivelling side entry leadout socket and sprung bias compensation, the simplification process involves omitting the fluid damping option and the user-friendly height adjustment, plus less costly wiring and the substitution of 3 for 7 ABEC bearing races.

## Lab Report

The medium effective mass should accommodate all but the highest compliance cartridges without difficulty. Bearing friction was very low and impressively smooth, while downforce calibration was precise, though bias compensation, surprisingly, was a little high at the outside grooves. The midband and treble evenness and control is little short of spectacular, carefully damped minor perturbations around 1-2kHz being the only notable feature.

## Sound Quality

Amongst the least characterful of tonearms, the main drawback with *Series IV* lies in its tendency to expose the shortcomings of partnering components. However good the *ATF5* is for the price, it is still a £100 cartridge and was clearly out of its depth in this company. *Karma* substitution brought the necessary bandwidth, integration and weight to confirm this as one of the finest tonearms around, somehow combining the 'welly' of the best pivoted designs with much of the delicacy and precision of air-bearing parallel trackers.

The lack of midband and treble coloration, plus precise, coherent and wideband stereo focusing are notable strengths, though

perhaps the bass is slightly less 'agile' than some alternatives, and the emphasis would seem to lean a little more towards control than 'speed'. However, these are impressions gained in isolation, with no opportunity for substitution comparison. And without a doubt the *IV* (and presumably even more so the *V*) has an uncanny ability to 'read' the characteristics of the turntable and cartridge, so isolating its own character is very difficult.

## Conclusions

It is hard to find fault in this exceptional tonearm, which provides all but the 'nth' degree of *Series V* refinement at a (comparatively) attractive price. No one should contemplate such a purchase without satisfying themselves first that the sound quality is right in the context of the other system ancillaries – particularly turntable and cartridge. But of all the exotic tonearms around, the SME excels in exuding exceptional engineering professionalism, and generates considerable confidence in its value as a long term investment.

## Test Results

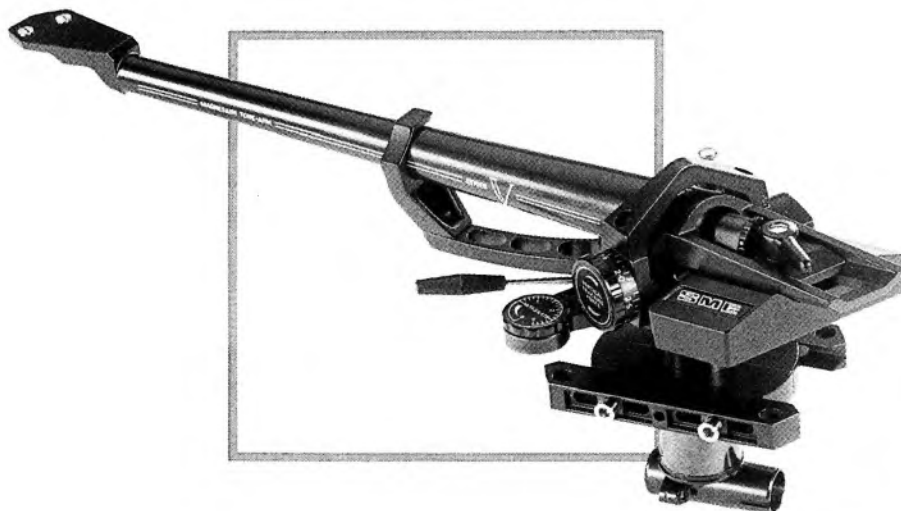
Arm	
Approximate effective mass inc screws, exc cartridge	11g
Type/mass of headshell	fixed, integral
Geometric accuracy	very good
Adjustments provided	overhang/height
Finish & engineering	excellent
Ease of assembly/set-up/use	very good
Friction (typical) lateral/vertical	< 10mg/< 10mg
Bias compensation method	calibrated spring
Bias force, rim/centre (set to 1.5gm elliptical)	240mg/210mg
Downforce calibration error, 1gm/2gm	nil
Cue drift	negligible
Cue rate ascent/descent	instant/2 secs
Arm resonances	excellent
Arm damping method	none
Load capacitance	100pF
Estimated typical purchase price	£675

Reprinted from issue No. 55 by Paul Messenger

Rating: Recommended

SME Ltd., Steyning, Sussex BN4 3GY. Tel: (0903) 814321

# SME V



**A**t the phenomenal price of £1,138 (phenomenal, that is, until you compare it with some of the high-end parallel trackers around), this arm's design technology, engineering finish and sound quality are all directed towards justifying that cost. Previous SME designs employed a gravity loaded knife edge for the vertical plane bearing, but the *V* uses firmly pre-loaded, stainless steel ball race bearings of the highest quality, offering zero detectable play.

The main beam or tube, in thinwall cast magnesium, is a complex one-piece structure including the shell/cartridge platform, the massive beam, the yoke bearing assembly and the rear section slide for the counterweight. The beam is heavily tapered both externally and in wall thickness. No joints are present from end to end though the high density tungsten counterweight block is joined *via* a cam lock system. A thumbscrew sets zero balance while downforce and bias correction are set by precisely calibrated dials.

While the mounting hardware is compatible with previous SME arms – the familiar oval hole with the four point fixing – the *V* has a rigid vice-like clamp system which nevertheless includes easy adjustment of overhang and offset geometry. Height adjustment is facilitated by a detachable control, which may be temporarily operated during play for fine tuning. Vertical tilt cannot be adjusted.

The special van den Hul type cable is connected *via* a Japanese style 5 pin plug. (Note, SME even make their own plugs.) The right angle type socket arm has viscous-damped free rotation, allowing the cable to take up a

natural 'set' in subchassis turntables.

The arm has a moderate effective mass, suited to medium compliance cartridges in the 8-30cu range; the top limit is assisted by the arm's damping feature. A calibrated damper engages in a horizontally acting silicone fluid trough, permitting a wide range of damping, with the suggestion that it is used with great moderation.

## Lab Report

This arm was well calibrated with accurate downforce and sensible levels of bias correction. Effective mass typically measured 11g including fixings. Various fluid choices enable any required damping to be achieved.

Arm resonance impulse analysis showed a well damped main arm mode at a high 1.6kHz, but the combination of rigidity and damping made it hard to identify on a conventional graph. In comparative terms, this suggests notably clean behaviour.

## Sound Quality

Perhaps confirming its aspiration to set a new reference standard, this arm has the ability to show just how coloured and tonally unbalanced many other arms are. It appears to have very little of its own false emphasis, and subjectively it reveals the black vinyl disc to a surprising degree. For example, stage width is notably increased, yet central focusing is more precise over a wide frequency range. Tonally even, previously 'difficult' musical passages such as certain female vocal tracks soar through the frequency range without any hindrance or any suspicion of a 'forced' quality. Stage depth is remarkably good, with harmonic perspectives convincingly maintained in free space.

Fine detail was excellently resolved – indeed certain detail was heard for the first time on many well known records. The bass end was agreeably firm and extended, lacking any particular emphasis, while the treble quality was sweet and airy, and slightly rich tonally compared with other pickup arms.

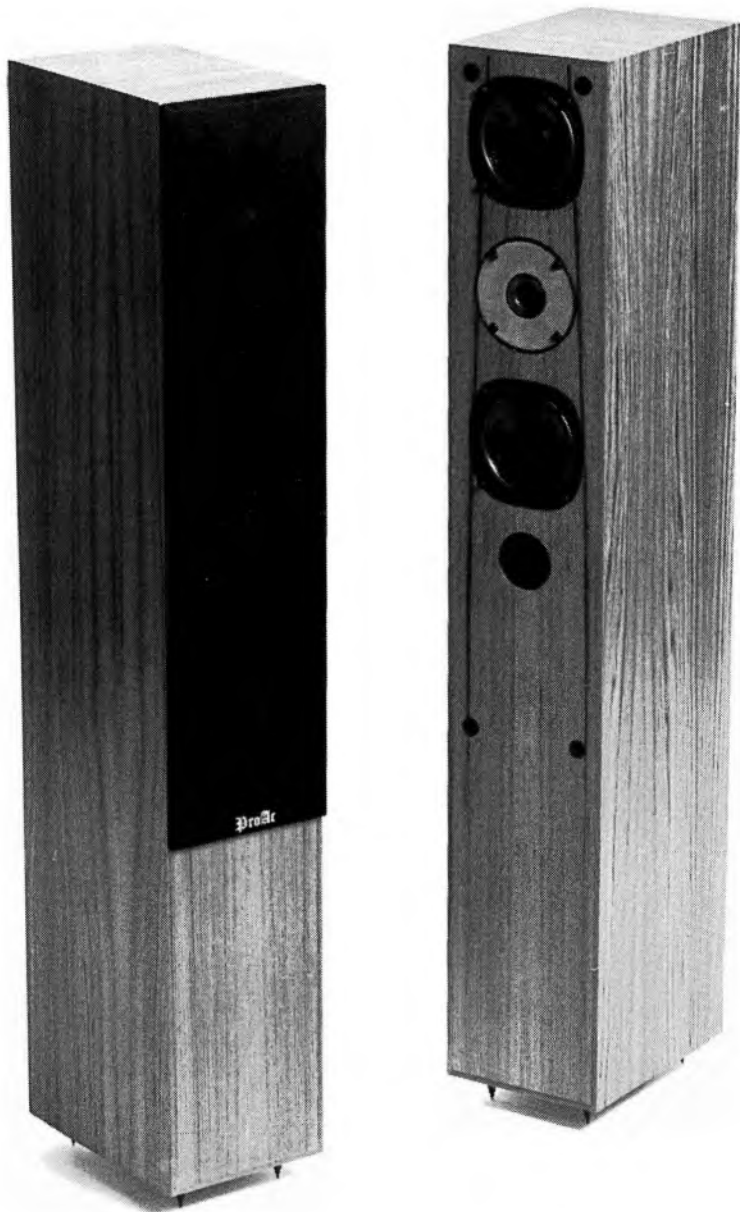
## Conclusions

The *Series V* is an excellent tonearm in terms of design, engineering, build, and sound quality. While the high price constrains considerations of value, it can be argued that this arm does just what it set out to do, namely establish a new reference standard regardless of price. In our view the *V* has re-established the old SME slogan, 'The Best Pickup Arm in the World', and demands recommendation.

## Test Results

Tonearm	
Approximate effective mass, inc screws, excl cartridge	11g
Type/mass of headshell	fixed
Geometric accuracy	excellent
Adjustments provided	height/overhang/offset/damping
Finish and engineering	excellent/excellent
Ease of assembly/setting-up/use	very good/good/very good
Friction, typical lateral/vertical	40mg/30mg
Bias compensation method	internal spring
Bias force, rim/centre (set to 1.5g elliptical)	150mg/210mg
Downforce calibration error, 1g/2g	+0.02g/-0.07g
Cue drift, 8mm ascent/descent	negligible, 1.5secs/3secs
Arm resonances	very good
Subjective sound quality	excellent
Arm damping	special structure, adjustable viscous damping
Estimated typical purchase price	£1138
<i>Reprinted from Collection II by Martin Colloms</i>	
Rating: Recommended	
SME Ltd., Sleying, Sussex BN4 3GY. Tel: (0903) 814321	

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# Audio Technica AT-OC9

As a souped-up version of Audio Technica's AT-OC7, the AT-OC9 is distinguished by its black corundum-coated alloy body and gold-plated 'ABC' generator housing. Fairly long bolts are required but the integrity of the structure is such that a firm bond with the headshell is assured.

The same nude diamond and tapered beryllium cantilever is employed but the OC9 also utilises a rutile magnet mould together with proprietary PCOCC coils mounted in an inverted V armature.

A vanadium yoke piece maintains the high power samarium-cobalt magnets at the preferred generator angle. Though still a little asymmetrical, the lower compliance of the AT-OC9 makes it more suitable for use with higher effective mass arms than the cheaper OC7.

## Lab Report

Stereo separation showed little deviation across the audio bandwidth while channel balance, THD and IMD were actually slightly worse than with the AT-OC7. At low frequencies the distortion was composed mainly of innocuous second harmonic while an



increase in the more disturbing higher-order components was noted at HF.

Nevertheless, the increased flux density created between the yoke poles of the AT-OC9 brings a substantial +4.1dB increase in output over its cheaper brother, despite a reduction in the generator coil resistance to 11.8ohms. Audio Technica have also tailored the frequency response slightly; though free of abrupt discontinuities there was a steady loss in treble output above 5kHz.

## Sound Quality

The AT-OC9 enjoyed a profound sense of integration throughout the entire frequency

range. The slight treble attenuation was not immediately obvious but it did seem to encourage a smooth, relaxing but confident presentation at high frequencies. Tonal colours were reproduced faithfully while stereo images were clearly isolated and focused.

## Conclusions

At £400 the AT-OC9 is obviously expensive, though as one of the cheapest and more generally competent models in this survey it does indeed represent good value and warrants unconditional Recommendation.

## Test Results

Type, body mass	low output mc, 7.8g
Stylus type	highly polished extended elliptical
Compliance, vert/lat	13.1cu/16.2cu
Tracking Force Range/test	1.25g - 1.75g/1.65g
Tracking ability, L/R	73µm/70µm
LF res., vert/lat (11g arm)	10Hz, 9dB/9Hz, 13dB
Output (1kHz, 5cm/sec, L/R)	0.48mV/0.46mV
Separation, L/R	100Hz 27.2/28.0    3kHz 31.3/32.5    10kHz 29.9/28.5dB
Channel balance	0.4dB
Coil resistance	11.8ohms
Frequency response 20Hz-20kHz	+0.4dB/-1.7dB
THD (300Hz, 1kHz)	1.07%, 1.21%
High frequency distortion (10.8kHz pulsed)	1.91%
Midband IM dist. (1kHz + 1.5kHz)	1.44%
IM dist. (SMPTE 2nd, 3rd orders)	8.39%, 1.78%
Vertical tracking angle	26 degrees
Loading requirements	>10ohms
Typical retail price	£400
Reviewed by Paul Miller	
Rating: Recommended	
Audio Technica Ltd., Technica House, Lockwood Close, Leeds LS11 5UU. Tel: (0532) 771441.	

# Clearaudio Accurate

Until recently the Pradikat was the top dog in Clearaudio's UK range but this has now been knocked into second place by the extravagantly-priced Accurate. Embodying the same design concepts as the cheapest Clearaudio MCs, the high cost of the Accurate is apparently justified by the use of carefully selected components. These include the Trigon Parabolic stylus (a little too heavily glued on this sample) and a hollow boron cantilever. The proprietary generator utilises no less than four rare-earth magnets that are disposed in two pairs fore and aft of the central pivot point. A change from aluminium to a toughened lead alloy (gold-plated) for the mounting block has doubled the mass of the Accurate compared to other Clearaudios.

## Lab Report

A considerable number of coil turns (note the high coil resistance of 50ohms) together with the four powerful magnets has realised a substantial 0.47mV output. The frequency response was commendably flat while mid-band stereo separation was truly exceptional, 37-38dB being recorded at 3kHz.

These good results were marred by the



inaccurate VTA of 30 degrees which contributed some 5.2 per cent distortion to the vertical component and shunted up the second-order SMPTE IMD to 13.2 per cent.

## Sound Quality

Initially, the Accurate simply sounded very neutral and balanced but betrayed little of the 'magic' usually associated with such exotic moving coils. However it appeared that this cartridge, more than any other, benefits from an extremely protracted running-in period whereupon the sound positively blossoms to reveal the true mettle of the design.

An uncommon stereo depth was realised

which, like the Koetsu Red Signature, allowed music to breathe freely from the loudspeakers. Bass, mid and treble detail were neatly balanced, no one area outshining another nor coloured to any appreciable extent. Stereo imaging was first rate - only a slight loss of focus at the stage extremes giving any cause for concern.

## Conclusions

This is 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.

## Test Results

Type, body mass	medium output mc.
Stylus type	extended line-contact, 5 x 35µm
Compliance, vert/lat	18.4cu/24.0cu
Tracking Force Range/test	1.8g - 2.2g/2.2g
Tracking ability, L/R	79µm/>80µm
LF res., vert/lat (11g arm)	8Hz, 10dB/7Hz, 12dB
Output (1kHz, 5cm/sec, L/R)	0.48mV/0.46mV
Separation, L/R	100Hz 30.3/28.5    3kHz 37.1/38.3    10kHz 29.6/31.4dB
Channel balance	0.4dB
Coil resistance	50ohms
Frequency response 20Hz-20kHz	+0.5dB/-0.9dB
THD (300Hz, 1kHz)	1.48%, 1.79%
High frequency distortion (10.8kHz pulsed)	2.58%
Midband IM dist. (1kHz + 1.5kHz)	1.68%
IM dist. (SMPTE 2nd, 3rd orders)	13.22%, 1.94%
Vertical tracking angle	30 degrees
Loading requirements	10 - 50kohms
Typical retail price	£2000
Reviewed by Paul Miller	
Rating: Recommended	
Vital Systems, 38a The Meadow Way, Harrow Weald, Middx HA3 7BW. Tel: (01) 863 8988.	

# Dynavector DV XX-1

The new XX-1 is a high output MC incorporating proprietary 'flux damper' and 'softened magnetism' concepts. Dynavector feel that signal intermodulation is caused by fluctuations in the permeance of the magnet gap as the armature moves about a fixed axis. Theoretically, these intermodulation products will manifest as audibly harsh and grainy colorations.

By modifying the ever-popular high power rare-earth magnet to a characteristic that offers a lower deviation in magnetic force, and fitting a switchable shorting-coil to the front yoke of the magnetic circuit, Dynavector claim to have reduced the deleterious effects of this non-linear magnetic interference.

The XX-1 employs a solid boron cantilever, fitted with a fine line-contact diamond while its low compliance is thoroughly in keeping with the substantial weight of the cartridge itself.

## Lab Report

Despite Dynavector's use of a relatively low power magnet, a substantial 2mV output was generated into a standard 47kohm load,



some clue to how this is achieved being given by the high 273ohm coil resistance. Channel separation was not exceptional but tracking performance seemed excellent. Conventional THD increased with frequency though the flux damper actually made things worse—the only reduction in distortion being the second-order SMPTE IMD which was reduced by 1.09 per cent.

## Sound Quality

Rich and powerful, the XX-1 demonstrated a tinge of metallic coloration through the treble. Midband detail was clearly projected without embellishment, though at times the

strident potency of the cartridge might be construed as a little heavy-handed. There was a slight reduction in the resolution of stereo depth together with a hint of softness that permeated the upper bass, however, the bass tightened-up and some of the treble colorations were removed once the flux damper was switched in.

## Conclusions

Certainly Dynavector's best high output MC yet, the XX-1 embodies a power and solidity rarely encountered amongst the breed. Nevertheless it did exhibit a peculiarly suppressed character that will suit lively rather than wholly neutral systems.

## Test Results

Type, body mass	high output mc, 12g		
Stylus type	line contact 0.14 x 0.08mm		
Compliance, vert/lat	10.8cu/13.3cu		
Tracking Force Range/test	1.8g - 2.2g/2.1g		
Tracking ability, L/R	> 80µm/> 80µm		
LF res., vert/lat (11g arm)	10Hz, 14dB/9Hz, 16dB		
Output (1kHz, 5cm/sec, L/R)	2.10mV/2.00mV		
Separation, L/R	100Hz	3kHz	10kHz
	26.5/27.0	27.2/27.0	24.1/24.8dB
Channel balance	0.4dB		
Coil resistance	273.5ohms		
Frequency response 20Hz-20kHz	+1.2dB/-1.3dB		
THD (300Hz, 1kHz)	0.81%, 1.98% (2.09%)		
High frequency distortion (10.8kHz pulsed)	2.63% (3.07%)		
Midband IM dist. (1kHz + 1.5kHz)	1.52% (1.52%)		
IM dist. (SMPTE 2nd, 3rd orders)	10.67% (9.58%), 1.16% (1.23%)		
Vertical tracking angle	25 degrees		
Loading requirements	47kohms		
Typical retail price	£360		
Reviewed by Paul Miller	Dynavector UK Ltd., 32 Reading Road, Woodley, Reading RG5 3DB.		
	Tel: (0734) 699 159.		

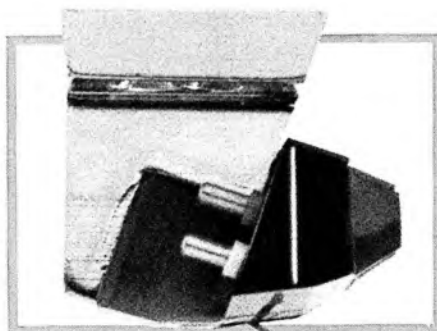
# Goldmund Clearaudio

Commissioned by Goldmund to partner some of their extraordinary turntables, the Clearaudio originates from Peter Suchy's hideout in deepest Erlangen, West Germany. The Goldmund Clearaudio appears to be derivative of the Clearaudio/Pradikat moving coil, this model occupying a back seat to the still more exalted Accurate.

The generator is shielded within a narrow tube and clamped in a resinous body while a pair of rare-earth magnets sit adjacent to each other, either side of the internal pivot point. This structure is supported by a hefty alloy mounting plate, itself gold-plated and drilled with no less than four bolt holes.

## Lab Report

The low body mass of this cartridge was matched by an appropriately high and symmetrical compliance, making the design eminently suitable for use with sub-11gram effective mass tonearms. Output was healthy at about 0.5mV though the asymmetric channel separation would seem to be a little unusual. The rather high distortion results were composed predominantly of even-order harmonics.



Nevertheless, the Goldmund did suffer from an excessive VTA of 31 degrees and a corresponding vertical distortion of 6 per cent; some degradation in lateral separation might then be expected.

## Sound Quality

With a clear and lively character coupled with a confident projection of musical detail, the Goldmund bore a strong sonic resemblance to the aforementioned Pradikat. It possessed a big, transparent and open sound free of those cluttering 'thick' colorations that often plague lesser transducers.

The perceived low frequency extension

flowed with the same lucid potency that characterises the Pradikat, even though its subtle integration was more in keeping with the dulcet tones of the costly Accurate.

## Conclusions

Something of a mixed bag overall, the Goldmund Clearaudio is in the unenviable position of competing with its sister models, imported directly into the UK from the original manufacturers in Germany. If you can afford the Goldmund then a listen to the Accurate might not go amiss.

## Test Results

Type, body mass	low output mc, 5.5g		
Stylus type	Trigon Parabolic line contact		
Compliance, vert/lat	23.3cu/23.3cu		
Tracking Force Range/test	1.9g - 2.3g/2.2g		
Tracking ability, L/R	> 80µm/> 80µm		
LF res., vert/lat (11g arm)	8Hz, 11dB/8Hz, 12dB		
Output (1kHz, 5cm/sec, L/R)	0.50mV/0.47mV		
Separation, L/R	100Hz	3kHz	10kHz
	27.9/23.5	30.2/25.8	29.1/25.3dB
Channel balance	0.5dB		
Coil resistance	50.34ohms		
Frequency response 20Hz-20kHz	+1.1dB/+2.8dB		
THD (300Hz, 1kHz)	2.37%, 2.8%		
High frequency distortion (10.8kHz pulsed)	2.15%		
Midband IM dist. (1kHz + 1.5kHz)	1.72%		
IM dist. (SMPTE 2nd, 3rd orders)	16.6%, 2.8%		
Vertical tracking angle	31 degrees		
Loading requirements	> 50ohms		
Typical retail price	£1500		
Reviewed by Paul Miller	Absolute Sounds Ltd., 318 Worple Road, London SW20 8QU.		
	Tel: (01) 947 5047.		

# Kiseki Blackheart

This latest addition to the prolific Kiseki stable appears to be something of misnomer. For, although the *Blackheart* superficially offers the same construction as the cheaper *Purpleheart* models it is actually destined to retail between the two gemstone models, the *Agate Ruby* and *Lapis Lazuli*.

Close inspection revealed what is either a boron rod or alloy cantilever with boron overlay (details are very sketchy at present) while the stylus is closer to a pseudo-elliptical profile than the line contact 'PF' used in the other top Kisekis. The mounting and polish of the naked stone was first rate nonetheless.

## LAB REPORT

This Kiseki *Blackheart* furnished very close-matched test results for both channels, through stereo separation, 1kHz balance and high frequency replay response. Tracking deteriorated slightly on the right channel despite accurate bias setting, though the discrepancy was far from serious.

Output was fairly low at 0.25mV, more in keeping with the cheaper Kisekis in fact, while distortion was kept at bay even if it did



increase at higher frequencies – second and third harmonics dominated the spectrum.

## SOUND QUALITY

Slightly more neutral, if less forthright than the Kiseki *Purplehearts*, the *Blackheart* offered a subtle, quiet and fairly refined perspective of musical events.

Although the very low bass often failed to grab the attention, it certainly sounded leaner and more articulate than other more euphonic high end MCs which may often appear a trifle warm in this respect.

Some loss in detail resolution was experienced at the very top end, but then this car-

tridge did exhibit a fairly abrupt high treble cut, falling to -2.8dB at 20kHz. The end result was a slightly vague character which contrasted with the sharply-focused transparency of the mid and lower treble registers.

## CONCLUSIONS

This cartridge demonstrated refined poise, a delicate but at once potent security even if in the final analysis it failed to elicit the same emotional response encouraged by the Koetsu and Clearaudio *Accurate*.

## TEST RESULTS

Type, body mass	low output mc, 7.5g
Stylus type	Pseudo-elliptical
Compliance, vert/lat	13.3cu/16.5cu
Tracking Force Range/test	1.6g - 2.2g/2.1g
Tracking ability, L/R	>80µm / >76µm
LF res., vert/lat (11g arm)	10Hz, 11dB/9Hz, 12dB
Output (1kHz, 5cm/sec, L/R)	0.25mV/0.25mV
Separation, L/R	100Hz 27.6/26.5    3kHz 30.2/29.8    10kHz 26.8/26.5dB
Channel balance	0dB
Coil resistance	4.59ohms
Frequency response 20Hz-20kHz	+0.8dB / -2.8dB
THD (300Hz, 1kHz)	1.16%, 1.61%
High frequency distortion (10.8kHz pulsed)	2.29%
Midband IM dist. (1kHz + 1.5kHz)	1.91%
IM dist. (SMPT 2nd, 3rd orders)	12.33%, 1.95%
Vertical tracking angle	25 degrees
Loading requirements	>40ohms
Typical retail price	£1595
<i>Reviewed by Paul Miller</i>	
Presence Audio, The Old Posthouse, Plummers Plain, Horsham, W. Sussex. Tel: (0403) 76777.	

# Kiseki Lapis Lazuli

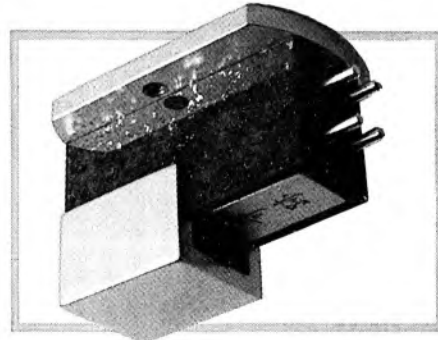
As the most exclusive moving coil cartridge in the world, Kiseki's beautiful *Lapis Lazuli* is also the most expensive. The PF line contact stylus, sendust armature and huge SaCo magnet are derived from the far cheaper *Agate Ruby* design. However, the ruby cantilever of the latter has been replaced by a solid diamond rod.

Most startling is the translucent azure blue and vitreous lustre of the *Lapis Lazuli* body. This is an ornamental stone rich in the mineral Lazurite and flecked with small grains of iron pyrites – 'Fool's Gold'.

## Lab Report

With an excellent channel balance and uniformity of response throughout the midband, the *Lapis* did demonstrate a 1.9dB discrepancy at 18-20kHz, attributed to an early tip resonance caused by excess glue, quite inappropriate at a tenth of the cost! Output was a healthy 0.37mV and gives some indication of the power of the magnets bearing in mind the low coil resistance of only 5.4ohms.

THD increased with frequency and was slightly too high overall even though the harmonic content was fairly innocuous, second



harmonics dominating the spectra. A considerable +8 degree VTA error contributed 4.1 per cent to the vertical distortion and might be expected to influence the perceived lateral separation.

## Sound Quality

The *Lapis Lazuli* stamped an iron fist of authority over all recordings. However, this is not to say the cartridge skirted over subtle musical details as these were reproduced with the same stop/start precision as the louder, transient elements. With an unerring sense of security, brought about by its fine tracking vocals were articulate and express-

ive, the finely-honed image nestling in a broad and properly resolved soundstage. In many respects this cartridge is unbeatable, and that includes the price!

## Conclusions

Combining some very sensible design concepts at a very un sensible price, the Kiseki *Lapis Lazuli* is best thought of as combining the detail resolution of the Ortofon *MC3000* with the effortless fluidity enjoyed by the Clearaudios.

## Test Results

Type, body mass	low output mc, 12.5g
Stylus type	Line contact 'PF', 0.14mm x 0.6mm
Compliance, vert/lat	13.6cu/17.2cu
Tracking Force Range/test	1.8g - 2.2g/2.1g
Tracking ability, L/R	>80µm / >79µm
LF res., vert/lat (11g arm)	9Hz, 11dB/8Hz, 13dB
Output (1kHz, 5cm/sec, L/R)	0.37mV/0.36mV
Separation, L/R	100Hz 26.1/28.2    3kHz 27.5/30.4    10kHz 25.4/26.7dB
Channel balance	0.1dB
Coil resistance	5.35ohms
Frequency response 20Hz-20kHz	+0.5dB / -1.7dB
THD (300Hz, 1kHz)	1.11%, 2.55%
High frequency distortion (10.8kHz pulsed)	2.98%
Midband IM dist. (1kHz + 1.5kHz)	1.39%
IM dist. (SMPT 2nd, 3rd orders)	14.93%, 1.89%
Vertical tracking angle	28 degrees
Loading requirements	>40ohms
Typical retail price	£3500
<i>Reviewed by Paul Miller</i>	
Presence Audio, The Old Posthouse, Plummers Plain, Horsham, W. Sussex. Tel: (0403) 76777.	

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# Absolute Sounds



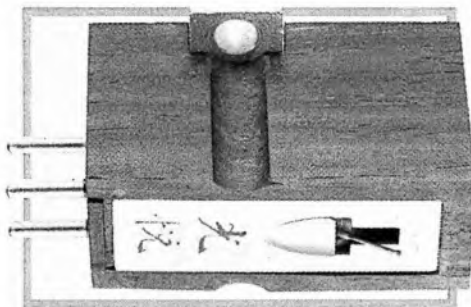
# Koetsu Red Signature

A few years ago the Koetsu *Signature* led the field in terms of cost and though now still far from affordable, it remains one of the cheaper super-fi MCs currently available. The red posetta-clad body and milled head-shell lugs do little to distinguish the *Red Signature* from the bog-standard version. The same gold-anodised alloy base plate is included (this sample coming a little unstuck).

Toughened inserts are now fitted inside the mounting lugs to reduce the chance of fracture while very powerful rare-earth magnets ensure a healthy 0.43mV output. A solid boron cantilever is employed and our sample was fitted with a neatly mounted and highly polished extended profile diamond.

## Lab Report

The frequency response was essentially flat and nicely matched between channels, displaying only the mildest generator loss (-0.4dB) through the midband and a faint (0.8dB) lift at HF. THD was very low at the frequency extremes so the high 2.2 per cent at 1kHz seemed a little unusual despite the predominance of second harmonic. Dynamic



compliance was slightly asymmetric but ideally placed for use with popular medium/heavy effective mass tonearms such as the SME *V* or *IV*.

## Sound Quality

The treble exhibited a beguiling and transparent smoothness. Bass was solid and suitably extended, missing no rhythmic information, while the open and astonishingly clear midband allowed vocals to breathe outwards rather than be forcefully projected. Music readily escaped the confines of the loudspeakers which appeared to melt from the scene.

Under critical conditions there was sometimes a faint euphonic embellishment of the upper bass though this never detracted from the essence of the music. The essential purpose and beauty of the music was rendered wholly intact and readily capable of extracting a powerful emotional reaction.

## Conclusions

More than any other Koetsu, the *Red Signature* successfully balances its euphonic enthusiasm with the need for faithful transcription. The result is a cartridge that leads the field in many if not all respects.

## Test Results

Type, body mass	low output mc, 10.5g
Stylus type	Fine line extended elliptical
Compliance, vert/lat	11.5cu/9.5cu
Tracking Force Range/test	1.9g - 2.2g/2.0g
Tracking ability, L/R	>80µm/>79µm
LF res., vert/lat (11g arm)	10Hz, 13dB/11Hz, 14dB
Output (1kHz, 5cm/sec, L/R)	0.43mV/0.42mV
Separation, L/R	100Hz 20.2/21.4    3kHz 30.4/31.2    10kHz 24.7/25.8dB
Channel balance	0.2dB
Coil resistance	2.54ohms
Frequency response 20Hz-20kHz	+0.5dB/-0.8dB
THD (300Hz, 1kHz)	0.84%, 2.22%
High frequency distortion (10.8kHz pulsed)	1.79%
Midband IM dist. (1kHz + 1.5kHz)	1.32%
IM dist. (SMPTE 2nd, 3rd orders)	8.16%, 1.43%
Vertical tracking angle	25 degrees
Loading requirements	>100ohms
Typical retail price	£1300

Reviewed by Paul Miller  
Rating: Recommended  
Absolute Sounds Ltd., 318 Worple Road, London SW20 8QU.  
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# Ortofon MC3000

Introduced as the logical successor to the very low output *MC2000*, the *MC3000* benefits from several decade's-worth of research into MC cartridge design. Ortofon have employed a powerful neodymium magnet and very thin silver coil wires to boost the output of the *MC3000* in relation to its forebear, although some users may still require the services of an additional gain stage.

A non-conductive carbon-fibre armature is used, linked to a tapered alloy cantilever that is fitted with a special 'Replicant 100' stylus. Ground with a flat, triangular-shaped front facet and an extended vertical contact plane of 100µm, this stylus most accurately mimics the profile of the original cutter without incurring groove damage through pinching.

## Lab Report

The *MC3000* sailed through the ultimate 80µm tracking band. Frequency response was accurately mirrored by both channels, each demonstrating a lift of some +1.7dB between 12-15kHz. Good channel separation was maintained at the frequency extremes while the absence of any significant odd-order THD components indicated that the



*MC3000's* generator was highly linear.

## Sound Quality

Ortofon's *MC3000* startled many listeners with its vivid clarity and ruthless transparency that cut to the heart of the music. No doubt aided by its profound groove stability this MC possessed the kind of instant transient attack and crystalline imagery usually reserved for the more articulate CD players. Subtle timbral details were faithfully transcribed alongside thundering crescendos, while even the most arduous sequences benefitted from a broad and perfectly stable soundstage.

Any hint of forwardness, particularly where female vocals were concerned, was soon ameliorated by the running-in action of the stylus and generator. After some 50 hours of use any treble 'sting' was but a memory.

## Conclusions

This is not a cartridge for the faint hearted, nor is it one for protagonists of bandwidth-limited systems. It is, quite simply, the most accurate transcription device yet created.

## Test Results

Type, body mass	very low output mc, 9.5g
Stylus type	Ortofon Replicant 100, 5 x 100µm
Compliance, vert/lat	12.1cu/14.9cu
Tracking Force Range/test	2.0g - 2.5g/2.3g
Tracking ability, L/R	>80µm/>80µm
LF res., vert/lat (11g arm)	10Hz, 11dB/9Hz, 16dB
Output (1kHz, 5cm/sec, L/R)	0.11mV/0.11mV
Separation, L/R	100Hz 27.4/27.5    3kHz 29.7/30.4    10kHz 26.2/26.8dB
Channel balance	0.1dB
Coil resistance	6.12ohms
Frequency response 20Hz-20kHz	+0.1dB/+1.7dB
THD (300Hz, 1kHz)	1.64%, 2.12%
High frequency distortion (10.8kHz pulsed)	2.19%
Midband IM dist. (1kHz + 1.5kHz)	1.59%
IM dist. (SMPTE 2nd, 3rd orders)	10.67%, 1.65%
Vertical tracking angle	26 degrees
Loading requirements	>100ohms
Typical retail price	£800

Reviewed by Paul Miller  
Rating: Recommended  
Ortofon UK Ltd., Denmark House, Tavistock Industrial Estate, Ruscombe, Twyford, Berks RG10 9NJ. Tel: (0734) 343621.

# van den Hul MC One / 10

**D**utchman A. J. van den Hul has had a major influence on stylus and cartridge design (not to mention cable research), the cartridges bearing his name arising out of work done with Empire in Europe a few years ago. The cartridge body of both the '10 and *One* is screwed metal, with small circular tapped fixing lugs (which could still use nuts if you strip the thread). Mechanical integrity is pretty sound, and headshell fixing should be tight and secure, with a reasonable contact area.

Mechanically the generators were similar but not identical. Both are well damped internally, and the '10 was the more compliant, though both will prefer low or medium mass arms. The shorter coils inside the *One* are reflected in a mite less output, but both have plenty for a normal moving-coil input. Inevitably, and mercifully, both were fitted with high quality tips.

## Lab Report

Tracking margins were adequate, but with little in hand, and even a little marginal on the '10. The frequency responses are smooth and fairly flat, the *One* dipping 2dB instead of



the '10's 1.5dB in the presence band. The *One* is both smoother and slightly better extended at high frequencies. Separation actually measured slightly better on the cheaper '10, but this was probably also partly due to asymmetry, and neither gave exceptional results.

## Sound Quality

Both cartridges rated very good on listening, but the preference for the *One* was quite distinct. The '10 is a fine, neutral, balanced performer, with a transparent midrange, fine depth and focus, firm extended bass but a slight treble 'sheen'. The *One* extended all the positive qualities of the '10, adding great

authority, weight and scale. The transparency extended further up into the treble, and the overall sound was significantly livelier and more dynamic. Focus was sharper, yet fine control and neutrality was retained.

## Conclusions

These two cartridges are both very expensive, yet both justify firm recommendation for those seeking sound of the very highest quality. However the *One* sounds so clearly better than the '10 that the latter now slips into its shadow.

## Test Results

<b>(MC10 in brackets)</b>	
Type, mass	low c/p m-c 7.5g
Stylus type	naked, fixed
stylus tip geometry	vdH line contact
Stylus finish/alignment	excellent (good)
Output Level (1kHz, 5cm/s)	0.43 (0.45mV)
Relative output (0dB = 1mV/cm/s)	-22.5 (-19.5)dB
Tracking ability (L, R)	80, 75 (71, 68)µm
Distortion 300Hz	
(lat + 9dB, vert + 6dB)	-48 - 32 (-54 - 35)dB
Frequency response limits 100Hz-5kHz	+1, -0.4db (-0.5)dB
Frequency response limits 30Hz-20kHz	+1, -0.4 (-0.5)dB
Stereo Separation 100Hz, 3kHz, 10kHz	27 32 23 (29 32 28)dB
Channel difference 1kHz, 10kHz	0, 0.1 (0.1, 0.05)dB
Test tracking weight, loading	1.6 (1.5)g n/a
LF resonance frequency, 11g arm	8 (7.3)Hz
Estimated compliance	18 (24)cc
Recommended arm mass/damping	6-12 (5-10)g, none
LF resonance rise, 11g arm	13dB
Typical selling price	£7cc, £599

Reprinted from *The Collection II* by Martin Colloms

Rating: Recommended

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# SOUNDWAVES

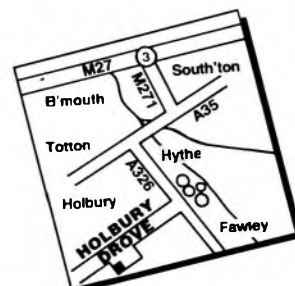
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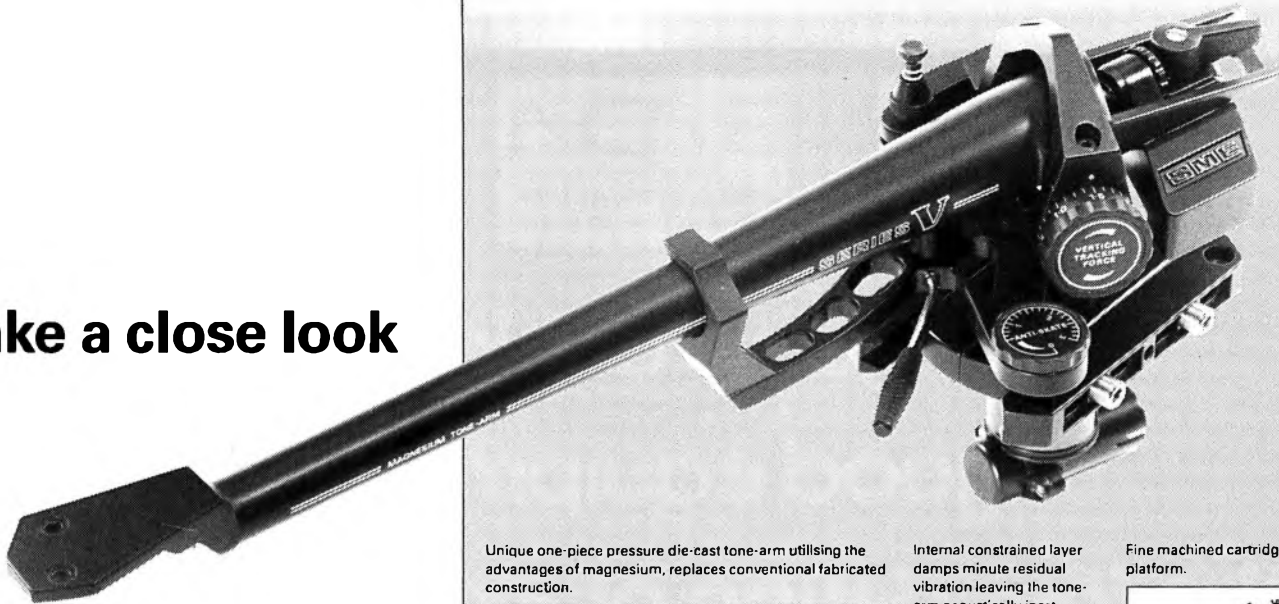
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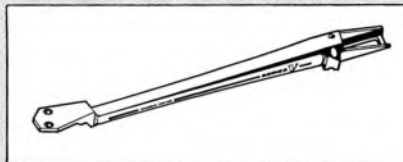


A close look at the unique Series V precision pick-up arm will reveal a wealth of design and engineering features of which only twenty are illustrated on this page. Some of these are concerned with ease and accuracy of adjustments essential for optimum cartridge performance; from others stem outstanding sonic qualities enabling the full detail and dynamics of the music to be heard, often for the first time.

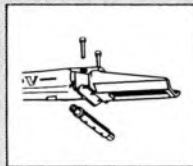
It is said that the best reproduction of LPs ranks next to the original performance for the critical home listener and the Series V used in concert with a comparable cartridge and deck will do much to reinforce this opinion.

The arm is described in greater detail in a four-page colour brochure which we shall be happy to send you on request.

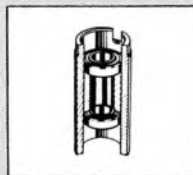
Unique one-piece pressure die-cast tone-arm utilising the advantages of magnesium, replaces conventional fabricated construction.



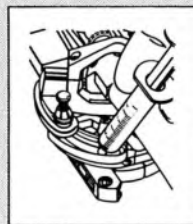
Unique assembly gives high rigidity and allows bearings to be critically adjusted before tone-arm is fitted.



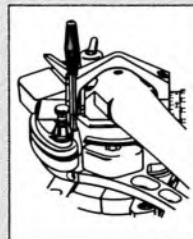
23mm diameter steel pillar, heat treated, ground and honed, carries two 17mm ABEC 7 ball races, widely spaced to resist tilt.



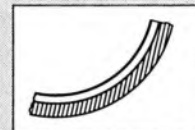
Subsonic lateral mode fluid damper can be instantly adjusted or cancelled.



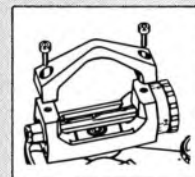
Fine adjustment of arm height (VTA).



Internal constrained layer damp minute residual vibration leaving the tone-arm acoustically inert.



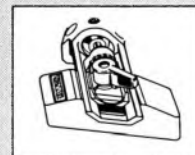
Stainless steel cross shaft, ground and thread ground. Carried in massive yoke on 10mm ABEC 7 ball races. Axis at record mean level to minimise warp-wow.



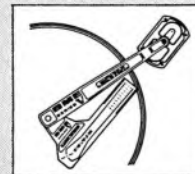
Lowering/raising control gives smooth positive action. Height of lift can be adjusted.



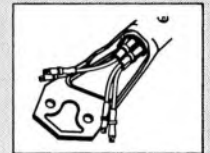
Underslung weight housing corrects centre of gravity and provides non-reflective tone-arm termination. Adjustment leadscrew journaled in twin ball races with lever clamping.



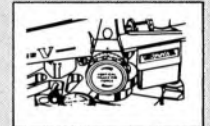
Advanced jig/template system guarantees correct positioning.



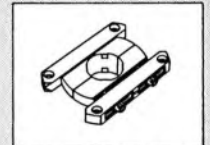
Fine machined cartridge platform.



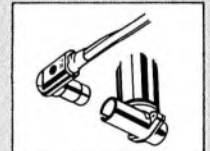
Dynamic balance - graduated vertical tracking force (VTF) control applies 0-3 grams x 0.125 gram through resonance controlled spring.



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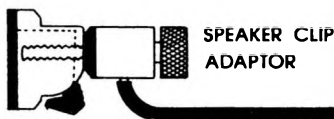
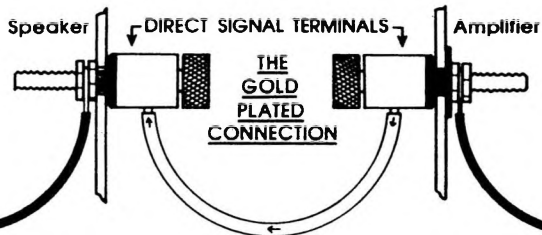
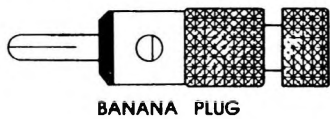
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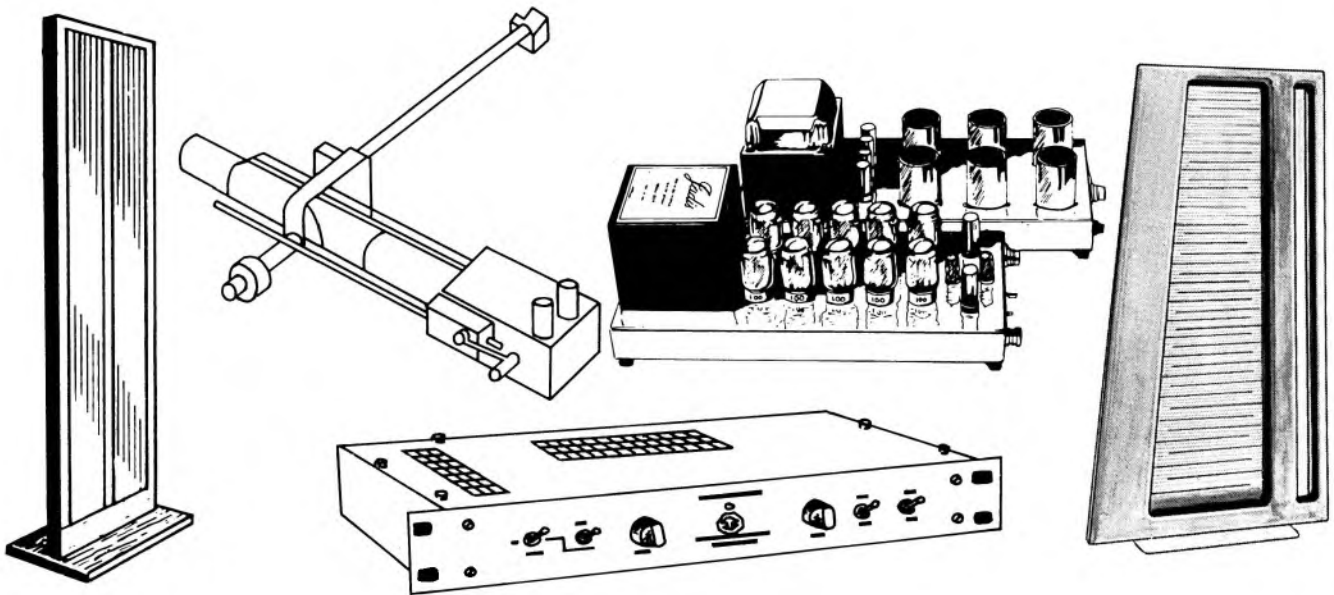
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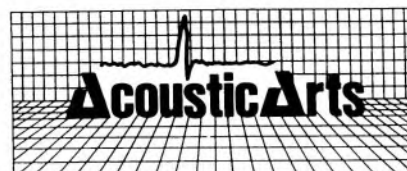
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# Audio Research SP9



This American company is well known for its high class range of valve (or as they would have it, tube) equipment. In recent years, the designers have achieved considerable success in using FETs in valve circuits, supplanting valves in a number of positions and resulting in hybrid designs. The *SP9* is an up-to-date ARC hybrid at a competitive price, even below its established *SP8 II* predecessor, itself a classic pre-amplifier design. Our *SP9* was one of the very latest production samples, already incorporating some minor revisions to improve the performance of the disc input stage, providing a recognisable change when compared with the model first delivered.

The front panel strongly resembles the *SP8*, and like that pre-amp also has an on-board power supply with a low noise toroidal transformer vertically mounted as far from the disc input as possible. As a result it offers the considerable advantage of a moving-coil cartridge compatible disc input, both in terms of sensitivity and quiet noise backgrounds – the first benefit of using FETs at the input.

Built into a decent sized box, the *SP9* has inputs for vinyl disc, CD, 'aux', tuner, and two tape machines. A good warm-up period is recommended, and it is also suggested that the reduced power consumption compared to earlier models allows the unit to be left on more or less indefinitely. True to its straight-line origins, the *SP9* has no tone controls or filters, but does include that odd facility known as 'stereo mode' including left/right/mono. All the signal connections are made *via* high quality gold-plated phono sockets.

## Lab Report

The *SP9* has three high quality regulated power supplies, one for the heaters, one for the RIAA sections, and one for the line stages. Like the previous valve circuits, the input is single-ended, this time with an FET followed by an *ECC88* valve. More FETs complete a discrete operational amplifier with series feedback RIAA equalisation. The line amplifier is similar, but omits the central FET cascode stage as less gain is required; line gain may be reduced by 6dB by desoldering an indicated resistor. Current *SP9*s incorporate a small stabilising network for the disc input as well as a more powerful toroidal

mains transformer. Loading resistors are also supplied for the dealer to set the correct matching impedance for various mm and m-c cartridges.

The 'aux/line' frequency response measured flat with a wide bandwidth, while the disc equalisation is perfectly matched between channels, and shows slight bass roll-off plus mild treble lift, shelved rather than continuously rising, which could give rise to a slight lightness of tonal balance on analogue disc.

The test programme gave very good distortion results, a traditional ARC strength, while the superb noise performance on 'mm' disc confirmed its suitability for the direct connection of most moving-coil cartridges. Overload margins were fine, input matching sensible, and the output tolerant of difficult power amplifier loadings. The fine channel matching and the generally good accuracy reflects the close tolerance components which have been used to build this product.

## Sound Quality

When first launched, this preamplifier delivered a strong performance *via* the line section, but showed some mild brightness, even a steely quality, *via* disc. However, the disc input of our latest sample sounds sweeter and better balanced, and now virtually matches the sound quality obtained with the line stage.

The rating was in the top class for its group. Traditional ARC qualities were in evidence, specifically a consistently high performance over the entire frequency range. The performance conveyed a strong sense of dynamic power and presence, yet depth, spatial perspectives and the recovery of

recorded ambience were to a high standard.

The bass was extended, crisp and clear, treble clean and detailed with little grain or edge, while the midrange certainly justified the 'high definition' description on the front panel. The disc input tonal balance was considered very slightly 'lightened', but this should not be viewed as strong criticism. Only in terms of stereo focus did the *SP9* make any significant concessions.

## Conclusions

This high quality hybrid preamplifier is fully moving-coil compatible and built to ARC's excellent standards of engineering and finish, promising a long trouble free working life and surely representing their best value product to date. The sound quality was undeniably high, coming close to the original legendary *SP11*. Essentially neutral, the *SP9* offers a well balanced performance and is easily matched to both sources and other amplifiers, ensuring confident Recommendation.

## Test Results

<b>Distortion</b>			
Total harmonic distortion, at rated power	20Hz -96dB	1kHz -97dB	20kHz -93dB
Intermodulation, 19/20kHz, rated power, aux input	> -40dB		
Intermodulation, 19/20kHz, at 0dB, disc (mm)	-72dB		
Intermodulation, 19/20kHz, at 0dB, disc (mc)	> -88dB		
<b>Noise</b>			
Disc (mm) input (HF, CCIR weighted)	-78dB		
Disc (mc) input (HF, CCIR weighted)	-63dB		
Aux/CD input (HF, CCIR weighted)	-79dB		
Residual, unweighted (volume control at min)	-86dB		
DC offset, pre-amp	left 0mV, right 0mV		
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (HF)	32dB	35dB	35dB
Disc (mc) input (HF)	52dB	54.5dB	55dB
Aux/CD input (HF)	>26dB	>26dB	>26dB
<b>Stereo separation</b>			
Disc input (mm)	98dB	65dB	40dB
Aux/CD input	98dB	65dB	40dB
Channel balance, disc, at 1kHz	0.11dB		
Volume/balance tracking	0dB	-20dB	-60dB
Aux/CD input	0dB	0dB	1.1dB
Input data	socket type	sensitivity	loading
Disc (mm) input		0.22mV	49kohms 160pF*
Disc (mc) input*		0.22mV	49ohms 160nF*
Aux/CD input		50mV	53kohms 115pF
Output, pre-amp (tape)	28V max, 0.5kohms		
Disc equalisation error, 30Hz-15kHz	+0.3dB, -0.3dB		
Size (width, height, depth)	48 x 13.8 x 31.5cm		
Typical price inc VAT	£1700		

\*Adjustable by dealer

Reprinted from issue No. 57 by Martin Colloms

Rating: Recommended

Absolute Sounds, 318 Worple Road, London SW20 8QU

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# Audio Research M100 / SP11 Mk2



**W**hile many famous brands come and go in a decade, Audio Research (ARC) have dominated the high-end for a generation, steadily building their own reputation by providing invaluable continuity, and hence acquiring a respectability that has enhanced the whole concept of high-end hi-fi – a concept with which the ARC name is virtually synonymous.

The company is about valves (in English, but these are really tubes of course), and has remained almost faithful throughout – a brief solid state flirtation back in the 'seventies was not appreciated by (even more conservative?) customers, so it was back to tubes – and on from strength to strength.

The model range is fairly stable and sensibly rationalised, starting at expensive and moving through to faintly ludicrous. However, within this apparent stability lies a policy of continual and often retro-fittable improvement, which has enabled this market leader to keep abreast of the competition.

Preamplifiers are the most common ARC products to be found in UK stores, and currently comprise the *SP9* (see previous page) and the £5,300 *SP11 II* reviewed here, the former representing the evolution of the well loved, single-box *SP8*, the latter succeeding the *SP10/11* two-box line. Sonics apart, it is difficult to distinguish the *Mark II* from the original *SP11*, as the one steadily improved over a two-year span until it suddenly decided to call itself an official *II* – and has gone on maturing ever since. The official *Mark I* to *II* upgrade can be carried out by ARC for £850.

Though there are more models to choose from (to provide a logical range of power outputs), the power amplifiers are similarly rationally ordered, with alternative stereo

and monoblok models available on the various chassis'. The £5,700/pair *M100s* sit around the middle of the complete price span, match the *11 II* very logically, and probably have ample power for most UK applications. In this sense the *M100* monoblok can be seen as a logical development of the fine *D115 II* stereo power amplifier; a *D115* frame becomes a mono power amp, with all resources devoted to one channel.

Such an amplifier would have certain inherent advantages anyway, but ARC have fitted high current output drivers, and the output biasing scheme gives easier setting up. DC coupling eliminates capacitors from earlier stages, augmented by an additional servo amplifier to stabilise the correct operating points, dynamically and statically. ARC's balanced cross-coupled circuit technology includes special coupling for the output tubes to both primary and secondaries of the superb output transformers.

Just as this issue was going to press, ARC made an important new product announcement from its Minneapolis, Minnesota US base. A new *D125* stereo power amplifier will offer more power than the *M100*, but sell at £1,200 less. See *Update* for further information on *D125*, but a brief explanation is needed to put the new model in context with the range as a whole. The £4,575 *D125* – expected UK availability not before late summer – replaces neither £3,200 *D115* nor £5,700 *M100*. Neither is it related to either, being the D series (dual mono, single chassis) version of the £10,000 *M300* high power monoblok design. The *D125* and *M300* offer what is really just an alternative compromise, achieving higher power outputs but risking wrath and rejection from the more obsessive valve purist. Absolute Sounds principal

Ricardo Franassovici comments appositely: "Do you prefer blondes or brunettes? I believe an ideal world needs both!"

The *SP11 II* preamplifier is a two-box affair, the second box containing a solid state power supply. Comprehensive inputs include a disc input suitable for moving-coil cartridges of healthy output; loadings are conveniently selected by a front panel switch. No tone controls are fitted, signal paths are wideband, and a bypass switch can route the disc signal direct to the output stage, avoiding the balance control and mono/stereo selector. Absolute phase switching is also available.

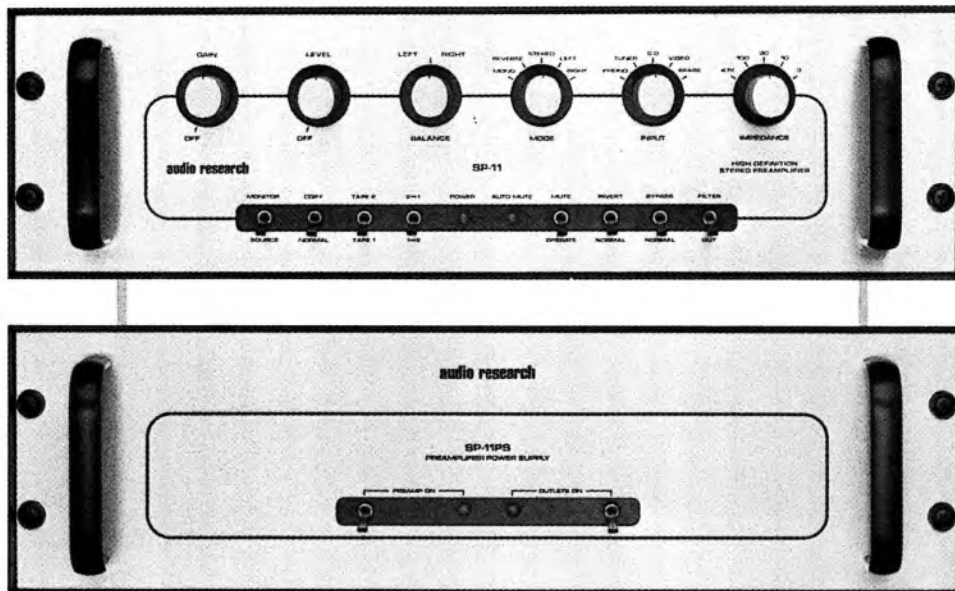
Preamplifier circuitry includes advanced cascode configurations combining low noise FETs and valves at the input. Good channel separation is assisted by separated internal design and extensive regulated supplies to isolate the channels and separate stages. The output is capable of driving quite long interconnect cables to the power amplifier – up to 15 metres if required.

## Sound Quality

These are both truly exceptional products. They work superbly as a pair, effortlessly delivering dynamic and musical soundstages.

The new *SP11 II* pre-amp provides still further improvement on the already exceptional *SP11*. It is clearly one of the world's finest, capable of superbly focused, stable stereo images, and textured and virtually grainless sonics. Improvements over its predecessor are difficult to nail down, being generalised throughout the subjective performance, yet specific enough in terms of the actual advance to merit the *Mark II* status. In a nutshell, ARC have managed to retain the





essentially involving musical qualities for which they're regarded, while smoothing and polishing the sound and sharpening up the definition and focus.

Essentially neutral with only mild coloration, all areas of the audible frequency range are reproduced very well. A particular strength concerns subjective dynamics, where the *SP11 II* draws and holds the attention by maintaining the 'drive' and 'life' in the programme. This proved true of both classical and popular material over a wide range of programme quality.

The *M100* power amplifier is one of those great products that can genuinely expand one's horizons and point to the way ahead. One of the finest amplifiers I have ever had the pleasure to hear, tonality is extraordinarily rich, the treble devoid of grain and false projection, and the bass is immensely deep and powerful – implying that the loudspeakers might have been set in a concrete sub-floor.

Against this authoritatively musical character, the amplifier displays a sparkling, lively transient performance with thrilling dynamic impact. It is highly transparent over a very wide frequency range, and produces excellent subjective depth in a stereo image which is huge in scale, yet remains superbly stable and focused.

## Lab Report

We experienced no headroom problems with the *SP11 II*, since it can produce more than 80V output from a moderate 240ohm output impedance. At nominal 0.5V outputs, with an IHF standard input the harmonic and intermodulation distortion figures are very good over the whole frequency range, though some increase in intermodulation is noted *via* disc.

Noise levels ref. moving magnet levels are very good for the flexible and sensitive disc input, though when used with the appropriate loading as a moving-coil input they are just satisfactory. This is a technical qualification only, because many owners in practice use Koetsus and other similar cartridges with fine results.

Figures for input overload relate to two gain conditions, set to 'high' for moving-coil and 'low' for moving-magnet. Overload margins are good for both conditions, while the reducing margin at high frequencies is not uncommon with valve pre-amps. Channel separation varied depending on whether crosstalk was measured right on left or left on right, and is fairly unimpressive at high frequencies. The RIAA equalisation is highly accurate.

The *M100* power amplifier comfortably met its 20dBW specification when correctly matched into an 8ohm load. Output impedance is a moderate 0.46ohms, and a good power bandwidth is delivered provided that the appropriate load tap is used. Current delivery is pretty good for a valve amplifier which consequently proved surprisingly load tolerant. Distortions are satisfactory at full power, and improve markedly at more realistic, lower levels. For example, by 0dBW, 1 watt, the 19/20kHz intermodulation distortion has fallen to -72.3dB, compared with -47.6dB at full level.

Noise levels are satisfactory and the frequency response was very wide, extending from below 0.5Hz to 33.5kHz, -0.5dB. The audio range is almost perfectly flat though some variation may be imposed on the output impedance by speaker loading differences. The power modulation test delivered a good result, producing a graph dominated by pure

harmonics of the input frequency.

## Conclusions

The 1988 vintage ARC product continues to show steady improvement over earlier samples, with or without a formal change in the model name. By this device the company continues to deliver its distinctive – if not definitive – version of the state of the art, combining the archetypal relaxed and musically inviting 'valve' sound with dramatic dynamics and steadily advancing resolution.

## Test Results

	stereo pre- plus monoblok power amplifier		
Rated power into 8ohms, maker's spec			100W (=20dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	16.6dBW	21.1dBW	20.4dBW
Both channels, 4ohm load	-dBW	17.6dBW	-dBW
One channel, 2ohms, pulsed	-dBW	16dBW	-dBW
Instantaneous peak current		+12A	-12A
Total harmonic distortion, at rated power, aux input	20Hz	1kHz	20kHz
	-47.9dB	-52dB	-48.8dB
Noise			
Disc (mm) input (1HF, CCIR weighted)			-80dB
Disc (mc) input (1HF, CCIR weighted)			-54dB
Aux/CD input (1HF, CCIR weighted)			-89dB
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (1HF)	25dB	25dB	31dB
Disc (mc) input (1HF)	45dB	45dB	51dB
Aux/CD input (1HF)	>20dB	>20dB	>20dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.09mV	47kohms 500pF
Disc (mc) input	Phono	0.09mV	100ohms 150nF
Aux input	Phono	29mV	4.7kohms 50pF
Power amp	Phono	69.5mV	100kohms —
Output, pre-amp (tape)			94.8V max, 240ohms
Disc equalisation error, 30Hz-15kHz			+0.03dB, -0.04dB
Size (width, height, depth)			48 x 14 x 34cm*
Typical price inc VAT			£5300 + £5700/pair
First reviewed: <i>The Collection 1986 and 1987</i>			
Rating: Recommended			
Absolute Sounds Ltd., 318 Warple Road, London SW20 8QU.			
Tel: (01) 947 5047.			

# Denon POA-6600



The Japanese superamp could be considered an endangered species in the UK environment, judging by the rarity with which one encounters its spoor while trekking the specialist hi-fi shops of our land. One remembers big Technics and Sansui models of old, but in more recent times only the Marantz monobloks come to mind as making any real impact on the market. But it's an unstated assumption up at Hayden Labs that anything Marantz can do, Denon can do better; now the brand has become so popular in so many areas, it's a sensible opportunity to bring in some extra prestige, not to mention muscle.

The POA6600 is a chunky and solid monoblok power amplifier that sells at £1,000 the pair, give or take a fiver, and will only be available through a limited number of outlets or to order. The brochure also shows sight of the partnering £850 DAP5500 digital/analogue preamplifier, but this was not submitted for review (see speculation inserted between lines). One implied digital system configuration places each 6600 power amplifier alongside its respective loudspeaker, connected *via* balanced line and with mains remote switching umbilical from the 5500, itself the receiver of direct digital data *via* optical coupling from CD and DAT players.

The technology bristles with buzzwords to describe unique circuit topologies and devices, such as high slew rate power transistors with avoidance of negative feedback, plus a high impedance load from driver to output stage to ensure immunity from loudspeaker load changes. A large toroid transformer makes a major contribution to the 16kg all-up weight, and is backed by 40,000 $\mu$ F of smoothing capacitors. Specified power output is a massive 250/450W into 8/4ohms, delivered through chunky binding posts, while inputs are phono unbalanced or Canon balanced. The front panel is tolerably tastefully decorated with status indicators, loud-

peaker, power and input switching, and an input level control. Build quality is first rate throughout.

## Lab Report

Given the specs, the weight, the build and the technology, measured power output is predictably devastating, and virtually independent of frequency or load –  $\pm 1$ dBW limits cover single/dual channel drive, 20Hz-20kHz on 4 and 8ohms, and 2ohm 1kHz burst power too. A maximum current peak of +40/-45amps before clipping is further evidence of superb load tolerance, delivered from a negligible output impedance.

Distortions are all vanishingly small too, with no crossover artefacts, while low inherent noise figures and fairly high input sensitivity suggests that one could get away with direct CD player drive. The input impedance varies according to the level setting, from 20-50kohms and 200pF-1nF. There are no mains-related components on the output even when working the power supply hard, the overall bandwidth is very wide ( $-3$ dB, 0.5Hz-200kHz), and DC offset is negligible.

## Sound Quality

Despite selling below the magic £1,000 mark, the 6600 still managed an excellent overall rating for sound quality. Very powerful, and quite difficult to criticise, there was a degree of hardening when operating at high levels, but the sound when cruising – or even just sitting by the French windows smelling early summer blossoms wafting in on a balmy breeze – is very refined. The deep and wide stereo soundstage showed surprising transparency and good 'monoblok' stability.

Though very powerful and extended, the

bass did lack a little 'slam' and 'life' compared with the best. Sweet, smooth and articulate, the midband sounds detailed and clear, if a shade 'lean' tonally. The treble is just a little lazy and 'lispy' – a slight sheening noticeable on sibilants – but smooth with it and generally inviting.

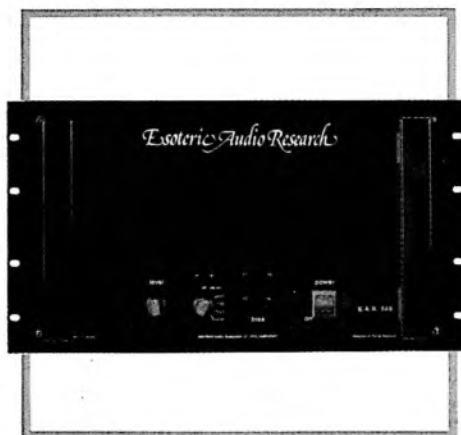
## Conclusions

Denon's first attempt at the exotic amplifier market for some years looks as impressive in relative value for money terms as their more popularly priced hi-fi separates. Delivering high quality sound in abundance, solid engineering expertise and content clearly compensate for any compromising of purist audiophile principles, and this Recommended model is also an attractively practical package. Wonder what the pre-amp sounds like...

## Test Results

Power output		monoblok power amplifier	
Rated power into 8ohms, maker's spec		250W (= 24dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	24.9dBW	25dBW	24.7dBW
One channel, 4ohm load	23.9dBW	24dBW	23.8dBW
One channel, 2ohms, pulsed	-dBW	24dBW	-dBW
Instantaneous peak current		+40A	-45A
Distortion			
Total harmonic distortion, at rated power	20Hz	1kHz	20kHz
	-84dB	-87dB	-77dB
Intermodulation, 19/20kHz, rated power			
			-100dB
Intermodulation, 19/20kHz, at 0dBW			
			-104dB
Noise 'A' wtd			
			-92dB (0dBW), -116 (full power)
DC output offset			
			0mV
Output impedance (damp)	0.11ohm	0.11ohm	0.17ohm
Input data			
	socket type	sensitivity	loading
Power amp (to clip)	phono/cannon	1.18mV	20-50kohms 2000pF
			1nF
Size (width, height, depth)			31 x 45.6 x 20.7cm
Typical price inc VAT			£1000 (pair)
Reviewed by Martin Colloms			
Rating: Recommended			
Hayden Laboratories Ltd., Hayden House, Chiltern Hill, Chalfont St Peter, Bucks. Tel: (0753) 888447			

# E.A.R. 549



Appearing in *Hi-Fi Choice* for the very first time, Esoteric Audio Research (E.A.R.) has in fact been around for a number of years, making more than usually distinctive high performance valve amplifiers which have established their own loyal following. Proprietor Tim de Paravicini has become something of a legend in his own right, with his erstwhile role as design consultant to other manufacturers (eg Musical Fidelity) and certain sectors of the professional audio world, but the range of four E.A.R. models and related activities have always occupied a fair share of his undoubted energy.

The £3,000/pair 549 reviewed here is the top of the line – a substantial (28kg) and exceedingly powerful (200W) monoblock valve power amplifier whose design differs from the norm in several interesting ways. Instead of building up from a baseplate chassis and then wrapping the whole top section in a metal grille to keep the flies off, the 549's chassis becomes the fascia, designed primarily for rack mounting and complete with carrying handles, leaving the valves and transformers sticking out towards the rear rather than sitting on top.

In other words, take a normal valve power amplifier, tip it up onto its rear edge and gild or blacken the base (for base now read fascia). Then add the carrying handles, flord graphics, output level, overload LEDs, and various devices for checking and resetting output valve bias (every three months is recommended).

The choice of four *6L509* output valves, originally designed for powering early colour TV chassis, is also rather unorthodox, though it does at least explain the nomenclature. The special wide-band Paravicini output transformers promise excellent results at the audio band extremes. The whole unit is properly engineered, well built and nicely finished, while the Pro overtones of the styling somehow manage to convey a determi-

nedly purposeful and solid air.

## Lab Report

The 549 successfully torpedoed stereotyping in the lab too. Having measured dozens of valve power amplifiers over the years, a pattern has emerged of limited power bandwidth and current delivery, plus significantly higher distortion levels than transistorised units. But given the raw data with no further information, one might have guessed this was a solid state design; the only real clue lies in the typically thermionic/transformer coupled output impedance which limits the damping factor.

Output power easily beat the 23dBW (200W) specification and demonstrates a fine, extended power bandwidth, good load tolerance and stability plus exceptional current delivery (17amps on the 8ohm tap, 23amps on the 4ohm terminals). Harmonic distortion measures fine at full level and still better at lower output. IM distortion was quite modest even at high frequencies, and overall distortion seemed quite consistent across the frequency range. The power supply modulation spectrogram (not shown) indicates fine mains rejection.

## Sound Quality

Though this amplifier does indeed sound very good, under our test conditions it falls a little short of expectations that it would combine the best features of valve and solid state stereotypes. Very high sound levels are delivered with bass extension, power and drive which is exceptional for a thermionic design, but an overall sound which was considered, perhaps perversely, a shade 'transistorised' in character.

The midband shows fine solidity, but a hint of 'nasal' coloration stood in the way of full transparency. Treble content sounds tidy and well controlled, but subtle harmonic shading seemed slightly lacking. Dynamics again sounded just a little over-controlled – more was promised than was actually delivered – though stereo soundstages had plenty of scale, plus reasonably good focus and depth.

## Conclusions

There have been plenty of transistor amplifiers over the years to claim a 'valve' sound, but here we find a valve design that in a number of respects resembles a good transistor design – and virtually matches solid state lab performance. While presenting a valid and interesting alternative to either, it also tends to fall between the two stools subjectively, though the exceptional power delivery sets a standard which may cause other valve amplifier designers to weep.

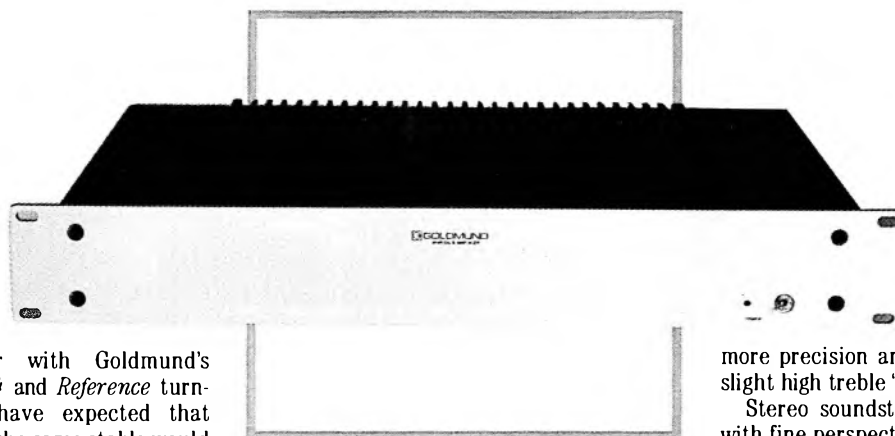
## Test Results

Power output	monoblok power amplifier		
Rated power into 8ohms, maker's spec	200W (=23dBW)		
Power output/8ohm tap	20Hz	1kHz	20kHz
One channel, 8ohm load	23.9dBW	24.4dBW	24.2dBW
One channel, 4ohm load	19.8dBW	20.9dBW	21dBW
One channel, 2ohms, pulsed	-dBW	17dBW	-dBW
Instantaneous peak current	±17A	(4ohm ±23A)	
Distortion			
Total harmonic distortion, at rated power	20Hz	1kHz	20kHz
	-58dB	-68dB	-60dB
Intermodulation, 19/20kHz, rated power	-62dB		
Intermodulation, 19/20kHz, at 0dBW	-71dB		
Noise 'A' wtd	-90dB (0dBW)	-110 (rated power)	
DC output offset	0mV		
Output impedance (damp)	0.28ohm	0.3ohm	0.62ohm
Input data	socket type	sensitivity	loading
Power amp (to clip)	phono	1.9V	2.5kchms — pF
Size (width, height, depth)	(2x) 48.3 x 26.7 x 25.4cm		
Typical price inc VAT	£3000 (pair)		

Reviewed by Martin Colloms

E.A.R. Ltd., Unit 11, Stukeley Meadows Ind. Est., Huntingdon, Cambs. Tel: (0480) 53791.

# Goldmund Mimesis 6



Anyone familiar with Goldmund's extravagant *ST4* and *Reference* turntables might have expected that power amplifiers from the same stable would send their owners straight down to the local surgical supplies for the latest line in trusses. Quite the contrary. The more expensive (£5,000) *Mimesis 3* is simply the slimmest, most *bijou* power amp around, yet reportedly delivers a punch which ranks it alongside far bulkier Krell and Audio Research models.

The £2,500 *Mimesis 6* reviewed here is the economy version (built double mono inside, around a common transformer). It is a little less slim than the *Mimesis 3* if still small enough to be overlooked in a busy rack, and shows some economies in build and presentation: the transformer which determines the case height is a more conventional toroid; the front panel nameplate is screened rather than engraved; and the heatsinks are stuck on the back panel again in the conventional manner, instead of being nicely integrated along the sides as part of the styling. And the status lights have been omitted, which some will no doubt regard as a blessing.

Under the pretty skin, Goldmund's reputation for build quality is maintained, though the *6* does show some economies compared with the *3* – less elaborate secondary power supply regulation, for example, and smaller main power supply components despite the higher case. The complementary class A/B output uses paralleled pairs of metal-cased Hitachi V-FETs, and the double-mono design operates down to a genuine DC. Elaborate protection circuitry does not prejudice the sound quality, and could help save tweeters if a fault develops somewhere in the system, but it did prevent some of the lab measurements from being taken (high frequency test signals at high power triggered protection).

For the rest, well what can you say about a power amplifier anyway? Since it runs quite cool, a 30 minute or so warm-up prior to listening is worthwhile. It has top quality WBT phono inputs, binding post/socket loudspeaker terminals and a power lead. And

that's your lot. We keep hearing about an exciting pre-amp from the same stable, but its always due to arrive next week – just the stuff of which future perfect legends are made, in fact.

## Lab Report

Rated at 80W/channel, the *Mimesis 6* actually delivered nearer 100, fully maintained at low frequencies. Our power measurements were rendered difficult by the enthusiasm of the protection circuitry, but all the evidence from reading between the various lines suggest a usefully balanced delivery of more than adequate power, capable of handling rather than enthusing over lower impedance loads, but with a more than adequate  $\pm 23A$  current capability before distortion.

Harmonic and intermodulation distortions are uniformly excellent, channel separation and noise levels very good, response flat from DC to 0.5MHz,  $-3dB$ . The input impedance is an 'easy' 50kohms, though 1.5V is required for full drive. DC offset is negligible, and the power supply modulation test showed little evidence of mains-related harmonic breakthrough.

## Sound Quality

Given the obligatory warm-up, the *Mimesis 6* delivered the characteristically musical Goldmund sound; neutral and well balanced, it is delicate and relaxed, if a little lacking in forcefulness. The very good bass can deliver a solid 'thwack' when required and shows fine pace, extension and power, if lacking the 'slam' and dynamic authority of some larger models. The classy treble was likeably free of hardness, but might have delivered a little

more precision and definition in place of a slight high treble 'haze'.

Stereo soundstages are wide and stable with fine perspectives, if not totally transparent. The slightly muted dynamics could add a touch of blandness to the proceedings if partnered with particularly smooth loudspeakers systems, and if anything the sound did err a little on the side of politeness, but gentleness and dependability are characteristics with wide appeal beyond the heavy metal mob.

## Conclusions

Lacking either glowing bottles and/or the ability to double as an effective space heater does tend to place the *Mimesis 6* in the ranks of logical rather than emotional purchases, which is no guarantee of success in high end hi-fi. But it is above all an amplifier for the discriminating user who wants the best, but without the hype and inconvenience the 'best' frequently bring in their wake. Comparable quality may be available elsewhere for less money, but not necessarily the same degree of fit and forget practicality, longevity and sheer goddamn discretion. One for those who prefer not to flaunt it.

## Test Results

Power output		stereo power amplifier	
Rated power into 8ohms, maker's spec		80W (= 19dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	19.5dBW	19.4dBW	*dBW
Both channels, 4ohm load	18.1dBW	18dBW	*dBW
One channel, 2ohms, pulsed	-dBW	*dBW	-dBW
Instantaneous peak current		+23A	-23A
Distortion			
Total harmonic distortion, at rated power	20Hz	1kHz	20kHz
	-84dB	-82dB	*dB
Intermodulation, 19/20kHz, rated power			
Intermodulation, 19/20kHz, at 0dBW			-91dB
Noise	-94dB (0dBW),	-108dB (rated power)	
DC output offset			
Stereo separation	133dB	111/103dB	100/75dB
Output impedance (damp)	0.07ohm	0.07ohm	0.12ohm
Channel balance			0.01dB
Input data			
Power amp (to clip)	socket type	sensitivity	loading
	phonos	1.5V	50kohms
Size (width, height, depth)			48.3x6.7x35cm
Typical price inc VAT			£2500

Reviewed by Martin Colloms  
Absolute Sounds, 318 Worple Road, London SW20 8QU.  
Tel: (01) 947 5047.

# Harman Kardon PM665

The most expensive amplifier in the HK range, the *PM665Vxi* is a typically massive Japanese-built integrated amplifier, weighing some 14kg. Although packed with features, clear labelling and sensible lay-out proves someone has taken care with the ergonomics – no double takes were necessary to decipher any functions. Bass and treble controls can be defeated, and variable turnover frequencies enhance their flexibility too. High cut and subsonic filters accompany loudness, mono and mute (20dB cut). The pre- and power amplifier connection may be switched out, so the individual sections may be used separately with other units or with some signal processing introduced into the line. Rotary input selectors cater for A/V (audio video), aux, tuner, CD, and phono. The latter has a separate push-button to select moving magnet or moving-coil sensitivities, and several different capacitance loads for the moving magnet input may be switched from the front panel.

The back panel has phono sockets for all audio and video applications, plus two sets of speaker binding posts. Two separate inputs cater for moving coil or moving magnet cartridges, and there is also provision for three tape recorders and routing for video signals. Switches select matching for 4ohm or 8ohm loudspeaker loads: on the 4ohm setting the supply voltage to the power amplifier is reduced to prevent too much power being taken by low impedance loads.

The 665 has a high current capability provided from two large power transformers, one for each channel. The power amplifier is a double mono design with separate bridge rectifiers supplying 2 x 8200µF capacitors per channel. Typically multi-board in construction, these are filled with circuits built from discrete components.

## Lab Report

Claimed power output is easily met across a good power bandwidth into 8ohms, and this falls by only a modest 1.5dB with both channels driven into 4ohm loads. Pulsed output is well maintained into 2ohms, and peak current capability measures ±44A, with still more available with some waveform break up. Total harmonic distortion is low and the intermodulation distortion results are generally good – somewhat poorer on the m-c setting, but still perfectly acceptable. Noise figures are poorer than expected, especially those for the power amp section, and the DC offset is a little high on one channel.

Overload margins are adequate on all inputs, and sensitivity and loadings have fairly standard values on all inputs which should prove well matched to the majority of



equipment. Channel separation is reasonable from low frequencies through the mid-band, but is unexceptional at high frequencies. Output impedance is low and channel balance and volume balance tracking good. Frequency response measurements are virtually identical on all inputs; flat over most of the audio bandwidth with some mild bass and ultrasonic rolloff. Channel deviation is kept within reasonable bounds in the RIAA stage. The power spectrogram reveals a little hum breakthrough, but at fairly low levels.

## Sound Quality

After a long warm up to stabilise operating conditions, the 665Vxi was put through its sonic paces, demonstrating the feel and scale of a big amp that large reserves of power bring with CD sources. The soundstage is more expansive than many, but by hinting that there could be more it failed to deliver full promise. There is a fair impression of depth, width and focus, which is in keeping with the price.

Tried on a variety of loudspeakers, the 665 was never in trouble, even with fairly difficult loads, managing to drive even insensitive speakers to high levels. Driven hard, there is some increased harshness and brittleness in the treble, but grip and control are retained. Mid tonal quality is a mite sharp and hard, but the bass is firm and extended, and the treble tidy if not particularly detailed.

It's not often that an integrated amplifier is preferred on the disc input, but the 665Vxi gained a higher score on m-c disc than via CD, while sounding similar in overall balance. The bass was well liked, differentiating individual strands within bass lines with fine clarity and articulation. The mid-

band sounds smooth and relaxed, with decent clarity but some moderation of dynamics. The treble has the same basic character as CD. Images were well focused within a soundstage of above average width and depth, but the overall effect was not quite open enough.

The sound improved still further on the moving magnet input, giving a consistently competent, powerful and easy presentation. Compared to the m-c input there was a mild improvement in dynamics and life.

## Conclusions

Harman Kardon's *PM665Vxi* is a big amplifier in every way, and is one of the best of its type. High current capability means that even difficult speakers (or indeed more than one pair) should be handled easily, and the multi-function switching allows it to form the centre of versatile audio/video home entertainment system. Sound quality lags some way behind the best of the British separates at this price, but you do get a lot of amplifier for the money.

## Test Results

Power output			150W (=22dBW)
Rated power into 8ohms, maker's spec	20Hz	1kHz	20kHz
Power output	22.9dBW	22.9dBW	22.8dBW
One channel, 8ohm load	21.4dBW	21.6dBW	21.5dBW
Both channels, 4ohm load	-dBW	22dBW	-dBW
One channel, 2ohms, pulsed		+42A	-44A
Instantaneous peak current			
Distortion	20Hz	1kHz	20kHz
Total harmonic distortion, at rated power, aux/CD in.	-76dB	-85dB	-83dB
Intermodulation, 19/20kHz, rated power, aux input			-76dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			-70dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			-48dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			-68dB
Disc (mc) input (IHF, CCIR weighted)			-66dB
Aux/CD input (IHF, CCIR weighted)			-70dB
Residual, unweighted (volume control at min)			-73dB
DC output offset		left 52mV, right 11mV	
DC offset, pre-amp		left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	34.3dB	33.8dB	33.7dB
Disc (mc) input (IHF)*	30.4dB	30.1dB	29.7dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
Stereo separation			
Disc input (mm)	81dB	75dB	44dB
Aux/CD input	81dB	75dB	50dB
Output impedance (damp)	0.16ohm	0.16ohm	0.18ohm
Channel balance, disc, at 1kHz			0.34dB
Volume/balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.1dB	0.23dB	0.1dB
Input data	socket type	sensitivity	loading
Disc (mm) input		0.21mV	46kohms 210pF
Disc (mc) input*		0.014mV	62ohms —nF
Aux/CD input		12.6mV	22kohms 560pF
Power amp		75mV	25kohms 360pF
Output, pre-amp (tape)			14.5V max, 1kohms
Disc equalisation error, 30Hz-15kHz			+0dB, -0.7dB
Size (width, height, depth)			44x13.5x39cm
Typical price inc VAT			£699

Reviewed by Chris Bryant

Harman (Audio) UK Ltd., Mill Street, Slough, Berks SL2 5DD.  
Tel: (0753) 76911.

# Jadis JA30 / JP30

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**H**igh standards of metalwork and presentation have become the norm in today's market for exotic hi-fi. It's all to do with trying to create product confidence above and beyond simple sonic excellence, in order to at least attempt to justify often simply outrageous prices. Yet even in exalted company, Jadis equipment somehow manages to look uniquely stylish and utterly distinguished, if determinedly nostalgic.

It's made in France, uses valves throughout, and is clearly proud of both these facts. Looking equally at home in antique or hi-fi shops, those who like automobile analogies can rest assured that if Ettore Bugatti had conceived an in-car entertainment system for the Royale, it would have looked like a Jadis.

The UK agent is Absolute Sounds, which places Jadis alongside (though scarcely in direct competition with) some of the best names in high-end amplification, notably Audio Research, Krell and Goldmund. The *JP/JA 30* pre- and power amplifiers reviewed here are the latest and cheapest in the line – at a package price that approaches £7,000! The top stereo pre-/power package hits 19 grand, so this is clearly a brand for those who do not need to ask the price.

Configured as a four-box system, with monoblok power amplifiers and pre-amp with separate supply, finish is a delightful blend of gold-plating, black enamel, stainless steel and chrome, with top quality finish, graphics etc. Finish apart, the power amplifier layout is distinctly reminiscent of the classic Quad II design, a timeless creation still widely used by enthusiasts today.

The *JP30* pre-amp (kindly loaned by Acoustic Arts of Watford) is deliciously plain and simple, only the cheap toggle switches

letting down the feel somewhat. One important point for UK users is that the vinyl disc input is only sensitive enough for direct connection of high output cartridges – low output m-cs will need the added compromise of some form of step-up device. A minor safety point concerns the power supply umbilical, which can leave high voltage for some hours on the exposed pins of the pre-amp power input socket if the units are separated soon after switch off.

Built on a non-ferrous chassis, the circuitry adopts a classic all-triode configuration, with shared stereo double-triode tubes using transistor-stabilised HT and heater supplies. The carefully selected components used throughout include polypropylene capacitors, special wire-wound and film type resistors, the very best dielectric switches, a superior grade of Alps potentiometers, and (*mais bien sur*) gold-plated phono sockets. Some twelve special Jadis 200 $\mu$ F electrolytics provide on-board decoupling for every stage. Provision is made for vinyl disc (mm), tuner and CD, plus a brace of aux inputs, with source/tape monitoring, volume and balance completing the feature count.

The *JA 30* power amplifier, rated at 30W class A uses two *KT88* valves in classic push-pull configuration, with *ECC83* differential drivers (an unusual choice since this is a low current type) and *ECC82* differential input. Bias circuitry is actually solid state (the rule rather than the exception these days), but painstaking attention to design detail leaves just one (split phase) capacitor in the signal path – a 1,600V rated 0.47 $\mu$ F polypropylene type. Fine components are again used throughout, particularly in the careful choice of resistors. The power supply has massive reservoirs, and generous component

ratings are used throughout. However, the glass envelopes of the *88*s are placed too close together, actually touching on our samples.

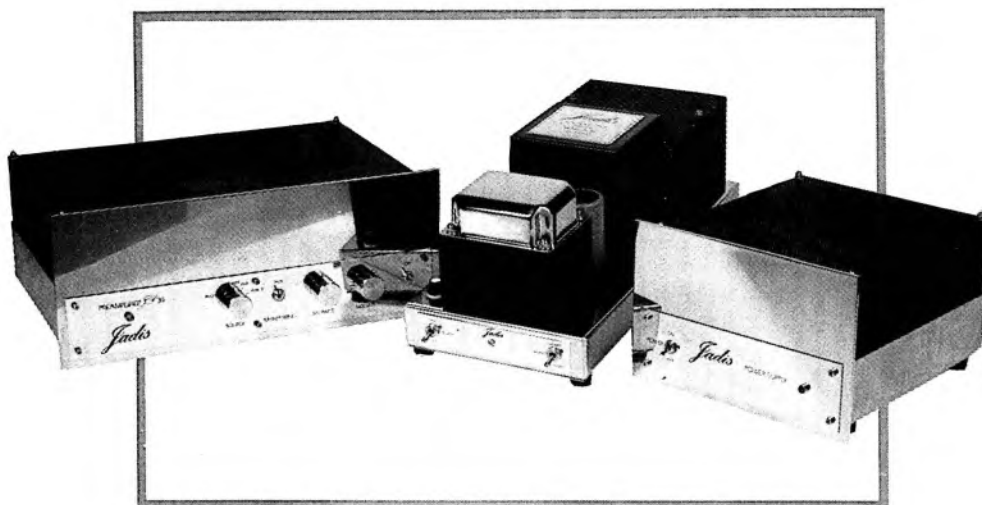
## Lab Report

The lab testing reveals the characteristic limitations of most thermionic amplifiers. No parameters even approach the current state of the art, though most just about pass muster nonetheless. Pre-amp distortion was pretty low at higher outputs, but poorer at lower levels on the disc input. Disc overload margins and noise performance are just satisfactory, while the frequency response shows a significant and certainly audible low frequency rolloff plus some HF boost. Fortunately channel balance was very close, and line input response is very flat.

Nevertheless, considering the price level, one might feel that some further tightening up is due. The volume control shows a balance shift of 0.8dB across a 60dB dynamic range, and the channel balance differed 0.4dB at 1kHz, even though good tracking was maintained across the RIAA equalisation curve – neither is a serious flaw in any sense, but both are mildly irritating under these circumstances.

The disc intermodulation spectrogram (not shown) illustrates the expected 1kHz difference signal and is fairly clean elsewhere in-band, but an odd low level (–68dB) peak is seen at 24kHz, perhaps associated with the HF rise seen in the frequency response. Another graph based on a single 1kHz tone shows a remarkably clean spectrum noise floor.

The significant bass rolloff on the disc input is perhaps the most serious technical weakness, and could well be due to insuffi-



cient loop gain to complete the full RIAA EQ. As is often the case with valve pre-amps, particularly those based on 'classic' circuit topologies, the JP30 does have to struggle a bit to achieve sufficient dynamic range across the full audio bandwidth, hampered by borderline gain and noise performance.

The power amplifier just failed to meet the 30W spec, and our 1% distortion criterion severely limited power delivery at low and high frequencies. That said, delivery into low impedances was competent enough, from a higher than usual source impedance. Distortion results were poor at rated power, but fine at lower levels. Signal/noise is fine, input sensitivity fairly high, and bandwidth constrained at high frequencies to 25kHz, -3dB. Some 50Hz hum breakthrough was seen on the power modulation spectrogram (not reproduced).

Results like these, when contrasted with the findings of the listening tests, throw up question marks against the whole business of amplifier measured performance. A 1 per cent distortion criterion for power measurements looks generous in the context of the capabilities of even a half decent transistor power amplifier, where 0.1 per cent is quite normal and the state of the art comfortably betters 0.01 per cent and is going for the next zero - low feedback transformer-coupled valve designs can never hope to approach figures that low.

But as the literature has confirmed again and again, harmonic distortion is sonically pretty innocuous, particularly that with high content of the lower harmonics (2nd, 3rd, 4th etc), and what the amplifier doesn't add, the loudspeaker surely will. THD measurement is therefore primarily a technique to explore the limits of an amplifier's perform-

ance envelope; useful with higher feedback transistor designs, its discrimination is poor with such as the Jadis. What matters more is how loud an amplifier goes before it hurts, and here the Jadis acquits itself with some honour.

### Sound Quality

Perversely in view of the indifferent lab performance, sound quality is well up in the top class, the midband in particular possessing a lucid transparency that is exceptionally seductive. This Jadis quartet is a fine example of the essential stereotype valve sound, pre- and power matching each other for quality and complementing each other well - the 'boppy' bass of the JP helping 'speed up' the low frequencies of the JA.

Again in spite of the measurements, it goes surprisingly loud, yet deftly avoids any aggression or glare. Though some alternatives might provide enhanced resolution at the soundstage and bandwidth extremes, the unforced naturalness of a euphonically creamy-textured midband, plus convincing unexaggerated dynamics ensure a place near the top of the tree.

### Conclusions

Hampered by a hefty \$7,000 price tag, indifferent lab performance and incompatibility with low output moving-coil cartridges (step-up/transformer needed), not to mention a reputation that perhaps led us to expect just slightly more spectacular sonics, this Jadis combination nevertheless deserves Recommendation simply because of its remarkable midrange, not to mention amongst the most attractive aesthetics and finish in the business.

Ultimately, it all comes down to soul.

### Test Results

Power output		stereo pre- and monoblok power amplifier	
Rated power into 8ohms, maker's spec		30W (= 14.8dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	8dBW	14dBW	10dBW
One channel, 4ohm load	7.7dBW	12dBW	8.2dBW
One channel, 2ohms, pulsed	-dBW	11dBW	-dBW
Instantaneous peak current		+5.8A	-6A
Distortion			
Total harmonic distortion, at rated power, aux/CD in.	20Hz	1kHz	20kHz
	-74dB	-75dB	-71dB*
Intermodulation, 19/20kHz, rated power, aux input			-100dB*
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			-43dB
Noise			
Disc (mm) input (1HF, CCIR weighted)			-69dB
Aux/CD input (1HF, CCIR weighted)			-74dB
Residual, unweighted (volume control at min)			-75dB
DC output offset			0mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (1HF)	26dB	26.7dB	21.8dB
Aux/CD input (1HF)	>23dB	>23dB	>23dB
Stereo separation			
Disc input (mm)	71dB	74/64dB	43/38dB
Aux/CD input	89dB	75/85dB	50/60dB
Output impedance (damp)	0.44ohm	0.43ohm	0.43ohm
Channel balance, disc, at 1kHz		-20dB	-60dB
Volume/balance tracking	0dB	0.43dB	0.85dB
Aux/CD input	0.02dB	0.43dB	0.85dB
Input data			
Disc (mm) input	socket type	sensitivity	loading
	phono	0.58mV	47kohms 320pF
Aux/CD input	phono	31mV	38kohms 60pF
Output, pre-amp (tape)		5V max,	38kohms
Disc equalisation error, 30Hz-15kHz		+0.4dB,	-3.1dB
Size (width, height, depth)	(2x) 43 x 17.4 x 33, 26 x 35 x 17.4cm		
Typical price inc VAT	£2990 + £3800 (pair)		

\*pre- only, see text

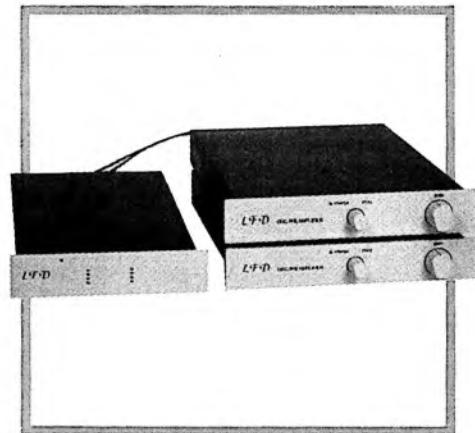
Reviewed by Martin Colloms

Rating: Recommended

Absolute Sounds, 318 Worple Road, London SW20 8QU.

Tel: (01) 947 5047

# LFD Disc Preamp



**L**F D's sole product – a preamplifier – tends to reinforce the dictum that interest value (as distinct from practicality) is inversely proportional to company size. Though in many senses the classic cottage industry start-up (one man plus bright idea, garage, token dog etc.), the pervasive background influence is the highly respected Essex University team (Dr. Malcolm Hawkford *et al*); alongside whom proprietor Richard Bews was working until recently.

The pre-amp featured here is very expensive (£2,500), beautifully finished, and sounds exceptionally good too. But it's also sufficiently idiosyncratic in current form to limit appeal to the well-heeled vinyl junky using a highish output (or transformer-coupled) m-c cartridge. In fact it is not yet really a pre-amp at all yet, lacking even such rudiments as line inputs, though an additional £500 passive control box may be purchased in order to add normal source switching capabilities.

The tested unit consists of separate but attractively matched power supply and twin (mono) signal processing boxes, the latter accepting inputs from medium output cartridges and delivering the appropriate equalised line output signal. However, unlike the numerous audiophile pre-amps which use outboard units to deliver power while the pre-amp is in use, the LFD power supply only becomes operational when the music stops; when the pre-amp is turned 'off'; whereupon the PS starts charging the various long life rechargeable cells which comprise the five(!) separate 'active' power supplies per channel. This application of low impedance wide bandwidth rechargeable cells provides an effective capacitance far greater than that achieved by capacitor-smoothed mains. The pre-amp will operate for two days continuously from a full charge.

The smart silver front panels have two switches each, one choosing between charge and play (analogous to on/off in this system), the other an elaborate 29-step switched attenuator, linking appropriate high quality, hard-wired discrete resistors. The essentially simple medium-gain circuit is carefully laid out and earthed, avoids negative feedback, and uses the finest quality components throughout.

There are optional fixed and variable outputs, the former bypassing both the attenuator and a transformer with dealer adjust-

able gain – the latter clearly something of an afterthought solution to achieving a high enough voltage output for US-style power amplifier sensitivities.

## Lab Report

Lacking any form of line stage, the overall gain is a little marginal. The input impedance suits lower impedance moving-coil cartridges (plus Deccas and perhaps a few moving magnet types, though not predictably – suck and see!). The sensitivity can't make up its mind whether it's aimed at high or low output cartridges, so it hits somewhere near the middle. The listener not too irritated by faintly audible background noise should be able to get away with Koetsus, Kisekis and Clearaudios without trouble, but should still check compatibility carefully before purchase.

Harmonic distortions are excellent, bar a mild LF rise, and IM figures are very good too. It's interesting to note the improved figures of the fixed over the variable output circuitry – objective correlation at last! Channel separation is naturally infinite, and volume/balance tracking is superb, though the ultimate attenuation range is limited to 50dB. RIAA equalisation is excellently balanced and pretty flat, with a gentle LF rolloff starting just within the audio band (30Hz, -1dB; 7Hz, -3dB).

## Sound Quality

Given carefully optimised matching components, and noting the head start offered by omitting the line stage, this unconventional half-a-pre-amplifier proves quite capable of redefining the current state of the sonic art. Distinguished particularly by its fast, open

and grain-free treble, detail, dynamics and clarity are exceptional. The bass end sounds comparatively a little lightweight, but nevertheless delivers convincing 'slam' and tunefulness.

Tonally precise and accurate, individual instrumental separation and definition is first rate. Soundstages show exceptional transparency and focus, with precise resolution throughout a wide subjective dynamic range. Amusical artefacts such as 'tizz' or grain are notably absent, replaced by an essentially neutral rather than consciously euphonic naturalness, and a freedom from any 'electronic' character.

## Conclusions

This is the classic high-end story – a first class product from a brand new company, but one where the designer's refusal to compromise imposes significant constraint upon the user. An LFD owner will enjoy what may well be the finest sounding pre-amp on the market, but will need patience and care in optimising a system to advantage. Even where the line level is used to extend system flexibility, there is still the awkward matter of the disc stage preferring higher output cartridges. Though we haven't had the chance to check out the passive add on switch unit, the exceptional sound quality of the basic pre-amp demands Recommendation to enthusiasts prepared to accept some mild inconvenience, and to spend the time needed to get best results.

## Test Results\*

		twin mono pre-amplifier		
<b>Distortion</b>				
Total harmonic distortion, disc in.	20Hz	1kHz	20kHz	
	-60dB	-84dB	-80dB	
Intermodulation, 19/20kHz, at 0dBW, disc				-83dB (fixed) -77dB (var)
<b>Noise</b>				
Disc input (1HF, CCIR weighted)				-69dB (fixed), -73dB (var)
Residual, unweighted (volume control at min)				> -96dB
DC offset, pre-amp				left 0mV, right 0mV
Input overload	20Hz	1kHz	20kHz	
Disc (mc) input (1HF)	22dB	21.8dB	21.8dB	
Volume/balance tracking	0dB	-20dB	-50dB	
Aux/CD input	0.02dB	0.01dB	0.07dB	
Input data	socket type	sensitivity	loading	
Disc (mc) input	phono	0.38mV	47kohms	—pF
Disc equalisation error, 30Hz-15kHz				+0dB, -1.1dB
Size (width, height, depth)				31x52x38cm
Typical price inc VAT				£2500 + £500 line switching
Reviewed by Martin Colloms				
Rating: Recommended				
LFD Audio, 110 Oxford Crescent, Clacton-on-Sea, Essex, CO15 3PZ. Tel: (0255) 220140				



# Marantz PM94

**D**ubbed a 'digital monitoring amplifier' by Marantz (the circuits are entirely analogue, of course) this mighty heavyweight is not the sort of amp you'd want to carry home from your local high street store. It weighs a massive 23kg.

Rated at 140 watts per channel into 8ohms (220W into 4ohms), plenty of power is available to drive most speakers – and to high levels at that. Styling is typically Japanese Marantz, with a large imposing front panel covered with buttons and knobs. But there is a pleasing symmetry about the control layout and the *PM94* proved easy to use.

The front panel is an aluminium extrusion and the case is of steel, but with screws and many parts of the chassis copper plated to help control eddy currents within, aiding low level performance. The whole is finished off with highly polished real wood end caps which may or may not fit in with your decor.

Only one pair of gain switchable disc inputs are provided, plus CD, 2 aux, 3 tape recorders and 2 sets of loudspeakers binding posts. By removing two jumper plugs the preamp may be separated from the power amp – a useful facility, particularly should you wish to insert some signal processing twixt the two.

A copper plated screen covers the preamp stages and separates them from the power amps and supplies. A large screened toroidal mains transformer takes centre stage with the 4 large high quality 27000 $\mu$ F main reservoir capacitors. Either side of these are separate boards for left and right power amplifiers which use Marantz's Quarter-A system whereby the circuit works at low level (up to 1/4 full power) in class A, switching to Class AB when more power is required. The outputs are complementary fast high power MOSFETs – 3 pairs per channel – which are mounted on large internal finned heatsinks.

The power amp is made up entirely from discrete components, both FETs and bipolar types are used together with high quality caps including copper foil types. Pre-stages also use components selected for their sound quality, and the disc stage uses a transformer with linear crystal oxygen free copper windings to provide the extra gain needed for moving coil cartridges. Three gain settings are provided, two *via* switched taps on the transformer and the third straight in for moving magnet sensitivity.

## Lab Report

Rated power output was easily exceeded with a massive 200watts available into 8ohms (one channel connected) and 250watts into 4ohms (both channels connected). The 20hm pulse test provides 24dBW and the



peak current capability was an adequate  $\pm 21A$ ; more was available but with increasing distortion.

Total harmonic distortion on all inputs was commendably low and intermodulation products notably absent on all inputs. Noise wasn't a problem either, with the worst case moving coil input a reasonable 72dB down on 2.83V (1dBW) output (CCIR weighted). Input overload was above reproach and stereo separation was exceedingly good at all frequencies on all inputs. Output impedance was negligible while channel balance and volume balance tracking are hard to fault.

Sensitivities have all been sensibly chosen, while the power supply modulation test revealed no 50Hz or 50Hz harmonic break through whatsoever. Interchannel RIAA deviation was nonexistent (this is getting boring, isn't there anything wrong?), and the frequency response was flat on the aux input with a slight rolloff of 0.2dB in both the bass and treble at the extreme band limits. RIAA response was well engineered but with a high frequency rise at ultra sonic frequencies (at last!) which could have been better tamed. Overall the *PM94* delivered a difficult to criticise, state-of-the-art, lab performance.

## Sound Quality

Driven from the Marantz *CD94* and used on the CD direct input a wide sound stage of above average depth was laid out with the performers quite well focused. The midrange was sweet and musical, if a little emphasised, with a hint of glare. The lower mid lacked power and dynamics, and was generally a bit lean sounding. Treble was faintly forward with audible grain and the bass was soft, missing control at the extreme low end with the

lower octaves not well integrated. Although this amp delivered precision and focus and was generally pleasant, it lacked the dynamics, drama and impact you get from the better separates at this price level.

On disc input the lower registers were a little slower with less dynamic impact. The mid showed a mild exaggeration of vocal range definition – quite likeable really – and the high frequency range was likewise reasonable if a mite tizzy. The overall feeling was that the sound bordered on the contrived and processed rather than the pure and open.

## Conclusions

This is one of the best sounding integrated amplifiers of its type. It is bettered by some lower priced home grown designs if judged on sound quality alone, but none of these are as powerful or have the input and switching facilities of the *PM94*. The excellent lab performance and build quality could suit many who want a powerful amp to install, use, and simply forget.

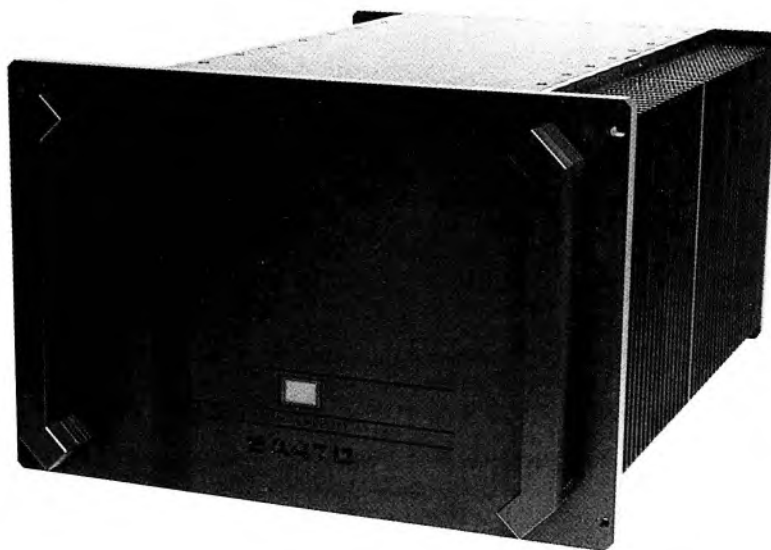
## Test Results

<b>Power output</b>			
Rated power into 8ohms, maker's spec		140W (=21.5dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	23dBW	23.1dBW	23dBW
Both channels, 4ohm load	21dBW	21.4dBW	21.2dBW
One channel, 2ohms, pulsed	-dBW	24dBW	-dBW
Instantaneous peak current		+21A	-21A
<b>Distortion</b>			
Total harmonic distortion, at rated power, aux/CD in.	20Hz	1kHz	20kHz
	-89dB	-92dB	-75dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			-98dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc) high			-88dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc) low			-90dB
Noise			low 90dB
Disc (mm) input (IHF, CCIR weighted)			-77dB
Disc (mc) input (IHF, CCIR weighted)			-72dB
Aux/CD input (IHF, CCIR weighted)			-80dB
Residual, unweighted (volume control at min)			-87dB
DC output offset			left 8mV, right 11mV
DC offset, pre-amp			left 0mV, right 0mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	34.4dB	33.8dB	32.0dB
Disc (mc) input (IHF)	39.3dB	36.5dB	34.9dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB
<b>Stereo separation</b>			
Disc input (mm)	100dB	94dB	72dB
Aux/CD input	104dB	95dB	75dB
Output impedance (damp)	0.044ohm	0.044ohm	0.05ohm
Channel balance, disc, at 1kHz			0.4dB
Volume/balance tracking	0dB	-20dB	-60dB
Aux/CD input	0.02dB	0.36dB	0.28dB
<b>Input data</b>	socket type	sensitivity	loading
Disc (mm) input	phono	0.20mV	47kohms 100pF
Disc (mc) input	phono	0.073mV	350ohms ---nF
Aux/CD input	phono	11.9mV	70kohms 50pF
Power amp	phono	131mV	28kohms 150pF
Output, pre-amp (tape)			12.5V max, 200ohms
Disc equalisation error, 30Hz-15kHz			+0.2dB, -0.2dB
Size (width, height, depth)			46.7x16.6x45cm
Typical price inc VAT			£999.90

Reviewed by Chris Bryant

Marantz Audio (UK) Ltd, Saxon Way Industrial Estate, Moor Lane, Harmondsworth, Middx UB7 0LW. Tel: (01) 897 6633

# Musical Fidelity separates



**T**he fastest growing UK hi-fi specialist for many a year, Musical Fidelity look set to become the 'third force' in UK amplifier manufacturers alongside Quad and Naim, although its approach makes a complete contrast. Where the older two companies both rely on very restricted ranges almost entirely manufactured in-house, Musical Fidelity has achieved rapid growth by an almost bewildering rate of new model launches, plus extensive use of OEM suppliers in manufacturing.

The launch programme has resulted in an extensive collection of both integrated and separate pre- and power amplifiers, which are now becoming rationalised into two distinct ranges. The separates are of most relevance to *The Collection*, and although we haven't sampled them all, we do have up to date experience of many. The various findings are combined in this single composite review to avoid having to leave some out.

While naturally approving evolutionary improvements, one of MF's more inconvenient habits (from the reviewer's perspective at least) is of frequently introducing important updates to existing models – to the point where a sell-by date might not be inappropriate! Such updates tend of course to be beneficial, and in any case most of the findings here are based on assessment within the last three months, so hopefully remain reasonably current.

The four integrated models (*A1*, *A100* and *B200A/B*) set the scene for the various separates covered here, by introducing the A and B enclosure styles. The *A1100* are table top models with a distinctive finned heatsink case and a 'leaning over' front panel. Separates derivations include the £300 *Preamp 3A* and £300 *P140* stereo power amplifier (*Hi-*

*Fi Choice* March 1988), but one can move much further upmarket with an £875 pair of *MA50* monoblok power amplifiers (not yet assessed). The launch of *MA100* monobloks, targetted at £1,600/pair, is said to be imminent.

For a £50 premium, the B series are housed in traditional US-style rack mount boxes, with flat, oversize fascias and ventilated casework. Four such pre-amps start with the simple £350 *3B*. At £500 sits the tone-control-equipped *P172*, untested by us and rather unloved by MF themselves. The high-end really starts with the £1,000 *MVT* and the new £2,000 *MX*. Power amplifiers begin with the £350 *P140B*, then the £500 *P170*, £1,200 *F270*, £2,200 *A370* and finally the monster £5,000 *SA470* (a free forklift truck and airconditioner with every one; and no, we haven't tried one yet).

Though the various models differ considerably in size and price, many share particular circuit configurations, albeit developed to different degrees of refinement through component selection, power supply topology etc. The basic circuitry is largely the work of Tim de Paravicini (also of E.A.R. fame), though MF principal Antony Michaelson hatches the original product concepts and supervises extensive in-house development work.

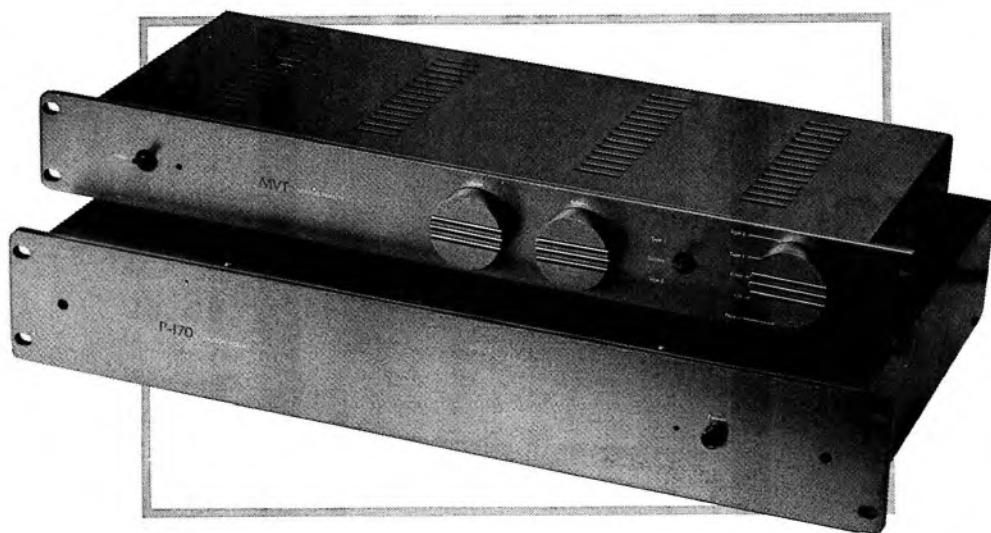
Distinguished most obviously by presentation, the ranges are technically similar apart from the occasional alternative of bi-polar output transistors amongst the MOSFETs. AM ascribes different sonic flavours too: the slightly folksy As, looking like genuine down-home British amplifiers, reportedly have the more relaxing characters; the 'international' Bs, resembling US and Pro models with rack-mount handles and fascias, tend to take a more analytical stance.

The various pre-amps (*P172* apart) are tersely simple in facilities, accommodating moving-coil and moving magnet cartridges but otherwise restricted to input selection, tape monitoring and volume, with the additional luxury of a balance control on *MVT* and *MX*. A fascinating switch which inverts absolute phase is fitted to *MX* alone, and should perhaps carry some sort of health warning against obsessive use.

The new *MA50* and *P140A* apart, the power amplifiers all follow *MVT/MX* style, sharing a common width with black heavy anodised front plates equipped (theoretically at least) for racking, and with an excellent standard of external finish. All are basically double-mono in internal construction, with IC op-amp inputs and multiple complementary FET outputs. But besides offering 2dBW steps in output power as one goes up the range, each successive model operates in class A over an increasing portion of its dynamic range.

Consequently the *P140* and *P170* are largely class B and housed in slimline cases, with ratings of 70W (18.5dBW) and 85W (19dBW) respectively. The 21dBW *F270* occupies three times the vertical height and half as much depth again in order to provide the power supply and cooling necessary for part class A working. The *A370*, its prefix indicating a closer approach to class A operation, is nearly twice the height again – looking almost cuboid and far from elegant, but practical enough nonetheless since it doesn't need (noisy) fan cooling. The 40kg weight is very much a two-man lift.

Class A operation above all means the substantial production of waste heat all the time that the amplifier is on. A nice by-product is of course that everything warms up quickly



after switch on, but when you've got a black cube sitting in the room with a case temperature of around 60°C, it's generating as much as a small radiator. Nice in the winter, when you can just turn the heating down, but not so convenient for summer listeners – in this respect the big MF power amps are better suited to large, well ventilated (or air-conditioned) rooms.

The toroids and power supply capacitors are generous considering the prices, with regulators supplying early stages. Attention to constructional detail is reflected in single strand LC internal wiring and custom polypolyethylene capacitors. The minimal power amp facilities are restricted to extra speaker terminals for bi-wiring to loudspeakers, the terminals themselves capable of accepting the most hawser-like cables. Inputs are high quality phono sockets. The '370 reservoirs total 100,000µF per channel, using selected Japanese audio premium electrolytics, and other special components are used elsewhere.

### Lab Report

Given the composite nature of this review, and to avoid unnecessary repetition, it will be taken as read that most measured parameters are perfectly satisfactory. Comment will be restricted to any peculiarities unearthed, and any obvious trends through the range.

The various RIAA (vinyl disc) responses of the various pre-amps show very slightly stronger output through the lower half of the audio band than the upper half. Each has a fairly rapid inbuilt LF rolloff, typically –3dB at 10Hz. Harmonic and intermodulation distortions are somewhat below average, but satisfactory nonetheless, and showing steady

improvement as one works up the range.

The power amplifiers each and severally exceeded their rated outputs without difficulty, though the effect of moving steadily upmarket is seen in improved 'stiffness' and capabilities into low impedances and at frequency extremes, as well as the promised higher power outputs.

Both P140 and P170 show some restriction towards bandwidth extremities and into current hungry loads. Peak current delivery and high frequency intermodulation are both unexceptional. The 270 shows better low impedance drive, though the ultimate current delivery of +25/–27A peak to peak is not exceptional – this is not really a bargain-price Scintilla driver. There was an odd slight peaking in the frequency response at 20Hz, amounting to less than 1dB, while the output impedance is high enough to cause slight response differences with low impedance loudspeakers.

The '370 delivers a comfortable 200+W per channel, with good bandwidth and load tolerance, backed by a substantial peak current output of +59/–58A. The power supply modulation spectrogram was particularly clean, but a small +0.5dB response rise at 10Hz was noted.

### Sound Quality

Sonically both Musical Fidelity ranges deliver a standard of sound quality that comfortably exceeds expectations for the particular price points – indeed the sonics of any one tends to be competitive with highly regarded models costing twice as much or more.

Even the \$300 pre- and power amplifiers come close to a very good overall sound quality rating. The MVT and P270 approach the

excellent class, within which the MVT and A370 are firmly ensconced. Key strengths throughout are a fine and neutral midrange tonality, set within generous and precise stereo staging, conveying lively and natural dynamics.

As one moves up the price ladder, focus and definition improve steadily, both in terms of the ability to hear the precise boundaries of a recorded acoustic and in the focusing and presentation of individual instruments therein. The bass sounds subjectively more extended and powerful yet also more relaxed and effortless, the treble more precise with greater clarity and detail.

### Conclusions

From the hurly burly of meteoric early growth, Musical Fidelity is still advancing at breakneck speed, but taking time to rationalise the amplifier ranges along the way. The result is (more or less) a series of pre-/power amplifier combinations that double in price for each step of the ladder.

The Preamp 3/P140 makes an excellent starting point, but the successive steps each show worthwhile improvement in information recovery, resolution and detailing, not to mention loudness. The top models are good enough to challenge far more expensive imported exotics, so general and enthusiastic Recommendation is entirely appropriate. That said, amplifier sound always tends to be a personal thing, so the reader should try to confirm our judgements for him/herself if possible.

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# Naim separates

Commercially now one of the largest UK hi-fi amplifier manufacturers, Naim have followed a single-minded path that sets them apart from 'mainstream' high-end amplifiers, both aspirationally and in the way the product range is set out. A limited number of building blocks can be combined in various ways to give a wide range of options, from under £500 entry level up to a multi-amp system at around £8,000.

It is widely accepted that Naim pre- and power amplifiers work best together, and optimally with a limited range of other components. Once chosen, it is easy to upgrade a Naim system by stages, without making many (if any) of the modules redundant. By the same token it could be argued that once on the Naim ladder, it is awkward to transfer back into the 'mainstream'.

With this in mind, our resident Naim fan (consultant editor *PM*) has pieced together a profile of the range, more as an overview than review proper, based not only on intermittent normal *Choice* assessment over the years, but also long regular personal experience.

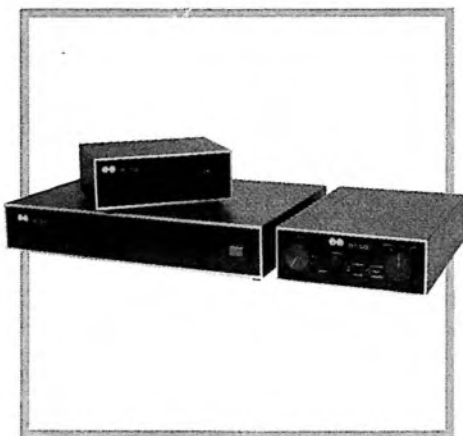
The various items in the range consist of two pre-amps (broadly similar in performance but with different facilities), two pre-amp power supplies, an active filter unit, plus three power amplifiers.

The simplest configuration combines the £285 *NAC62* or £426 *NAC32-5* pre amp with £282 *NAP90* or £414 *NAP140* power amplifiers; in these instances the pre-amp draws power from the power amplifier. The next stage involves adding a separate power supply for the pre-amp, either the smaller *SNAPS* or the heavyweight *HI-CAP*.

The power amplifier improvements are considered best left until the pre-amp is fully extended – *ie HI-CAP* supplied. The next step up the ladder is the famous £966 *NAP250* – possibly the longest standing amplifier still in current production. This is a full-width model rated at 70W/channel with four regulated power supplies, two of which utilise the same transistors as the output.

The final passive step is the *NAP135* monoblok (£1932/pair), of similar power rating and size as the *250* but with improved supplies and an on-board cooling fan. The latter only comes into operation when the amplifier is working very hard, so it is effectively inaudible.

The passive ladder brings a maximum amplification price of around £3,000, but a price premium of around £850 is the down payment on a transfer to the active ladder, by adding an active crossover unit and its accompanying *HI-CAP*. (The far less easy instalments are the doubling or trebling of



power amplifiers needed to drive the loudspeakers actively.)

Currently Naim's active systems are oriented towards their own and Linn loudspeakers. There are alternative crossovers for two-way and three-way loudspeakers, for which one can use two or three *NAP250*s, or four or six *NAP135*s. The full 'sixpack' carries a total amplification price of around £8,000 – well into high-end territory, if still a little paltry by US standards.

The pre-amps are simple affairs with minimal facilities – volume, balance and input selection, plus mute and tape monitoring. Inside, a series of sub-boards are plugged onto a main motherboard, allowing substitution for different cartridge matching or upgrading. Both mm and m-c disc boards contain appropriate equalisation and amplification in a single stage up to line level.

Fed up with the limitations of phono sockets, Naim have the temerity to fit BNCs for their disc inputs. They claim these offer certain fundamental advantages, though it can be an operational pain in the butt for dealers and reviewers! Again eschewing phonos (and causing further inconvenience), XLR and DIN socketry is used in various configurations throughout the remaining Naim interconnects, in line with a complex and careful 'star earth' approach. Appropriate leads with good quality locking plugs and (deliberately) non-exotic cables are provided.

The power amplifiers are entirely plain, their substantial alloy casings providing the heatsinking (fan supplemented on *135*). The rear loudspeaker terminals are simply recessed banana sockets – wire wrap/spade terminals are regarded as prone to gradual material compression, whereas a spring banana

plug preserves contact pressure and self-wipes on re-insertion.

The basic design configuration is bi-polar quasi-complementary, using selected high speed devices. Lack of output filtering requires the inductance provided by about 3m of Naim cable, so some caution should be taken with unknown exotic types. For similar reasons, there is a tendency to pick up RF-breakthrough and mains-borne interference. Both these effects are unpredictable, depending upon the particular site, and seem to affect a fairly small percentage.

## Lab Report

Tested on several occasions in the past, Naim amplifiers have always delivered a good sound if unspectacular lab results.

The disc frequency response shows a precisely tailored characteristic, very flat through most of the range but rolled off fairly early at the extremes. The *250*, rated at 70W/8ohms, delivers a fine power bandwidth into 8 and 4ohms, while still holding up respectably into 2ohms. Current delivery is an appropriate  $\pm 16A$ .

## Sound Quality

There is little to complain about in terms of musical communication. Naim amplifiers are very involving, lively and informative, delivering a high 'boogie factor' with realistic dynamic shading. People sound surprisingly human underneath the inevitable patina of electronic processing which affects both recording and replay.

However, the sound itself has a distinct character that is not to every taste. There is little of the 'air', 'space' and transparency that is usually associated with an 'audiophile' sound, and there is a certain 'signature' that might be regarded as akin to coloration, albeit to a mild degree. Furthermore, stereo images sound rather 'shut in', rather indifferently focused, and constrained in depth.

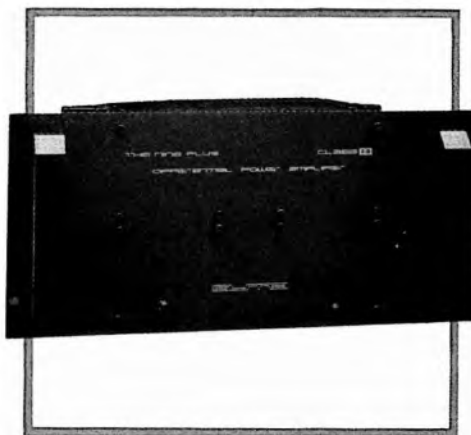
On balance, the sound seems to suit those who place priority on recreating the experience of music, as distinct from a specific musical experience.

## Conclusions

The Naims continue to merit recommendation, subject to personal taste and appropriate system matching, for they do seem to perform best in a known and controlled context. There is impressive subjective commonality and coherence as one moves up the range, each step clearly audible, while excellent build quality and a good record on avoiding obsolescence are further plus points.

Naim Audio Ltd., Southampton Road, Salisbury, Wilts SP1 2LN.  
Tel: (0722) 332266.

# Sumo nine Plus



Readers of US esoteric hi-fi magazines of the 'seventies will doubtless recall a company called GAS (Great American Sound) and their memorably named range of macho amplifiers – *Ampzilla*, and of course *Son of Ampzilla* to name but two. GAS disappeared, but its similarly colourful principal Jim Bongiorno reappeared in 1978, showing he had not lost his sense of humour or irony by choosing the Japanese name Sumo for his new American company. The underlying philosophy of the products is not to attempt to redefine the state of the art irrespective of costs, but rather achieve a sane balance that provides excellent performance at a not too extravagant price.

Sumo is arriving in the UK for the first time, and is one of the launch ranges of brand new high-end distributor Acoustic Gold. Again the name may be new, but principal Dennis Wratten has had many years experience in both UK and US hi-fi manufacturing and distribution.

The subject of this particular review is the £1,200 *Nine Plus* – or the *Nine +*, whichever Sumo decide to call it on the day they screen the front panels (we have photographic evidence of both). Though only 65W rated, it is a large, heavy and imposing looking 'class A' power amplifier presented very much in the American manner with impressively finned heatsinking, oversquare typefaces, and those other little macho touches designed to appeal to the person whose lifestyle really demands a black panther purring on the carpet in the corner of the room. But the problems of housetraining and making arrangements to get away to the yacht for the weekend make a Sumo an attractive alternative.

At least you can switch off the *Nine Plus*' purr, though the high noise level of the cooling fan in use was a major Achilles heel of our sample. The manufacturer is introducing a (retrofittable) modification, but this is a point prospective purchasers can and should check for themselves.

Comparatively compact by virtue of the forced ventilation, this pure class A design is based around a central toroid and ten bi-

polar output transistors per channel, used with multiple supplies in a differential 'quasi bridge', balanced configuration. The input uses a dual differential *LF412* op amp, and multiple regulated supplies are provided. Construction quality is good throughout, and protection is handled by thermal trip and fused mains input.

## Lab Report

The 65W rating, or indeed the 78W lab finding, does not sound too spectacular, though it is actually pretty healthy by class A standards, particularly as this amplifier is not too extravagantly priced. And the power delivery into lower impedances and across a wide bandwidth is well nigh exemplary, the  $\pm 16$ amp peak being appropriate to the output level.

All the other measurements are fine too, including low output impedance, low distortions and excellent channel separation. Fan apart, noise levels are low, and the balanced configuration confers superb common mode rejection and excellent suppression of mains supply components.

## Sound Quality

History suggests one is unlikely to find exceptional sound quality in £1,200 US amplifiers, yet the *Nine Plus* sat there confounding our preconceptions by delivering something comparable with well regarded and much more expensive exotica. Notwithstanding the modest power rating the sound was big and effortless, sounding subjectively closer to 200W a side!

Stereo images were big and wide, with convincing depth and fine discrimination of perspectives. The top class bass combines

power with speed and control, providing an enervating foundation to a sweet and accurate midband with fine presence and immediacy, and good detail. The treble is precise and detailed without unwanted exaggeration, though with a slight 'breathy' quality that mars transparency slightly.

## Conclusions

This all points to confident Recommendation for a fine, subjectively 'big' and gutsy amplifier that is available at a very fair price. But that depends on what happens to the cooling fan. As tested, the background noise was unacceptably high, restricting use to highish levels and interfering markedly with low level listening. But if the manufacturer succeeds in taming the purr, or if the unit can be sited in a ventilated cupboard, then such criticism may be laid aside. Potential purchasers without air conditioning should note that 65W class A generates a lot of waste heat irrespective of volume levels used.

## Test Results

		stereo power amplifier		
		65W (=18dBW)		
Rated power into 8ohms, maker's spec		20Hz	1kHz	20kHz
Power output		18.9dBW	18.9dBW	18.8dBW
One channel, 8ohm load		18.7dBW	18.7dBW	18.6W
Both channels, 4ohm load		-dBW	17.5dBW	-dBW
One channel, 2ohms, pulsed			+16A	-16A
Instantaneous peak current				
Distortion				
Total harmonic distortion, at rated power		20Hz	1kHz	20kHz
		-80dB	-79dB	-70dB
Intermodulation, 19/20kHz, rated power				-87dB
Intermodulation, 19/20kHz, at 0dBW				-100dB
Noise 'A' wtd				-84dB (0dBW), -104 (full power)
DC output offset				left 11mV, right 1mV
Stereo separation		110dB	100dB	90dB
Output impedance (damp)		0.08ohm	0.09ohm	0.2ohm
Channel balance				0.04dB
Input data		socket type	sensitivity	loading
Power amp (to clip)		phono	1.16V	1000kohms 300pF
Size (width, height, depth)				48 x 22 x 18cm
Typical price inc VAT				£1200

Reviewed by Martin Colloms

Rating: Recommended

Acoustic Gold Ltd., 1 Orston Lodge, Old Farm Road, Hampton, Middx TW12 3RD. Tel: (01) 941 6737.

# YBA 2 Pre / Power

These relatively expensive separates come from Phlox Electronique of France, from the same designer as the well regarded Vecteur range of cables. The power amplifier is rated at 70W and 140W into 8ohms and 4ohms respectively, while the preamplifier is a 'straight line', no frills design.

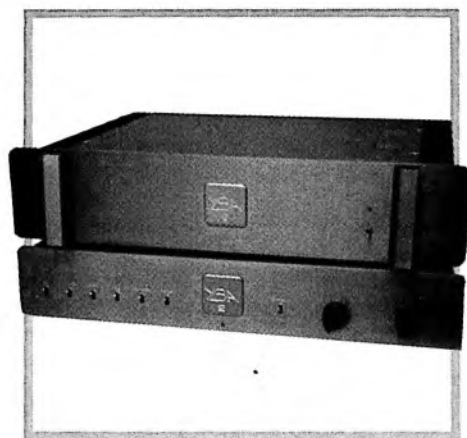
The preamplifier is attractively housed in a grey anodised all aluminium case finished to the highest standards. A row of toggle selector switches is uniformly spaced on the front panel, alongside a separate 'direct' switch.

The back panel inputs are high quality gold plated phono sockets, with the disc inputs spaced to accept the dedicated 'Vecteur' moving-coil input transformer. (The standard vinyl disc input sensitivity is for moving magnet cartridges.) Other inputs are available for tape, CD, and 'aux'. No on/off switch is included, the pre-amplifier being 'on' as soon as it is connected to the mains.

Internal construction is to a high standard using selected metal film resistors, polypolypropylene capacitors, and no fewer than 16 top quality 4,700 $\mu$ F electrolytics, all of which are mounted on a double-sided printed circuit board. The DC coupled disc amplifier uses discrete transistors as the active elements. The power supply is derived from a small transformer followed by the high quality smoothing electrolytics. No active regulation is used and all interconnections external to the board are performed by single strand linear crystal wire coated with high quality insulation. The volume controls are top grade.

The power amplifier comes in a matching case, equally well finished but with a small power switch and indicator on the front panel. Finned heatsinks adorn the entire height and length of the side panels. On the back are high quality phono sockets for the signal inputs and 4mm sockets for the speaker connections. The same high quality components are used to construct this 'double mono' (albeit using a shared transformer) symmetric, low feedback, short signal path design, which uses 4 complementary bipolar *TO3* output transistors. These are mounted using mica with a grounded copper interface, a technique which is claimed to limit heatsink capacitive effects on transistor operation.

Both pre- and power amplifiers are supported on three rigid mounting feet providing some mechanical grounding, which may help negate vibration effects. Other neat touches in both units include thermally connected transistors, and vibration damping material attached to important components.



## Lab Report

The power specification was easily exceeded into 8ohms, but with some reduction at 20kHz into 4ohms. While the amplifier performed well at low to mid frequencies, slew problems occurred on the 20kHz test and only 13.5dBW was recorded for 1 per cent distortion. A respectable 18.5dBW was achieved on the 2ohm pulsed test and the peak current capability was a comfortable  $\pm 24A$ .

The preamp displayed low distortion and very good noise figures. DC offset was low and input overload adequate. Stereo separation was fine and sensitivity and loadings were well chosen, especially if the pre and power amps were used together. However, some mains hum was present on the disc input.

## Sound Quality

The 'direct' or bypass switch should be engaged for best analogue disc results, otherwise we found stereo focus noticeably phasy. At the expense of mild hum, the disc input gain was sufficient for some m-c cartridges to be used direct, bypassing the admittedly slight losses incurred with the optional m-c input transformer (a recommendable device in its own right).

The pre-amp alone majored on space and depth, with a most revealing sense of transparency and ease. Tonally the mid was excellent, and bass and treble simply very good! Stereo focus was also very fine, and performance was improved still further *via* CD, where it ranked with some of the finest pre-amps up to double its price. There was a slight 'slowness' in the bass, but otherwise the sound appeared musical and dynamic,

transparent and spacious.

The 2 power amplifier's performance was fully commensurate with that of the pre-amp, again showing that marginally soft bass but with a first rate mid and treble performance. Subtle on low level detail, it was dynamic on the powerful sections and consistently well focused and finely staged. This first rate performance was maintained into the more difficult loads and at high subjective volume levels - it sounded generous and powerful yet never hard or fatiguing.

## Conclusions

This combination of YBA's smaller separates has done very well in review, with a build, finish and performance comparable with products costing twice or three times the amount. Its portrayal of depth in the sound stage was truly exceptional, while the transparency and musical character both spoke well for the designer. Either together or as separates these two products may be enthusiastically Recommended, with the hope that attention will be paid to the disc hum.

## Test Results

<b>Power output</b>			
Rated power into 8ohms, maker's spec		70W (= 18.5dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	20.6dBW	20.7dBW	20.3dBW
Both channels, 4ohm load	19.1dBW	19.1dBW	13.5dBW
One channel, 2ohms, pulsed	-dBW	18.5dBW	-dBW
Instantaneous peak current		+25A	-24A
<b>Distortion</b>			
Total harmonic distortion, at rated power, aux/CD in.	20Hz	1kHz	20kHz
	-70dB	-69dB	-53dB
Intermodulation, 19/20kHz, rated power, aux input			-68dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			56dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			-60dB*
<b>Noise</b>			
Disc (mm) input (1HF, CCIR weighted)			-79dB
Disc (mc) input (1HF, CCIR weighted)			-75dB*
Aux/CD input (1HF, CCIR weighted)			-82dB
Residual, unweighted (volume control at min)			-85dB
<b>DC output offset</b>			left 7mV, right 74mV
<b>DC offset, pre-amp</b>			left 0mV, right 0mV
<b>Input overload</b>	20Hz	1kHz	20kHz
Disc (mm) input (1HF)	23.8dB	24.3dB	15.2dB
Disc (mc) input (1HF)	>24dB	>26dB	>20dB
Aux/CD input (1HF)	>23dB	>23dB	>23dB
<b>Stereo separation</b>			
Disc input (mm)	69dB	66dB	42dB
Aux/CD input	70dB	73dB	47dB
<b>Output impedance (damp)</b>	0.08ohm	0.09ohm	0.12ohm
<b>Channel balance, disc, at 1kHz</b>			0dB
<b>Volume/balance tracking</b>	0dB	-20dB	-60dB
Aux/CD input	n/a dB	n/a dB	n/a dB
<b>Input data</b>	socket type	sensitivity	loading
Disc (mm) input		1.58mV	56kohms 80pF
Aux/CD input		83mV	53kohms 170pF
Power amp		120mV	28kohms 140pF
<b>Output, pre-amp (tape)</b>			7.7V max, 22ohms
<b>Disc equalisation error, 30Hz-15kHz</b>			+0.1dB, -0.2dB
<b>Size (width, height, depth)</b>			43.0x7.4x36cm
<b>Typical price inc VAT</b>			£1395 + £1695
			(m-c transformer £299 extra)

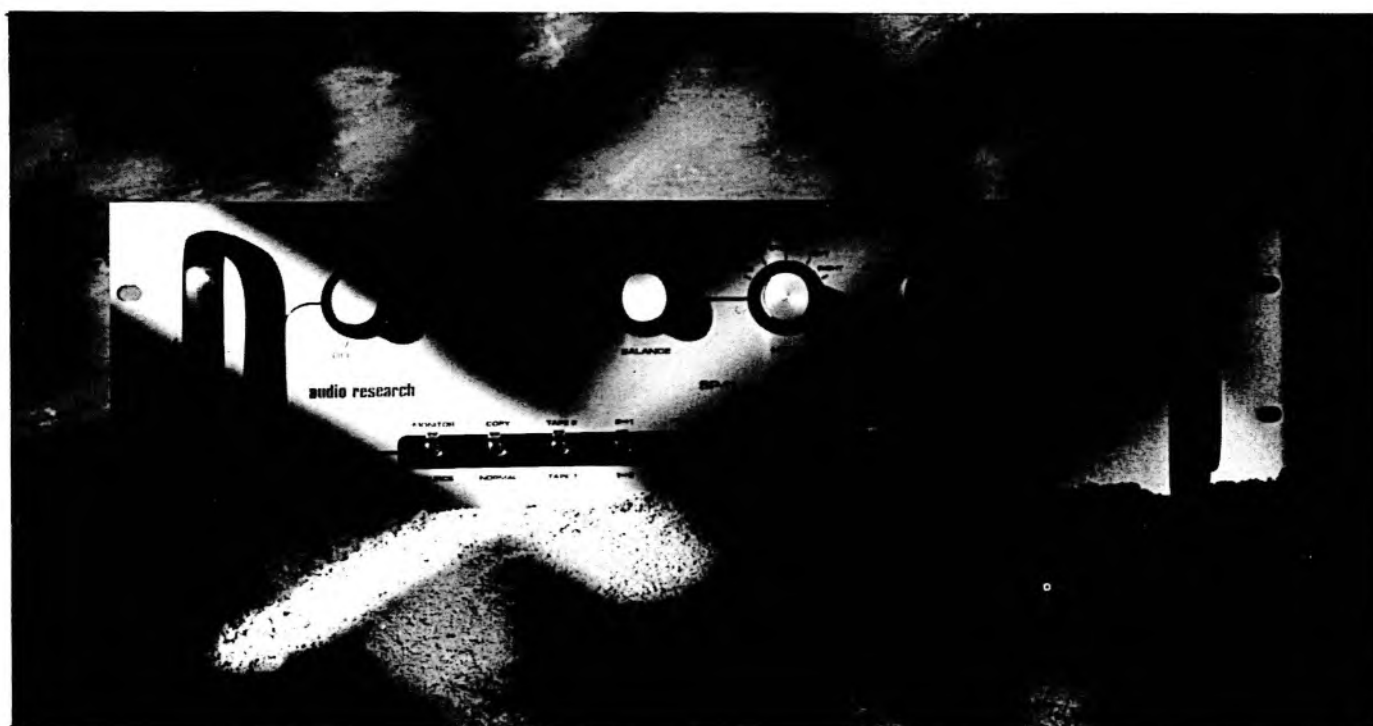
Reprinted from issue No. 56 by Martin Colloms

Rating: Recommended

Presence Audio, The Old Posthouse, Plummers Plain, Horsham, W Sussex. Tel: (0403) 76777

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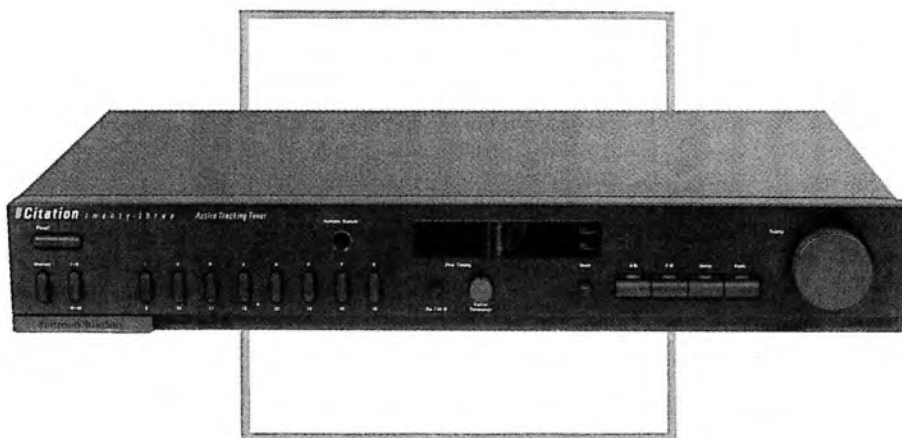
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# Harman Kardon Citation Twenty-Three



This FM/AM Citation tuner is rather unobtrusive with its matt black exterior and discrete green display. Styling is unusual, from the small central display and bevelled edges to the elongated push buttons with green LEDs set into the top which light to show the selected functions. Digital it may be, but a nicely weighted tuning knob harks back to the days of analogue dials. The HK *Citation Twenty-Three* also comes supplied with a remote control, which must be a plus.

Tuning can be set to Seek or Manual. When on Seek you just have to turn the knob slightly to set auto-tuning circuits in motion. A fine tuning/Hi Q control lets you adjust the final 'display assisted' setting as you wish. By unlocking the synthesised tuning circuits the user can tune away from offending interference while maintaining capture of the required signal, thus allowing increased adjacent channel rejection. Mono and inter-station muting are other useful features, together with an adjustable muting level, though the control for the latter is sited on the rear panel.

Sixteen preset stations can be stored using a 9 button array. The remote includes all the front panel controls, including power on, with the exception of the fine tune control. Incidentally the handbook is clear, concise and well written.

This tuner also uses active tracking circuits to increase adjacent FM selectivity. The function of this is to limit the tracking range of the phase lock loop, by first determining the modulation deviation of the locked signal, and then adjusting it accordingly. This, they claim, reduces phase and amplitude inaccuracies of normal sharp pass-band filters.

## Lab Report

The measured sensitivity was to the standard expected with this class of tuner for both stereo and mono reception. Noise was low but the 19kHz pilot tone and 38kHz sidebands could be suppressed a little better. Alternate channel selectivity was very good but the capture ratio recorded was 9dB, which is due to the action of the active tracking circuits. Total harmonic distortion was reasonable but the stereo separation was surprisingly poor, though in actual fact this is probably adequate for most transmissions. Output level won't be a problem and channel balance was excellent with only 0.02dB deviation at 1kHz. The signal strength meter was a little too sensitive for our tastes, attaining maximum reading at only 700µV. The tuner also took a rather long time to unmute once a signal was captured.

Frequency response was flat to 5kHz from where it exhibited a high frequency roll-off – slightly down at 10kHz and 1dB down at 15kHz.

## Sound Quality

AM sound was a little brittle and sharp but it did have fair bass and treble. There were a few too many birdies and whistles on weaker stations, but overall the sound was thought above average on strong signals.

It was on FM that the *Citation Twenty-Three* came into its own. There were one or two complaints, but overall the performance was close to that achieved by the best available. The perceived background noise level was consistently low, and there was a virtual absence of birdies and whistles. The bass was particularly good, very articulate and tuneful with extension and slam. The midrange was

clear and well focused with good detail, balance, and transparency – very dynamic and informative, but also a little 'hard' at times. The treble was also well liked for its fine resolution and informative character. This tuner wins because of its good focus, solid image and good depth.

## Conclusions

Fine performance, interesting features and ease of use are this tuner's *forte*. I enjoyed using it in my system as it did all I asked of it, and the sound quality is top notch. The remote didn't do wonders for my fitness, however.

## Test Results

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	2.5µV/28µV
Ultimate signal-to-noise (CCIR/ARM/1 kHz ref)	77dB/65dB*
Muting threshold, R.F. level	25µV
Alternate channel selectivity	78dB
Pilot tone rejection, 19kHz/39kHz	46dB/55dB
AM rejection	67dB
Capture ratio	9dB
Total harmonic distortion	
at 100% mod, 1kHz, mono/stereo	-47dB/-53dB
Stereo separation, 1kHz/5kHz/10kHz	32dB/28dB/23dB
Output level, 100% modulation	500mV
Channel balance, stereo	0.02dB
Dimensions (width, height, depth)	44 x 6 x 35cms
Typical price inc VAT	£559

\*See text

Reviewed by Chris Bryant

Rating: Recommended

Harman (Audio) UK Ltd., Mill Street, Slough, Berks SL2 5DD

Tel: (0753) 76911.

# Athena by SUMO.

## An affordable upgrade to high-end sound.

---

□ *A high-end preamplifier for £595*

SUMO'S Athena preamplifier was designed for enthusiasts, by enthusiasts, to offer remarkably detailed and transparent, yet warm and natural sound. Sound directly comparable with cost-no-object equipment at much higher prices. Yet, thanks to the falling US Dollar, the American-made Athena now costs only £595. An affordable upgrade to high-end sound.

□ *All discrete, Class A circuitry*

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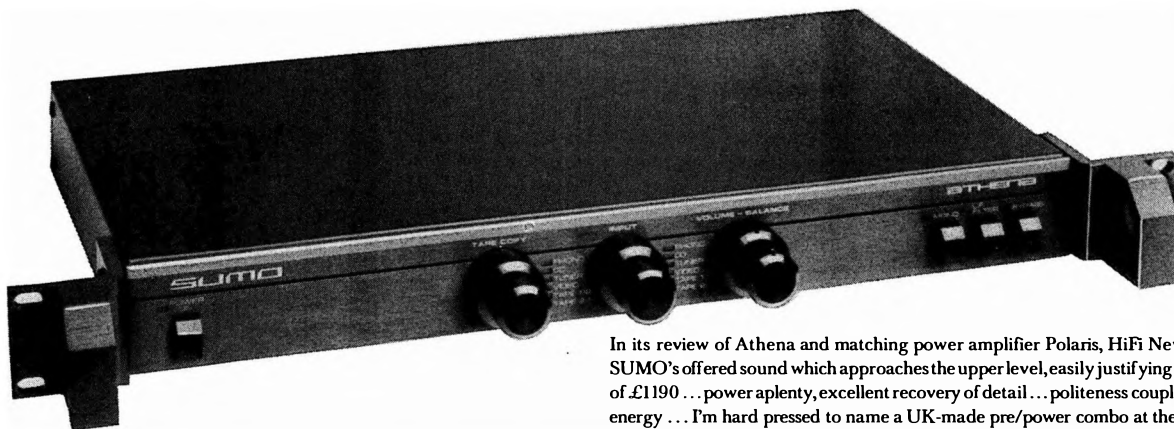
development of every design detail, coupled with the use of the highest grade components. All discrete, Class A circuitry uses 1% metal film resistors and metallized polypropylene capacitors with oxygen free copper leads. Components are mounted on a military grade glass epoxy printed circuit board, and external connections are made via gold-plated sockets. A muting circuit prevents switch-on 'thumps'.

□ *Flexible inputs and outputs*

Inputs are provided for moving-coil or moving-magnet cartridge (switchable), CD, tuner and video and there are two tape recorder loops. MC cartridge loading can be optimised. A switchable line level 'direct' facility bypasses active gain stages. There are two preamplifier outputs, for further flexibility. Athena can deliver an output of up to 20 volts, and a peak to peak current of 350mA, giving effortless headroom.

□ *Guaranteed for three years*

SUMO products are designed and made in California, and backed by parent company Califone International, a major US manufacturer of educational electronics. SUMO's sound quality is matched by impeccable standards of finish, construction and reliability, and a three year guarantee.



In its review of Athena and matching power amplifier Polaris, HiFi News said 'the SUMO's offered sound which approaches the upper level, easily justifying a total price of £1190... power aplenty, excellent recovery of detail... politeness coupled with real energy... I'm hard pressed to name a UK-made pre/power combo at the same price point which inspires the same confidence'.

————— MATCHING COMPONENTS BY SUMO —————

AURORA am/fm tuner: £595

Digitally synthesised tuning. 8 presets. Switchable wide/narrow IF. Dynamic noise reduction for weak signals. Size matches Athena.

POLARIS power amplifier: £595

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ANDROMEDA power amplifier: £995

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THE NINE PLUS Class A power amplifier: £1195

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Prices are suggested retail including VAT.

## Acoustic Gold

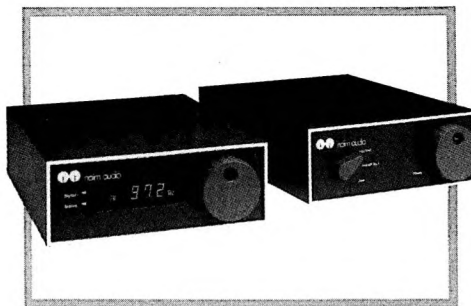
# Naim NAT-01

The £1,098 two-box *NAT01* follows the usual Naim tradition of simplicity first and foremost, and a minimum of user adjustment. The power supply contains only a switch in preparation for any additional tuning modules, and so may be sited out of the way for the time being. The tuner itself just has a single large knob and a digital frequency display, backed up by two indicator lights, though the tuning itself uses analogue varicaps, unusually with a tuning head made by Naim Audio themselves. Though lacking presets, the tuning knob has a fine traditional flywheel action.

Most of the necessary functions like stereo/mono switching are performed automatically. The lower indicator arrow comes on to indicate signal, while the upper is added when the tuner switches to stereo, while the frequency display itself brightens perceptibly when the station is precisely tuned.

## Lab Report

The *NAT01* performed most satisfactorily on the lab tests. The frequency response was flat up to around 10kHz, then beginning an ini-



tially gradual rolloff ( $-2\text{dB}$  at  $15\text{kHz}$ ).

The various RF measurements indicated a high quality carefully aligned 'front end', entirely effective at capturing wanted and rejecting unwanted aerial input and showing evidence of careful quality control. The automatic muting threshold is set a little higher than most, so this is clearly not a tuner for those who wish to explore the airwaves and pull in weak, distant stations.

## Sound Quality

There may be better sounding tuners around somewhere in the world, but we have yet to hear one. The sound is recognisably 'Naim-

like', but *NAT01* provides an unusually transparent window onto the broadcasting studio. This can be something of a two-edged sword: one is sometimes discomforted by the generally mediocre quality of much recorded music output, but when a real live broadcast comes along the difference is immediately, spine-tinglingly obvious – even if the music isn't to taste, it is difficult to stay tuned. And radio drama takes on a dynamic realism quite devoid of the artificiality that most tuners seem to introduce.

## Conclusions

Clearly meriting recommendation, the crucial question will then be whether or not radio programming rates an expenditure of £1,100.

## Test Results

Sensitivity for 50dB signal-to-noise Mono/stereo	7 $\mu\text{V}$ 70 $\mu\text{V}$
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	72dB/66dB
Muting threshold	55 $\mu\text{V}$
Alternative channel selectivity	-66dB
Pilot tone rejection, 19kHz/38kHz	-54/-76dB
AM rejection	-73dB
Capture ratio	2.3dB
Total harmonic distortion	
At 100% mod, 1kHz mono/stereo	-50/-60dB
Stereo separation, 1kHz/5kHz/10kHz	35dB/37dB/35dB
Output level, 100% mod	200mV
Channel balance stereo	-0.02dB
Dimensions (width, depth, height)	(21 x 36 x 8.5) x 2cms
Typical price inc VAT	£1098

Reprinted from issue No 55 by Martin Colloms and Paul Messenger  
 Rating: Recommended  
 Naim Audio Ltd., Southampton Road, Salisbury SP1 2LN.  
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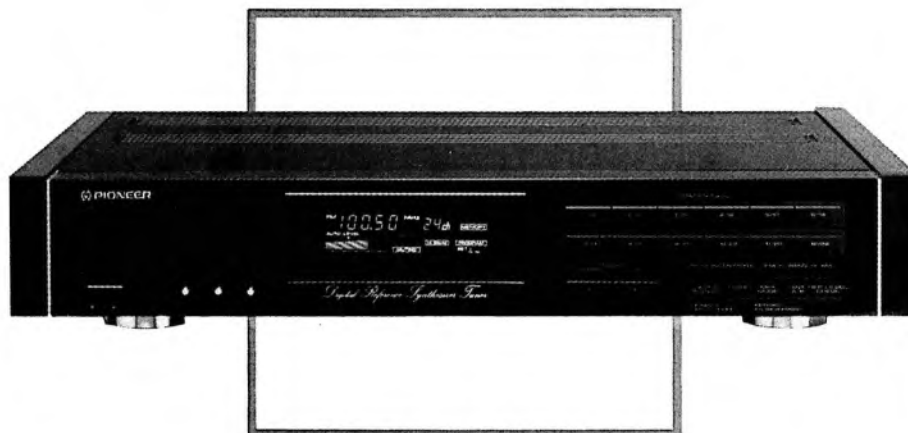
*“Whilst no interconnect will be 100% inaudible, it is fair to say that this cable came closest to those tried in achieving that goal. The music retained its tunefulness and rhythm, detail was not being lost, and that sparkle which was taken from the music by all the other cables still shone through.”*

Hi-Fi Review, Nov 86

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# Pioneer F-91



This is a top of the range digital synthesised FM/AM tuner, and features are a plenty. Styling is extravagant, the front panel of highly polished black with gold trim, and it's finished off with real wood side panels.

When using the *F91* you can choose between manual or auto tuning with an option of response to three different levels of signal strengths. If set to manual the frequency changes by one step each time one of the up/down tuning buttons is pressed. Memory is available for a total of 24 FM and AM stations *via* a 13-button key pad and there is a record level check tone (330Hz – equivalent to 50 per cent modulation). Interchannel muting is provided to suppress interstation noise during tuning and a MPX mode switch lets you choose between stereo, mono or Hi blend. The latter should be selected when the signal is noisy to give acceptable stereo on even fairly weak stations. When set to program mode the three stations stored in the relevant memory are recalled in sequence as power is turned off and on again.

The fluorescent display is informative, with flags for FM, AM, stereo, mute mono, high blend, memory, memory number, record set, programme set, and there is also an integral signal strength indicator.

The circuits contain some clever technical wizardry in the form of an IF strip with an active real time tracking system which is claimed to remove interference signals without impairing sound quality. The whole thing is designed on Pioneer's honeycomb chassis and internal damping has been applied where appropriate.

## Lab Report

Sensitivity was excellent and the CCIR/ARM

weighted signal-to-noise ratio was likewise. Muting threshold was set a little low for some tastes, and for the perfectionist the pilot tone rejection could be improved on. But even this recorded result was rather better than the majority of tuners normally deliver. Alternate channel selectivity and capture ratio were fine and the AM rejection very good. Output level for 100 per cent modulation was decent enough and channel balance was 0.26dB out – not enough to make you rush for your balance control. Frequency response was very flat through the midband with some slight unevenness at high frequencies, but this was held within 0.2dB up to 12kHz and only 0.4dB down at 15kHz. The signal strength meter had 8 levels, active from 3µV up to 2.5mV, which is a sensible working range.

## Sound Quality

The AM sound was quite unexceptional, reminiscent of the majority of tuners currently available. Music stations were not really worth listening to on AM – far too nasal and shut in, and only adequate for news and chat.

It was on FM that the tuner excelled. Initial listening tests revealed it to be one of the finest available at any price and it was only when closely controlled comparisons were made with some other significantly more expensive tuners that any slight weaknesses came to light.

The *F91* had the quietest background noise around when fed with signals of decent strength, but there were some low level birdies with stereo signals up to 1mV. Bass was firm and tuneful, if a bit lean, giving the sound a lightened character. The mid was lively, open and dynamic with good detail,

but we did detect some mild nasal coloration. The treble was clear and concise, showing good detail and great precision. Stereo images were well established and the soundstage was wide with well-focused images throughout the audio frequency band. Depth was good by tuner standards, if not quite up to the standard set by the H/K *Citation* or the Revox. But both the latter are exceptional in this respect.

## Conclusions

This may be the cheapest of the high performance tuners covered in this issue, but it's also easy to use, has excellent RF performance and scored very highly on listening tests. Pioneer have done well to put together such a package for this price and the only real problem is to find good enough programming to exercise its virtues.

## Test Results

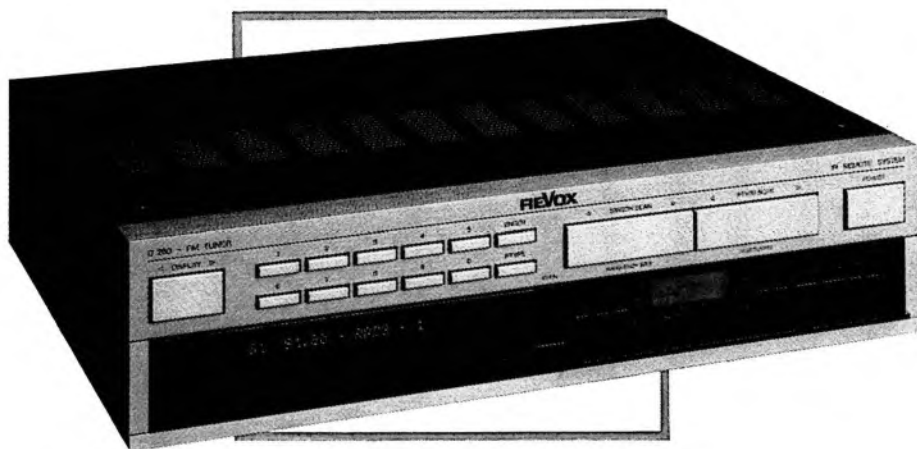
Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	1.5µV/20µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	82dB/68dB
Muting threshold, R.F. level	5.5µV
Alternate channel selectivity	70dB
Pilot tone rejection, 19kHz/39kHz	53dB/78dB
AM rejection	75dB
Capture ratio	2.3dB
Total harmonic distortion	
at 100% mod, 1kHz, mono/stereo	–75dB/–67dB
Stereo separation, 1kHz/5kHz/10kHz	53dB/49dB/44dB
Output level, 100% modulation	835mV
Channel balance, stereo	0.26dB
Dimensions (width, height, depth)	457 x 85 x 320cms
Typical price inc VAT	£350

Reviewed by Chris Bryant

Rating: Recommended

Pioneer High Fidelity (GB) Ltd., Field Way, Greenford, Middx UB6 8UZ  
Tel: (01) 575 5757

# Revox B260



**R**evox are a Swiss firm who have a fine reputation for providing hi-tech tuner designs with excellent build quality. Reception conditions in Switzerland aren't the easiest in the world and, with an added problem of being centrally located in Europe where the FM bands are crammed to capacity, it's not surprising that their RF and IF sections have to be something special.

The FM only tuner is styled and sized to match the amplifier and CD players we have reviewed in earlier issues, and forms part of their fully remote system.

The instruction manual runs to 30 pages so it's impossible to do justice to all the facilities provided in a review of this length. Suffice it to say that this FM tuner has virtually everything the enthusiast could wish for.

All functions are implemented *via* push buttons with two displays to help select the exact settings for maximum performance from the incoming signal. Two aerial inputs, two RF and two IF sections are available to maximise bandwidth, sensitivity, and selectivity for best reception. Up to 60 stations can be stored in memory along with 11 selectable parameters for each – *eg* antenna selection, sensitivity, audio level, call letter, program type, etc. This is all made easy by the automatic search and memory setting system. 'P' type (program type) is available to index the stations into various categories – pop, classical, news, etc.

The main display (on the left) shows memory number, frequency and alpha numeric label with the subsidiary display (which lights when the window is lowered) showing the tuning set up. There are also mono, muting and two stage hi-blend facilities. Stored stations can be scanned in

ascending or descending order (each preset station heard for a few seconds) or selected *via* the key pad. As with Revox's amplifier, all subsidiary controls and displays are hidden behind a smoked glass panel which flips out of the way at the touch of a button.

In the future a Radio Data System Decoder will be available as an option.

## Lab Report

Sensitivity for a 50dB signal-to-noise ratio was  $1.7\mu\text{V}$  mono,  $25\mu\text{V}$  stereo, pretty impressive and little affected by RF or IF settings. Signal-to-noise ratio was also good. Alternate channel selectivity was very good on all settings and the capture ratio was perfectly adequate. AM rejection was very good and the distribution figures low. Stereo separation was well maintained at high frequencies and with 1.7V audio output no matching problems should result with modern equipment.

Frequency response was very flat up to 3kHz followed by a small 0.4dB depression centred at 8kHz, returning to normal level before the final roll-off above 15kHz. The signal strength meter has fine resolution over a range from  $1\mu\text{V}$  up to 150mV and must be one of the best fitted to any hi-fi tuner currently available.

## Sound Quality

The treble was a little defocused but had excellent detail, sounding a mite brash, and not as precise as it might have been. It was rather reminiscent of the Philips CD sound in this respect. The mid was lively, pleasant and tuneful with plenty of detail – perhaps the best available from FM. Bass was not quite in the same class, but pretty good nonetheless.

The overall sound was open, rewarding and very easy to get on with. Depth, ambience and mid focus were excellent for a tuner and it had a wide and coherent sound stage. When tried on the narrow IF setting the stage closed in to some extent but there was still plenty going on to make for interesting listening.

## Conclusions

Sophisticated and expensive, the B260 is ideally suited to partner the rest of the Revox range and should also work very well in other systems. Once the memories are set up it becomes very easy and quick to use with the correct RF, IF and aerial settings programmed for 60 preselected stations. Overall tuner performance and sound quality are up with the best, but unfortunately its price precludes purchase by all but the lucky few.

## Test Results

<b>Sensitivity for 50dB signal-to-noise ratio</b>	
Mono/stereo	1.7 $\mu\text{V}$ / 25 $\mu\text{V}$
<b>Ultimate signal-to-noise (CCIR/ARM/1kHz ref)</b>	
Mono/stereo	78dB / 70dB
<b>Muting threshold, R.F. level</b>	7 $\mu\text{V}$
<b>Alternate channel selectivity</b>	80dB
<b>Pilot tone rejection, 19kHz/38kHz</b>	78dB / >90dB
<b>AM rejection</b>	73dB*
<b>Capture ratio</b>	2.25dB*
<b>Total harmonic distortion at 100% mod.</b>	
1kHz, mono/stereo	–66dB / –65dB
<b>Stereo separation, 1kHz/5kHz/10kHz</b>	50dB / 50dB / 43dB
<b>Output level, 100% modulation</b>	1.684 / 1.713mV
<b>Channel balance, stereo</b>	0.15dB
<b>Dimensions (width, height, depth)</b>	45 x 11 x 33.5cms
<b>Typical price inc. VAT</b>	£918

\*see text

Reviewed by Chris Bryant

Rating: Recommended

F.W.O. Raich Ltd., 49 Theobald St., Rozehamwcod, Herts WD6 4RZ

Tel: (011) 953 0091

# Sony STS-700ES

This \$300 upmarket 'ES' tuner is the top current Sony model available in the UK. Described as 'direct comparator', it is larger than most, solidly built and finely finished. It is a quartz digital synthesiser design covering FM and medium and long wave AM, with 10 preset switches plus 'manual' and computer controlled electronic tuning.

A feature is the wide/narrow IF option which helps get the best performance from local/distant stations respectively. Pushbuttons and knobs select auto muting/mode plus a variety of tuning and programming functions such as 'scan'. However, the signal strength meter is rather more decorative than functional, using 10 segments to display five levels, with full saturation at a low 100µV.

## Sound Quality

FM sensitivity seemed subjectively very good, adequate for good stereo by 200µV and solid above 500µV aerial signal, with noticeably quiet backgrounds compared with the norm. The sound quality too is very good indeed, with excellent stereo focus and width, fine resolution at low and high frequencies, and



an even, smooth overall balance, perhaps a touch on the bright side compared with other leading references. Coloration was negligible, but a slight softening of impact was queried by one listener.

The AM reception was competent and the tuning indicator worked well. Backgrounds were again unusually quiet, and the sound quality was pretty decent, particularly in the bass, though the 'corner' of the HF rolloff seemed audible as a slightly 'quacky' coloration.

## Lab Report

An outstanding set of performance measure-

ments serve as a worthwhile benchmark against which lesser models may be compared, with signal-to-noise ratios particularly excellent. The normal/narrow tuning 'window' proved effective in operation, with appropriate advantages and disadvantages showing up in the figures.

## Conclusions

This is a first class tuner in every respect including FM sound quality, with above average AM reception. Though it is more expensive than average it shows what a basic Japanese IC package can achieve by intelligent engineering and a little relaxation of tight budgetary constraints, and fully merits recommendation.

## Test Results

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	2.6/36µV (3/39µV narrow)
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	-82dB/-75dB
Muting threshold, R.F. level	4µV
Alternate channel selectivity	71dB (83dB narrow)
Pilot tone rejection, 19kHz/38kHz	-73dB/-93dB
AM rejection	71dB
Capture ratio	1.8dB (2.6dB narrow)
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	-70dB/-65dB
Stereo separation, 1kHz/5kHz/10kHz	54dB/42dB/37dB
Output level, 100% modulation	570mV
Channel balance, stereo	-0.02dB
Typical price inc VAT	£300

Reprinted from issue No. 55 by Martin Colloms

Rating: Best Buy

Sony UK Ltd., Sony House, South Street, Staines, Middlesex TW18 4PF. Tel: (0784) 67000.

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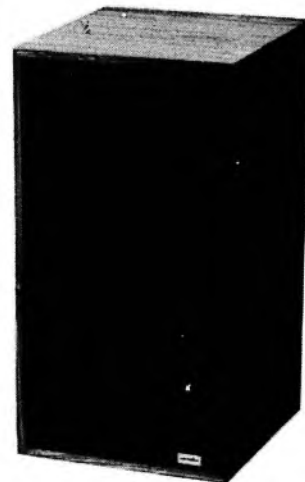


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Hi-Fi News April 1985



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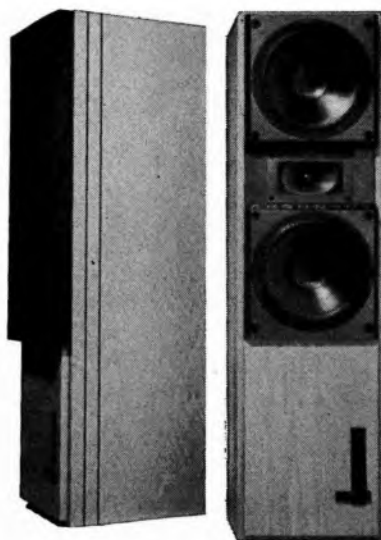
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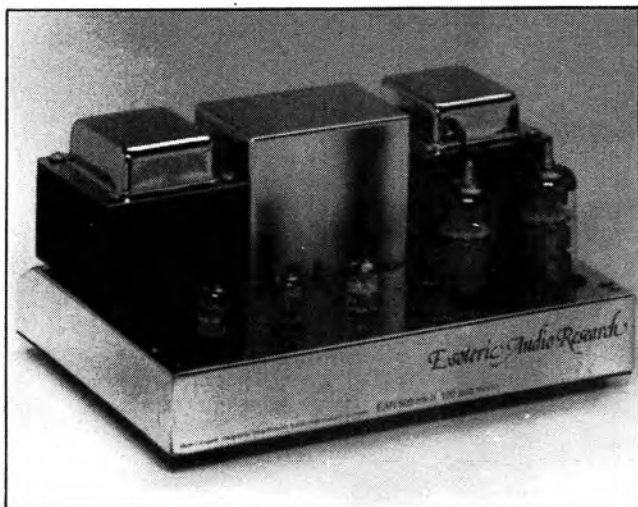
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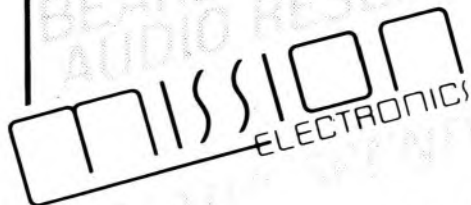
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# Apogee Caliper

**T**he *Caliper*, which inspired a brand of alcohol free lager, is the baby Apogee, the smallest model from the only known manufacturer of full range ribbon loudspeakers. Small, of course, is a relative term. The *Calipers* stand over 1.2 metres high and about 70cm wide – and weigh 35kg each. My arms and back can testify to the practical difficulties of schlepping them into and out of my listening room.

The *Caliper* has two planar drivers, a large trapezoidal bass ribbon and a thin suspended treble ribbon which are the full length strips positioned on the inside edge of the speakers. The speaker is fronted only by a thin, stocking-like netting, and is therefore extremely fragile, which the author has had cause to discover the hard way.

The frame to which everything is mounted clearly plays an important role in panel speakers. The *Caliper* has a complex and heavy wood and steel frame, and whilst there's some flexibility in the structure, it's significantly less than with any of the other planar speaker known to the author.

The *Caliper* is propped in a near upright position (a plumbline is provided to get the lean angle right) by an adjustable foot attached to an outrigger at the rear. As with many US loudspeaker designs, there's no provision for spiking and, from what I can tell, not much thought has been given to the question of physical support. The *Caliper* sounds considerably better completely upright, and better still a few inches above ground level.

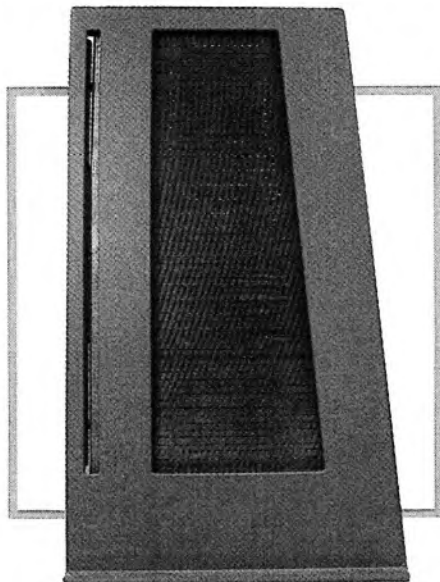
## Lab Report

Though not fully tested anechoically, evidence indicates that the *Caliper* has a deep, extended bass (there's useful output well below 50Hz) and that the response shape is surprisingly smooth (when set up properly – see later) throughout, albeit with a mild tendency to favour the bass.

Treble output is a little down on the most favourable axis. The other relevant factor is that the *Caliper* is not easy to drive. Impedance is very low and sensitivity even lower, though the figure-of-eight radiation pattern gives the speaker a good 'throw' in large rooms. The *Caliper* is a nominal 3ohm load, and reactive too, which combined with ultra-low sensitivity makes it something of a graveyard for amplifiers lacking very healthy current as well as voltage delivery.

## Sound Quality

The *Caliper* ain't your normal bag of potatoes. It requires care, attention, has very expensive tastes in amplifiers – and when that's all taken care of, it needs even more care and attention. Altogether you could call this a prima donna among loudspeakers, but



we'd be forgetting the bigger and even fussier (by virtues of their extra bass extension) models in the range.

The load sensitivity is beyond dispute. I have used an old series Krell *KSA50* power amp with the *Caliper* for some time and, although it works, the combination is almost subliminally uncomfortable. The idea that this is an Apogee suitable for use with receivers, which was an idea prevalent at the launch, begs the question, 'What kind of receivers are we talking about and which planet are they made on?' The *Caliper* really is both inefficient and hard to drive. The Musical Fidelity *A970*, on the other hand, turned out to be ideal.

Positioning must be approached in a thorough and painstaking way. Simply by varying the distance from the speaker to the wall behind in steps of, say, 10cm or so, the bass can be made to sound bloated and uneven, or correctly focused and integrated. As already said, the *Caliper* does tend to sound a little obvious in the bass; however, the real surprise is how deep and potent the bass is, and the level that can be sustained before the excursion limited diaphragms run out of room. (No harm appears to be sustained as a result of occasional overload.) Some surprisingly deep organ pedal stops can be reproduced without obvious doubling, and the *Caliper's* ability to move air barely stops short of producing an output that can be felt as well as heard.

But we need to look further to find the real reason for shelling out £2.5K for a pair of *Calipers*. On audition, bass quality was remarkable for a panel loudspeaker, but less so for a box speaker except in one detail – the free-breathing, open way bass was delivered.

No, it is the sheer musical competence of the mid and top that really marks the *Caliper* out, and that cannot be readily duplicated by conventional box speakers. The *Caliper* is totally seamless through this region, and capable of a rare combination of fluidity, resolution and positiveness. The freedom from the usual box-type 'cuppy' midband colorations, hardness and/or hollowness was expected; the natural, subtle ease of the sound wasn't, or at least not altogether. The most likeable quality perhaps is the individuality and presence of individual instruments which in the *Caliper* is combined with an otherwise unobtrusive quality bordering on gentleness when confronted by tape hiss or record surface noise.

One problem with *Calipers* is that they're a bit like enormous headphones. They're definitely 'hot seat' designs. Imaging is best for one or, at most, two people, and those listening well off-axis hear a rather syrupy and distant sounding mix. Like other panel designs, image scale can be disconcertingly large and forward, but with good recordings individual instruments are well separated and have very specific, localised imagery.

Those used to normal box speakers, which most of us are, may find the soundstage disconcertingly big at first, but it's also very outgoing, inviting, and is easy to adapt to. The baby Apogee has a marvellously natural sense of dynamics. Resolution is also of a high order, but there is a slight veiling which is partly associated with a reticence bordering on 'slowness' at the high frequency extreme. A little rejigging here wouldn't hurt, but this isn't a make or break matter.

## Conclusions

Antisocial yes, expensive certainly, but the Apogee *Caliper* offers a touch of real magic, allied to a sometimes excessive bass and a slightly dull treble. Probably the equal of the bigger Apogees in most respects apart from the reduced bass extension and maximum output level, the *Caliper* is recommended subject to the various caveats discussed in the review.

## Test Results

Size (height x width x depth)	122.5 x 71 x 10cm (excluding rear foot)
Recommended amplifier power/channel	80 – 200 watts
Recommended placement	free standing, away from walls
Frequency response ( $\pm 3dB$ , 2m)	n/a
Low frequency rolloff ( $-5dB/1m$ )	n/a
Sensitivity (ref 2.83V or 1w, 8ohms, 1m)	n/a
Impedance characteristic (ease of drive)	poor
Forward response uniformity	good
Typical price per pair inc VAT	£2500
Reviewed by Alvin Gold	
Rating: Recommended	
Absolute Sounds Ltd., 318 Worple Road, London SW20 8QJ	
Tel: (01) 947 5047.	

# Avance Concrete 2000



**A**vance is a Scandinavian manufacturer of high grade loudspeakers masquerading as traffic bollards, which are imported by HW International of Shure, Hafler and Luxman fame. The *Concrete* range consists of a number of closely related designs which differ in driver complement, size and price, but which share a key design idea – enclosures made of concrete.

The use of concrete, mixed in this case with a fibrous fill probably intended to improve damping and to make the cabinet less likely to chip (Avance don't specify), serves two ends. First, and most crucially, it is 'dead, free of inherent resonances (and) does not interfere with the reproduction of sound from the speaker units' – their words. Tied in with this, the nature of the design is such that the edges are not weak discontinuities as they are with wooden boxes. Second, and in contrast to boxes made of wood panels, concrete can easily be formed into arbitrary shapes, and the *2000* takes full advantage of this. The front panel is inclined slightly backwards at the top to give correct time alignment from a normal listening angle. The sides are skewed and faceted in such a way that there are no true parallel internal reflecting surfaces. Acoustic control is furthered by foam blocks. There's some rounding of baffle edges too, to reduce diffraction, an end that is best ensured by leaving the covers off. They do little for visual unity either.

The hardware is quite impressive. The three drivers include a large pulp cone bass driver with a massive magnet assembly and a diecast chassis basket. The cone is doped on the front, and has a thick line of a material akin to rubberised bath grout in consistency and stuck in a ring on the back. The mid-range driver is a plastic cone unit which works into its own enclosed line, and the tweeter is a small recessed soft dome, well engineered and plainly not of the 75p variety. The crossover is well made using well specified components, while internal wiring is a thick proprietary multistrand cable. The input terminals are solid brass and the rear panel is also home to a rear facing port. The outside of these heavyweight enclosures is finished in a very presentable textured white finish – very easily chipped, so be warned.

## Lab Report

All the frequency responses, whether measured anechoically or in room, showed a peaky, probably one-note bass, the peak appearing between 80 – 90Hz. There's a severe dip in output above this, around 200Hz, and again at 2kHz, both presumably associated with the crossover. Different listening axes predictably alter the equation somewhat, and to a certain extent integration seems better off axis than on. A broad response plateau exists between 400Hz and about 1.4kHz, which is in an area where the ear is particularly sensitive, and this, together with what is simply a surprisingly ragged shape overall, was essentially constant however measured.

The averaged in-room response, which gives perhaps the most representative feel for perceived balance, again shows strongly boosted output in the two main areas already mentioned – the bass and the midband. In all cases, however, the tweeter output was smooth and well extended. Power handling is in the 200watt region with music programme, and the *2000* will sustain high volume levels without distress. Sensitivity is below average, however, and amplifiers smaller than a good 50watts are not recommendable. The impedance plot is generally benign, with a 5.5ohm minimum. Distortion levels were fine.

## Sound Quality

As the key selling feature is the absence of a resonating chipboard enclosure, it was natural to look first at what benefits this provides. Having started off slightly sceptical about this aspect of the design, I must report that my scepticism was entirely misplaced. The lack of 'cabinet talk' was obvious in a number

of ways, the most impressive of which was the complete removal of a layer of low level, low frequency 'gunge' that the Avance suddenly reveals to be present in just about all its competitors. It's beyond question that what you hear from this loudspeaker comes almost entirely from the drive units, an impression that was much firmer than it was with other advanced enclosure designs.

All this tends to throw the spotlight on the rest of the hardware, and it's difficult to avoid concluding that the other parts of the system don't stand up altogether well to the additional exposure they receive. The Avance *Concrete* is coloured: there's an explicit forwardness certainly associated with the midband response plateau shown in the measurements, and the telltale rawness of phasing problems in the crossover region was also occasionally heard – programme dependent as usual. Piano tone was wooden and 'plunky' while the top end sounded slightly fuzzy and lacking in real extension. Bass depth and power were good, but there was some overhang and a suggestion of a 'one-note' effect, though not of the severity suggested by the measurements.

## Conclusions

Oversimplifying just a little, there are more than merely suggestions here of a fine enclosure let down by a rather ill-sorted combination of drivers and crossover. None of the latter are poor in themselves – just the opposite in fact – but the ingredients haven't really coalesced into a unified whole.

With further development the Avance *Concrete 2000* could be something special, but as it stands right now it is simply an example of the pitfalls of concentrating all efforts on a small subset of the range of problems that confront the designer.

## Test Results

Size (height x width x depth)	86.5 x 29.2 x 43cm
Recommended amplifier power/channel	200 watts
Recommended placement	clear of walls
Frequency response ( $\pm 3dB$ , 2m)	65Hz – 20kHz
Low frequency rolloff ( $-6dB/1m$ )	40Hz
Sensitivity (ref 2.83V or 1w, 8ohms, 1m)	94dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	poor
Typical price per pair inc VAT	£970
Reviewed by Alvin Gold	
HW International Ltd., 3-5 Eden Grove, London N7 8EQ.	
Tel: (011) 607 2717	

# B&W Matrix 1E



**T**hough compact, the *Matrix 1E* is a high-tech luxury-finish model, and at £595 clearly makes no compromise on costs. *Matrix* refers to a series of B&W models which have in common a radical advanced cabinet construction technique, designed to provide high stiffness through a 'honeycomb' internal structure, the '1' being the smallest and least expensive of these. The matrix cabinet is constructed in MDF and chipboard, with foam damping/filling, and has an effective internal volume of 12 litres.

The enclosures are narrow but fairly deep and surprisingly heavy, and are beautifully veneered in real walnut on five faces. An access plate fits flush into the base, and this proved to be the unfortunate nemesis of the fine cabinetwork of our samples. Moving 30 or so pairs of speakers around and stacking them as pairs, we realised too late that the screws retaining these plates had not been properly aligned and driven home, and had savaged and mutilated the top surfaces. Fortunately this is not likely to happen in actual use, but is certainly a point B&W could do well to note.

Both the drive unit chassis and front plate of the 200mm bass/mid unit are cast in one piece from magnesium alloy in order to ensure utmost rigidity. The tweeter is a 26mm polyamide soft dome attached to a separate magnesium alloy front plate. These castings have annular channels and cross members which are filled on their rear surface with high density polyurethane elastomer to damp out high frequency resonance.

The drive units are fed from a 4th-order high quality, hard-wired crossover network, which incorporates polypropylene film

capacitors and high power devices. Bi-wiring is available, accessed *via* the inset baseplate. Build quality throughout is first class.

## Lab Report

Sensitivity is a little below average, but one would imagine a *Matrix* owner is unlikely to be short of a few watts to drive them. A minimum power of 25W is suggested, but despite its diminutive size the '1' is quite capable of handling 150W. It is a fairly easy amplifier load, and a worthwhile by-product of the sensitivity is an unusually extended bass for the size, despite an alignment for free space siting. Loudness capability is about average.

The response trace, with grille removed, is excellent, with fine extension at bass and high frequencies and excellent frontal off-axis driver integration. Pity about the grille though . . . The in-room averaged trace showed an astonishingly close room match; bass happily extends down to 30Hz; the mid-range is superbly balanced; the treble showed a near perfect roll-off ( $\pm 3\text{dB}$  25Hz-8kHz in-room!).

Distortion was moderate in the bass and midrange, and very good in the treble. Pair matching was to a fine  $\pm 0.5\text{dB}$  throughout.

## Sound Quality

The *Matrix 1* was certainly one of the 'finds' of the project, rating a comfortable 'good' overall from both panels, and attracting some enthusiastic and quite consistent praise. Impressively neutral, it was also revealing and seductive in its fine midband and treble detail.

Bass was nicely extended, but the *PM* panel found it a little 'full', and less clear

than the rest of the range, while the one significant dissenter complained of general 'sluggishness'. Perhaps the *Matrix 1* is not the last word in dynamics and pace, and to some tastes might be considered a trifle bland. But it has qualities of subtlety unmatched by more 'fiery' designs, and gave exceptional clarity and focus when bi-wired.

## Conclusions

Celestion may have led the way in establishing high quality no-cost-compromise compact loudspeakers, but B&W's *Matrix 1* proves that they too have the technology and expertise to come up with the goods – albeit by adopting an entirely different approach. Clearly recommended, the refined nature of the *Matrix 1* makes it somehow better suited to the delicacy of acoustic instruments than the flagellation of synthesiser bass and percussion.

## Test Results

Size (height x width x depth)	41 x 23 x 32cms
Recommended amplifier power per channel (for 95dBa minimum per pair at 2m)	(25) – 150W
Recommended placement	(free space on rigid 45cm stands)
Frequency response ( $\pm 1$ – 3dB, 2m)	60Hz – 20kHz
Low frequency rolloff ( $-6\text{dB}$ , 1m)	50Hz
Voltage sensitivity (ref 2.83V or 1W into 8ohms, 1m)	85.5dB/W
Approximate max sound level (pair at 2m)	102dB/A
Impedance characteristic (ease of drive)	V good
Forward response uniformity	V accurate
Typical price per pair inc. VAT	£595
Reprinted from issue No. 53 by Martin Colloms and Paul Messenger	
Rating: Recommended	
Nakamichi B&W (UK) Ltd., Marlborough Rd., Churchill Ind. Est., Lancing, W. Sussex. Tel: (0903) 750750	

# Celestion System 6000



**C**elestion's *System 6000* loudspeaker is both an extension of the already highly regarded *SL600* compact monitor, and a system in its own right. After discussion, we decided it deserved its own separate presentation, but the reader should refer to our *SL600* review (issue 46) for more details on the satellite units themselves. The lucky owner of a pair of *600*s (or certain other speakers perhaps, notably the Quad *ESL63*) can purchase the *6000* upgrade (bass units and electronic crossover) and add his choice of an extra stereo power amplifier.

Since introducing *System 6000* Celestion have further developed the *SL600*, resulting in the *SL700* which is reviewed elsewhere in this issue. Note however that the *6000* bass extender is *not* suitable for use with the *700*.

With its radical lightweight alloy cabinet, the *600* is already regarded as a reference standard for fine stereo imaging and low coloration. But its basic dimensions inevitably restrict bass extension, loudness capability and power handling to a significant degree. The only solution is to add extra bass driving capability and so ease the demands on the small drive unit. But preserving the qualities of the *600* demanded extra care, some years of research and development, and a solution as radical as the original *600*.

The difficult part was in producing a subwoofer system whose enclosure was good enough not to swamp and dominate the sound of the system, masking the *600*'s greatest virtue. And the solution was to do without an enclosure entirely. Using a simple, low-stress frame, the *6000* subwoofer is an open-baffle twin-dipole design, more similar to a panel than enclosure loudspeaker, but with some of the characteristics of conventional dynamic drive units. To get real extension from a panel, you need substantial frontal area to prevent front-to-back cancellation – or you can supply the equalisation electronically in an active filter unit as Celestion have done here.

Electronic equalisation offers flexibility in bass alignment to suit room characteristics, while the separate mid-treble box and dipole bass structure allows the latter to be oriented to minimise the excitation of room

resonances, while the former are directed to give the best stereophony.

The *6000* bass unit may not be to everyone's taste aesthetically – there is an inescapable Star Wars air which suits the high-tech environment better than the ancestral pile. And if you can ignore the feeling that Royal Navy radar operatives may be watching your every move, there is no avoiding the conclusion that this is a most ingenious design which appears to offer remarkable performance from quite compact dimensions.

## SOUND QUALITY

From the start there was no doubt that this is a genuine fullrange audiophile quality speaker system. It sounded completely coherent, and showed significantly greater authority than the *600* alone. Gratifyingly, the subwoofers did not detract from the essential transparency of the standard *600*, and on some material the addition was barely detectable. Put on some wideband material and turn the wick up and the differences become real enough. The inherently mildly 'rich' upper bass balance is maintained, but reduced intermodulation (avoiding working the midrange unit down into the bass region) improves resolution and articulation substantially.

The system could achieve respectable rather than dramatically high levels, and substantial power amplifiers are required for full exploitation. The *6000* proved responsive to the improvements offered by costly amplification so the electronic equalisation circuitry clearly provides only marginal signal degradation, and the end result was fully competitive with several large exotic panel

models, while offering a superior overall performance balance to most. The extreme bass and treble were both naturally restrained, coloration was very low – a touch of nasality and a hint of sibilant exaggeration were noted – but the absence of cabinet effects and good subjective speed and control told their own story.

## LAB REPORT

No problems were encountered when measuring the supplied active equaliser unit, which shows very low distortion and is well tailored to the system, crossing over at 100Hz with effective 24dB/octave slopes. The sensitivity of the bass unit is higher than the *600* system, so there is no fear of low frequency overload – even when set to 20Hz extension, the equalisation is only +4.5dB at 20Hz.

The frequency responses were excellent on- and off-axis, with good low frequency extension to 25Hz. The effect of the directional dipole was evident in the room responses. With a little care and experiment it was possible to 'tune' the bass direction with respect to room boundaries to give a very even, extended response. The sensitivity is a low 82.5dB/W, suggesting a maximum loudness of around 100dBA. The impedance has a reasonably 'kind' 8ohms characteristic – except at very high frequencies where some capacitance has been known to upset some amplifiers.

## CONCLUSIONS

The ingenious addition of the *6000* subwoofer gives much more than it takes away, the only minor reservation relating to the electronics, which are very good rather than great. The *6000* deserves confident recommendation as a balanced full range system which ably builds on the strengths of the *600*, qualified to the degree that this is not a super-loud or -sensitive system. And as a parting note, Quad *ESL63* users might be interested to know what a good match the *6000* bass system is for these popular electrostatics, offering similar benefits to those afforded the *600*.

*Reprinted from The Collection II by Martin Colloms*

*Rating: Recommended*

Celestion International Ltd., Ditton Works, Foxhall Road, Ipswich, Suffolk IP3 8JP. Tel: (0473) 723131.

# Celestion SL700

Celestion's original showcase for their pioneering metal dome tweeter technology – the *SL6* – has developed into a family of related designs which are inseparably linked with the Celestion name and philosophy as, say, the *ESL63* is with Quad. Celestion have settled on a rigorous, though not unadventurous textbook approach to the design process, which results in a very high engineering content. The acknowledged difficulties of making the complex cabinet also partly accounts for the high price. But exotically engineered stands are included in the price, which by the manufacturer's reckoning might well command £300 if sold on their own.

The *SL700* is new and near the top of Celestion's range, the only more costly model being the *System 6000* which is loosely based on the lower spec *SL600* but includes subwoofers. To a first approximation it uses a modified version of *SL600*'s sandwiched aluminium honeycomb enclosure (the material is called Aerolam) along with a drive unit complement derived from, but not identical to, that of the *SL6S*. The crossover is completely new and bears no direct relationship to any other *SL* series network.

Apart from some new panel graphics, the *SL700* looks similar to *SL600*, the grey Nextel covering being identical. Inside the enclosure, though, Celestion have built in an Aerolam brace linking the sides, base and top. Another difference is that the rear houses four rather than two 4mm sockets for bi-wiring or bi-amping. Links are provided for conventional operation.

The bass unit has a diecast basket and the Cobex-like cone from the *SL6S*, but with a new magnet assembly. The tweeter likewise is the alloy dome originally employed in that application, but selection criteria have been tightened. There's a foam filling to absorb some of the energy inside the box, a very well constructed crossover, and solid core wiring based on Hitachi LC-OFC stock, silver plated and with a PTFE dielectric. The crossover inductors are also LC-OFC and wound onto laminated gap cores. Capacitors are polypyrrolene high power components, hard wired and laid in foam for decoupling. The bass and treble sections are physically separated. Level matching is achieved by using a shunt treble inductor as an auto-transformer, which eliminates a series resistor.

## LAB REPORT

On the whole the Celestion lived up to expectations, but the anechoic responses showed two interesting trends: first a loss of output above 15kHz (on a less exacting design this would barely merit comment) prior to the



usual sharp out-of-band response peak, (which is about +10dB at 23kHz). The other, and it's a more important observation altogether, is that there's a general slight loss of output, averaging about 2dB, over the main part of the midband from below 1kHz to above 3kHz.

Off-axis response runs were on the whole remarkably consistent with the forward pattern, and confirm the general trends. Bass extends smoothly down to 45Hz/-6dB, which is surprisingly low for the box size. Pair matching is effectively perfect, and there are no front grilles to screw up the sound – or the good looks.

Measured at the normal 96dB test level, both 2nd and 3rd harmonic distortion were high, though the figures reduced dramatically as the level dropped. Seen from the amplifier end, the *SL700* is a reactive if not a low impedance load. The impedance plot shows some very sharp impedance changes, and this, together with very low sensitivity, highlights how amplifier fussy this design is. Avoid using amplifiers with high source impedance, or high impedance cables.

## SOUND QUALITY

I have persevered with the *SL700* on and off for a period of about two months, using a variety of complementary and in some cases not so complementary systems. I don't wish to make it sound like an ordeal, but somewhat ruefully have to admit ending up as perplexed as I was at the outset.

First point is that my expectations (and I expect many *SL6* and *600* fans will feel the same) were confounded. In a general sense, the *SL6* (and derivatives up to but excluding the *SL6S*) have tended to be rather gentle,

archetypally English transducers, their inability to offend being at once the summit of their achievement, and to detractors, their Achilles heel. The *SL700* seems in some ways almost like a deliberate rejection of the heritage; it's clearly bright, and good as the tweeter is – it lacks the spitefulness and false emphasis of most soft dome tweeters – it's far too obvious in this application.

The bass and lower midband on the other hand had a marvellously articulate and truly holographic quality. In one musical example, a Schubert piano trio (*Opus 100* on Harmonia Mundi/Les Musiciens), the piano and cello had a remarkable naturalness, in particular a sonority and spaciousness that in my system allowed the reproduction chain to almost vanish, which isn't exactly an everyday experience. Yet measured against the same standards, the violin on the same recording was coarse and dry, its image leaping forward, immediately pulling the illusion down to earth. The Celestions were not wholly convincing with rock music either where they could sound rather pushy. On the plus side, the speakers were relatively unfused by different listening environments.

The stands by the way proved to be superb, not merely in this application, but also with other small, high grade loudspeakers, notably the *AE1* from Acoustic Energy. Maybe Celestion will relent and make them available on their own, because at the moment they're about the best stands you can't buy.

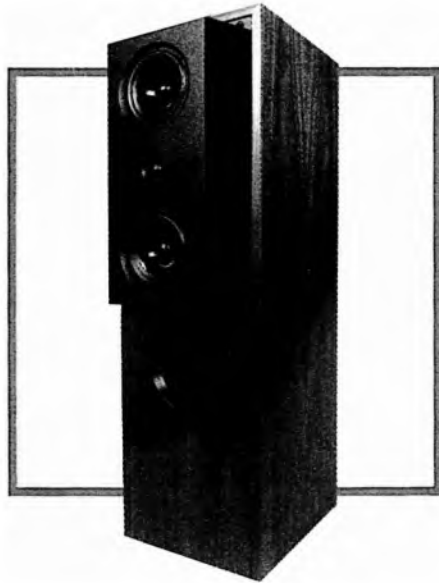
## CONCLUSIONS

This is early days for what is a very costly and complex design which sounds like nothing less than a classic in the making. The raw qualities are clearly there, but the high frequency end is not yet fully integrated and so the system lacks balance. Celestion themselves have identified several minor weaknesses even during the course of this review. I reviewed sample number 9 from the first production batch – Celestion expect to have made about 2000 by the time this reaches the bookstands, and what is written here should not be taken as anything other than a snapshot of a model at an early stage in its career.

## TEST RESULTS

Size (height x width x depth)	37.5 x 20 x 23.5cm
Recommended amplifier power/channel	50 – 150 watts
Recommended placement	free air, on tall stands
Frequency response ( $\pm 3dB$ , 2m)	50Hz – 20kHz
Low frequency rolloff (-6dB/1m)	45Hz
Sensitivity (ref 2.83V or 1w, Bohms, 1m)	83dB
Impedance characteristic (ease of drive)	poor
Forward response uniformity	good
Typical price per pair inc VAT	£1220 inc stands
Reviewed by Alvin Gold	
Celestion International Ltd., Dilton Works, Foxhall Road, Ipswich, Suffolk IP3 8JP. Tel: (0473) 723131.	

# Kef 104 / 2



**F**ew speakers have ever combined as much innovation in one package as the Kef 104/2, and the fact that it is still regarded as a key model some four years after introduction shows that it is standing the test of time well. Our original review covered an early sample, so the introduction of an optional additional *KUBE* bass equaliser provided an excuse to try a sample from current production.

The 104/2 is a substantial floor-standing speaker, supplied with adjustable spikes or studs, and designed for siting well away from side and rear walls. The main carcass, properly veneered on all faces, is a special form of 'coupled-cavity' bass system. Two matched, vertically opposed drivers mounted inside the box, provide highly efficient and carefully 'tailored' output through a large shaped port situated just below the mid/treble sub-assembly. Twin 100mm midrange drivers flank a single 25mm tweeter on this slim sub-baffle fixed to the front of the main carcass.

The five drivers are linked using a complex 'conjugate load' crossover in order to cancel any impedance variations and leave a flat 40hm load—easy for an amplifier to drive, but quite demanding in terms of current delivery.

The £800 104/2 is now available with a special *KUBE* equaliser costing an extra £100, which is an electronic 'black box' that sits between pre and power amp or in a tape monitor loop. This allows very precise 'tailoring' of the bass-end to suit particular room and siting characteristics, and a measure of control over the 'loudness vs bass extension' trade-off.

## Lab Report

There seemed little point in carrying out a

full repeat measurement programme on this model, though we did check room-averaged responses with and without *KUBE*. The sensitivity is a substantial 92dB, needing minimal amplifier power for really high levels, and the load is basically easy, though one which may draw current a little heavily for smaller valve amplifiers. Without *KUBE* the bass is not perhaps as extended as one might expect, though this is part of the sensitivity trade-off, which *KUBE* users can avoid if desired.

The response measurements were very good indeed, flat and with good integration between the drivers. And the grille is better left on, a refreshing change indicative of painstaking skill at the design stage. Distortion and compression were both low.

The room responses showed improved mid and treble smoothness over the earlier model tested, with just a hint of presence 'brightness' remaining. The low frequencies showed the same mild upper bass heaviness but with decent extension when checked without the equaliser. With the equaliser in circuit the lower mid/upper bass had been flattened out, while the lower bass was very well extended but also distinctly 'heavy'.

## Sound Quality

Used without equaliser, 104/2 managed a good overall rating on the *PM* tests despite a wider than usual variation between listeners. There was wide praise for the power and 'punchy' dynamics, good stereo imagery and generally low coloration (albeit with some 'boxiness'). But the bass was a bit 'thumpy' and the treble a little forward, and qualitatively not to all tastes. The addition of *KUBE* flattened the bass noticeably but also com-

promised transparency – to a degree which may depend on the driving system.

The *MC* panel rated the 'straight' 104/2 a fine 'good plus', but downrated this to merely 'above average' when *KUBE* was in use, whereupon clarity, transparency and 'speed' seemed affected and the bass became too heavy. The 104/2 on its own was liked for its fine combination of liveliness with powerful tight bass and low coloration with precisely focused stereo images.

## Conclusions

Still capable of polarising opinions and interacting unexpectedly with different rooms, Kef's 104/2 remains a reference point, offering excellent engineering and quality build with considerable subtlety and prodigious loudness capabilities. Clearly recommended in standard form, we are less convinced by the *KUBE* option; probably innocuous and maybe useful in more modest systems, the transparency loss with the ancillaries used for our listening tests was too large to ignore.

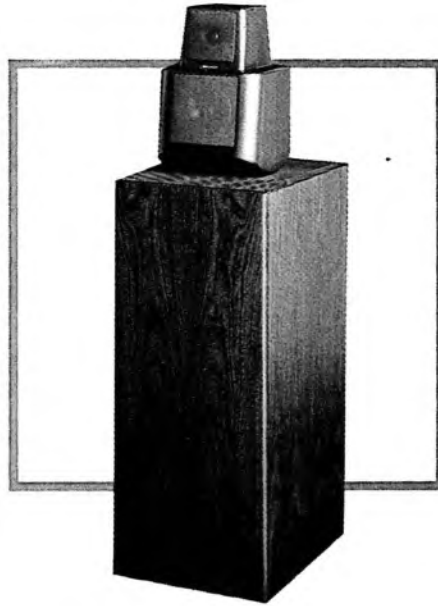
## Test Results

Size (height x width x depth)	90 x 28 x 41.5cms
Recommended amplifier power per channel (for 96dB minimum per pair at 2m)	(10) – 200W
Recommended placement	free space floor standing
Frequency response (+/-3dB, 2m)	60Hz – 20kHz average
Low frequency rolloff (-6dB, 1m)	50Hz
Voltage sensitivity (ref 2.83V or 1W into 8ohms, 1m)	92dB/W
Approximate max sound level (pair at 2m)	110dB average
Impedance characteristic (ease of drive)	V good
Forward response uniformity	V good
Typical price per pair inc. VAT	£860 (KUBE £100)

Reprinted from issue No. 53 by Martin Colloms and Paul Messenger  
Kef Electronics Ltd., Tcville, Maidstone, Kent ME15 6QP  
Tel: (0622) 672261



# Kef 107



**A** new flagship model from KEF is a rare and inevitably innovative event, and the Summer '86 launch of Model 107, introducing a 'hybrid' approach to crossover network design, is no exception. 'Hybrid' in this instance refers to a combination of active and passive drive techniques. The loudspeaker is supplied complete with a small and neat mains-powered unit that takes over the role of equalising the loudspeaker's response between pre- and power amplifiers (or within the tape record/replay loop of an integrated amplifier), while performing a few other useful tricks besides.

The loudspeakers themselves are quite large, but attractively styled and not unduly obtrusive. However, they should ideally be sited clear of walls to give lowest coloration from the wide dispersion mid and treble, and are in any case clearly better suited to the larger room.

The ancestry of both the 105 and 104/2 models may be seen in the physical makeup of the 107, but with obvious refinements. The bass section uses the efficient 'coupled cavity' principle introduced on 104/2, but with larger drivers and enclosures, plus a port which exhausts upwards immediately under the midrange driver, giving good co-unit integration and even horizontal dispersion. As before distortion is reduced by operating the twin drivers in opposition, with mechanical coupling. The mid and treble units are mounted in a head assembly similar to that used in Model 105 (now discontinued) but with substantial reinforcement and extra damping.

Each enclosure has a complex and very closely toleranced dividing network which incorporates KEF's 'conjugate load matching' technique. This adds extra components in parallel to 'neutralise' the impedance and phase load variations across the frequency range. The result is a completely flat 4ohm impedance which allows any reasonable amplifier to use its full power potential, by avoiding any 'awkward spots' which can limit available headroom.

The advantages of supplying the equalisation electronically ahead of the power amplifier are twofold. The main task of equalisation is to extend the bass response, and in a passive crossover this is normally achieved by wasting some of the power supplied in the midband. By using electronics, KEF boost the bass power supplied instead, and so avoid this wastage, which is worthwhile because the midrange contains the highest energy

levels with most types of music.

The equaliser unit also has a wide range of bass alignment options, allowing user selection of the ultimate low frequency cutoff, the Q factor which determines the 'character' of the bass (rich, dry etc), and a 'contour' to compensate for room boundary effects. These greatly assist in matching the system to the room, the site in that room, the other components of the system, and the personal taste of the user - and give an ability to choose the tradeoff between system loudness and bass extension according to circumstances.

## Sound Quality

The model 107 gave remarkable results with quite modest amplification, proving capable of extravagantly high listening levels and a large scale sound, the unusually good dynamic headroom giving a welcome sense of ease and lack of strain at most normal levels. Coloration was low, stereo spacious and precise, with fine detail well portrayed, while the overall balance - closer to the older 105 than KEF's more recent 104/2 - was neutral and free from any exaggeration. However, 107 is capable of 5dB more loudness than 105, and proved superior in extension and other qualities besides.

Minor criticisms were noted nevertheless. There was a slight loss of 'air' and 'dulling' in the extreme treble, plus a touch of mild congestion in the upper vocal range. While the bass sounded impressively clear, 'fast' and dynamic, it was also a touch 'heavy' at very low frequencies - true even with the best *KUBE* setting for room and site. With certain special discs such as the Telarc 1812 cannons the heavily boosted bass could be driven

into distortion, but this was never any problem using normal material.

When used on the end of a top line system with thousands of pounds worth of amplification, the improvement over cheaper amplification was not as great as had been expected. The finger of suspicion points to the *KUBE* itself, and this was more or less confirmed by trying the system *KUBE*-less. Without its designed equalisation, and listening through the balance changes, an improvement in transparency was noted.

## Lab Report

Measurement gave the *KUBE* a clean bill of technical health and confirmed the accuracy of the various equalisation functions. The overall range of adjustment can be quite high, from a 12dB cut at 50Hz to a 22dB boost at 10Hz, the latter inevitably making some demands on amplifier headroom under some circumstances. More typically, +6dB at 30Hz should pose no problems, and the high inherent sensitivity of 90dB/W is further assistance. The impedance was confirmed as an essentially resistive 4ohms, which should create no problems with a decent modern amplifier - rather the reverse, the amplifier should find it easy to deliver near rated power without drama.

The frequency response measured super-bly on axis, with  $\pm 2$ dB 40Hz-20kHz. Mild crossover region unevenness measured above axis should not trouble the seated listener, while lateral off-axis and nearfield plots showed fine control and drive unit integration. The room responses confirmed a natural (*KUBE*-less) extension down to 25Hz, and confirmed the subjectively noted slight excess of low bass relative to upper bass/lower mid when the *KUBE* was used.

## Conclusions

Taken overall Model 107 looks a remarkable package, combining accuracy and stereo subtlety with high sensitivity, loudness and bass extension, plus unusual user flexibility in a package of excellent acoustic performance and reasonably modest dimensions. Its particular forte lies in driving large rooms without the need for expensive amplification, but the moderate transparency limitations of the *KUBE* electronics somewhat restrict its suitability for partnering more exotic amplification.

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Rating: Recommended  
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# Linn Sara 9



**D**ubbed the *Sara 9* for internal purposes by Linn Products, the original model was launched nearly nine years ago, but has undergone considerable development throughout that period. Available now only in passive, single wire form, the only recent visible changes are the switch to 4mm loudspeaker sockets from the original (somewhat idiosyncratic) Canons, and an earlier change to a Medite enclosure. The latter improved the standard of finish, the front edges acquiring a smoothly rounded form with predictable benefits both to styling and to cabinet edge diffraction effects.

The *Sara* is unusually well built and extremely heavy for its size. The squat, shallow sealed box of just 20 litres volume is fitted with the Linn's standard (Scanspeak) soft-dome tweeter and two modified Kef *B200s*, one mounted behind the other either side of a sealed cavity that is part of a complex mass loaded plastics moulding which also forms the front baffle. The two bass drivers are driven in parallel (hence the 4ohm rating), the rear one reducing back pressure on the first, which is equivalent to allowing the front driver to 'see' a larger box enclosure than is in fact provided. (Another way of looking at this arrangement is to say that the two closely coupled drivers have an effectively doubled cone mass, reducing the LF resonant frequency and extending bass response.)

For the *Sara 9*, the bass unit has been extensively modified. A heavier, better damped suspension and surround helps tame midband behaviour, and reduces the former violent LF impedance changes. The crossover has been completely redesigned, and is now a 4th-order 'all pass' Linkwitz-Riley network. This in effect has a 'Butterworth squared' response which is substantially in phase over the crossover region – the latter now at a lower 2kHz. The *Sara* also now has 200µs built-in L-C delay (in three stages of 65µs so respectable sounding components can be used) by way of time alignment.

## Lab Report

The *Sara* has always had a distinctive, mid-prominent frequency balance, but this has been much tamed in this latest incarnation. There's still a gentle decline in LF output that can't be fully compensated by proximity to a wall, and the room averaged response shape points to an upper bass suckout. Bass extension is excellent, however, and the raw

50Hz/–6dB figure doesn't account for wall loading, or the very gentle nature of the rolloff below that figure.

There is a gentle decline at the HF end of the passband too, but the effect was just that – gentle. The cumulative evidence from the off-axis responses shows that the *Sara* has a remarkably consistent radiation pattern laterally, giving a wide listening window. There are no sharp on-axis discontinuities, although the tweeter's HF resonance can be seen as a high Q peak at 20kHz. In the 15 degree above-axis plot, there's a narrow, deep 2kHz crossover notch, but the response shape is otherwise essentially identical to the axial one.

The use of two bass drivers in tandem seems to have succeeded in reducing distortion, as levels are very low. Pair matching is very good, and as expected the foam covers make virtually no measurable difference to the forward response shape. (There is a very slight but definite *audible* difference, however, and if anything the system sounds a little tidier at HF with the covers in place.)

There was a time when the *Sara* was classified as a punishing amplifier load. No longer. Although still a 4ohm model, impedance never falls below this value (it used to hover around 3ohms), and the load is much less reactive than before. Sensitivity is about average, assisted by the lower than normal impedance. So as long as your amplifier is happy driving 4ohm loads, other demands are purely qualitative.

The clear suggestion from the measurements is of a more civilised, accurate transducer than before, but one that still provides some continuity with the past.

## Sound Quality

There's an argument which suggests that this is the best Linn loudspeaker of them all. The bigger *DMS* and *PMS* are certainly much harder to build successful systems around, and the newer and technically more neutral (read 'accurate') *Nexus* somehow fails to stir the emotions (review last issue). The *Sara* on the other hand is special.

Without a shadow of a doubt, the *Sara* has never been in better voice. Although it always had some distinctive and pervasive strengths, it was also inclined to 'shriek' or simply sound hard. The *Sara* now is much smoother and sweeter, but also sounds as positive and as tangible as ever. The old strengths are as they were: bass depth and power are exemplary for the enclosure size, and show up some much larger designs. But the *Sara 9* offers more grunt and less bark. Dynamics are excellent too, and the system can be driven hard and loud without distress or inconsistency. It's a much more accommodating design than before, and virtually free of the 'edge of the seat' quality of old.

The most remarkable change, however, is in the stereo imaging. The *Sara* always sounded quite tangible, but image specificity was vague and depth information suppressed. The crossover changes and time alignment have had the effect of opening the image out, and greatly extending depth resolution.

## Conclusions

The *Sara* was always good, but unevenly so, and often hard to take, depending on individual sensibilities. The new one is easier to use, and a good deal easier on the ear, without loss of the distinctive strengths. Just the opposite in fact, so it perhaps deserves an accolade as 'most improved loudspeaker of the year' – Recommended, and with some enthusiasm.

## Test Results

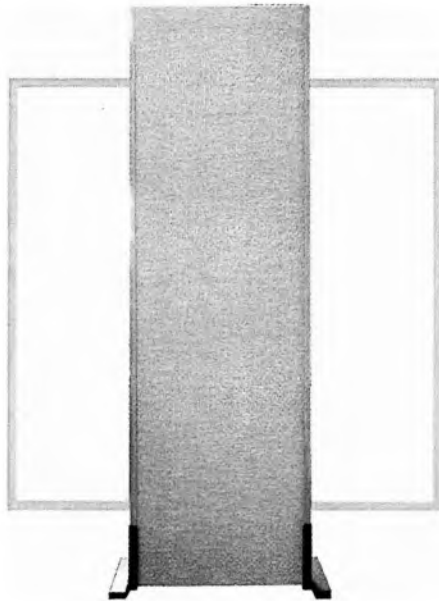
Size (height x width x depth)	43 x 34 x 26.5cm
Recommended amplifier power/channel	50 – 200 watts
Recommended placement	stand mounting, near wall
Frequency response (±3dB, 2m)	75Hz – 20kHz
Low frequency rolloff (–6dB/1m)	50Hz
Sensitivity (ref 2.83V or 1w, 8ohms, 1m)	88dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	quite good
Typical price per pair inc VAT	£729

Reviewed by Alvin Gold

Rating: Recommended

Linn Products Ltd., Floors Road, Waterfoot, Eaglesham, Glasgow G76 0EP. Tel: (041) 644 5111.

# Magneplanar MG 2.5R



Previous panel loudspeakers manufactured by the Magneplan Corp. have been distinguished by the presence, or otherwise, of an integral ribbon tweeter. In an attempt to bridge the gap between the costlier panels and the more affordable non-ribbon designs, Magneplan have launched the Magneplanar *MG2.5R*. Broadly speaking this loudspeaker marries the conventional panel of the *MG11c* with a wide-range ribbon element similar to that found in the *MG11a*.

Sheathed in an off-white woven fabric and complemented by reinforcing oak side panels, the basic design enjoys an elegant simplicity. The internal skeleton is fashioned from a slab of 19mm Medite with individual sections catering for the bass panel, ribbon tweeter and crossover network. Despite cramped conditions, good quality components are employed in the 12dB/6dB per octave dual-slope crossover, including air-cored inductors and large polypropylene capacitors.

All signals below the nominal 800Hz crossover frequency are handled by a strategically clamped mylar film that measures some 25.8 x 150cm. A long, single brass wire is distributed up and down this mylar film so as to form a planar voice coil. When an audio signal is applied, the induced electromagnetic field interacts with a succession of fixed parallel bar magnets, causing the diaphragm to move one way and the other. These magnets actually take the form of a perforated sheet, fixed to the front face of the main frame in order to protect the delicate moving film from accidental damage.

Midrange and higher frequencies are reproduced by a pleated alloy film that operates within a field set up by two opposing magnets. Some 94cm long but only 0.5cm wide and 2.5 $\mu$ m thick, this metallic ribbon has a finite lifetime of between 1 and 4 years depending on usage and abuse. Fortunately, burst ribbons may quickly be replaced by the user with recourse to little more than a screwdriver.

## Lab Report

Due to the peculiar directivity pattern and

close proximity effects displayed by such a dipole loudspeaker, traditional on-axis sensitivity measurements proved misleading. In practice the 81-82dB/1W/1m result should be replaced for a more realistic (though still below average sensitivity) figure of 84-85dB/W. The maximum estimated sound pressure level was 103dB, though this was achieved with the minimum of compression, 0.05dB being measured at 96dBA. Both odd-order harmonic distortions and IMD products were maintained below 0.5 per cent from 150Hz-15kHz, further evidence of the low coloration displayed by this design.

Without the series damping resistor in place, the *MG2.5R* demonstrated a nominal impedance of some 5ohms (mainly resistive) with a minima of 3.5ohms indicated above 3.8kHz. A time and position-averaged in-room frequency response demonstrated a declining trend either side of the 800Hz crossover frequency, the ribbon displaying very even distribution above 1.2kHz while the bass suffered several mild +3dB discontinuities between 250Hz and the theoretical -6dB point of 35Hz.

## Sound Quality

Employed with a neutral system the supplementary treble padding resistors (1ohm non-inductive types) were not required to tame the explicit bite of the ribbons. These resistors are also less likely to be required if the ribbons are deployed at the outside edge of the speakers, as suggested by Magneplanar themselves. In common with all Magneplanar loudspeakers, the *MG2.5Rs* sounded a little tight and lacking in fluidity for the first few days, while the upper bass performance was considered a little lumpy. Nevertheless,

once the large panel had 'eased' it not only displayed a very smooth, detailed and well-integrated bass but also benefitted from a perceived increase in low frequency extension.

Similarly, the etched transparency offered by the accompanying ribbon seemed to blend in more successfully with the faintly warmer and softer aspect of the lower octaves. Treble passages were rendered with extreme care and precision, the sheer transient speed of the open ribbon setting it apart from conventional dome varieties. Capable of recreating an impressive and realistic soundstage populated with uncannily tactile stereo images, the *MG2.5R* still erred on the side of subtlety and finesse rather than that of blatant dynamics. Across the entire audible spectrum the perception of refinement and detail resolution was of a calibre rarely encountered, the singular lack of any 'bloom' or boxy colorations ensuring that the transition back to a conventional moving-coil design would be a disappointing experience.

## Conclusions

Magneplanar appear to have succeeded in offering *MG11a* quality at a price many enthusiasts might readily contemplate. In essence, the *MG2.5R* offers the low coloration and profound musical insight of the better electrostatic loudspeakers but without the penalty of reduced low frequency extension. With some extra sonic solidity and improved stereo focus offered in the form of Foundation Audio's clamp-on Maggie feet, the *MG2.5R* sets an overall standard few other designs can hope to match.

## Test Results

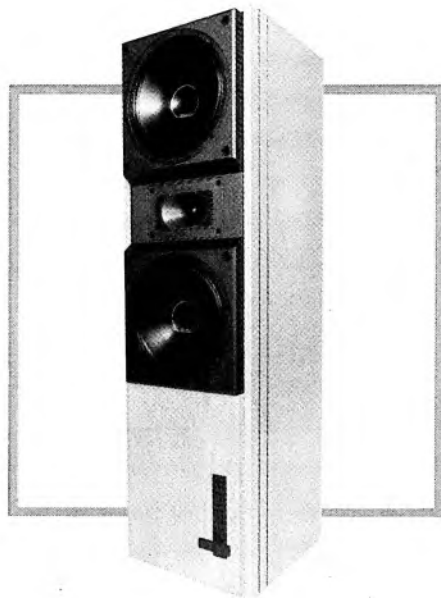
Size (ht x wd x dep)	185 x 56 x 4.5
Recommended Amplifier Power	50-200W
Recommended Placement	Maggie Stands, clear of rear walls
Low frequency rolloff (-6dB)	35Hz
Voltage sensitivity	83-85dB/W
Approximate maximum spl	102-103dBA
Impedance trend	Very Good
Uniformity of fwd. response	Very Good
Typical Retail Price	£1857

Reviewed by Paul Miller

Rating: Recommended

Absolute Sounds Ltd., 318 Wexple Road, London SW20 8QU  
Tel: (01) 947 5047.

# Mission Argonaut



The £700 *Argonaut* is the top model in the extensive and popular Mission range. Quite large, it is a floor-standing model which needs no separate stand, is slim with a small (spiked) 'footprint', and is aligned to be sited fairly close to a rear wall. The review pair were supplied in the most attractive grey-stained veneer thoughtfully tone-matched to the PM's new carpet and leaving him finding excuses to hang on to them. The front baffle has a step to aid driver time-alignment, and though the grille has some clever shaping it is still better left off whereupon the elaborate baffle trim lends a slightly aggressive appearance.

This is a three-way design, using twin 200mm polypropylene cast-frame units for the bass, rolling off the lower one quite early and allowing the upper driver to handle most midrange chores. This in turn is succeeded by a mildly horn-loaded tweeter – an unusual approach for a dynamic loudspeaker, but helpful in achieving this design's very high sensitivity. Extra terminals allow for normal single-run or bi-wire configurations, and the comparatively simple crossover uses high quality components – film caps, WW resistors and heavy multistrand hard-wiring.

Build quality and finish are both excellent. The 60 litre sealed box enclosure is made from fairly lightweight 12mm board, but there are two circumferential braces and additional cabinet wall damping pads, and the main front baffle is built from substantial 24mm MDF.

## Lab Report

Sensitivity is a remarkably high 91dB, so amplifier power availability will not be any problem, though residual power amp noise

could start to become irritating! Bass extension remains quite generous, though the load presented to the amplifier is a little current-hungry at low frequencies as is often the case with tandem bass systems. No problem for decent transistor amplifiers, but valve fans should check compatibility. Given the power handling, loudness capability is prodigious. And given the right material, the *Argonaut* can really 'rock the house'.

The response traces were pretty decent, though with unmistakable evidence of a steady rise on-axis at high frequencies, probably due to the horn coupling. However, with the speakers sited straight ahead, a well placed listener will probably receive just about the right off-axis angle for optimum response. Grille removal makes a slight improvement in smoothness, but overall integration and off-axis responses were all pretty respectable. The room-averaged response showed an excellent extended low frequency match, with a 'basically neutral balance enlivened by slight richness, forwardness and brightness. Distortion was low, and pair-matching within an excellent  $\pm 0.2$  dB.

## Sound Quality

After a little experimentation in finding the optimum position, the *Argonaut* rated a fine 'good plus' in the PM tests. There was a tendency to low frequency richness, and some criticism of forwardness and treble harshness and 'shimmer'. But this was more than compensated by the fine dynamics, weight and scale, the lively and articulate presentation.

The MC panel came to very similar conclusions, experimenting also with bi-wire and near free space conditions to advantage.

Described as 'a bit of a rock machine', the sound could have been purer and sweeter, and a 'sheeny' treble was not to every taste, but again good detail, dynamics and power were well appreciated.

## Conclusions

Not perhaps the sweetest or subtlest of speakers, the Mission *Argonaut* nevertheless offers impressive drama and excitement, and a sound quality rating quite sufficient to merit Recommendation. It provides a rare combination of fine room-matched bass extension with the capability to go really loud, while at the same time taking up a bare minimum of floorspace in the domestic environment. On the grey carpet they blended in so beautifully...

## Test Results

Size (height x width x depth)	95 x 23 x 31cms
Recommended amplifier power per channel (for 96dB minimum per pair at 2m)	(10) – 200W
Recommended placement	floor standing near rear wall
Frequency response (+/- 3dB, 2m)	60Hz – 20kHz
Low frequency rolloff (-6dB, 1m)	40Hz
Voltage sensitivity (ref 2.83V or 1W into Bohms, 1m)	91dB/W
Approximate max sound level (pair at 2m)	109dB
Impedance characteristic (ease of drive)	below average
Forward response uniformity	above average
Typical price per pair inc. VAT	£700
Reprinted from issue No. 53 by Martin Colloms and Paul Messenger	
Rating: Recommended	
Mission Electronics, Stonehill, Huntingdon PE18 6ED.	
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# Mordaunt-Short System 442



This recent flagship from Mordaunt-Short – their first for many years – is also a trendsetter in integrating loudspeaker and stand, a development which looks set to become increasingly important over the next few years. M'S's application is original and unique, with a number of other radical techniques. The result is an expensive but attractively compact design – if a touch robotic in appearance.

The 442 starts with a rigid backbone stand, to which the drive units are firmly mechanically fixed. The 35 litre reflex-loaded cabinet is then attached *via* vibration absorbing gaskets, still acting as enclosure for driver rear radiation, but avoiding most vibration excitation. A further feature is an extra rear-mounted bass driver which opposes the mechanical movement of the main driver at low frequencies and helps improve linearity.

More so than other integrated stand designs, the 442 is easy to set up and install, merely requiring the removal of two transit screws underneath to float the cabinet. Additional refinements include the direct coupled main bass/mid driver, using a polypropylene cone in cast magnesium frame, and subtly designed mechanically to need no crossover circuitry. The crossover permits tri-wiring, while M'S' effective Positec protection circuitry provides some user peace of mind.

Build quality is excellent, with real wooden veneer cabinetwork combined with extensive black fabric grille material. Inside the steel backbone connects to the aluminium baffle and rear driver by tuned aluminium rods, while the rubber finished foot is equipped with proper adjustable spikes. The £1150 price may seem steep, but

is much less so when the quality of the ingredients and radical engineering are taken into account. Free space siting is essential, to avoid unwanted bass boost and reflection effects from the rear driver.

## Lab Report

Sensitivity is a comfortable 87.5dB/W, capable of giving decent levels from a modest 20W of amplifier power. Yet power handling is clearly very generous, so high sound levels are available, but a rather low impedance in the bass region is best driven by a good quality amplifier with healthy current delivery.

The bass shows decent extension, albeit with some lift at very low frequencies. The responses showed a notch effect in the mid-bass, a function of cancellation in this twin driver arrangement, and this is likely to produce some sensitivity to precise siting – careful experimentation will be worthwhile. The responses were generally very even, smooth and flat through the midband and treble, with decent off-axis integration but mild evidence of unwanted grille effects (a pity, as the rebating is good and the speaker looks odd with grille removed). The loss of upper bass energy and mild low bass boom was seen in the room-averaged response, but the extended bass and smooth mid and treble were both confirmed.

## Sound Quality

Though not auditioned blind because of siting constraints, the 442 was a clear favourite amongst the *PM* panel, largely because the sound was fundamentally very clean and unfatiguing, even though there was mild criticism of the slightly heavy, rich bass, and a slight lack of sparkle and speed.

The *MC* panel confirmed these findings quite closely, and under blind conditions – and further confirmed the audibility of removing the transit screws to float the cabinet properly, and the efficacy of the tri-wire option. There was some criticism of slight blandness and mid hardness, and the bass heaviness was again noted, but the fine, smooth clarity with good focus and decent depth, low cabinet coloration and convincing dynamics were all praised.

## Conclusions

Though there are one or two detail oddities, and probably room for a little further developmental refinement, the 442 was a resounding success with the listening panels. It is attractively styled yet conveniently compact, while the technical innovations are clearly linked to an unusual degree of refinement. Given the mild caveat over the interaction of bass with specific rooms, the 442 is probably more nearly all things to all men than most other top loudspeakers.

## Test Results

Size (height x width x depth)	95 x 26 x 38cms
Recommended amplifier power per channel (for 96dB minimum per pair at 2m)	(20) – 250W
Recommended placement	floor-standing in free space
Frequency response (+/-3dB, 2m)	see text
Low frequency rolloff (-6dB, 1m)	40Hz
Voltage sensitivity (ref 2.83V or 1W into 8ohms, 1m)	87.5dB/W
Approximate max sound level (pair at 2m)	106dB
Impedance characteristic (ease of drive)	below average
Forward response uniformity	above average
Typical price per pair inc. VAT	£1150
<i>Reprinted from issue No. 53 by Martin Colloms and Paul Messenger</i>	
<i>Rating: Recommended</i>	
Mordaunt-Short Ltd., Darford Mill, Petersfield, Hants GU31 5AZ.	
Tel: (0730) 80721	

# Quad ESL-63

**D**evelopment work on this design started, as the model number suggests, as long ago as 1963, though it did not go into production until 1981. In the '63, the old *Electrostatic's* problem areas, namely directivity, bandwidth sensitivity, power handling and amplifier loading, have all found at least partial solutions.

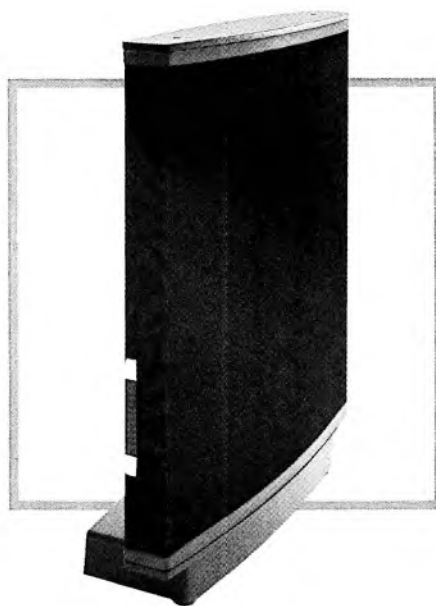
A single large-area damped plastic film diaphragm is electrostatically energised to operate as a phased array of eight concentric elements, so the emerging wavefront is an approximate simulation of the radiation from a theoretical point source 30cm behind the centre of the panel. A high voltage delay line feeding the multiple elements incorporates compensation for the clamped boundary of the diaphragm, and equalisation for the axial frequency response. The size and apportionment of frequency range and delay to the elements allows control of directivity, which is adjusted to give a smooth and uniform decay at increasing off-axis angles. But it should still be borne in mind that distribution from the '63 is poor by comparison with the best moving-coil designs.

The latter characteristic presented a problem on tests, since in the modest confines of my listening room only two of the six panelists could be in the optimum zone, and when used as suggested on the floor at our typical 3-3.5m listening distance, the main axial treble response was directed nearer to chests than ears. Accordingly, the speakers were elevated by about 20cm on open stands and tilted marginally backwards. Further auditioning was also conducted with solo listeners to augment the panel's data.

The *Quad 63* is a bipolar design which generates regions of acoustic power fore and aft that are suppressed in the sideways directions. This results in a rather different room drive and reverberation compared with considerably more omni-directional small box speakers. So even if the Quad did provide an identical axial frequency response to a low coloration moving-coil model, it would not sound the same due to the significantly different room reverberation tonal balance.

## Lab Report

The sensitivity reading was not comparable with a normal speaker due to the doublet directivity. Furthermore, the 1 metre reference response was theoretically too close, risking proximity and integration errors. Approximation or not, the reading was below average at 84dB/W, though as with all panel speakers intensity is maintained well at a distance from the speakers. The reference response met  $\pm 2$ dB limits between 50Hz and 9kHz, outside of which some irregularities



were charted which could not be wholly blamed on proximity, as 2m and 3m response checks verified.

Averaged in  $\frac{1}{3}$ -octave bands at 2m, the speaker demonstrated a superbly even mid and low range response, with some mild 'lumpiness' above 5kHz. The response sensitivity to axis was shown by a measurement just 7.5° off-axis vertically, which revealed a more than 5dB loss above 12kHz. The output decayed much more than average off axis, but the decay pattern was exceptional in terms of consistency and evenness. In practice the bass rolloff was indeterminate, depending on the listening room boundaries and in particular the distance to the rear wall (with zero bass when placed against the latter). In open air or in large rooms 34Hz, -6dB is possible, but at a modest level.

While not as kind a load as Quad suggest, with dips to 3.5ohms recorded at 50Hz and 10kHz, the speaker should not cause amplifiers too much trouble. But when the speaker is heavily overloaded it protects by a short-circuit 'crowbar' which may damage some amplifiers. Above 60Hz, even at a full 96dB, the distortion performance was superlative, though the '63 would not accept inputs over 30W or so below this frequency without diaphragm rattling. Above 100Hz the distortion was 10-100 times better than usual, but compression occurred at a 100W peak input, due to the speaker's protection circuit; however, at 50W, just 3dB less, the pulse reproduction was simply too perfect to register measurements.

## Sound Quality

At risk of appearing to make excuses for the '63, The subjective data did partly reflect its

directionality, and side positioned listeners were not well served. Prolonged solo listening suggested that to some extent the sound was something of an acquired taste, and that if its particular qualities appealed, these could assume such overriding importance that no other model would suffice. On first hearing however it can sound somewhat 'dead' and 'clothly', due in part to the loss of reverberant energy in the upper frequencies when compared to a conventional speaker. A trace of a 'whistly' quality in the extreme treble was audible to a few keen-eared listeners, while the sweetness and integration of the mid/treble band at first lends a dim impression until experience shows that the necessary treble detail still exists but in an unusually natural form.

Listeners accustomed to a dynamic and punchy bass of good power handling, particularly on rock-oriented programme, found the '63 disappointing since it could not play very loud, and the bass power, though more extended than an *LS3/5a*, was little greater. Without the 'liveness' and 'excitement' of some of the better box systems, the '63 at first appears to lack detail and transparency. But prolonged listening showed that this was due to the misleading frequency balance, and that superb image depth as well as detail were apparent on-axis.

## Conclusions

Since our original review minor improvements have been made to this speaker, notably considerably revised protection circuitry, allowing louder and better reproduction of bass transients. While not a powerhouse, it does at least now do respectable justice to the bass on rock material.

The Quad has uniquely musical qualities through the vital mid registers, and deserves auditioning on high quality material if its blend of strengths and weaknesses are to be fairly assessed by the intending purchaser. Recommended.

## Test Results

Size (height x width x depth)	93 x 66 x 27cms
Recommended amplifier power per channel (for 96dB minimum per pair at 2m)	(25) - 100W
Recommended placement	on open stand, well clear of rear wall
Frequency response (+/-3dB, 2m)	40Hz - 18kHz
Low frequency rolloff (-6dB, 1m)	34Hz
Voltage sensitivity (ref 2.83V or 1W into 8ohms, 1m)	84dB/W
Approximate max sound level (pair at 2m)	99dB/A
Impedance characteristic (ease of drive)	fairly difficult
Forward response uniformity	good*
Typical price per pair inc. VAT	£1459

\*see text

Reprinted from issue No. 53 by Martin Colloms

Rating: Recommended

Quad Electroacoustics Ltd., 30 St. Peters Road, Huntingdon PE18 7DB. Tel: (0480) 52561



# SD Acoustics SD1

**S**D Acoustics' *SD1* is a large and imposing loudspeaker, free standing *via* an integral frame stand which accepts spikes in the usual way. When fully clothed, the *SD1* looks like an almost featureless obelisk with a wood veneered lower section and top plate and black cloth elsewhere. Remove the front panel, however, or view from the back, and the underlying structure looks rather different. The system consists of a large base section which houses the bass driver, and a narrower top section for the midrange unit and tweeter.

Separation of the bass and midrange units is enforced by the simple expedient of building them into dedicated enclosures, separated by an open framework which is also home to the crossover network. Above the midrange unit, and separated by a thin strip of purest fresh air, the tweeter is mounted on its own sub-baffle. The tweeter itself is sealed at the rear.

The 220mm Audax bass driver was chosen primarily for its transient ability. To this end it has a lightweight treated cone and a massive motor assembly, built into a well made diecast chassis. It is mounted into a plain (unbraced and undamped) foam-lined box which is reflex loaded, the port facing downwards. One of the benefits of this technique is good port damping, which translates into a bass quality less woolly than usual. Another is that one of the key room interfaces is predetermined, and the system turns out, as claimed, to be relatively uncritical of positioning.

The 120mm midrange unit is also from Audax and is fitted with a treated pulp cone and an enormous magnet. It has an even better power to weight ratio than the bass driver, and the claimed transient ability of a tweeter (I forgot to ask which one). The tweeter is an interesting ribbon foil design from Visaton in Germany which is very similar (and may even be related) to the better known Infinity EMIT. The crossover points are at 350Hz and 4kHz, leaving the area of the ears' greatest sensitivity mainly to the midrange driver. The crossover provides first order (6dB/octave) slopes at both ends of the midrange unit passband; the others are second order. Standard quality components are used here, and the three sections of the crossover can be unlinked for tri-wiring or triamping using three power amplifiers. Most of the listening was done using the first of these two options, and the benefits are considerable.

## Lab Report

Forward response uniformity is not wonderful. Superimposed on a basically even energy



trend, there's a broad suckout centred on 400Hz, and a 5dB peak in output around 5kHz, which suggests that the speaker will sound bright and thin. Bass is flat down to around 80Hz and rolls away rapidly below that, but there is still plenty of output at 50Hz.

The various off-axis responses were unusually consistent with the ones measured on the normal axis, the benefit being a wider than usual listening window. Listening from close quarters however meant being well below the tweeter axis, and while the *SD1* is fairly tolerant of this, the system tended to sound more natural from a fair distance. This isn't a system for small rooms.

The *SD1* is an efficient loudspeaker and capable of handling a substantial amount of power and turning it into high sound pressure levels if required. Impedance drops to a minimum of a little under 6ohms, but the speaker is not difficult to drive. Higher than normal sensitivity measured around 90dB for 1watt at 1metre, which means that high power amplification is not strictly necessary in most applications. The front covers make little difference to the *SD1*'s measured response or sound, and pair matching is very close.

## Sound Quality

The first point I would like to bring to the reader's attention is how damn enjoyable it is simply to sit down and listen to the *SD1*. The sound is far too clear and detailed to be called relaxed, but the speaker offers a large and positive stereo image with no obvious loss of specificity. The *SD1* is exceptionally spacious and stable. Another impressive feature is its speed: the system has the transient

response and control popularly supposed to belong only to the world of electrostatics, and the wealth of coherently presented information reproduced from records and CDs I thought I knew pretty well came as something of a shock.

These qualities are not achieved entirely without cost – financial considerations aside. On the whole I thought the brightness – the system is bright – was not often a disadvantage because it was achieved with very little of the hardness or spitefulness that is the usual payoff in such circumstances. But when things became very agitated the music projected a little too far forward.

Yet there's never any muddle and very little cross modulation between the various competing sounds, even the subtlest of which remains readily distinguishable at nearly all times. The other point is that tonal quality lacks a little warmth, and that the more richly coloured acoustic instruments – cellos and basses, some of the woodwind and brass for example – tend to lack substance.

On the whole I was not put off by these characteristics because they were outweighed by the positive ones. But it's even more important than usual to look for appropriate qualities in the rest of the system. This doesn't mean picking dull sounding components, rather picking ones whose inherent quality is good enough to sustain the magnifying glass view the *SD1* tends to give. The *SD1* is simply very demanding of the quality of partnering amplifiers and source components.

## Conclusions

The *SD1* is a cool and rather bright loudspeaker, but with excellent bass depth and superb control and definition throughout. It is not beyond reproach but fully justifies its cost on subjective grounds alone, though system matching is more critical than usual.

The manufacturer informed us that an updating exercise is in hand, mainly involving the crossover, which should have the effect of adding a little lower midband warmth and reducing the brightness.

## Test Results

Size (height x width x depth)	123.5 x 38.2 x 31.9cm
Recommended amplifier power/channel	25 – 200 watts
Recommended placement	free standing, away from walls
Frequency response ( $\pm$ 3dB, 2m)	65Hz – 20kHz
Low frequency roll-off ( $-$ 6dB/1m)	50Hz
Sensitivity (ref 2.83V or 1w, 8ohms, 1m)	90dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	poor
Typical price per pair inc VAT	£1050
Reviewed by Alvin Gold	
Rating: Recommended	
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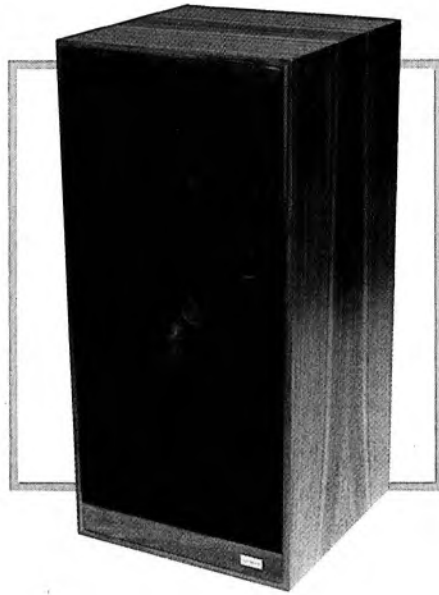
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# Spendor SP1



Over the past years Spendor have produced variants on the theme of the legendary *BC1* – for example, the higher sensitivity *BC2* – but none of them have quite captured the subtlety and mid-range quality of the original.

While the *SP1* is built in the classic *BC1* tradition, it uses a new grade of polypropylene exclusive to Spendor for the bass/mid unit. It is built on a die-cast chassis and energised by a massive magnet assembly. The cone is doped by hand, and has its front pole cavity filled by an alloy plug attached to the pole face.

Spendor's traditional radiometal-cored inductors and plastic-film capacitors are used for the high-quality crossover. Above 3kHz Spendor's own carefully selected version of the Celestion *HF1300* dome tweeter takes over, and the final half-octave is filled in by the Coles 19mm plastic dome unit.

The excellently veneered 44 litre enclosure is built of thinwall multiply, heavily bitumen damped and lined with acoustic foam. The system is reflex-tuned by a large, offset ducted port, and is intended for free space mounting on open stands.

## Sound Quality

The *SP1* did well on the *Choice* test programme, providing favourable results on analogue material and even better scores using digital masters. The balance was tonally accurate with very good reproduction of human voice, showing natural sibilants and character. The frequency response sounded wide and uniform, with good extension, albeit with a slight excess in output at the lowest frequencies.

Mid coloration was generally low, the tre-

ble 'sweet' and clear, and stereo perspectives well constructed. Frontal focus, width and depth were all well presented. High sound levels were possible with low apparent distortion. While some mild lower-mid 'plumminess' was observed, plus a touch of 'BBC nasality' this was not considered to be very important.

## Lab Report

Measured at 1 metre on axis, the *SP1* delivered a smooth response except for a small 3.5kHz peak (improved on later production speakers). The bass was precisely tuned and well extended to 41Hz, -6dB. Sensitivity measured 87dB/W, about average and more than double that of the *BC1* (in decibel terms, an increase of more than 3dB). Pair matching was very close. The recommended power input range is 12-150W, and maximum levels of up to 103dB were possible, again rather higher than for the *BC1*.

The averaged response at 2 metres was very uniform, meeting  $\pm 2$ dB limits for 60Hz to 13kHz. The vertical dispersion was very satisfactory, and laterally was rather better than average. The integrated response in the listening room was very good indeed, only marred by the slight bass excess noted previously.

Fine distortion results were obtained at 96dB sound pressure level, measuring around 0.3% above 200Hz and holding to around 3% at lower frequencies. With the sound level reduced to 86dB, a substantial improvement to 0.8% or better was recorded at low frequencies, with negligible midrange second harmonic and an average of 0.2% third. These are fine results. The impedance curve averaged 14ohms, with a momentary

and pretty harmless dip to 5.3ohms at 20kHz, so the *SP1* is therefore classed as a very good amplifier load.

## Conclusions

The *SP1* has evolved into a subtle and musical sounding performer in the true Spendor tradition. It is fairly expensive, but the good test results go quite some way towards justifying the price. Offering an easy amplifier load plus improved bass power, articulation and clarity, reduced midrange distortion and a higher sensitivity, the *SP1* can give a decently high acoustic level. It possesses a clean, neutral tonal balance and should be equally valuable for medium-level monitoring or domestic use.

The *SP1* receives a warm Recommendation.

## Test Results

Size (height x width x depth)	63.5 x 29.5 x 30.5cm
Recommended amplifier power per channel (for 96dB minimum per pair at 2 metres)	(12) – 150W
Recommended placement	floor stands
Frequency response, within $\pm 3$ dB at 2 metres	45Hz to 20kHz
Low frequency rolloff (-6dB point) at 1 metre	41Hz
Voltage sensitivity (ref. 2.83V or 1 watt into 8ohms at 1 metre)	87dB
Approximate max sound level (pair) at 2 metres	103dB
Impedance characteristic (ease of drive)	very good
Forward response uniformity	very good
Typical price per pair, including VAT	£680
<i>Reprinted from The Collection II by Martin Colloms</i>	
Rating: Recommended	
Spendor Audio Systems Ltd., Unit 47, Station Road Ind. Est., Hailsham, Sussex BN27 2ER. Tel: (0323) 843474	

# Spica Angelus



**H**ere is a striking example of late 20th century technology, from a company best known for the much smaller *TC-50* which was reviewed in the December issue. The *TC-50*, you may remember, has a pulp bass and soft dome tweeter in an enclosure which superficially resembles the top part of the *Angelus*. The bottom section of the latter, which is dedicated to the memory of Richard C. Heyser, inventor of time delay spectrometry, allows floor standing (spiked) and adds cubic capacity to extend bass response to a speaker that is otherwise fundamentally quite similar to the *TC-50*. The enclosure is sealed.

The manufacturer has not resisted the temptation to 'improve' (see later) things as well as merely adding to them, and the bass unit here is plastic coned. The other unit is a soft dome tweeter, similar (identical?) to the one in the smaller model.

The *Angelus* is supplied in mirror image pairs with the two drivers vertically in line but offset slightly from the centre line. It's extremely heavy, constructed from thick section chipboard, and made rigid by a massive front/rear brace extending most of the way from the floor to the waist section.

The two drivers are inclined upwards, firing above the listening seat which provides time alignment from a normal listening position. All the enclosure panels apart from the front and rear are at odd angles which effectively disperses many of the acoustic and structural modes that bedevil all loudspeakers. A wool filling adds acoustic damping inside, and a blanket is used around the drivers to reduce secondary radiation. The crossover is well specified and laid out, and wiring is in thin solid core throughout, which from visual inspection appears to be Hitachi LC-OFC. Bi-wiring is allowed after removing external shorting links.

The speakers sound best with the covers removed, but the benefit is relatively small and the *Angelus* looks rather strange with the acoustic blanket on show. The woodwork is veneered in a rather anonymous wood vaguely reminiscent of walnut. Probably.

## Lab Report

Aligned for use away from walls (the styling suggests wall proximity use, but it doesn't work), the *Angelus* has a surprisingly shal-

low bass. Extension doesn't exceed that of many much smaller loudspeakers, and the tweeter bandwidth is similarly constrained at the opposite end of the audio frequency band.

In between these extremes, however, the *Angelus* is beyond easy criticism. The response shape is exceptionally smooth and the overall balance neutral. The *Angelus* is not especially tolerant of being listened to from well off axis, or from above the line; the tweeter is more than usually directional and a rather large crossover dip opens out even at quite modest incident angles. Efficiency is medium, but the speaker can be driven quite hard. The *Angelus* is a benign load with a minimum 6ohms impedance.

## Sound Quality

From the outset I was assailed by a complex melange of impressions, some highly positive but some slightly less so. The *Angelus* is on the one hand lively and dynamic. It pulls a great deal of information off record, disc or whatever, and does so in a measured, articulate manner with a fine sense of subtle detail down to the lowest audible levels. (This, incidentally, is a solid-core attribute, though certainly not without matching qualities elsewhere in the design of the loudspeaker.)

The tweeter is clearly well above average, which helps no end, and both upper midband and treble quality are clearly good, being precise without being pointed or in any way obvious. Imagery is also very specific and at times almost tangible, though as the manufacturer very nearly suggests in the wordy but excellent instruction manual, the *Angelus* is something of a 'hot spot' design.

I was less happy with the bass and mid-

band proper, however. Although plainly extremely accurate tonally, the bass end of the spectrum has a restrained and slightly muffled quality out of keeping with the high frequency performance, and the midband had a slight plummy which sometimes showed as quackiness – a problem endemic with older, heavier plastic-cones. It was accompanied in this case by a tad of hollowness, perhaps due to the enclosure itself.

I don't wish to make it sound as though the *Angelus* made poor music. It made very fine music in fact, the excellent control and top end dynamics being particularly impressive. But the *Angelus* conspicuously failed to make the most of what it was presented with. The urgency and power implicit in the recording of one particularly telling disc, Schoenberg's *Pelleas und Melisande* (arguably one of the very few essential Karajan recordings, DGG 423 132-2) failed to smoulder as it should. The sonorous, resonant lower strings in particular sounded pinched and thin.

In many ways the *Angelus* is a surprisingly old-fashioned style performer, though in sheer dynamic clout and consistency, as well as underlying resolution, it transcends such easy stereotyping.

## Conclusions

I sometimes think that costly loudspeakers are there simply to trip up their designers on the 'provide enough rope' principle. The *Spica Angelus* has avoided the trap, but fails to completely match the agenda set by the cheaper *TC-50*. The bass end in particular is restrained and slightly slow (the upper mid and top by contrast are exceptionally fast and true) while the midband sounds somewhat over-damped.

## Test Results

Size (height x width x depth)	116.8 x 53.3 x 26cm
Recommended amplifier power/channel	∞ – 200 watts
Recommended placement	free standing, away from walls
Frequency response (± 3dB, 2m)	78Hz – 20kHz
Low frequency rolloff (– 6dB/1m)	50Hz
Sensitivity (ref 2.83V or 1w, 8ohms, 1m)	86.5dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	excellent
Typical price per pair inc VAT	£1195
Reviewed by Alvin Gold	
Presence Audio, The Old Posthouse, Plummers Plain, Horsham, W Sussex. Tel: (0403) 76777	

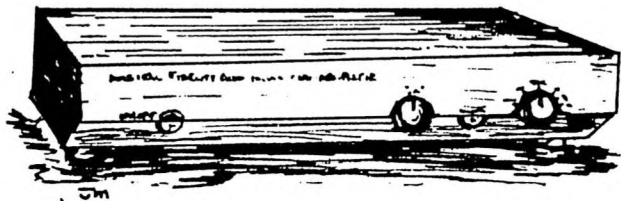
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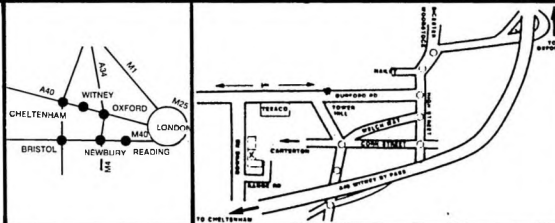
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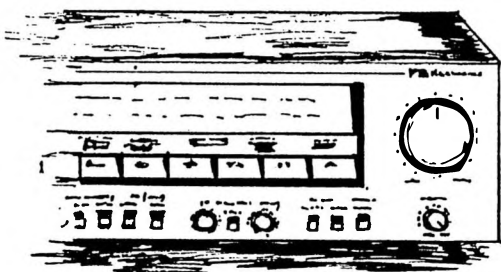
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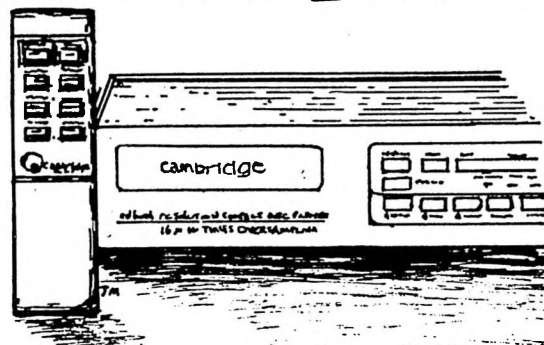
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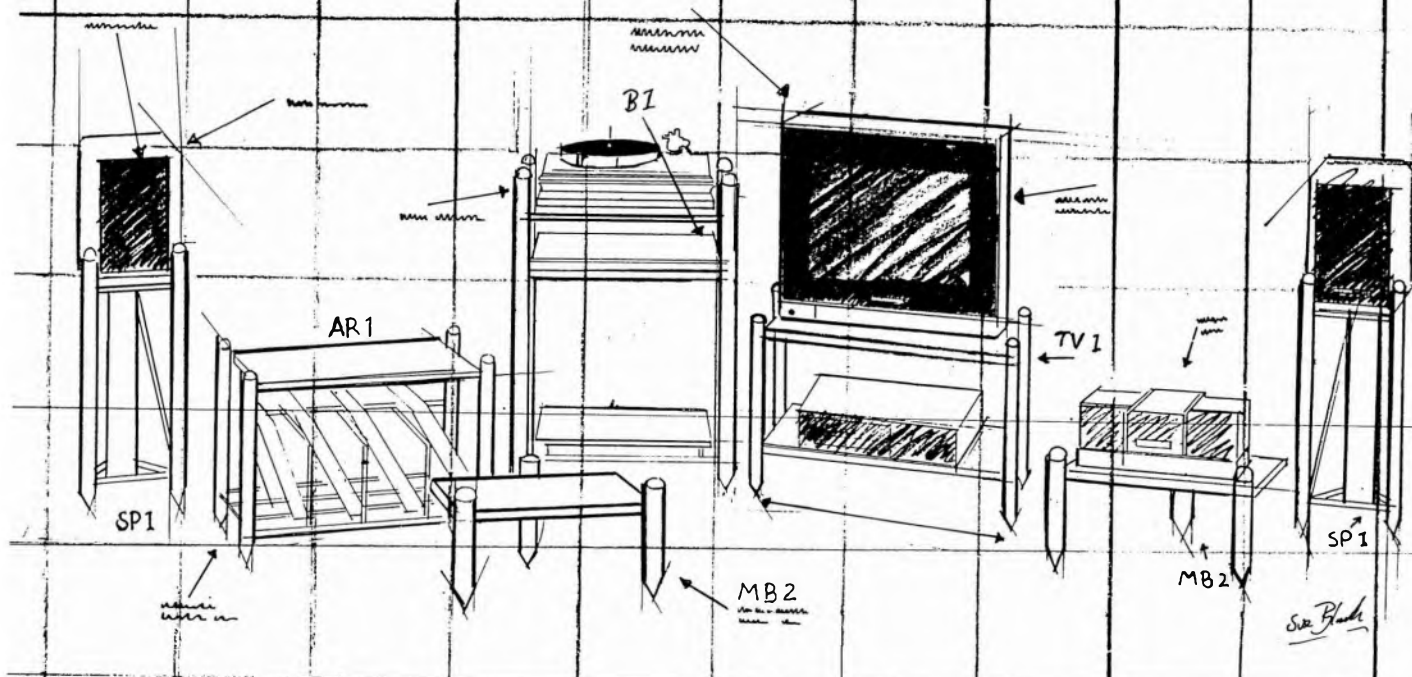
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**157, Curle Street, Glasgow**

# Arcam Delta Black Box



The world's first affordable standalone digital-to-analogue converter system for CD players is A&R's claim for the £250 *Black Box*. There are in fact some standalone DACs around already that are suitable for DAT (and sometimes planned satellite transmissions) as well as CD, but none are available in the UK except when packaged with CD players. And the A&R is certainly sharply priced.

The *Black Box* is designed for use with any CD player that has an electrical digital data-stream output (invariably on a single phono socket), which includes most or all Philips-based players and an increasing number of others. The *Black Box* can only process CD format signals; it is not designed to handle DAT, nor the optical digital outputs which are available on some upmarket players. However, the digital interface is on a small and readily interchangeable internal plug-in board, and A&R's intention is to produce an optical input in due course, and a 48kHz DAT one as well (probably later rather than sooner).

Far more than a simple repackaging exercise of the output stage of their *Delta 70* CD player, the key feature is the UK made, A&R designed 1,000 gate array ASIC (Application Specific Integrated Circuit), which performs a whole range of housekeeping tasks that would normally be handled by acres of smaller ICs and microprocessors. The result is much reduced current consumption and radiation of digital signals inside the case, and therefore more effective separation of the digital and analogue sections of the circuit.

Analogue processing is 16 bit with 4x oversampling, using selected samples of Philips' now well known *7DA1541A* DAC to provide true parallel processing for the two channels plus digital filtering. The DAC is mounted on its own PC board subsection which is suspended on Sorbothane to reduce microphony. All analogue circuitry is Class-A, using high grade, close tolerance discrete components. The DAC feeds the output directly without any additional output buffering or processing. The power supplies are extensively regulated and employ entirely separate power transformers for the digital and analogue sections of the circuit.

Two outputs are provided, one at a nominal 800mV and the other at 2V (standard CD output level). Output impedance is low so it will happily drive long and even unscreened leads and passive preamps, generally without hum build-up or loss of HF. The only other facility is a front panel absolute phase switch operating in the digital domain.

Making due allowance for some unfinished details on a 'late preproduction' sample, the slimline *Black Box* is very well made, externally and internally. It is suitable for stacking with A&R's *Delta 70* CD player if no room is available alongside (it will sound better if not stacked), and shares the latter's neat, low key styling.

## Sound Quality

The first sample turned out to work only with certain CD players. On investigation by A&R, it turns out that the otherwise tight Philips/Sony specification for CD makes no distinction between a normal and an inverse digital pulse train (where every '1' is replaced by a '0' and *vice versa*)! Early production machines (and my jury-rigged test sample) have a rear panel switch to change over the polarity of the input. If the player doesn't work one way, it'll work the other. Later versions will switch automatically.

After the statutory burn-in period (about 3 days), I am in the happy position of being able to confirm that the *Black Box* exceeded all expectations based on price and technology. It is a notably tidy sounding box which can make practically any player sound in its own image. I tried it with a number of mostly high quality CD players, begged or borrowed as necessary.

The most obvious application for the *Black*

*Box* is with A&R's own *Delta 70* CD player, which starts life as a better than average Philips clone, albeit a little recessed and laid back sonically. The *Delta 70* plus *Black Box* sounds perceptibly more outgoing than the *Delta 70* alone, with more obvious separation between the elements in the sound picture and greater bass extension and dynamics. But the very slightly dull tonal balance is still there, and was probably engineered in deliberately – very civilised sounding.

The Sony *CDP-710/Black Box* combination has a more open, expansive bass than the straight Sony. Instrumental separation is improved, image scale is greater but with improved specificity – an all round upgrade.

The Akai *CD-73* delivered similar *Black Box* sounds to the Sony *CDP-710*, but the add-on also gives greater presence and sounds more articulate.

With *Black Box* attached, the Sony *CDP-555ESD* was sharper and more incisive, and with greater presence. However, when used on its own this Sony has a still more powerful and extended bass, and was also more detailed, notwithstanding the laid back presentation. The Sony alone wins on this occasion.

The A&R adds a little more presence, separation, and 'colour', to the Denon *DCD-1700*, but in this case the advantage is probably not large enough to justify the additional expense.

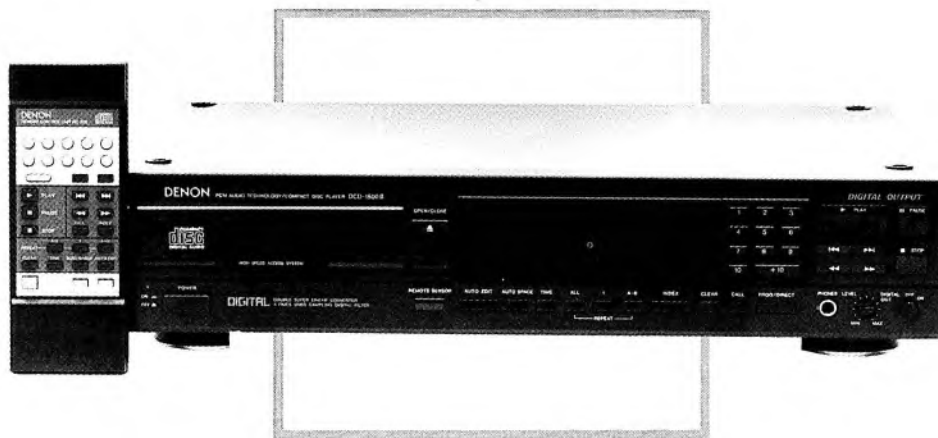
Much to my surprise, I felt the A&R improved the already excellent Meridian *207* player. As in some of the other couplings, the *Black Box* improved instrumental separation and gave a bigger bass and larger image scale, but still with excellent positioning.

## Conclusions

In most applications involving middle price CD players, and in some cases even with expensive ones, the *Black Box* provides excellent (improved) bass and significantly tightens up stereo resolution and clarity, without any tendency to brightness or stridency. This elegant add-on appears to be conspicuously good value for money.

Reviewed by Alvin Gold  
Rating: Recommended  
A&R Cambridge Ltd., Denny Industrial Estate, Waterbeach,  
Cambridge CB5 9PD Tel: (0223) 861550

# Denon DCD-1500 MkII



After many years of desultory representation in Britain, Japanese audio specialist Denon is hitting the jackpot, together with UK distributor Hayden Labs, thanks to a range of fine cassette decks backed by other good quality electronics including CD players. Timing could not have been better, as several bigger and less specialist manufacturers turned their attention towards microwave ovens and midi systems in the mid-eighties. Marketing presented some attractive dealer incentives, while the product range itself provides unusual coherence and consistency alongside traditionally good reliability.

Clearly a luxury model in presentation, it's built like a tank, using well damped metal for top, sides and base, along with a quality extruded front panel, sitting on proper feet that should afford some environmental isolation.

Obviously aimed at the more discerning linguaphile, an instruction manual in Svenska, Italiano, and Espanol (as distinct from the more prosaic English, Deutsche, Francais of the more humdrum '800) was a particularly challenging innovation - knowing the UK hi-fi trade, I don't really see this idea catching on. That aside, ergonomics are pretty good, if decorated with propaganda. The main control keypad is neater and better integrated, the same (comprehensive) display is used, and there are a few extra buttons along the front: to auto edit, auto space, time, call and prog/direct, add three varieties of repeat plus index and clear. The back panel provides optical or electrical digital outputs, switched from the front panel.

It has a basically plastic chassis with damped steel panels. The plastic drive mechanism with damped disc clamp sits on a pressed steel subchassis. 16-bit and 4x oversampling, digital conversion is handled by a pair of Burr Brown *PCM56Ps*, feeding an *NE5532* output filter with linear crystal wind-

ings. The single board layout and wiring is neat, with normal commercial grade componentry throughout. A sizeable transformer supplies power, but internal mains are not shrouded and on our sample a dry joint was found at the neutral/PCB junction.

## Lab Report

The frequency responses were pretty flat, while showing a slightly rising LF trend and mild ripple over the final two octaves of treble. Channel balance was very close, and stereo separation very good indeed, with no interchannel phase shift. Harmonic and intermodulation distortions were all well controlled, though the IM spectrogram showed some 25kHz beat products.

Output matches the standard well, from a reasonable 580ohms source impedance. Signal-to-noise ratios were pretty good, while the spectrogram showed only a couple of visible spikes above a very low noise floor. Mechanically very quiet with good rejection of external shock and vibration, track selection speed was only just better than average - shaving a half second (less than 20%) from the '800's performance on our test hardly seemed to warrant making a fuss about high speed access on the drawer mechanism. Error correction was effective, de-emphasis accurate enough, but the low level resolution could have been closer - a 5dB error at -90dB was rather larger than one might expect at this price level. However, taken overall this was a good technical performance which exceeds that of the '800 in every respect.

## Sound Quality

This quite expensive Denon managed to jus-

tify its price with a very good overall rating for sound quality, sounding nicely transparent throughout, with good stereo staging and precision. The bass was full and articulate, albeit a touch 'softened', the midband sounded a touch 'grainy' and 'electronic' but was informative, nicely detailed and well balanced. The treble sounded lively and open with delicate detailing.

## Conclusions

Sounding significantly better than its stablemate, the *1500II* clearly justifies its elaborate construction. Close attention to detail has resulted in a fine lab performance besides, and the range of features is comprehensive, yet nicely presented. Recommendation is obviously appropriate.

## Test Results

	20Hz	1kHz	20kHz
Channel balance	0.05dB	0.04dB	0dB
Stereo separation	118dB	119dB	93dB
Channel phase difference	0°	0°	0°
Total harmonic dist, 0dB	-90dB	-86dB	-87dB
Total harmonic dist, -10dB	—	-82dB	—
Total harmonic dist, -60dB	—	-37dB	—
Total harmonic dist, -80dB	—	-17dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	-99dB
Intermodulation, 19kHz/20kHz, -10dB	—	—	-102dB
Frequency response, left channel	0.13dB	0	-0.01dB
Frequency response, right channel	0.13dB	0	-0.04dB
Signal-to-noise, 20Hz-20kHz unweighted	—	—	99/100dB
Signal-to-noise, CCIR/ARM, 1kHz ref	—	—	97/100dB
Output level, 0dB, left/right	—	—	2.154V
Output impedance	—	—	580ohms
De-emphasis 1kHz, -0.27dB; 5kHz, -4.48dB; 16kHz, -8.95dB	—	—	—
Track access time	—	—	2.5 secs
Error correction capability	—	—	>900µm gap, >800µm dot
Mechanical noise	—	—	very low
Spuriae up to 100kHz	—	—	-85dB
Resolution at -90dB	—	—	-84.3/-85.5dB
Headphone socket	—	—	100ohms
Dimensions (w x d x h)	—	—	43.4 x 33 x 10.2cm
Estimated typical purchase price	—	—	£500

Reprinted from issue No. 58 by Martin Colloms

Rating: Recommended

Hayden Laboratories, Hayden House, Chiltern Hill, Chalfont St. Peter, Bucks. Tel: (0753) 888447.



# Kinergetics KCD 30



Superficially this rather dull-looking US CD player sells at a very high price, considering it is based heavily on Philips Eurointernals – even the inevitable price penalties of to-ing and fro-ing all over the globe before finally arriving in the UK can't go more than part of the way towards accounting for 1,700 odd pounds. The matt black 'anti-style' presentation (albeit well finished), a technical story to test the reader's credulity, not to mention the price, place the *KCD-30* firmly in a particular sector of the high end, rack-mount ears and all.

However, unlike some hair-shirt designs there's enough Philips left inside to incorporate that company's clever code-reading FTS circuitry, which allows the user to instruct the machine to replay only the favourite tracks preprogrammed on the disc, plus a fairly elaborate remote control system. Other features include a high level output with front panel volume and balance, for the convenience of those wishing to minimise signal paths and drive power amplifiers directly.

And under the skin, a far more extensive modification package than usual is applied to what were originally Philips 460 building blocks. Case, disc playing chassis and power supplies have all been substantially beefed up, and discrete transistors boost the 5534 op-amp output for direct power amplifier drive.

A large and elaborate Kinergetic PCB provides the *KCD-30*'s 'special ingredient', in the form of ASR-licensed 'Dynamic Hysteresis Processing' circuitry. This claims that inherent component distortions in circuit components like ICs may be 'cancelled' by 'modelling' a network of similarly imperfect components to act as the inverse in the feedback loop. Switch contacts, IC sockets, capacitors and resistors are all used to create this 'anti-grunge' model, and there are internal switches which can be used to 're-tune' the cancelling circuitry to taste, or even to specific discs, preferably with expert advice.

## Lab Report

Whatever the DHP circuitry may do for the sound quality, it hasn't earned any spurs on the test bench. Measured performance

remains perfectly adequate, but performance parameters for channel separation, particularly at high frequencies, and harmonic distortion are generally behind the standard Philips/Marantz models. 0dB THD is some 30dB poorer than expected, though in fairness, distortion levels, and intermodulation in particular, do improve at lower signal levels – as they ought to, though in the case of CD frequently do not.

Low level resolution is the typical Philips-based 'iffy' figure of 15.3 bits, noise levels are adequate if higher than usual, and ultrasonics are pretty well controlled. The playing mechanism shows average access speed and vibration rejection, error correction behaves as advertised, though full level white noise shows some clip – reinforcing the impression that this player gets a little close to its available headroom near maximum signal levels.

## Sound Quality

Though commentators elsewhere have waxed lyrical over the *30*, our palates were not entirely satisfied by the bill of fare. While it certainly sits alongside the top handful of machines on the market – and represents a significant improvement over its *KCD-20* predecessor – it does not quite stand out in the way that certain others do. Very good, certainly, and somewhat different too, but is this sufficient to justify such a high price tag?

Initially impressive, the considered judgement was that images were a little larger than life, with some slight 'phasiness' lending a little diffusion to the central focusing. Ambience recovery was liked on louder passages, but depth seemed a little foreshortened when the music was quiet. The bass sounds strong and dynamic in the US man-

ner, but treble was a touch 'spotlighted' and a shade grainy too. Admittedly we did not have the opportunity or training to explore the internal adjustments in any detail, but on our tests the level of transparency seems a little wanting, even though the recovery of detail is first class.

## Conclusions

Definitely a technical oddball, as far as we're concerned the jury's still out on the distortion cancelling technique. That apart it is properly built, intelligently featured and sounds very good in its own way. And there's the key: ultimately, the *KCD-30* does sound noticeably 'different' – not necessarily to our collective tastes, but possibly to yours. So if you're still searching in vain for CD Shangri-la (aren't we all?) – and if your credit card rating can stand the strain – it's certainly a model worth placing on the auditioning list.

## Test Results

	20Hz	1kHz	20kHz
Channel balance	0.06dB	0.01dB	0dB
Stereo separation	109dB	80dB	55dB
Channel phase difference	4°	0°	0°
Total harmonic dist, 0dB	-53dB	-62dB	-85dB
Total harmonic dist, -10dB	—	-75dB	—
Total harmonic dist, -60dB	—	-47dB	—
Total harmonic dist, -80dB	—	-18dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	-64dB
Intermodulation, 19kHz/20kHz, -10dB	—	—	-82dB
Frequency response, left channel	—dB	0dB	—dB
Frequency response, right channel	—dB	0dB	—dB
Signal to noise, 20Hz 20kHz unweighted	—	—	99dB
Signal-to-noise, CCIR/ARM, 1kHz ref	—	—	93dB
Output level, 0dB, left/right	—	—	5.05V
Output impedance	—	—	1-725ohms
De-emphasis 1kHz, -0.45dB; 5kHz, -4.79dB; 16kHz, -8.25dB	—	—	—
Track access time	—	—	2400µm dnt
Error correction capability	>900µm gap.	>800µm dnt	—
Mechanical noise	—	—	low
Spuriae up to 100kHz	—	—	-85dB
Resolution at -90dB	—	—	-98.9/-102.5dB
Headphone socket	—	—	none
Dimensions (w x d x h)	—	—	48.3 x 34 x 10cm
Estimated typical purchase price	—	—	£1700

Reviewed by Martin Colloms

Absolute Sounds, 31R Warple Road, London SW20 8DIL  
Tel: (01) 947 5047.

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# Marantz CDA94

**M**arantz' *CD94* first appeared some eighteen months ago, as a 'flagship' single box standalone CD player whose £800 price tag was justified by heavy-weight Japanese build and fine sound quality. Similarity to the clone Philips *CD960* may have lost a sale or two, as the latter carries a sharper £700 price, but the distribution channels don't overlap much and Marantz' *CD94* has carved out its own niche as one of CD's leading reference points.

Now the company has distanced itself still further from its parent by launching the add-on *CDA94* outboard digital processor. This too sells for a rather extravagant £800, so the full, state-of-the-art two-box combination reviewed here will severely dent the bank balance of even die-hard silver disc fans, though of course the single box *94* remains available.

Add-on processors are the true luxury fringe of CD replay, containing components that merely duplicate those already provided in the player. But they do offer a technique that separates the 'dirty' digital signal processing and its RF 'hash' from the more sensitive analogue circuitry of the player. And in this case the digital signal can be carried *via* an optical link, which avoids any interactions that might result from an electronic earth path.

Physically similar and beautifully finished, these substantial units are completely different in appearance, construction and price from the standard Belgium-sourced Marantz CD players, though the basic technology is still fundamentally familiar.

The styling of the player itself is cleverly organised to promote ease of use. Separating the controls into two groups, the main operational controls (play, stop/pause, skip, open/close, plus FTS select) are to the right and below the quite elaborate display. Subsidiary facilities including a 10-digit keypad and headphone socket are tucked behind a hinged cover, permitting audible scan, repeat, display mode, programming, etc. The full remote control can be interlinked with other compatible Marantz system components.

The rear panels have the requisite sockets for optical and electronic digital data transfer, the *CDA* offering balanced (Canon) and unbalanced (phono) audio outputs. The main frames and the disc playing chassis are substantial metal diecastings, the latter spring-decoupled for vibration avoidance. The *CDA* uses separate transformers each with extensive regulation for the digital and analogue circuitry. Components have been carefully chosen to promote sound quality, and the internal construction includes segre-



gated, screened sections and extensive copper plating. Sony input processor chips combine with Philips 7220 digital filter and the 1541 dual DAC.

## Lab Report

Rather than recite the standard litany which confirms the expected exemplary lab performance, it might be more interesting to compare our measurements for the two-box model with the findings on the straight *94* a year ago. Sorry: it might have been more interesting had there been any substantial variations; instead there are just a handful of relatively inconsequential nits to pick.

Channel balance is significantly tighter, frequency response a little flatter (very, very flat instead of just very flat), and low level nonlinearity is halved – better than the rather average findings with our original *94* and amongst the best Philips derived machines, if still less than the very best. Which is at least evidence that tight quality control procedures are being followed in production. There was no sign of the slight 'rounding' found with the *94* on the white noise test, but output level with the *CDA* is just a shade below the nominal standard.

On the player side error correction was very good on all tests, and resistance to shock or vibration likewise. Mechanical noise is very low, and track access times about average.

## Sound Quality

All things considered, especially the price, the *CD/CDA94* must be regarded as a mild disappointment. After a fair amount of care taken in set-up, it scraped rather than soared into the ranks of the excellent when all

options were optimised. Certainly the *CDA* unit did provide some improvement, particularly when using the optical digital link and the balanced audio output, but the margin over the standard model was less than we expected.

But then the *94* alone has improved since originally tested. Robust in character, with fine soundstaging, clean treble, firm bass and good dynamics, it now clearly offers a worthwhile edge over the competing Philips clone. Add in the *CDA*, stir briefly and note the improved focus and depth and the enhancement of musical detail – alongside a slightly more laid back, possibly less dynamic overall presentation.

## Conclusions

Taking its logical place at the top of the Marantz CD hierarchy, this two-box combination delivers reference standard lab and listening test results, albeit at a price. While the sound represents a subtle further refinement over that already established by the *94*, the *CD/CDA* combination would not appear to offer quite the same value for money as the *CD* alone, or indeed some cheaper Marantz players. But the well heeled in search of refinement to soothe the furrowed brow should certainly put this Recommended combination on their shortlist, and see for themselves whether the second box justifies its premium.

## Test Results

CDA-94 Processor	20Hz	1kHz	20kHz
Channel balance	0.06dB	0.06dB	0.05dB
Stereo separation	115dB	107dB	97dB
Channel phase difference	0°	0°	0°
Total harmonic dist, 0dB	-96dB	-86dB	-85dB
Total harmonic dist, -10dB	—	-82dB	—
Total harmonic dist, -60dB	—	-48dB	—
Total harmonic dist, -80dB	—	-23dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	-98dB
Intermodulation, 19kHz/20kHz, -10dB	—	—	-100dB
Frequency response, left channel	-0.05dB	0dB	-0.09dB
Frequency response, right channel	-0.05dB	0dB	-0.09dB
Signal-to-noise, 20Hz-20kHz unweighted	—	—	110dB
Signal-to-noise, CCIR/ARM, 1kHz ref	—	—	108dB
Output level, 0dB, left/right	—	—	1.9V
Output impedance	—	—	100ohms
De-emphasis 1kHz, -0.38dB; 5kHz, -4.68dB; 16kHz, -9.28dB	—	—	—
Spurious up to 100kHz	—	—	-83dB
Resolution at -90dB	—	—	-94.7/-96.2dB
Dimensions (w x d x h)	—	—	46 x 36 x 10.5cm
Estimated typical purchase price	£800 (+ £800 CD94 player)	—	—
Reviewed by Martin Colloms			
Rating: Recommended			
Marantz Audio (UK) Ltd., 15-16 Saxon Way Ind. Est., Moor Lane, Harmondsworth, Middx UB7 0LW. Tel: (01) 897 6633.			

# Meridian 207

Though to all superficial intents and purposes identical to the CD207 first reviewed in *Choice* some fifteen months back, internally this model has changed sufficiently to warrant full re-appraisal of sound quality and lab performance.

Technically minded regular readers might recall that the original 207 was based on Philips' earlier 14-bit decoding chips, so an update was inevitable when the 16-bit chips came available (or rather when the 14-bit ones became unavailable). Meridian have simultaneously added the latest Philips CDM-2 transport, their own internal refinements to transport and laser control electronics, and new vibration isolation, while retaining the top class aesthetics and idiosyncratic ergonomics that were such a feature of the original.

Not only is the 207 indisputably the most elegant looking CD player around, it also has potential system capabilities only matched by B&O and Revox in providing full 'round the house' remote operation. And where the earlier Meridian MCDs (based on the early Philips 100 chassis) were sparse, the 207 is much better endowed with automatic/programming facilities.

This two-box player has separate 'half width' transport and electronics sections which can be sited side by side or stacked to taste. A pinstripe motif provides an attractive visual distinction which is reflected in the layout of the chassis controls and remote unit. The control keys are straightforward in the main, but utilise a shift-key system for less commonly used functions which takes a little learning – this is really just a matter of getting used to a different approach.

The electronics section also contains an impressive inbuilt pre-amplifier which includes a fine electronic volume control (suitable for remote operation), plus line level inputs; a high quality optional (£100) vinyl disc input is now also available. Therefore the 207 can be connected directly to a power amplifier or a pair of Meridian's active loudspeakers, while also accepting and switching additional signals from vinyl disc (mm or m-c), tuner and tape sources. Both these functions are controllable from the optional 209 remote control unit, itself a substantial casting allowing, ultimately, armchair control throughout the house from different independent sources.

The CDM-2 transport section is Sorbothane mounted into a substantial slide-out drawer system, giving the stacking advantages of a front loader but on a more solid structural foundation than usual. The metal sleeve and glass front plate provide a mea-



sure of acoustic isolation during play, reducing vibration at the disc. Considerable care has been taken over the various power supplies, separating analogue from digital and running the transport separately as well.

## Lab Report

The 16 bit chip set smooths out nearly all the (sonically innocuous) high frequency ripple. The mildest of HF rolloffs leaves 20kHz down some 0.4dB.

Channel balance is very close, with zero HF phase error, though stereo separation is a little asymmetric in the midband. A similar asymmetry is observed in the noise figures. Distortion results are generally good, albeit somewhat less than the best. Low level linearity has never been a strong point of this latest chip set, and the 15.3 bits measured here is pretty typical. Absolute phase is maintained, and can be inverted electronically from the control panel or remote unit.

The Sorbothane mounting is claimed to improve immunity to higher frequency vibration, though in point of fact resistance to mechanical shock seems to have been marginally impaired – this is an observation, not a criticism. The track access test took a reasonable 3.5secs. The fixed output meets the standard, while the output *via* the electronic volume control gives up to 9V, both from low source impedances. This volume control shows good channel tracking down to low levels and has a variable law to retain normal 'feel'.

The pre-amp section inputs showed carefully bandlimited responses. Sensitivity was sensible for most sources, though overload margins could have been a little better, and the line input impedance was a little on the

low side, particularly for interfacing some valve equipment. Distortion, noise and other measured parameters were all fine.

## Sound Quality

Providing a steady and significant though not spectacular advance over the 14-bit original, the CD207 stays amongst the pack leaders at any price, notwithstanding its extra on-board pre-amp. Tried for the first time, the vinyl disc input came comfortably up to expectations, even the moving-coil stage masking the sound only slightly.

The treble seems to be the main beneficiary of the upgrade. Mildly exaggerated and lacking air before; now it is sweeter, more transparent, and free of grain, providing unusually good focus besides. Depth is very good rather than exceptional, and stereo width marginally less than the best too. But the midrange balance was particularly well liked, and the bass sounds crisp, dynamic and articulate.

## Conclusions

The 207 delivers a sound quality in the very top class, comfortably ahead of more mass produced products and bettered only slightly by the odd competitor here and there. Clearly deserving strong Recommendation, not only is it arguably the prettiest model around, the on-board pre amp – now vinyl disc ready at an extra £100 – make it also one of the most practical and versatile, while Meridian's plans provide future-readiness to an unusual and attractive degree.

## Test Results

	20Hz	1kHz	20kHz
Channel balance	0.07dB	0.07dB	0.08dB
Stereo separation	64/105dB	64/97dB	64dB
Channel phase difference	0°	0°	0°
Total harmonic dist, 0dB	-75dB	-83dB	-87dB
Total harmonic dist, -10dB	—	-79dB	—
Total harmonic dist, -60dB	—	-40dB	—
Total harmonic dist, -80dB	—	-14dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	-79dB
Intermodulation, 19kHz/20kHz, -10dB	—	—	-81dB
Frequency response, left channel	-0.01dB	0dB	-0.34dB
Frequency response, right channel	-0.01dB	0dB	-0.34dB
Signal-to-noise, 20Hz-20kHz unweighted	—	—	100/108dB
Signal-to-noise, CCIR/ARM, 1kHz ref	—	—	99/106dB
Output level, 0dB, left/right	—	—	2.07V
Output impedance	—	—	270ohms
Track access time	—	—	3.5 secs
Error correction capability	>900µm gap,	>800µm dot	—
Mechanical noise	—	—	low
Spurious up to 100kHz	—	—	-88dB
Resolution at -90dB	—	—	-101/-121dB
Headphone socket	—	—	yes
Dimensions (w x d x h)	—	—	(2x) 16 x 32 x 10cm
Estimated typical purchase price	—	—	£950 (plus extras)

Reviewed by Martin Colloms

Rating: Recommended

Boothroyd Stuart Ltd., 13 Clifton Road, Huntingdon, Cambs PE18 7EJ.  
Tel: (0480) 57339.

# Philips CD880



**B**uilt like a tank, this \$500 heavyweight claims Belgian manufacture (like all the cheaper Philips models) but in many respects resembles their 960 'flagship' produced in the ex-Marantz factory in Japan. The truth is it's something of a hybrid, sharing some parts with the 960 but assembled and cased in Belgium – a cost effective blend to be sure, if a trifle incongruous in the light of Philips current EEC politicking over European manufacturing content in CD players. The front panel extrusion confers confidence, as do the controls and operational smoothness – a nice touch being the rubber 'graze pad' along the front edge of the drawer, while the boxed heatsink on the rear also avoids abrading errant fingers. The base seemed well damped, but the wrapover top and side piece is a bit rattly, while vibration decoupling through the feet seems limited.

The feature count is pretty impressive, the front panel proclaiming the 'remote volume control' (in addition to implied remote function control) and 'digital and optical output/direct track access/direct program' to all and sundry. Other features include Philips' own clever FTS (favourite track selection) system for pre-programming one's CD collection, 'shuffle' (random) play, plus all the usual drive and programming functions expected on a luxury model. The very informative display is as elaborate as the array of controls, and the whole might prove a little daunting for some users, though button pushers will relish the 12 key programming pad with menu display etc.

The internal engineering and componentry go a long way towards justifying the 'de luxe' claims. The whole unit is based on a solid die-cast chassis, and some of the steel panels are copper plated, if undamped. The transport is also based on a Philips die-casting, and many of the components are

specially selected, expensive grades. The large power supply transformer has similarly generous 2x6,800 $\mu$ F reservoir capacitors, and the DACs are selected A-grade TDA1541s.

## Lab Report

The frequency response up to 20kHz would put most signal generators to shame – very flat but with Philips' mild high frequency ripple. Stereo separation was very good and channel balance almost perfect. The dual DACs mean no inter-channel phase difference and absolute phase is maintained. THD was superior at all frequencies and levels, downband noise from 20kHz 0dB was well suppressed, and IM products were almost lost in the measuring instrument noise floor. Output level was a standard 2V from the familiar Philips 200ohm source impedance.

De-emphasis was correct, track access time fast, mechanical noise very low and resistance to shock and vibration judged excellent. No problems were encountered with error correction functions, and the white noise test was passed without problem. Signal-to-noise ratios were excellent, but ultrasonic spurious could have been better suppressed. The low level resolution was a little better than the majority of players using TDA1541 DACs, but still showed an average error of 6dB, though there was a reasonable attempt at the reproduction of a –90dB 1kHz sine wave.

## Sound Quality

This substantially built Philips costs significantly more than all but their 960, yet the very good sound quality rating justifies its position in the hierarchy. The sound was

solid, competently uncoloured and pleasantly free of any oddities. There was a slightly 'steely' quality on strings, but the treble was really very good, if a touch bland. Bass showed a mild loss of weight, but was fast and dry, while the midrange was impressively neutral, if a shade muted dynamically. Stereo staging was consistently very good in all respects.

## Conclusions

The 880 is an impressive blend of luxury build quality and features at a far from extravagant price. It also delivers the subjective goods and hence deserves Recommendation.

## Test Results

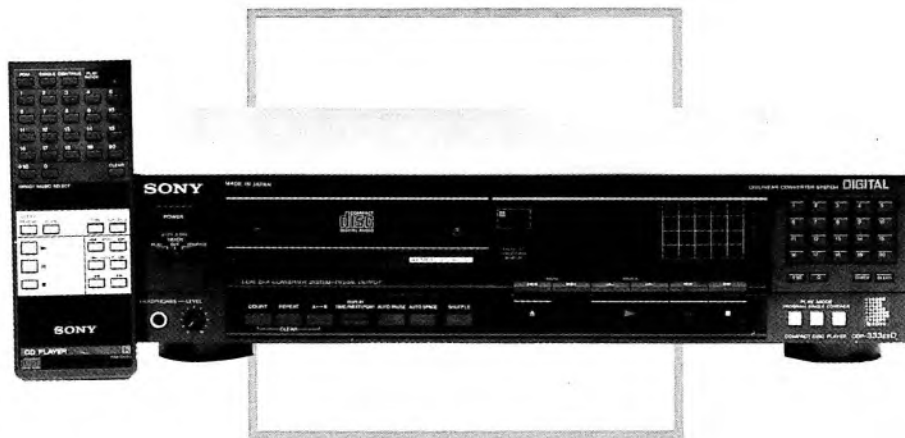
	20Hz	1kHz	20kHz
Channel balance	0.03dB	0.04dB	0.05dB
Stereo separation	126dB	121dB	100dB
Channel phase difference	0°	0°	0°
Total harmonic dist, 0dB	–100dB	–87dB	–86dB
Total harmonic dist, –10dB	—	–83dB	—
Total harmonic dist, –60dB	—	–47dB	—
Total harmonic dist, –80dB	—	–25dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	–105dB
Intermodulation, 19kHz/20kHz, –10dB	—	—	–101dB
Frequency response, left channel	0.01dB	0	–0.02dB
Frequency response, right channel	0dB	0	–0.04dB
Signal-to-noise, 20Hz–20kHz unweighted	—	—	104/108dB
Signal-to-noise, CCIR/ARM, 1kHz ref	—	—	108/109dB
Output level, 0dB, left/right	—	—	2.03V
Output impedance	—	—	200ohms
De-emphasis 1kHz, 5kHz, 16kHz	–0.38dB, –4.62dB, –9.1dB	—	—
Track access time	—	—	2.5 secs
Error correction capability	>900 $\mu$ m gap, >800 $\mu$ m dot	—	—
Mechanical noise	—	—	low
Spurious up to 100kHz	—	—	–83dB
Resolution at –90dB	—	—	–95.3/–97.4dB
Headphone socket	—	—	variable, 144ohms
Dimensions (w x d x h)	—	—	42 x 34.5 x 10.5cm
Estimated typical purchase price	—	—	£500

Reprinted from issue No. 58 by Martin Colloms

Rating: Recommended

Philips Electrical Ltd., City House, 420–430 London Road, Croydon, Surrey CR9 3QR. Tel: (01) 689 2166.

# Sony CDP-333ESD



Sony's luxury *Esprit* models of a few years ago proved a bit too exotic for British tastes, but their more recent and less ambitious *ES* initiative has comfortably exceeded sales expectations, helping to reawaken demand for luxury finish imported hi-fi. The £1,000 *555ES* was a particular favourite in our '87 tests, rivalling earlier two-box Sonys, so expectations ran pretty high for this £600 *333ES*.

It is a heavy, solid machine, encased in well damped metal (or slightly rattly metal in the case of the top-plate), sitting on proper feet which should assist environmental isolation. The front panel is necessarily elaborate to handle the large number of features, but the layout is clean and logical enough, apart perhaps from the rather odd looking white play mode buttons. The complex display incorporates a 20-track menu, alongside the 20 front panel and mirroring the 20 remote control handset track entry keys. Though otherwise comprehensive, Sony have deliberately refrained from providing remote volume adjustment. The overall finish is exceptional, the appearance just slightly aggressive, and slightly cluttered with gold and white graphics.

Internal inspection shows that the very solid casework has interlinked, damped panels, while the smooth disc drive also features special damping. High quality printed circuit boards are neatly interlinked and feature good quality components throughout. A decent size transformer uses a number of regulators to feed various sections. A Sony digital filter is combined with Philips *TDA1541A* DACs in a 4x oversampling configuration.

## Lab Report

Given Sony's aspirations for this model, an exemplary lab performance was pretty well

inevitable. The frequency response was a very straight line indeed, channel balance and stereo separation figures were both exceptional, and all represented a mild improvement over the earlier but more expensive *555ES*. Dual DACs ensure inter-channel high frequency phase consistency. Harmonic and intermodulation distortions were all very low.

Output measured close enough to standard, from a tolerantly low source impedance. De-emphasis is accurate, track access fast, mechanical noise very low, and the error correction circuitry corrects errors. Shock and vibration immunity was confirmed as very good indeed. Signal-to-noise ratios were exceptionally good, and ultrasonic spurious notable for their near absence – here again better than the *555*. The  $-90\text{dB}$  1kHz sine-wave was reproduced very close to that level, indicating near-16-bit low level resolution. One observed oddity was that inserting headphones caused a change in the line output level.

## Sound Quality

Based on experience of more than one sample, the *333ES* consistently rated excellent on sound quality, in fact achieving a higher overall score than did the more expensive *555ES*.

The midrange sounded sweet, musical and unforced, while the well integrated treble had good perspectives and lacked unwelcome edge or 'grain'. Information was clearly presented and focus quite exceptional, as was stereo depth. By perfectionist standards the bass was slightly 'softened' and 'lightened', while dynamics also lacked a little drama and power, though both were funda-

mentally good nonetheless. Above all this has proved to be one of the most consistently listenable players around.

## Conclusions

We've learned that Sony are soon to discontinue the *333ES*, nonetheless you can expect to see samples in the shops for a good few months yet – maybe even at discounted prices once the machine is no longer a current model. The model nevertheless represents a triumph for Sony's development department, effectively bringing down the entry level price to 'high end' CD replay. Clearly Recommended.

## Test Results

	20Hz	1kHz	20kHz
Channel balance	0.0dB	0.0dB	0.04dB
Stereo separation	130dB	120dB	104dB
Channel phase difference	0°	0°	0°
Total harmonic dist, 0dB	-89dB	-89dB	-87dB
Total harmonic dist, -10dB	—	-82dB	—
Total harmonic dist, -60dB	—	-43dB	—
Total harmonic dist, -80dB	—	-22dB	—
Intermodulation, 19kHz/20kHz, 0dB	—	—	-100dB
Intermodulation, 19kHz/20kHz, -10dB	—	—	-87dB
Frequency response, left channel	0.02dB	0	-0.04dB
Frequency response, right channel	0.02dB	0	-0.08dB
Signal-to-noise, 20Hz-20kHz unweighted	—	—	110/109dB
Signal-to-noise, CCIR/ARM, 1kHz ref	—	—	108/106dB
Output level, 0dB, left/right	—	—	2V
Output impedance	—	—	200ohms
De-emphasis 1kHz, -0.33dB; 5kHz, -4.55dB; 16kHz, -9.11dB	—	—	—
Track access time	—	—	2 secs
Error correction capability	—	—	>900µm gap, >800µm dot
Mechanical noise	—	—	very low
Spurious up to 100kHz	—	—	-101dB
Resolution at -90dB	—	—	-91.5/-91.35dB
Headphone socket	—	—	100ohms
Dimensions (w x d x h)	—	—	43 x 34.5 x 11.8cm
Estimated typical purchase price	—	—	£599

Reprinted from issue No. 58 by Martin Colloms

Rating: Recommended

Sony UK Ltd., Sony House, South St. Staines, Middx.  
Tel: (0704) 67000.

# ESSENTIAL NUMBERS.



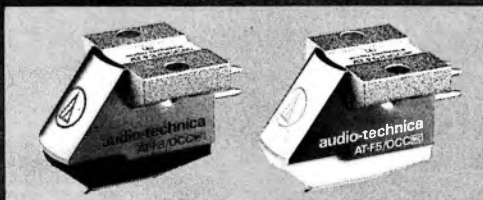
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Whilst the list of technical achievements is endless, the true test is in the listening. Press comments include . . . *'the OC7 is a superb sounding cartridge; there's no other way of looking at it. It's treble articulation and dynamics are exceptional'* — *NEW HI-FI SOUND*. *'I will say with certainty that the OC9 is one of the very best cartridges I know, and can give it my strongest and most enthusiastic recommendation'* — *HI-FI REVIEW*.

Please contact Audio Technica for complete reprints of these together with the reviews of Hi-Fi Answers, Gramophone and Hi-Fi News. Better still, call in for a personal audition at BADA and specialist audio retailers and find out why AT-OC7 and AT-OC9 are now essential numbers in today's top flight analogue systems.

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	AT-OC9	AT-OC7
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Weight (gm)	7.8	7.8
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# Aiwa AD-WX909



**I**ntriguingly whereas the £180 *AD-WX707* (reviewed in our April issue) has a unidirectional playback transport and an auto-reverse record one, the *AD-WX909* is exactly the opposite (*ie* an auto-reverse playback transport). Apart from losing the ability to make 90 minute near-continuous recordings, this makes a good deal of sense. The playback transport generally fulfils a less critical role in a twin deck (dubbing tapes is hardly a recipe for hi-fi even when done at normal speed), and the convenience of auto-reverse operation probably outweighs any qualitative compromise. For the record/playback section however, sound quality must be the primary concern, and the limitations inherent in auto-reverse operation are better avoided.

What you have here then is a unidirectional recording mechanism with three heads for full source/tape monitoring (with auto and manual monitor switching – all mod cons!), plus Dolby *HX Pro*. The record deck also features an automatic head demagnetising circuit – thus removing the need to buy any expensive devices designed for this purpose.

Each transport has Dolby B and C, logic control with track search, cue and review and (unusually) dedicated electronic tape counters. The two transports have their own rear panel connections, and a spare input (labelled CD/DAT) is also provided, but there's no microphone input. This basic mix is leavened with the usual – and some less usual – extras, including standard and high speed dubbing, blank skip, track search, bias adjust (Type I and II), parallel recording and sequential play. It's all very tasty – and well presented too. The auto-reverse playback

deck employs a quick acting side change that switches as soon as it detects the tape/leader join, making continuous playback reasonably plausible.

## Lab Report

The record/replay frequency responses are a bit messy. To achieve a flat and extended HF response will result in something of a 'hole in the middle' centred on 5kHz. Unfortunately metal tapes cannot be tweaked at all. Dolby tracking is fair but not exceptional, especially with the more manipulative Dolby C which shows limited amplitude broadband response lifts centred on 200Hz and 5kHz. Bass and treble are well extended, however.

The record transport has excellent pitch stability – the spectrum analysis is pretty clean – but the playback only transport (results not shown in the table) was predictably less good, being roughly comparable to the record transport of Aiwa's *WX707*. It's not possible to be too specific since the tests could only cover playback. The various noise and distortion figures were quite good, but the 0VU intermodulation level was significant.

## Sound Quality

The two transports must be discussed separately. The main record/playback one is an excellent performer, fully capable of recordings which retained many of the subtler qualities of the source intact. The deck sounded tonally colourful (in the positive sense) and dynamically (relatively) unfettered. There was some advantage in using metal tapes over chrome and chrome over ferric, but the *HX Pro* circuitry went some way towards levelling the odds. The Dolby processing was

also well adjusted to its role, and did little to rob the sound of vitality or believability. Pitch resolution and speed were beyond reproach.

The playback transport was nothing like as good, however, sounding relatively scrappy and suffering some unevenness and dropout. It sounded cheap, consequently this was reflected in the dubbing performance of the *AD-WX909*.

## Conclusions

Heartily Recommended – Aiwa can justifiably be proud of this one. At last a dual transport cassette deck you don't have to make excuses for.

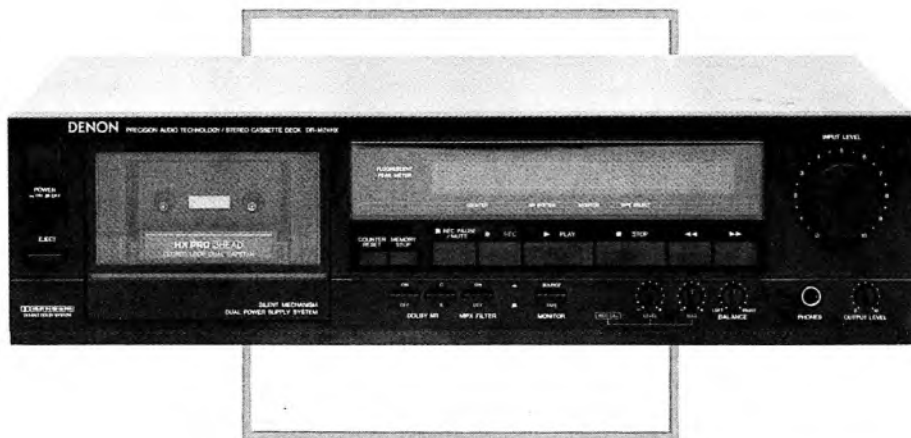
## Test Results

Rec/replay response – 3dB ref 1kHz	
IEC Type I	<20Hz – 18.5kHz
IEC Type II	<20Hz – 20kHz
IEC Type IV	<20Hz – 20kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.078%/0.10%
Wow/Flutter Peak DIN wtd	0.068%/0.099%
Speed error	+0.15%
Type I signal/noise CCIR/ARM 315Hz	50dB
distortion 0dB	0.46%
Type II signal/noise CCIR/ARM 315Hz	53.5dB
distortion 0dB	1.0%
Type IV signal/noise CCIR/ARM 315Hz	53dB
distortion 0dB	0.85%
Channel separation DVU/1kHz	48dB
Line input sensitivity/overload	78mV/25V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	690mV/2.4V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	1.9%
Azimuth check R-L phase at 8kHz	5 degrees
VU indication at IEC 0dB	+5dB
Dimensions (w x h x d)	43 x 126 x 31.7cms
Typical Retail Price	£400

Reprinted from issue No. 57 by Alvin Gola  
Rating: Best Buy

Aiwa (UK) Ltd., Unit 2, Dukes Estate, Western Avenue, London W3 0SY. Tel: 01-993 1672

# Denon DR-M24HX



The DR-M24HX is the second cheapest of four currently listed 3-head Denon recorders, the others being the 20, 30HX and 44HX.

As its name suggests, the 24HX is Dolby HX Pro equipped, in addition to Dolby B and C noise reduction. Equally important, the transport employs dual capstans in a closed loop arrangement, Denon being one of a small number of manufacturers using this inherently complicated and expensive technique. Mode engagement (by cams) achieves almost Nakamichi standards of quietness, and operational 'feel' is very good.

Tape type selection is automatic, and a switchable MPX filter is also provided. The record level meters operate over a 28dB dynamic range, and an electronic memory counter is fitted.

The 24HX has front panel provision for bias and level adjustment, the latter set by switching between source and tape (there's no built-in oscillator) so that no difference shows on the meters. Bias has to be set by ear.

Denon have apparently gone to some lengths to create clean-sounding electronics, citing such measures as the use of high grade capacitors and other components, and separate dedicated power supply feeds for the different circuit areas.

## Lab Report

The sensitivity adjustment used in combination with the bias trim enables almost any tape to be used, including the recent high energy Type Is and IIs, which are further assisted by the Dolby HX Pro circuitry. The common features inherent in the recorder

are the loss of output in the lower midrange, and very slight top end brightness (not enough to be particularly damaging). Pre-recorded tapes are reproduced with relatively little treble loss.

Wow and flutter levels were numerically moderate, though the spectrum analysis indicated several discrete flutter sidebands, albeit at fairly low levels. The Denon also has an excellent working dynamic range. Note the low Type I and IV OVU distortion combined with good noise figures; considering that OVU corresponds to IEC 0dB, higher distortion levels might have been expected.

## Sound Quality

The 24HX strikes an excellent overall subjective compromise. Rarely particularly accurate tonally, the Denon nonetheless sounded unusually surefooted and was essentially true to the dynamics and detail of the recorded source on all three tape types – which is also a tribute to the Dolby HX Pro processing.

The basic electronics attain a high audio standard too, the source feed monitor sounding comparable to the signal monitored directly from the amplifier. The Dolby installation also appears to be a good one, in the sense that the usual losses of dynamics, openness and information were very small – indeed often negligible or completely inaudible.

Stereo imaging and depth were well presented. The impression of a coherent soundstage was very tangible, because the deck suffered much less than most from the cassette medium's disease of terminal vagueness.

## Conclusions

This is a very clean, open and spacious sounding recorder with an attractive range of facilities. The sound is very positively presented, to the point of being larger than life at times. The Denon DR-M24HX is a deck of breeding, and very well built to boot. Obvious Best Buy material.

## Test Results

Rec/replay response – 3dB ref 1kHz	
IEC Type I	25Hz – 16kHz
IEC Type II	25Hz – 16kHz
IEC Type IV	24Hz – 19kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.13%/0.13%
Wow/Flutter Peak DIN wtd	0.11%/0.12%
Speed error	+0.175%
Type I signal/noise CCIR/ARM 315Hz distortion 0dB	50dB
Type II signal/noise CCIR/ARM 315Hz distortion 0dB	0.65%
Type IV signal/noise CCIR/ARM 315Hz distortion 0dB	53dB
Type IV signal/noise CCIR/ARM 315Hz distortion 0dB	1.4%
Type IV signal/noise CCIR/ARM 315Hz distortion 0dB	53dB
Channel separation DVU/1kHz	0.8%
Line input sensitivity/overload	45dB
Mic input sensitivity/overload	51.5mV/4.5V
Line output for 0dB/maximum	n/a
IM distortion 1kHz, ref 10kHz/11kHz 0dB	91.7mV/4.5V
Azimuth check R-L phase at 8kHz	2.5%
VU indication at IEC 0dB	27 degrees
Dimensions (w x h x d)	0dB
Typical Retail Price	43.4 x 11.5 x 28.6cms
Reprinted from issue No. 57 by Alvin Gold	£289.95

Rating: Best Buy  
Hayden Laboratories Ltd., Hayden House, Chiltern Hill, Chalfont St Peter, Bucks. Tel: (0753) 888447.

# Denon DR-M44HX

Denon's flagship *DR-M44HX* is a three-head (which means off-tape monitoring whilst recording), dual capstan cassette deck with an extremely effective automatic tape set-up system (as distinct from auto tape type recognition, which is also fitted). In addition, Dolby *HX Pro* reduces HF compression and makes the recording process more linear at high levels, especially with low bias tapes.

In common with other recent Denon models, the *DR-M44HX* uses a new cam-operated transport, so tape handling is unusually gentle from the moment a cassette is placed in the back-lit well. This deck is never impolite enough to click and jerk in the way solenoid controlled decks are wont to do as they shift from mode to mode. The transport is made by Denon themselves, who are one of very few who don't buy their mechanisms from an OEM supplier.

The *44* is also blessed with a very full and complex status display. This includes an excellent set of record level meters (28dB range, good resolution, two colours, peak hold LEDs), and an electronic tape counter reading in minutes and seconds, complete with matching memory stop feature. The display area also serves to show the current transport status, tape/source monitoring status, the information concerned with the auto tape tuning system and much more.

Noise reduction is courtesy of the ubiquitous Dolby B and C, with separate MPX filtering. The output level of both headphones and main preamp level output can be adjusted with an output pot: the same criticism applies here as elsewhere; for sonic reasons the level control should not be wired into the critical amplifier feed (sound effect of slapping wrist). A remote control can be added, using an outboard receiver. Even as it stands though, control layout is immaculate, and the deck is a pleasure to use.

## Lab Report

The *DR-M44HX* has an excellent transport, arguably the single greatest attribute of any cassette deck. The 0.04% weighted wow and flutter figure is low enough in its own right of course, but it's backed up by a flutter spectrogram which shows negligible wow, and other effects well distributed.

The feature that most clearly approximates to a flutter component is at 23Hz, but even this peaks at only -40dB. The pitch centre in the noise modulation graph is also extremely sharp and narrow, which suggests that pitch resolution will be excellent. Mod-



ulation noise is low throughout.

The amplitude responses are equally well optimised. The bass end is very well engineered, and deviations from the straight and narrow amount to no more than can be contained in a 1.5dB envelope (at least when the auto tuning system has been used first, and regardless of the brand and type of tape used). There was no discernible Dolby mis-tracking.

By rights, however, prerecorded tapes should sound a little dull. There's a fairly substantial azimuth error (67 degrees at 8kHz) which should not be present on a deck of the Denon's pretensions. The only other small fly in the ointment is the high level of intermodulation products, which suggests that the record circuit may be running out of headroom at this point, even though the less sensitive harmonic distortion numbers give no confirmation.

## Sound Quality

From the first bar of the first recording, it was obvious that here was a deck with real class and an uncommon repertoire of skills. The *DR-M44HX* has a number of priceless (all right, expensive) facilities. One of these is Dolby HX Professional, which beefs up ferric (Type I) performance standards by reducing compression and improving consistency, especially at high levels. The upshot of this is that a good ferric tape can show most of the capabilities of a good Type II tape, especially in the realm of mid and HF dynamics.

The other is much more important: guaranteed rock steady pitch plus considerable resolution (I believe there is a causal relationship between the two), and without

any sense of grain. Best of all, the sound is simply but unmistakably of very high musical quality. This Denon may be used in a truly capable, high resolution 'audiophile' system without betraying itself too obviously as a mere cassette deck, which is no mean accolade given current cassette deck standards!

The intermodulation result is reflected in the headroom: high energy HF rich material tended to splatter and image vaguely around the soundstage with metal tapes in use. Nevertheless, and despite Dolby *HX Pro*, this deck is a natural for exploiting metal tape. Not because of any half-baked notions of extra HF headroom, but because metal is particularly effective at capturing the subtleties and expressive range of midband information when using a good quality source.

Only pre-recorded material disappointed slightly. The quality of music making here was more abrupt, less articulate, and less convincing dynamically. There was also more extreme HF hiss than normal with Dolby B engaged. Dolby B performed quite satisfactorily when recording and playing back, but as usual Dolby C processing messed things up and defocused the sound to a degree.

## Conclusions

The *DR-M44HX* has certain objective limitations, mostly minor, but is true to the spirit of the music it reproduces, especially with Type IV (metal) tape. A first class transport is the key, but the good range of features, notably auto-tape tuning, does nothing to hinder. Highly recommended

## Test Results

Rec/replay response -3dB ref 1kHz	
IEC Type I	23Hz - 14kHz*
IEC Type II	24Hz - 15kHz
IEC Type IV	23Hz - 21kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.04%/0.11%
Speed error	-0.4%
Type I signal/noise CCIR/ARM 315Hz	48dB
distortion 0dB	0.65%
Type II signal/noise CCIR/ARM 315Hz	50dB
distortion 0dB	0.75%
Type IV signal/noise CCIR/ARM 315Hz	51.5dB
distortion 0dB	0.85%
Channel separation 0VU/1kHz	-45dB
Line input sensitivity/overload	89mV/>7V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	826mV/3.4V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	10%
Azimuth check R-L phase at 8kHz	67 degrees
VU indication at IEC 0dB	+1dB
Dimensions (w x h x d)	43.4 x 11.5 x 28.6cms
Typical Retail Price	£399

\*after auto-tuning  
 Reprinted from issue No. 52 by Alvin Golt  
 Reprint: Recommended  
 Hayden Laboratories Ltd., Hayden House, Chiltern Hill,  
 Chalfont St Peter, Bucks. Tel: (0753) 888447

# Doug Brady Hi-Fi

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# Nakamichi CR-7E

**A**lthough a full £250 cheaper than the *Dragon*, the Dolby B/C CR7E is not downmarket of that model. It simply offers an alternative and in certain ways more domesticated set of specifications, with a roughly equivalent standard of engineering. Naturally this is in the Mercedes class.

Proof of its friendlier packaging is the auto tape type sensing feature, the first time this has been seen on a Nakamichi (though a manual facility is retained as an option). There is also a version of the playback head azimuth adjustment facility first seen in the *Dragon*, and an auto tape tuning facility.

Naturally the CR7E has three discrete heads, offering better physical and electrical independence than the siamesed variety (claim Nakamichi). The transport uses an elaborate dual capstan system; one feature missing from the CR7E, however is the *Dragon's* auto reverse.

The auto tape alignment works similarly to the manual *Dragon* system in adjusting sensitivity and bias but not record equalisation. However, the CR7 also includes playback head azimuth adjustment as the first step in the process (necessary because the playback head can be re-oriented with respect to the record one, which is not the case elsewhere). The whole alignment procedure takes about 15 seconds. To cope with the playback situation, the CR7E has a manual azimuth alignment control, with a graphic display which is of no help at all – it's purely cosmetic: the technique is simply to tune for maximum treble.

Another example of the new user friendly Nakamichi image takes the shape of a neat infra-red remote control handset. With just eight control buttons, it enables the user to start recording or access any of the other important transport modes, and to tweak the azimuth setting.

## Lab Report

The CR7E has an excellent transport by normal standards, but on the showing of this sample at least it's inferior to that of the *Dragon*. Taking the noise modulation plot, the CR7 has a fairly narrow main component, but with observable wow sidebands. At wider bandwidths, noise levels are low. The differences were more marked with the fluttergram, which should have been better. 6Hz wow was at -24dB, and there were other significant components at 12Hz, 18Hz and at other multiples of 6Hz. All of which helps explain the 0.13% peak DIN weighted wow & flutter figure, which on past form is not typical for this model.

As with other Nakamichis, the record/replay frequency responses – measured after



auto-calibration – have supremely accurate midbands, which barely deteriorate at the frequency extremes. IEC Type I ferric tape had a barely perceptible rolloff in the extreme HF, whilst Type II and IV tapes were simply flat up to nearly 20kHz. Both types of Dolby processing had a small but perhaps significant effect on the intrinsic response shape.

The playback only response, is textbook stuff, akin to that of the *Dragon*. Out of interest, this response was run twice, once with the azimuth control centred, and once with the setting corrected by ear. The former gave a measured 60 degree phase lag at 8kHz, and a -3dB point at just over 8kHz. Properly optimised, the -3dB point was at just over 20kHz!

Taking the achieved harmonic distortion levels into account, the CR7E has an amazingly good noise performance, with Type II stock in particular (Type I ferrics measured similarly). This deck has a genuinely wide working dynamic range.

## Sound Quality

Given the inferior measurements in crucial areas, notably wow & flutter, the CR7 was expected to audition a little worse than the *Dragon*. Instead it sounded better – clearly better.

However the main sonic features were shared between the two. One of the points that was noticed first was the comparative absence of 'waffle' in the bass. The CR7 shares with the *Dragon* a very powerful, deeply extended bass that has a superb sense of pitch and a real ability to start and stop quickly, adding stature and tonal variety to the music as a whole. The other remarkable

feature of the sound of both top Nakamichis is the combination of lucidity and transparency in the midband.

Where the CR7 scores over the *Dragon* and any other cassette deck known to the author is in the quality of its electronics. Where the *Dragon* tended to sound a little hard and constrained, the CR7 was sweetness and light itself. It sounded as though the circuit is what it probably isn't – simple.

Pitch and image stability were not materially worse than the *Dragon*, numbers notwithstanding. But again it was necessary to switch the Dolby circuits off to extract the last ounce of vitality and resolution. With some types of music this is simply impractical, but the CR7 can drive tape very hard indeed before obvious compression sets in.

Adjustable azimuth once again means that pre-recorded cassettes can be exploited for all they're worth. The CR7 was capable of extracting a great deal from a wide range of tapes, though they still tended to sound a little threadbare compared to other sources of pre-recorded music. Nonetheless the sheer quality of sound that can be extracted from this £1,500 machine playing £1.50's worth of ferric oxide, binder and plastic is quite an eye-opener.

## Conclusions

As well as offering a more extensive range of user features than cheaper Nakamichis, the CR7 also sounds better, thus justifying its extremely high price. It demonstrates clearly what is possible with the cassette medium, in a rather more user-friendly form than previous top decks from this manufacturer.

## Test Results

Rec/replay response - 3dB ref 1kHz	
IEC Type I	<20Hz - 17kHz
IEC Type II	<20Hz - 19kHz
IEC Type IV	<20Hz - 23kHz
Wow & Flutter - Peak DIN wtd/unwtd	-0.13%/0.20%
Speed error	-0.1%
Type I signal/noise CCIR/ARM 315Hz	50dB
distortion 0dB	0.7%
Type II signal/noise CCIR/ARM 315Hz	52dB
distortion 0dB	0.8%
Type IV signal/noise CCIR/ARM 315Hz	52.5dB
distortion 0dB	0.6%
Channel separation 0VU/1kHz	48dB
Line input sensitivity/overload	74mV/>7V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	1.40V/7.4V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	0.75%
Azimuth check R-L phase at 8kHz	adjustable*
VU indication at IEC 0dB	+3dB
Dimensions (w x h x d)	83.5 x 13.5 x 30.6cms
Typical Retail Price	£1500

\*see text

Reprinted from issue No. 52 by Alvin Gold

Rating: Recommended

Nakamichi B&W (UK) Ltd., Marlborough Road, Churchill Ind. Est., Lancing, West Sussex. Tel: (0903) 750750

# Nakamichi Dragon

Until the *CR-7E* arrived, this was the cassette deck against which all others were judged. The *Dragon's* claim to fame is twofold. First, it is almost unequalled in the sheer quality and integrity of its construction, which has all the hallmarks of a professional piece of kit. It has a truly sophisticated transport mechanism using two separate quartz-referenced non-cogging direct drive motors, one for each of the two capstans, plus a separate reel motor. The trailing capstan must run slightly slower than the leading one to maintain tension across the heads, and although this is established practice with unidirectional decks, it's hairy stuff with auto-reverse models.

Secondly, the *Dragon* is uncompromisingly directed at extracting the optimum playback quality from any tape, no matter what its origins.

Bias adjustment varies the amplitude/frequency response, especially at HF, whilst the sensitivity adjustment facilitates correct Dolby tracking integrity. The Nakamichi design enables any tape to be tuned in by way of the three tape slots independently. The adjustments are performed manually using built-in 400Hz and 15kHz oscillators.

The other unique *Dragon* feature is the automatically adjusting replay head azimuth. The playback head gap for one channel only is divided along its length (equivalent to track width on the tape) into two sub-units, each with its own windings, and circuitry looks for phase differences between them. This difference signal then feeds a servo motor which corrects the azimuth of the head to match that of the original recording.

These are the items you won't find on the *Dragon*: there is no automatic tape type selection, Dolby *HX Pro* or *dbx*, nor auto-reverse record. You will of course find Dolby B and C, with independent MPX filtering 2-speed auto fade – and the rest is all in the fine print.

The inescapable irony with the *Dragon* is that a great deal of the expense and complication is directed at a task that shouldn't be necessary if other manufacturers did their jobs right by sticking to the relevant standards – correcting the incompatibilities that arise from recorder to recorder and from tape to tape.

## Lab Report

Pitch stability is of an impressively high order, as was demonstrated by the noise modulation spectrogram for example, with ultra-low noise levels from  $\pm 20$ Hz out. The fluttergram told a similar story – all discrete peaks were at  $-40$ dB or better! And those that were there were well dispersed, which of



course is the primary design aim of the diffused resonance transport construction. 0.027% peak DIN weighted wow & flutter is a fine result by any standard, and combined with the two spectrum analysis plots, speaks volumes for the *Dragon's* engineering.

As expected, very little measured intermodulation distortion means the *Dragon* is one deck that is perfectly capable of driving metal tape hard. The signal/noise and harmonic distortion figures are referred to the 0VU point on the Nakamichi meters, which corresponds to 3dB below IEC 0dB. Taking this into account, the noise levels are good, especially with Type II and IV tapes. The distortion figures are also low, so most program material can be recorded a few decibels into the red. The *Dragon* has a wide working dynamic range.

On the test bench the playback plot spoke for itself. Likewise most of the record/playback responses. The bias and sensitivity settings used were the standard ones (all adjustments points centred) and can in fact be flattened at the HF end to a high degree of accuracy with almost any tape type. Dolby processing had essentially no effect whatever on the intrinsic responses. The LF end is well tailored, with a bare minimum of head contour effects.

## Sound Quality

There's no doubting the audio quality of this elaborate cassette deck. By any standards, it's special. As a tape processor – ignoring its record and playback amplifiers for a moment – it is all but inaudible. With a good tape on board, especially a metal (Type IV) the quality of sound produced from the tapes was essentially the same as the sound monitored

via the deck's electronics, but with certain caveats.

Caveat number one concerns Dolby processing. With the *Dragon*, we hoped to find a deck where Dolby simply reduced noise, without significant side effects.

Sadly it was not to be. Selecting either flavour of noise reduction added a hardness and constriction to the music that could not be mistaken. It wasn't severe, and with some program material couldn't even be heard, but there was no doubt at all that when quality was of the essence, recording without Dolby led to a freer, airier and sweeter sound. Happily, the Nakamichi is one deck that has a sufficiently wide dynamic range for practical use without noise reduction.

The only other slight bottleneck with the *Dragon* was the electronics, which also imposed a distinctive sonic signature on the sound. Using the *Dragon* wired into the tape monitor loop of a high grade preamplifier introduced further slight hardening and loss of stereo depth and separation. But the effect was mild.

Auto azimuth control means that the best will be extracted from all pre-recorded cassettes, and these sounded magnificent in nearly all respects.

## Conclusions

Prior to the introduction of the *CR-7E*, the *Dragon* was very simply the finest domestic cassette recorder money could buy. However, the *CR-7* has placed it in a slightly different perspective. Take away some of the shiny finish, attach rack mounting handles and balanced 600ohm socketry, and what it really is would be revealed: a refugee from the studio world.

## Test Results

Rec/replay response – 3dB ref 1kHz	
IEC Type I	< 20Hz – 18kHz
IEC Type II	< 20Hz – 19kHz
IEC Type IV	< 20Hz – 18kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.027%/0.065%
Speed error	–0.2%
Type I signal/noise CCIR/ARM 315Hz	48.5dB
distortion 0dB	0.65%
Type II signal/noise CCIR/ARM 315Hz	50dB
distortion 0dB	0.5%
Type IV signal/noise CCIR/ARM 315Hz	51dB
distortion 0dB	0.44%
Channel separation 0VU/1kHz	–47dB
Line input sensitivity/overload	80mV/>7V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	1.36mV/6.5V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	0.2%
Azimuth check R-L phase at 8kHz	5 degrees
VU indication at IEC 0dB	+3dB
Dimensions (w x h x d)	45 x 13.5 x 30cms
Typical Retail Price	£1750

Reprinted from issue No. 52 by *Alvin Gold*

Ratting: Recommended

Nakamichi B&W (UK) Ltd., Marlborough Road, Churchill Ind. Est., Lancing, West Sussex. Tel: (0903) 750750.

# Sony TC-K700ES

The *TC-K700ES* is based loosely on the facilities of the *TC-K444* and the audio circuitry of the earlier but highly ranked *TC-K777*. However, target performance standards are higher still, and the *TC-K700ES* has a price to match its own unique identity.

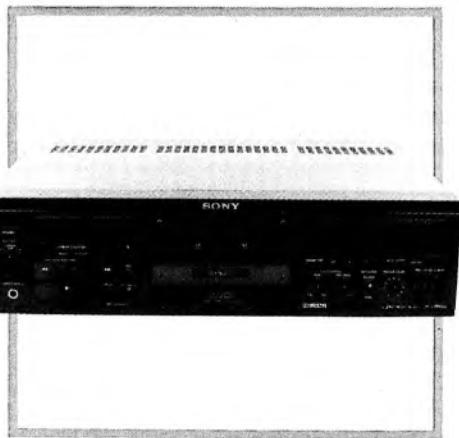
The deck is based around a unidirectional, dual-capstan, three-head transport which allows instant source/tape checks to be made *via* a front panel switch. The dual capstan drive effectively locks the mechanics of the cassette out of the speed stability and tape to head contact equation. Sony were the first to use this system with compact cassette, something like a decade ago.

The rather 'clanky' transport is operated by a well organised bank of light-touch switches, and allows 'punch-in' recording (hold 'play' and press 'record') and automatic four second mutes. The tape counter does its arithmetic in minutes and seconds, and has a memory and auto-play features.

Sony's record level meters have long been a strong point, and these are no exceptions. They have a wide 48dB range spaced over 16 steps, with peak hold LEDs which stay lit for a short while after the peak has passed. Tape type selection is fully automatic (this being the only obvious feature to separate the *TC-K700ES* from the *TC-K444ES*), but bias and sensitivity settings – which affect the tracking integrity of the Dolby circuits – can be adjusted manually.

Socketry is limited to amplifier interconnections, and a variable output headphone socket. Noise reduction is by Dolby B and C, with switchable multiplex filtering. As usual, the MPX filters should be switched off except in the comparatively rare cases of tuners with high levels of 19kHz multiplex signal on the output.

For once, the inside of this deck is worthy of notice in its own right. This is one of the very few existing cassette decks (apart from those made by cassette specialists like Nakamichi) where mechanical integrity and resistance to microphony is rightly elevated to the status of an obsession. The transport mechanism, main transformer and rectifier are rigidly secured to a block, itself firmly attached to the middle of a stiff chassis which is supported by four solid feet. All other structural elements are designed to resist mechanical excitation in similar manner – even the cover. To reduce induction or power supply imprinting problems on the audio circuits from the control side, these two sections are disposed each side of the transport, and fed with their own dedicated power supplies.



## Lab Report

Most of the frequency responses gave classic text book results with a characteristically downwards tilt at the HF end which was both mild and linear. Metal tape responses were well extended into the treble, but the lower energy formulations were clearly bandwidth limited. One particularly pleasing point is that the response shapes didn't alter perceptibly at all with the two noise reduction systems switched in.

The tests were run using Sony's own tapes (*HFS*, *UX-S* and *Metal-S*; Types I, II & IV respectively). Cross-checks with the usual IEC reference tapes actually gave slightly more linear results still, but Sony Tape II was a full 1.5dB quieter at 53.5dB for 0.95% THD (0VU) and Type IV similarly measured 3dB better at -56dB for 0.75% THD (again at 0VU). The metal figure is outstanding, a credit to both tape and machine. Azimuth alignment is good but not wonderful, and the replay response shape was duller than ideal.

The fluttergram showed a curious cyclic pattern, which suggests that one of the capstans might have been slightly out of true. Even so, the Sony behaves really well mechanically, with very low levels of both wow and flutter. The 0.033% wow and flutter figure is itself outstanding. The spectrogram backed the noise measurements with very low noise modulation, a cleanly defined pitch centre frequency, and very little that is not random and at low level elsewhere.

## Sound Quality

The audio results of the *TC-K700ES* fully justify the sophistication and engineering that have gone into it, both compared to the *TC-K444ES* and in its own right.

Where the *700* excels (and most cassette decks conspicuously fail) is in the way stereo depth and breadth is preserved, without loss of image precision. Instrumental separation was fundamentally better than with most decks, and there was almost none of the impression that dominant instruments were modulating others.

The strengths of the Sony were apparent on all tape types, with the higher energy formulations offering a real advantage on music with a lot of HF energy. Furthermore, this is one of the few decks where the sound doesn't deteriorate substantially when Dolby processing is added into the equation. Dolby C mildly softened the impact of transient leading edges, but the integrity of the sound stayed high and the lack of noise is its own benefit of course. At all times, the character of what background noise remained stayed smooth and innocuous. Replay performance of prerecorded cassettes was excellent, whilst in no way matching record/replay performance for resolution and focus.

About the only real criticisms are of a slightly cold, 'sterile' feel which can be heard *via* the electronics alone as well as *via* tape – the electronics of this deck are good, but they're not great – and the bass which in normal cassette fashion tends to be rather loose and vague in pitch and impact.

## Conclusions

With the *700ES*, Sony have placed a cassette deck firmly in the esoteric league which is as supremely well designed and easy to operate as it is to listen to.

## Test Results

Rec/replay response – 3dB ref 1kHz	
IEC Type I	<20Hz – 12kHz*
IEC Type II	<20Hz – 12kHz*
IEC Type IV	<20Hz – 19kHz*
Wow & Flutter – Peak DIN wtd/unwtd	0.033%/0.11%
Speed error	-0.45%
Type I signal/noise CCIR/ARM 315Hz	50dB
distortion 0dB	0.6%
Type II signal/noise CCIR/ARM 315Hz	53.5dB
distortion 0dB	0.95%
Type IV signal/noise CCIR/ARM 315Hz	56dB
distortion 0dB	0.75%
Channel separation 0VU/1kHz	-45dB
Line input sensitivity/overload	94mV/7V
Mic input sensitivity/overload	a/a
Line output for 0dB/maximum	662mV/6V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	1.2%
Azimuth check R-L phase at 8kHz	+6 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	43 x 12.5 x 35cms
Typical Retail Price	£499

\*using Sony tape – see text

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Rating: Recommended

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# Sony WM-D6C Walkman Pro

The 'Professional' in the same name isn't boastful imagery or wishful thinking: it's literally true. The WM-D6C is the ideal reporter's electronic notepad where quality counts, say for broadcasting purposes. It's also perfect for bootlegging...

Of course it's also an excellent Walkman like any other Walkman except that in this case you get something that really sings. And it's a cassette deck, or can be used as one, with all the normal facilities of a cassette deck, including switching for the usual three tape types, here labelled Normal I, CrO2 II and Metal IV (are you reading this Naka-michi?), and Dolby B and C noise reduction. There's even a third position here called 'off' which sounds even better.

The transport controls are cleverly packaged and allow the usual modes plus punch-in recording and cue and review - audible if you fiddle with the controls just so, but unmuted so you should watch the volume control if you value your tweeters. Or even your ears. Be warned also that auto-stop doesn't function from fast wind.

A simple mechanical tape counter is mounted at 90 degrees to the usual viewing angle and a 5-LED peak level meter (calibrated at -10, -5, 0, +3, +6dB) displays the levels of the highest of the two channels, and also monitors battery condition. To save battery power, make the unit less obtrusive in clandestine situations or to improve sound quality (or all of the above) the LEDs can be switched off.

Other hardware includes microphone and headphone socketry, the former with a -20dB attenuator switch, and a variable playback speed pot which is active only if the quartz servo is switched out of circuit first. Naturally there are in- and outputs at line level. All socketry is based on the Walkman standard 3.5mm stereo connectors which are dictated by the size of the player. (Phono adaptor leads are readily available.)

The Sony comes with a simple but adequate case and strap and a pair of simple micro headphones (you can buy better from Sony themselves and elsewhere). As standard, power comes from 4 MN1500/HP7AA size cells (use alkalines or rechargeables), but there are several other possibilities including various AC and car units.

On first acquaintance, some of the controls seem unnecessarily fiddly and/or stiff. Certainly the tape selector could have been abandoned in favour of a feeler system like other modern decks, but the main point is that Sony have simply done their best to proof the deck against accidental operator errors.



## Lab Report

Overall the *Pro* produced a set of measurements that was altogether the equal of anything at twice the price designed purely for mains use. No excuses whatsoever need be made for its size or portability.

The noise modulation plot was a little noisy, but there were few discrete effects, and the centre frequency was very sharply reproduced indeed, with absolutely negligible spread which is the visible indication of drift. The fluttergram indicates moderate levels of wideband noise, plus some sub-5Hz wow. Wow and flutter was moderate to low elsewhere. The figures 0.12% peak DIN wtd, 0.30% u/w were astonishing for a portable machine, and satisfactory by mains domestic standards.

The IM distortion check gave a very low figure, 0.5% total, which means there is plenty of headroom to exploit metal tapes fully. Azimuth was satisfactory.

Integrity of the various response curves was also of the highest order, with the solitary exception of the playback only one, which died a bit early (-3dB, 9kHz). The record/playback responses were all flat within a 1dB envelope up to around 15kHz using IEC tapes - which indicates a standard of setting up that beats most of Sony's own home recorders flat. The LF end is also well controlled. Although the 0VU distortion levels looked high, the meters themselves were set high (0VU = IEC 0dB), and the s/n ratios were also very good. Easing the record levels slightly will restore normality.

## Sound Quality

In a nutshell, sound quality is excellent, though it isn't strictly neutral. It has an

extraordinarily lucid and 'hear through' mid-band, this being the deck's best feature. But it works also because the HF end is unusually clean and clear, and because the bass end is distinctly lightweight, and therefore avoids overwhelming the midband in the manner of much cassette equipment (and also cheap turntables). The secret of the clarity is probably the necessary simplicity of the Sony's circuitry - necessary both to fit in the box and to avoid consuming too much power.

Noise levels are quite low and appear mostly as a thin, HF hiss. Certainly noise is low enough to allow Dolby-less recording with head-banging. One intermittent snag is that tape tension over the head appears to be low, and dropout is a little more in evidence than usual.

All three tape groups were capable of making extremely fine recordings with the WM-D6C, but the ability to lay very high currents on tape, combined with excellent signal/noise and first class frequency domain uniformity meant that metal Type IV tape was able to demonstrate its inherent superiority. Subjective speed uniformity was even better than the numbers suggested, and held up well when the unit was shifted around.

## Conclusions

One of the finest sounding cassette decks on the market today *regardless* of price. The fact that it fits in your pocket and works off batteries are just bonuses. An extraordinary recorder, and mandatory Best Buy material. But one minor caveat: the rumour mill suggests it is not as reliable as conventional machines - and we would hesitate to take one into the local radio shop for service.

## Test Results

Rec/replay response - 3dB ref 1kHz	
IEC Type I	32Hz - 14kHz
IEC Type II	32Hz - 16kHz
IEC Type IV	32Hz - 16kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.12%/0.30%
Speed error	-0.2%
Type I signal/noise CCIR/ARM 315Hz	55dB
distortion 0dB	3.0%
Type II signal/noise CCIR/ARM 315Hz	55dB
distortion 0dB	3.1%
Type IV signal/noise CCIR/ARM 315Hz	56.5dB
distortion 0dB	3.1%
Channel separation 0VU/1kHz	45dB
Line input sensitivity/overload	89mV/>7V
Mic input sensitivity/overload	0.34mV/10.6mV
Line output for 0dB/maximum	390mV/2.9V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	0.5%
Azimuth check R-L phase at 8kHz	19 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	18.1 x 4 x 9.5cms
Typical Retail Price	£249

Reprinted from issue No. 52 by Alvin Gold

Rating: Best Buy

Sony (UK) Ltd., Sony House, South Street, Staines, Middlesex TW18 4PF. Tel: (0784) 67000.

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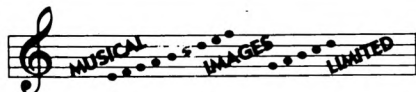
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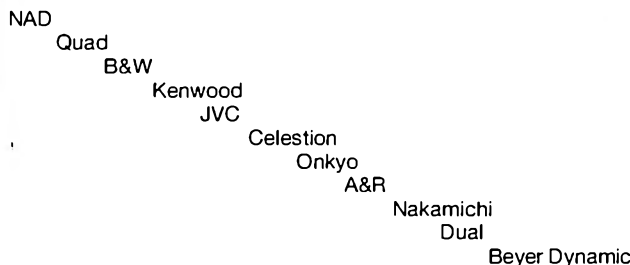
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# DIRECTORY

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. At present this runs to some 700 plus products 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 *RD90 Superior* heads the Motor Units section as it is sold and 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 *Bs* 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.

## 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).

BB = Best Buy  
R = Recommended

### 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
Akai APA201 £80	Poor Average—	It 'lived down' to our expectations sounding 'dead' and 'smeared', with little depth and poor bass	Solid, auto return, direct drive, 5g P-mount		48
Alphason Sonata/HR-100S-MCS £695/£412	Excellent Very Good	Highly capable audiophile system with real resolution and control. Bass is powerful and dynamic ability unbridled	Manual, subchassis, belt drive, 10g	R	This
Ariston Q-Deck £140	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	55
Ariston RD60 £219	Good Good	With the Enigma arm, this balanced and communicative turntable falls only slightly short of the RD90 on sound quality	Manual, belt drive, subchassis, 11.5g	BB	48
Ariston RD40 Q/Enigma £388	Average+ Good	Worth considering for stylish appearance and decent performance, but undermined by RD60 in value for money terms	Man/electronic, belt drive, subchassis, 11.5g		48
Bang and Olufsen TX2 £288	Average+ Average+	Fully automatic, it can interface to B&O's remote control system, is attractively styled and even sounds respectable!	Automatic, belt drive, subchassis, 6g (B&O carts. only)		48 (Summary)
Dual CS503-1 £125	Poor Average	Stated as a replacement for the CS505, the 503-1 needs careful system matching to mask rumble and microphony, but is good enough to benefit from a better cartridge	Semi auto, belt drive, low mass arm	R	55
Dual CS5000 £200	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 £4,000	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	This
Heybrook TT2 turntable & arm £279/£249	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	55
Kuzma Stabi t'table/Stogi arm £575/£349	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	This
Linn Axis £345	Good+ Good+	Setting new performance-for-price standards this cleverly engineered and competent deck has many of the qualities of the Sondek LP12	Electronic, belt drive, semi subchassis, 13g	BB	48/Coli
Linn Sondek/Ittok (Troika) £509/£429 (£625)	Excellent Excellent	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	Manual subchassis player, belt drive, 14g	R	This
Lux PD290 £167	Average Average	For the non-critical user who likes Lux styling and who requires a basic turntable	Semi automatic, direct drive, 10g		40

# DIRECTORY

## INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
<b>Mantecore Mantra</b> £300/£330 (Arm)	Good + Good +	Fitted with a Rega RB250 arm variant and AT95E cartridge the Mantra fared very well indeed with a fine midrange and good focus	Subchassis, 12g, manual	BB	48/Coll
<b>NAD 512D</b> £90	Average Average -	Offering near hi-fi quality on a suspended sub-chassis deck fitted with an Ortofon OM10 cartridge can't be bad at this price	Semi-automatic, subchassis, 9g	BB	48
<b>Oak/Moth</b> £175	Average - Average -	Despite the excellent Moth tonearm, motor vibration on the Oak makes for a sonically poor performer	Solid, manual, 12g		48
<b>Omega Point Silver/Black</b> £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 'welle'	Manual, solid, belt drive, unipivot, 11g		55
<b>Rega Planar 2</b> £135	Average + Good	A remarkable product at the price, surprisingly articulate and confident	Integrated turntable, manual, 11.5g	BB	48
<b>Rega Planar 3</b> £188	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	Integrated turntable, manual, 11.5g	BB	48
<b>Revox B291</b> £629	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
<b>Rotel RP-830</b> £160	Average Average	Reasonable sound, but nothing to get excited about. Bass quality not well integrated, but control OK; mid/top are fine	Manual, integrated, belt drive, solid, inc cartridge	R	55
<b>Source/Odyssey RP1</b> From £1,908	Very Good	Mixed. The turntable has tremendous power and authority, but as tested suffered pitch imprecision. The arm is rather ill controlled and lacks resolution and focus	Manual, belt drive, subchassis, motor, outboard PSU, 15g		55
<b>Systemdek II</b> £199	Good + Good	Rating above average for its price the II sounded open and clear, if a bit soft in the bass	Manual/electronic, belt drive, subchassis, 15g	BB	48
<b>Systemdek IIX</b> £199	Good + Good	The more conventional appearance of the IIX has made it popular, performing competently, but essentially sounding similar to the II	Manual/electronic, subchassis, 15g	BB	48
<b>Technics SLBD-22</b> £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
<b>Technics SL-DD33</b> £110	Average Average	As with the DD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
<b>Technics SL-L20</b> £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
<b>Technics SL-QD33</b> £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
<b>Thorens TD280</b> £159	Average Average	Not impressive in the context of other Thorens models. The sound was considered lively if somewhat coarse and brash	Electronic, solid plinth, 12.5g		48
<b>Thorens TD166III</b> £179	Good Good	Old turntables never die, this revved 166 yet again takes its place near the top of its class	Auto lift, subchassis, 7g	BB	48
<b>Thorens TD316</b> £219	Good Good	A competent, well built if not dynamic sounding machine, ably holding its own in its price category	Electronic, subchassis, 4.5g	R	48
<b>Thorens TD320</b> £319	Good + Good	The top of the range and a solid performer providing a stable focused sound, and not critical of siting	Electronic, subchassis, 7g (available without arm)	R	48

## MOTOR UNITS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Ariston RD90 Superior</b> £900	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
<b>Audio Labor Konstant</b> £2,560	Good + + Very Good	The space-station-like solid alloy frame needs a substantial shelf, but absolute stability renders a confident, neutral sound	Belt drive, subchassis	R	48/Coll
<b>Elite Rock</b> £450	Good Good	Tight, tidy sounding player which works with a wide variety of (non-tangential) arms, giving almost CD like precision and clarity. Good bass depth, but dry balance	Manual, belt drive, solid, arm damping, various optional extras	R	55
<b>Goldmund Studio</b> £2,350	Very Good Excellent	A reference point for high end audio, only exceeded by the even more extravagant Reference. Currently being reworked into a more competitive (!) package	Electronic, direct drive, solid subchassis	R	This
<b>Logic Gemini</b> £700	Good Average +	Innovative twin-motor design but insufficiently developed. Rates good overall but sounds a bit slow and lacking authority	Subchassis, electronic		48
<b>Michell Synchro</b> £235	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	55
<b>Michell Gyrodec</b> £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
<b>NVA Turntable</b> £499	Average Good	A surprisingly fast and assured performer, but with lightweight bass and a little aggressive. Easy to set up, the price (necessarily) includes stand	Manual only, belt drive subchassis, integral stand, 33 1/2 rpm		This
<b>Oracle Delphi III</b> £500	Very Good Very Good	Stable imaging, good bass and refined detail, it's well made and consistent in service - but very expensive	Manual, belt drive, subchassis	R	This
<b>Oxford Acoustics Crystal Reference</b> £1955	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	This
<b>Pink Triangle PT T00</b> £539	Very Good Very Good	A substantial improvement on its predecessor, the T00's new outboard power supply and motor gave a neutral sound with fine depth and detail	Electronic, subchassis	R	48/Coll
<b>Roksan Xerxes</b> £595	Excellent Excellent	This unique design cuts a swathe through the conventions of turntable design, providing superb resolution and stereo. Setting up is critical, and for experts only	Manual, belt drive, solid/decoupled	R	This
<b>SEE Revolver</b> £127	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
<b>Systemdek IV</b> £448	Good + Good +	Clarity and definition in the midrange and treble were outstanding. It was better for firm support; less happy on floor tables	Electronic, belt drive subchassis	R	43
<b>Thorens TD160S Mk IV</b> £225	Average Average +	Good value suspended sub-chassis turntable which doesn't need specialist setting up, and which performs consistently and well. Bass is a little over-warm	Manual, belt drive, subchassis motor unit	R	55
<b>Thorens TD521</b> £625	Average Average +	Nice product. Unexciting, rather undynamic and insubstantial sound quality, but facilities compensate	Manual, belt, suspended motor unit, 78rpm, pitch control, 12" arm/16" records		55

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# DIRECTORY

## TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Airtangent II £1998	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 £110	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Delta £165	Good Average+	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £210	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 £395	Good++ Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll
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 AT1120 £132	Good Average+	This low effective mass (5g) arm suits fairly high compliance MM cartridges; gives pleasant tonal balance with good stereo imagery	5g		35
Decca 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 £960	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 £3850	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	Very expensive but with a performance that merits recommendation	12g	R	48
Kusma £349	Very Good Very Good	A classic performance: solid and dynamic with exceptional bass weight and speed, if a little 'urtidy'	14.5g	R	48/Coll
Linn LV Plus £129	Good+ Good	The fixed headshell provides an improvement over the LVX resulting in better clarity, detail and punch	13g	BB	48
Linn Ittok LVII £429	Very Good Very Good	Suitable for many turntables this top-quality arm performs best with the LP12, the combination exceeding the sum of both parts	13.5g	R	48/Coll
Logic Datum 2 £230	Very Good Good++	Rated sonically very good with fine depth focus and transparency, good air and life, albeit slightly 'urtidy'	15g	R	48/Coll
Mission Mechanic £700	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 £65	Good Good+	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	This
Rega RB300 £90	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	This
SME 3009 Series IHS £156	Good Average+	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £216	Good Average+	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £272	Average+ Average+	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME Series IV £675	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	This
SME Series V £1138	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	This
Souther Tri-Quartz £850	Average Good	A unique parallel tracking arm that makes up for what it lacks sonically in its unusual appearance	3-4g		48
Well Tempered Arm £545	Good++ Good++	The overall performance of this arm "grows" on the listener, justifying the possible mounting complications and radical styling	6.8g	R	48/Coll

## 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).  
BB = Best Buy  
R = Recommended

NAME PRICE	LAB SOUND	COMMENTS	ARM AMP MATCHING	VALUE	BACK ISSUE FULL REVIEW
A&R C77 £20	Average+ Average+	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal	BB	48
A&R P77Mg £47.50	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	R	48
A&R E77Mg £57.50	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8g Normal	R	48
ADC TRX1 £49.90	Average Average	Sounding bright and "tinkly" but with a rich bass this model may endear itself to those who like canaries and gongs. Now quite competitively priced	6-15g Normal		38
ADC TRX II £69.60	Average Average+	Comments like "fiercely exciting" treble and "plummy" bass made this cartridge seem overpriced, though price reductions now make it more competitive	6-15g Normal		38 (Summary)
Audionote 102VDH £795	Good Very Good	One of the best, giving "an extraordinarily relaxing midrange clarity." But it picked up a bit of surface noise and dust and needs a transformer	8-18g Very low (transformer)		43
Audioquest MC5 £200	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal		54



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# DIRECTORY

## CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM AMP MATCHING	VALUE	BACK ISSUE FULL REVIEW
Audioquest 404BL £299	Average Average	Lateral stereo imaging is thwarted by huge VTA error and the meagre tracking margins do little to help. Sound quality is not competitive	8-20g Low		54
Audio Technica AT 105 £13.95	Average Average	Tight budget people may enjoy this cartridge whose "overall performance was very good for the price"	6-16g Normal		43
Audio Technica AT95E £14.95	Average- Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal	BB	48
Audio Technica AT 115E £27.95	Average Average	Clear and detailed sound quality although a bit on the "heavy" side. Sonically lagged the cheaper 110E!	5-16g Normal		43
Audio Technica AT3200XEI £42.95	Average+ Average	This high output MC sounds better than it looks, with a decent 'laid back' sound quality	6-18g Normal	R	43
Audio Technica ATF30CC £70	Good Good	Slight generator asymmetry but low overall distortion and broad arm matching, plus a lively balanced sound	8-18g Low	BB	54
Audio Technica AT 140ML £99.95	Average Average	Pricy product this. Prefers low-medium mass arms and low capacitance loading, and is sonically unremarkable	6-12g Normal		43
Audio Technica ATF50CC £100	Average+ Good	Decent output, good channel balance and a thoroughly refined sound sets the standard at £100	9-20g Low	BB	54
Audio Technica AT33ML £238.95	Average+ Good	A little expensive but technically competent, and sonically pretty good; low output MC with rather garish gilt finish	6-16g Low		43
Audio Technica ATOC7 £245	Good+ Good+	Technically and subjectively this cartridge represents a new dawn for AT, in the twilight of analogue audio	6-13g Low	R	54
Audio Technica AT-OC9 £400	Average+ Very Good	Tonal colours were reproduced faithfully while stereo images were clearly isolated and focused despite contributing to a thoroughly integrated whole. Slightly less transparent than more costly MCs	6-14g Low	R	This
Azden YMT0VE £12.50	Average Average-	A good tracker. Sounds rather bunched-up but not totally incoherent - for very basic systems only	5-15g Normal		54
Azden GM1E £30	Average- Average-	Of academic interest only, this high o/p mc is seriously flawed in sonic terms	8-18g Low/normal		54
Azden GMP5L £99	Average+ Average+	Although no P-mount system will do this cartridge justice, it can still be enjoyed in its universal mode. The subtle balance may prove irresistible to some	4-10g Low	R	54
B&O MMC5 £21	Average+ Average	Cheapest in the family - smooth treble and good focus, but the bass was left in the wings	5-15g Normal		38 (Summary)
B&O MMC4 £33	Good Average+	Solid and well balanced in the midrange, the '4 lacks bass impact	5-15g Normal		48
B&O MMC3 £50	Good Average	Slightly "laid back" sound quality but a good performer for the price. Best suited to B&O equipment	5-15g Normal		48
B&O MMC2 £75	Good Average+	Only a modest improvement on its cheaper brothers (and sisters)	5-15g Normal		48
B&O MMC1 £97	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		48
Cello Chorale £799	Good Very Good	Looking like a piece of NASA gadgetry the Chorale's transparent treble delicacy was without equal. A serious audiophile choice	4-10g Low o/p	R	48/Coll
Clear Audio Gamma £285	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		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	R	54
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		Coll
Clearaudio 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	R	This
Denon DL110 £60	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	BB	48
Denon DL150 £80	Average+ Good	Although listeners just preferred the 110 its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Low		43
Denon DL 103 £90	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low	R	48
Dynavector DV-50X £60	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal		48
Dynavector DV10X IV £60	Average Average+	Fine sounding and realistically priced; damping is recommended to ensure successful tracking ability	8-18g Normal	R	48
Dynavector DV23RS £150	Average+ Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low		28
Dynavector DV XX-1 £360	Good Good+	The XX-1 embodies a power and solidity rarely encountered amongst the breed, nevertheless it did exhibit a peculiarly suppressed character that will suit lively rather than wholly neutral systems	7-17g Normal		This
Glanz MFG 110EX £24	Average Average	A little bright but giving detailed bass and clear treble this was competitive at the price	6-16g Normal	R	Systems
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		48
Goldmund Clearaudio £1500	Average+ Average	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		This
Goldring Epic £18	Average- Average	An unpretentious "punchy" partner to a budget system, giving decent dynamics and focus	6-14g Normal	R	48
Goldring 1010 £33.95	Average+ Average-	Listening results were a disappointment for a design which "looks right" in many respects	8-16g Normal		43
Goldring G1010 £34	Average Average	A bit fiddly to set-up but rewarding once accomplished. The big and bouncy sound belies its price. Sensitive to amp loading	10-20g Normal	BB	54
Goldring 1020 £49.95	Average+ Average-	This one strutted finely onto stage but couldn't project to the "gods"	8-16g Normal		43
Goldring 1040 £74.95	Average+ Average-	High frequency extension was improved by the van den Hul tip, nice looking model - no great actress	8-16g Normal		48
Goldring Eroica L £91	Average Average+	Open and relaxed sounding, the L version is just that bit more refined than its high output brother	7-18g Low	R	54
Goldring Electro II £135 complete	Average Average+	A pretty decent allrounder that did not excel sufficiently to warrant recommendation	8-16g Normal		43

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 50

# HEYBROOK POINT FIVE



## A REALLY DIFFERENT LOW COST TWO WAY LOUSPEAKER

Heybrook's Pint-Size Point Five is the latest addition to the ranks of low cost two-way loudspeakers. But in a world which is mostly populated by clones, makeweights and also-rans, this one really is different.

What the Point Five is really all about, though, are the 3 qualities, speed, resolution and real attack and force. There's enough substance backing it up to add some flesh to the bones, too, so the music also has body and a well defined resonant structure.

The very high levels of resolution achievable with this design were plainly apparent on a wide range of materials, control was evident all the time, in the precision with which stereo in the build-up to crescendos, in the tidiness of the bass, in the way notes were released, images were projected into the space around, and in front of, the speakers.

Finally - and on a resoundingly positive note - I must mention the unusually dynamic nature of the Point Five. Unlike most smallish loudspeakers, it doesn't appear to compress or change in sound as it goes loud, and with this unusual freedom from squash, it's quite easy to take the speaker right up to, and even beyond, its working dynamic range.

In short, this is one budget loudspeaker that works. Instead of trying to squeeze every last Hertz in the bass, or decibel in level, Heybrook have concentrated on

making a loudspeaker that is, above all, detailed, articulate and dynamic, whilst retaining excellent control, it's a powerful list of virtues at the price.

## WHAT THEY SAY ABOUT US SOUNDS GOOD!

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## HI-FI Answers Sound quality is, in a nutshell excellent

The speaker is always under firm and positive control, transient and dynamic behaviour are both exemplary or better, and bass quality is fast, pitch accurate and has lots of drive.

The Point Five is simply very refined, and gives a 'big' sound with excellent dynamics and space, and very good resolution of detail. Best of all, though, is the midband which has a rare openness and an alive quality that is not easily mistaken. This is a loudspeaker where, given a decently well behaved reproduction system, the stereo soundstage comes out more than half way to meet the listener.

I believe that the new budget Heybrook is a significant product. By designing intelligently within tight cost constraints, the company have come up with something genuinely new and with obvious potential design stretch for future up-market models to exploit. Meanwhile, the Point Five's lively, forthcoming sound is very much in tune with what is required of a small, modern speaker. I'm positive it's going to be enormously and deservedly successful.

## WHAT HI-FI? Tells you the best hi-fi to buy

### The Heybrook is an excellent all-round design

that could easily be awarded top marks for compatibility. It is easy to drive, very clean-sounding and it is well-balanced at both bass and treble extremes.

One excellent feature of the Heybrook speaker is its full bass performance. The treble frequencies sounded excellent too, and the sound was unusually clean and dynamic - particularly when playing material with lots of cymbal work. Indeed, the little Point Fives often sounded the equal of a much bigger and much more expensive design.

Stereo imagery was pin-point sharp and highly detailed, yet not in a cold or dissecting manner. The Heybrook Point Five is an excellent example of cost-effective engineering where economies have been made to overall advantage. From the clever design of the cabinet with its medite top and bottom pieces top the simple crossover and specially designed bass/mid unit, the whole speaker is an example of how to build a top class small speaker at a very reasonable selling price.

## THE HIT LIST SPEAKERS HEYBROOK POINT FIVE

MC, 2W CB  
Review: January 1988 Design/  
Manufacture: UK

The new Point Five, a small two-way loudspeaker from Heybrook, marks a break with the past in more ways than one. The enclosure is easily the most novel feature, the baffle being part of the main structure rather than being mounted in afterwards as usual. Heybrook had to use new construction techniques to achieve this, the benefit being a structure with greater physical integrity and which is easier to control.

Internal wiring is solid-core, which should be observed elsewhere in the partnering system too, and the crossover is also built in line with solid-core ideas as far as possible.

Used a few inches clear of a wall the Point Fives have a bass and midrange that are marvelously expressive and articulate, and exhibit real control and excellent stereo. On very early samples the tweeter was slightly uncouth, but this trait has now been cured.

# DIRECTORY

## CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM AMP MATCHING	VALUE	BACK ISSUE FULL REVIEW
Goldring Electro 11LZ Boron £199 complete	Average Average+	Well balanced sound but lacking low frequency authority, midrange focus and "punch"	12-20g Low		38 (Summary)
Grace F9E II £240	Good Good	For lively presentation, excellent separation and generally satisfactory sonic delivery – consider this model	5-10g Normal		48
Grado XTE +1 £20	Average— Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal	R	54
Grado XF3E + £45	Average— Average	Downtilting balance disguises the brightness of this cartridge, bit of a mixed bag at this price	9-20g (damping) Normal		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		43
Kiseki Blue Silver Spot £395	Average+ Good	Solid performance from a very solid cartridge but lacks some of the magic of other Kisekis. Compliance too high	5-12g Low		54
Kiseki Purpleheart Sapphire £675	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		Collection
Kiseki Blackheart £1595	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		This
Kiseki Lapis Lazuli £3500	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		This
Koetsu Black K £550	Good+ Good+	Impressive in scale and dynamics but with some criticism of bass muddling and high treble fizz. Listen before deciding	6-18g Low	R	48/Coll
Koetsu Red £896	Good+ Very Good	Named like a rare, and perhaps dangerous, little oriental fish this famous cartridge sounded "almost larger than life"	10-25g Low	R	48/Coll
Koetsu Red Signature £1300	Good Excellent	Technically this cartridge suffers no faults whilst on a subjective level it offers rare musical insight	10-21g Low	R	This
Linn Basik £19.50	Average— Average	This goes much further in delivering the goods than its price tag might indicate	6-14g Normal	BB	48/Systems
Linn K9 £69	Average Good	Linn threw this model into the leading pack by beefing up the Bask's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal	BB	48/Coll
Linn Asaka £279	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	R	48/Coll
Linn Karma £435	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	R	48/Coll
Linn Troika £625	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		Coll
London Maroon £109	Poor Average+	Utterly different from other cartridges, the Maroon combines Heaven and Hell with good bass and midband but poor top-end control	8-16g + damping Normal		48
London Super Gold £248	Average— Good+	Sometimes a bit fierce in emphasising record surface faults, it is perhaps best at revealing the excitement and tension in music	8-20g + damping Normal	R	48/Coll
Madrigal Carnegie One £685	Average+ Good	Looks like a duck but sounds much better, certainly worth auditioning. Compliance too high	5-11g Low		54
Milltek Aurora £198	Good+ Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal	R	48/Coll
Milltek Olympia £298	Average+ Good+	Warm and detailed sound – packs the punch of the best m-cs with high output as a bonus	12-20g (damping) Normal	R	54
Mission 773HC £150	Good Good	A sufficiently well-balanced and competitively priced "old-timer" which still warrants recommendation	6-16g Low	R	38
Monster Alpha 2 £479	Good Good+	In the final analysis this fine allrounder is insufficiently exceptional in any specific respect to justify fully its high price	6-14g Low		Collection
NAD 9100 £12	Average— Average	Clearly a Best Buy model for rock music fans, opera and choral music lovers might do better to avoid its tracking (in)abilities	10-20g Normal	BB	38
NAD 9200 £26	Average— Average—	Although competent in many respects, overall the 9200 must be considered an undistinguished contender	6-19g Normal		28
Nagaoka mm4 £8	Average— Average—	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal	R	54
Nagaoka MP10 £17	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal	R	48
Nagaoka MP11 Boron £38	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	BB	48
Nagaoka MP10SB £40	Average Average+	Stilton's mods have improved the fine detail resolution of this popular budget model	5-15g Normal	R	54
Nagaoka MP11 Gold £45	Average— Average+	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal	R	48
Nagaoka MP11 Gold SB £70	Average— Average	Excessive price loading for a blob of aluminium	2-6g Normal		54
Ortofon VMSSE II £14	Average Average	Sound quality was thought fair for the price, though a little 'untidy'	8-18g Normal		38 (Summary)
Ortofon OM5E £16	Average— Average—	The OM10 is a hi-fi cartridge – the OM5E is not	5-16g Normal		43
Ortofon OM10 £21	Average Average	One of the leading "cheapiers", this gives a fine level of sound quality for the price, with good matching compatibility	5-15g Normal	BB	48
Ortofon VMS 10E II £21	Average— Average—	Some of its stablemates fared rather better, and showed less evidence of tracking problems to boot	Normal		38
Ortofon VMS20E II £35	Average Average	One of the most popular cartridges ever, sound quality was a bit laid-back and tracking could have been better	3-10g Normal		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	R	48
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		48
Ortofon VMS30E II £52	Average+ Average	Rather an old soldier in relation to turntable technology, it will perform undemandingly in demanding circumstances	5-13g Normal		38
Ortofon MC10 Super £65	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low	BB	48

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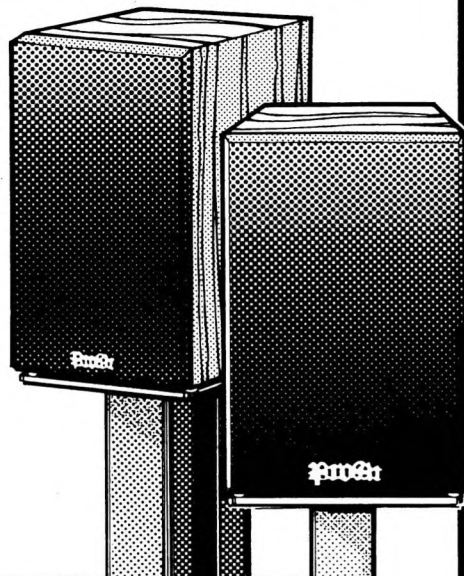
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GLASGOW	The Music Room, 221 St Vincent Street
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LEEDS	Audio Projects, 45 Headingley Lane
LEICESTER	Alpha Electronics, 1 Guildhall Lane
LIVERPOOL	W. A. Brady, 401 Smithdown Road
LONDON W1	Telesonic, 92 Tottenham Court Road
LONDON W1	K.J. Leisuresound, 26 New Cavendish Street
LONDON W2	Thomas Heinitz, 35 Moscow Road
LONDON W5	Ealing TV & Hi Fi, 27 bond Street, Ealing
LONDON WC2	W. A. Brady, 18 Monmouth Street
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LONDON NW6	Studio 99, Fairfax Road, Swiss Cottage
LONDON SW19	M. O'Brien Hi Fi, 95 High Street, Wimbledon Village
MANCHESTER	The Music Room, 50 Bridge Street
RAYLEIGH	Rayleigh Hi Fi, 44a High Street
READING	Reading Hi Fi Centre, 6 Harris Arcade, Friar Street
ROTHERHAM	Moorgate Acoustics, 2 Westgate
SEVENOAKS	Sevenoaks Hi Fi, 111 London Road
SOLIHULL	Alternative Audio, 95 Hobs Moat Road
WARRINGTON	Doug Brady Hi Fi, Kingsway Studios, Kingsway
WATFORD	Acoustic Arts, 101 St Albans Road

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# DIRECTORY

## CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Ortofon OM4U £75	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		48
Ortofon X3 £75	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but uninvolving	5-15g Normal		48
Ortofon MC20 Super £180	Average + Good +	An "inviting" sound quality, polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low	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		Coll
Ortofon MC2000 £450	Very Good Good +	There are few grounds on which to fault the MC2000, but extremely low output means the expense and aggravation of a transformer	5-10g Very low (transformer)		38
Ortofon MC3000 £800	Good Excellent	Quite simply, the most accurate transcription device yet created - not one for the faint hearted	6-16g V. Low	R	This
RATA RP20 £22	Average - Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g	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	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		43
Rega RB100 £38	Average Average +	Remarkable mechanical performance in the right system context, but "try before you buy"	5-12g Normal	R	48
Shure M92E £15	Average - Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal		43
Shure M99E £24	Average - Average -	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal		38 (Summary)
Shure ME75E0 £24	Average Average -	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal		38
Shure M104E £32	Average - Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal		38
Shure ME97HE £43.95	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	R	48
Shure M105E £45	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		38 (Summary)
Shure M110HE £55	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal		38 (Summary)
Shure M111HE £67	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal		38 (Summary)
Shure ML120HE £95	Average + Average +	Quite decent sound quality and a generally fine balanced performance	6-18g Normal		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		43
Shure V15 VMR £195	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		38
Shure Ultra 500 £452	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal		48
Supex SM100E £115	Average Average +	Delivers as much musical information as many moving coils - the bass in particular having an attractive bounce	6-15g Normal		38
Supex SD900IV £350	Average + Good +	The 900 is an inherently fine cartridge, but despite a recent update it is beginning to show its age	10-18g Low		48/Coll
Supex SD901IV £375	Average + Good +	This high output model delivered sufficient subjective and objective performance, plus good compatibility, to justify its price tag	8-18g Normal	R	48
Supex SDX2000 £651 L, £721 H	Good Good +	The high-o/p 2000 was preferred on listening tests to the low-o/p model, which even so has a unique place among the top designs	6-16g Either		48
Van Den Hul MC10 £699	Good Good +	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low	R	This
Van Den Hul MC One £799	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	R	This

## 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
A&R Arcam Alpha £149.90	Average + Fair	This good all-rounder sounds musical if slightly softened. Good build and presentation	5 inputs hdph MM/MC tone controls 30W	R	50
A&R Arcam Delta 90 £329.90	Good Fair	Well balanced and sweet-natured in any given system with MC capability, but pricey	70W MM/MC 5 inputs tone controls		50
Albarray M408 II £595 pr.	Good + Good +	Unusually styled transistor monoblok power amplifiers reintroduced with improved performance and sound quality. Needs good warm-up for best sweetness and clarity	40W Power amp only	R	56
Audio Research SP9 £1700	Very Good Very Good	This new high performance valve FET hybrid preamplifier sets a high standard for versatility, build quality and sound	5 inputs, MM/MC	R	This
Audio Research SP8 £1998	Very Good Good +	The sound from this valve pre-amp was good enough to do justice to the finest ancillaries	5 inputs MM	R	39

# DIRECTORY

## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Audio Research M100</b> £2850 each	Good+ Excellent	These high end valve monoblok power amps justify their cost by providing near state of the art sound quality. Our reviewer was so excited he bought them	100W	R	This
<b>Audio Research SP11 II</b> £3350	Very Good Excellent	Current state of the valve pre-amp art. A reference point	Straight line MM/MC Disc + phase invert	R	This
<b>Audiolab 8000C</b> £3000	Very Good Good+	Bettering the high standard set by the integrated 8000A this pre-amp sounds more tidy and refined, if a little clinical and cold	5 inputs MM/MC Disc hdph tone controls	R	50
<b>Audiolab 8000A</b> £325	Very Good Good+	A strong contender using high grade circuitry and providing good sound quality on all inputs. Hard to fault at the price	5 inputs MM/MC disc 50W hdph tone controls	BB	50
<b>Audiolab 8000P</b> £465	Very Good Good+	A gutsy performer providing high levels into both 8 and 4ohm loads. A power amp to keep the competition worried	100W	R	50
<b>Beard P35</b> £695	Good Good+	A superbly built and engagingly rhythmic valve power amp, sounding sweet and slightly soft in the classic valve style	35W	R	50
<b>Beard 50s</b> £395	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	R	50
<b>Beard M76</b> £1595 pair	Good Good+	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W	R	50
<b>Burmester 838</b> £1490	Very Good Good	A disc-only minimalist pre-amp, strong points include excellent build, extreme neutrality, dry clean bass and notably sharp stereo focusing	MC only, MM option		Collection
<b>Burmester 846</b> £1599	Very Good Good+	Usually coupled with the 838 this high-level pre-amp provides many and versatile input facilities	6 inputs	R	Collection
<b>Burmester 850</b> £3995	Good+ Good	Each of these mono power amplifiers contains separate high current 25W amps giving a refined coherent sound over most of the frequency range	100W	R	Collection
<b>Cambridge Audio P40</b> £200	Good Good+	A very fine sounding integrated amplifier with simple facilities and MC cartridge capability	5 inputs 40W MM/MC straight line	BB	50
<b>Cambridge Audio C75</b> £279	Good+ Good+	Whilst not quite on par with its A75 companion this pre-amp provided excellent stereo imagery but was a touch "heavy" in character	MM/MC disc	R	50
<b>Cambridge Audio A75</b> £299	Very Good Very Good	This strong power amplifier sounded open and effortless, with fine bass drive and dynamics, albeit a touch grainy and harsh at high frequencies	100W	R	50
<b>Cello Audio Suite</b> £5280	Excellent V Good/Excellent	Cello's pre-amp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
<b>Conrad Johnson PV7</b> £799	Very Good Good	This beautifully finished quality preamplifier performed well, delivering a musically relaxed sound though not offering especial value for money	5 inputs, MM disc		57
<b>Conrad Johnson MV50</b> £1795	Good+ Good+	Coupled with the PV5, this CJ power amp performed well on audition	50W	R	Coll
<b>Conrad Johnson PV5</b> £2010	Good+ Good+	The PV5 is a classy sounding valve pre-amp, and natural partner to the MV50	5 inputs MM	R	Coll
<b>Conrad Johnson Motif MC-8</b> £2500	Very Good Very Good	A cheaper alternative to the '7, this pre-amp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/MC	R	50
<b>Conrad Johnson Premier Three</b> £3775	Good+ Very Good	The Three is a musically accurate and graceful pre-amp which proved versatile on a wide range of inputs	5 inputs MM/MC		Coll
<b>Conrad Johnson Premier Four</b> £3900	Good+ Very Good	Ambience was the Four's fortè – this power amp proved exceptionally revealing of instrumental locations	100W		Coll
<b>Copland Pre and power amps</b> £649 each	Good+ Fair	At £649 each this simple Danish valve pre/power combination is expensive, though the power amplifier sounds very easy on the ear	3 inputs MM, 12W		50
<b>Counterpoint SA7</b> £747	Average+ Good	Simple valve Californian pre-amp offering inspiring transparency for the price	4 inputs straight line MM/MC	R	Coll-
<b>Counterpoint SA12</b> £1250	Good+ Good+	A real power-house power amp, beefy and load-tolerant although like the SA7 a trifle untidy at frequency extremes	100W	R	Coll
<b>Creek 4040</b> £145	Average+ Fair	This simple integrated model had a controversial sound, liked by some, plus an acceptable lab performance	4 inputs MM 12W	R	50
<b>Creek CAS 4140</b> £199	Good+ Good	Redesigned for '88, this is a fine allrounder with good moving-coil input, plain presentation	40W MM/MC 3 line inputs	BB	56
<b>Croft Micro</b> £150	Average+ Good	A real upsetter, this excellent valve pre-amp put the cat among the pigeons proving good sounds can be made at budget price levels	4 inputs MM straight line	R	Coll
<b>Croft Super Micro A</b> £500	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
<b>Croft Series IV(S)</b> £730	Good Good	The original IV is still available now supplemented by the higher price and power (S); both are fine performers	40/60W channel	R	57
<b>Croft Series IVSA</b> £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
<b>DBX CX3/DX3</b> £1500	Good Fairly Good	Versatile separates majoring on 4-channel surround sound and high power. Garish presentation and unexceptional sound	125W MM/MC 7 inputs, tone, 4 channel surround		56
<b>Deftec DPA 100S</b> £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	30W	R	50
<b>Denon PMA-250</b> £125	Good Fair	As a "budget-plus" integrated amplifier the '250 gave an open sound with lively dynamics and should appeal to a wide range of tastes	30W MM hdph	R	50
<b>Denon PDA-6600</b> £1,000/pair	Excellent Excellent	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles	250W monoblok, remote power	R	This
<b>DNM 3</b> £1000	Good+ Good+	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art pre-amp	5 inputs MM/MC twin vol controls	R	44
<b>E.A.R.</b> £3,000/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		This
<b>Exposure VIII</b> £310	Very Good Good+	This power amplifier created a good impression of speed and power, but was a trifle fierce in the treble	50W	R	50
<b>Exposure VII</b> £340	Very Good Good	A double mono transistor pre-amp with a notably dynamic and punchy character, though not suited to all tastes	3 inputs MM/MC	R	50
<b>Goldmund Mimesis 6</b> £2,500	Very Good Excellent	Small and discrete for those who'd rather not flaunt it, this is no powerhouse but sounds subtle, delicate and refined	80W stereo power amp		This
<b>Grant G60AMS</b> £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 monoblocks 41 8ohms	R	57
<b>Hafner DH120 kit form</b> £295	Fair	We didn't build one; see below	60W		44
<b>Hafner DH120 assembled</b> £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

# DIRECTORY

## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Harman Kardon 640 Vxi £225	Good + + Good	Moderately priced but built to HK's high standards; good value and good load tolerance	50W MM, 5 line inputs tone controls	R	56
Harman Kardon 655 Vxi £449	Very Good Good	Plenty of well built integrated amplifier for the money, with lots of power to drive almost anything, plus versatile inputs	100W MM/MC 6 line inputs tone controls	R	56
Harman Kardon PM665Vxi £699	Good Good	A versatile and meaty amplifier with high current capability, but sound quality lags behind certain home grown alternatives	150W MM/MC tone controls (switchable)		This
Hitachi 007 £299	Good + Fair	Decent but unexceptional performance and sound quality, plus good facilities; represents a worthwhile improvement from Hitachi	75W MM 6 line inputs tone controls		56
Inca Tech Dirk £215	Good + Good +	This tiny, minimalist model is effectively a power amplifier with volume control, providing inputs for CD player and tape recorder but not tuner!	50W, 2 line inputs, straight line		56
Inca Tech Claymore £345	Good + Good +	Limited facilities but a strong, clear, well-focused sound results in auspicious Choice debut for this relatively young company	50W MM/MC 3 line inputs straight line	R	56
Jadis JP30/JA30 £6,790	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	This
JVC AX-22 £110	Average Poor	Serves a market that buys on features rather than sound quality. Includes special "flashing light" power meter	55W MM tone controls		50
Kenwood KA-550 £130	Good Fair	Decent sound quality and build at an affordable price, it also has a capable moving coil input – something of a rarity among the competition	40W hdph Tone controls MM/MC	R	50
Krell PAM5 £1589	Very Good Good	Superbly built, the Pam 5 pre-amp gave good definition throughout the frequency range with a good measure of excitement	MM/MC	R	50
Krell KSA50 Mk2 £2540	Very Good Good +	This power amp still holds its own with good depth and ambience and excellent stereo focus	50W	R	50
Le Tube £585	Good + Good	If moving coil sensitivity is not required then this pre-amplifier will offer a clean view with very good stereo	3 inputs MM	R	44
LFD £2,500 +	Very Good Excellent	Can set the subjective standards that others merely aspire to, but this outstanding if unconventional multi-box pre-amp needs careful matching to ancillary components (cartridge, power amp)	MC (with care), passive line extra	R	This
Linn LK2 £440	Good + Fair	This pre-amp was marginally less successful than the LK1 but the pair (of Linns) worked well together and are well worth considering. Recent modifications as yet unchecked	5 inputs MM/MC	*	50
Linn LK1 £459	Good + Fair	A durable tolerant power amp, setting a respectable standard on both lab test and audition	60W		50
Linx Stratos £999	Good + Good	Facing strong competition in the UK this New Zealand pre-/power combination gives good sound quality... but not exceptional at the price	120W MM/MC straight line		50
Luxman LV100 £205	Good Fair	Nicely finished modern integrated amplifier, generally competent though not exceptional	45W MM 4 line inputs tone controls		56
Luxman LV-105 £599	Very Good Fair	Superbly finished and built, in a sense this model managed to capture the "valve" sound with an easy musical quality and good bass register	85W MM/MC		44
Lux LV105u £685	Very Good Good	This very well equipped and beautifully finished Japanese integrated amplifier has two valves in the early section of the power amplifier. Pleasant and musical it sets no value for money record here	9 inputs 80W, MM/MC tone controls		57
Magnum A100 £1995 pair	Good + + Good +	Given their massive power rating a pair of A100's make a fine stereo power amp; ideal for high levels and with a wide dynamic range for digital programme	320W	R	50
Marantz PM26 £110	Average Poor	Well built and attractively presented this just manages recommendation, though sonically falling somewhat short of the best examples of its type	30W MM sliding tone controls	R	50
Marantz PM35 £160	Very Good Good	This new generation Marantz is a good allrounder, and shows that extra care is being taken over sound quality: well equipped and versatile	45W MM/MC 3 line inputs tone controls	R	56
Marantz PM45 £200	Good + Fair	Generally pleasant and polite with above average clarity; there was some softening in the bass, restricting dynamic output somewhat	40W MM/MC tone controls	R	50
Marantz PM94 £1,000	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)		This
Meridian 201/205 £550/£395 each	Very Good Good +	A fine pre-amp 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	56
Mission Cyrus One £150	Good Good	A reference standard amplifier for its price category the Cyrus 1 attained a high sonic standard. A stylish, neutral performer	5 inputs MM – medium MC 30W straight line	BB	50
Mission Cyrus Two £300	Good + Good +	A significant improvement on the already competent 'One, the 'Two remained neutral and confident over the whole frequency range	50W 5 inputs MM/MC Disc straight line	BB	50
Mission Cyrus Two with PSX £500	Good + Good +	Although making the 'Two more powerful, the PSX power supply does not offer significantly better sound quality	A power supply, see above		50
Musical Fidelity A1 £249	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
Musical Fidelity B200 £299	Very Good Good +	Running cooler than other MF's, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/MC 4 line inputs straight line	BB	56
Musical Fidelity A100 £439	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	56
Musical Fidelity Pre 3/P140 £299/£299	Very Good Very Good	Delivering true audiophile sound quality well ahead of their price, both components shine in their own right	70W MM/MC 4 line inputs straight line	R	56
Musical Fidelity P170 £499	Very Good Very Good	Acquitted itself well, later samples showing steadily increasing refinements	85W	R	50
Musical Fidelity MVT Mk 3 £1199	Very Good Excellent	The MVT pre-amp was "simply a knockout in its class", providing competition for £2000-plus amplifier systems	MM/MC 5 inputs	R	50
Musical Fidelity P270 £1199	Very Good Excellent	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 £2,000	Very Good Excellent	Soundwise this pre-amp puts Musical Fidelity on terms with much more expensive exotics, with top class transparency, focus and dynamics	MM/MC, phase invert	R	This
Musical Fidelity A370 £2199	Very Good Excellent	Arguably the finest sounding power-amplifier manufactured in the UK	185W	R	50
Myst TMA3 £288	Very Good Fair	This excellently-constructed, no-frills, dependable amplifier should offer long life with above average sound quality	35W MM/MC 4 inputs		50
NAD 3020e £110	Good Fair	A little light in balance and "weight" but superior to run-of-the-mill budget amplifiers	20W MM/MC 4 inputs	BB	50
NAD 2200 £339	Good + + Fair	Not recommended on grounds of sound quality, but worth serious consideration for its exceptional power output	100W		44

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DENON DCD 3300 .....	POA	TECHNICS SLP250 .....	POA
MARANTZ CD273SE .....	POA	TECHNICS SLP350 .....	POA
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MISSION PCM II .....	POA	TECHNICS SLPJ22 .....	POA
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# Sound us out.

Let me begin this months dissertation by clarifying a point of confusion that has arisen amongst some readers due to our address. Both Alan Abbott and myself are dedicated music and audio enthusiasts. We aim to bring a quality of advice and service to the customer that is quite often unavailable in the high street shops. We have many years in the audio business both as customers and salesman on which to base our advice and well remember what it is like to be bombarded by the confusing and often conflicting advice of magazines and hi-fi sales people.

Both of us pursue other occupations and we pride ourselves on the fact that we are not under pressure to sell to the customers simply to earn a living. Here in our quiet, rural surroundings you will have the opportunity to audition a wide range of equipment in a relaxed and unhurried home atmosphere. No one will try and speed a sale along just to get at the next customer. When you arrive you are the ONLY customer and therefore deserving of our fullest attention. Take as long as you like, we would rather you came back two or three times before making your choice rather than let you leave with the vague feeling you may have made a mistake.

At the time of writing we are the only UK dealers to have the full range of Spica Speakers in stock from the giant killing TC 50 and the bi wired TC 50 SE to the mighty Angelus. (At last a truly outstanding speaker of sensible domestic proportions). We are the first dealers to stock these fine transducers and within days of their arrival have already sold the first pair. Demand is going to be big, why not book your home demonstration with us now, or alternatively pay us a visit (by appointment only). We can offer the finest demonstration facilities available with completely honest and unbiased advice. (If we cannot fulfil your requirements then we are happy to suggest others who can).

Some recent additions to our range are the legendary Albarry Monoblock power amplifiers, the YBA pre and power combination. And let's not forget the magnificent LFD pre amplifier and Air 2:11 valve amplifier, the latter Alans reference power amplifier against which all others are judged.

For those who must have their cake and eat it, we have a full SAE system comprising CD player, tape, pre amplifier, power amplifier and tuner. Together they offer superb sound quality and harmonious aesthetics. The pre-amplifier is of special note demanding serious consideration as an audiophile unit in its own right. This unit will shake your faith in the minimalist approach to pre amplifier design! Priced at only £795. SAE could easily ask twice the price judged on sound quality alone, and comes highly recommended by the American audio magazine The Stereophile.

Kind regards,  
BRIAN VOCE

Our range of fine products include:  
ALBARRY, YBA, AIR, LFD, KISEKI, VECTEUR, STAD, AUDIOSTATIC, BEARD, DECCA, ODYSSEY, JECKLIN, SPICA, GLANZ, PAWEL, NUANCE, OMEGA POINT, AUDIO INNOVATIONS, AUDIO NOTE, GRYTHON, MILLTEK, ODYSSEY CARTRIDGES, ODYSSEY ARMS, PHONO AMPLIFIER, PLENTITUDE, QUICKSILVER, SOUTHER, SNELL, VOYD.

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# DIRECTORY

## AMPLIFIERS

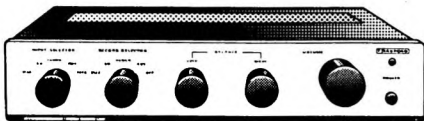
NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Naim NAIT 2</b> £322	Average + Fair	Well built with good load tolerance the NAIT delivered a fully competitive sound in spite of its modest measured power output. Recent modifications as yet unchecked	15W pc MM 3 inputs	R*	50
<b>Naim Separates</b> £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	This
<b>Nakamichi CATE/PATE</b> £2500/£1700	Very good Good/Good+	Exceptional build and finish, plus good general performance, remote control and versatility, but expensive	200W MM/MC 6 line inputs, remote, tone controls		56
<b>Nikko NA700</b> £189	Good ++ Poor	Disappointing sound quality at an above budget price. Inescapably old fashioned	60W MM/MC 4 line inputs tone filters		56
<b>Nuance</b> £795	Very Good Good	A subtle civilised pre-amp though a little lacking in resolution and detail; suited to some tastes but not top-drawer	4 inputs MC	R	50
<b>Orell SA-040</b> £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
<b>Perreaux SA3</b> £690	Very Good Fair	This exotic New Zealand-built pre-amp did not really offer the sort of sound quality expected at the price	4 inputs MM/MC		44
<b>Perreaux 1850</b> £990	Very Good Fair	This power amp's musical qualities were disappointing, though powerfully delivered. Build and finish were exemplary	180W		44
<b>Philips FA860</b> £249	Very Good Fair	Well balanced model from Philips' Japanese factory, with versatility, good build and finish	70W MM/MC 5 line inputs tone controls		56
<b>Philips FA960</b> £299	Very Good Good	Japanese built high quality integrated model with versatile features and plenty of power	110W MM/MC 8 line inputs tone controls		56
<b>Pioneer A331</b> £150	Good ++ Fair	A new face for Pioneer, with improved standards of sound quality and value alongside traditional strengths of build and finish	50W MM 4 line inputs tone controls	R	56
<b>Plentitude</b> £795	Very Good Good+	Rating slightly higher than its Nuance partner, this power amp provided a tight, controlled sound, if somewhat lacking in scale and grace	80W	R	50
<b>PS Audio PS4.5</b> £696	Very Good Good+	Sonically the best pre-amp in its class, but on the bright side, so purchasers should try it with their prospective equipment	MM/MC	R	50
<b>QED A240 CD II</b> £169	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	56
<b>QED A240 SA II</b> £219	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	56
<b>Quad 34</b> £269	Very Good Fair	This well-built durable pre-amp 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
<b>Quad 405</b> £329	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
<b>Quicksilver Mono</b> £1495	Good Good+	Moderately improved for '88 the Quicksilver still rates well despite up and coming competition	60W monoblok 4/8ohms		57
<b>Radford SC25</b> £598	Very Good Very Good	A very fair price for a solid, well built valve pre-amp, combining good allround performance and a neutral sound	5 inputs, MM, straight line	R	57
<b>Radford MA75</b> £776	Good Very Good	A fine quality valve monoblok with good load tolerance and a neutral accurate sound, offering significant gains in power and focus over the STA25	75W monobloks	R	57
<b>Radford STA25 Renaissance</b> £897	Good Good+	Offering superb midrange performance if not quite as good at the extremes, the Renaissance valve power amp is a genuine audiophile product	25W	R	50
<b>Revox B250</b> £1128	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
<b>Robertson Forty Ten</b> £987	Very Good Good	Here is a neat little power amp (60W) you can fit and forget; it proved most satisfying over long listening sessions	60W		Coll
<b>Rotel RA820A II</b> £125	Good ++ Good	This series II version of an established budget favourite delivers the goods sonically and is fine value for money	35W MM 4 line inputs tone controls	BB	56
<b>Rotel RB/RC850</b> £130/£119	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	R	56
<b>Rotel RA870BX</b> £325	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	BB	56
<b>Sansui AU-G11X</b> £139	Good + Fair	Tightly controlled if somewhat congested and lightweight, but a reasonable compromise between features and sound quality	25W MM hdph 4 inputs, tone controls	R	50
<b>Sansui AU-G30X</b> £199	Good ++ Fair	A very competent amp with no glaring faults, performing well with phono and compact disc inputs	4 inputs MM 45W tone controls Hdph	R	50
<b>Sansui B2301</b> £1880	Very Good Good+	Rating better than the pre-amp and providing generous power output, this amp could not be considered competitive in its price bracket	300W		Coll
<b>Sansui C2301</b> £2306	Excellent Good	Sansui's flagship pre-amp did not really rate well given its price, but is not short on features	All facilities		Coll
<b>Sony TAF 500ES</b> £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
<b>Sony TAF 700ES</b> £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
<b>Sumo Nine +</b> £1,200	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	This
<b>Tannoy SR-840</b> £1713	Very Good Good	A "muscle" power amp, capable of impressive levels into difficult loads while remaining quite subtle and revealing	250W	R	50
<b>Technics SU-500</b> £100	Average Poor	Technics have something of a knack in creating models which just border on what we regard as the minimum standards for Hi-Fi. This is an example of that	40W MM hdph tone controls		50
<b>Technics SUV55A</b> £200	Very Good Good	A typically well built modern allrounder, with good versatility and sound quality	65W MM/MC 6 line inputs tone controls	R	56
<b>Technics SUV85A</b> £350	Very Good Good	Similar to '55 but with more power and better sound quality still	110W MM/MC 9 line inputs tone controls	R	56
<b>Vacuum State FVP</b> £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
<b>VTL Minimal</b> £340	Good Good	Providing decent sound quality at the price, this basic pre-amp sounded open and clear in mid and treble	3 inputs (MM)	R	50
<b>VTL 50W</b> £1150	Good Good	Rating good on audition and providing complementary characteristics to the minimal pre-amp, these monoblok power amps sounded a little slow and unrevealing	50W 3 inputs	R	50

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# The Radford Renaissance range of Valve Amplifiers

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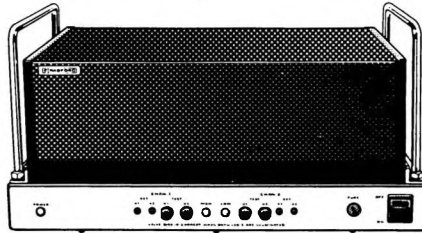


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Hi-Fi News, U.K. May 87.

*"Perhaps the strongest points of the Radford Renaissance is its bass – surprisingly good for a tube power amp."*

Stereophile, U.S.A. September 87.

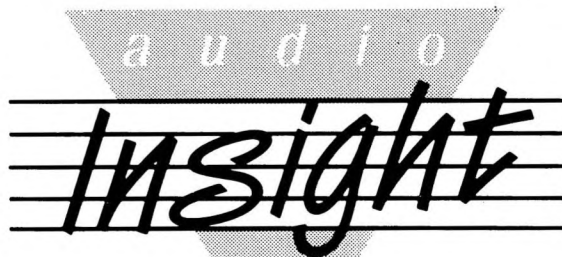


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HI-FI MARKETS

# DIRECTORY

## AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Yamaha AX-300 £120	Good Fair	A lively and dynamic performer, offering a credible if bright sound at a competitive price	30W hdph tone controls (MM)	R	50	
Yamaha AX500 £200	Very Good Good	A well built versatile performer with generous power, decent sound	90W MM/MC 5 line inputs tone, var. loudness	R	56	
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	

## 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 £700	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 Research 8BX £100	Average Average—	Spacious and informative sound quality with bass well under control. Not that there was much bass to control	40 x 25 x 19cm shelf or 50cm stand near wall	88.5dB/W 70Hz		53
Acoustic Research 22BX £200	Average Average	Basically well-engineered with sound "nicely out of the box". Some of our "ears" were less enthusiastic	47 x 29 x 22cm shelf or 50cm stand near wall	89.5dB/W 55Hz	R	59
Acoustic Research 35BX £250	Average Average—	This is quite loud, with some boom and tizz, making it suitable for supine strummers of imaginary guitars perhaps	58 x 26 x 27cm free space on 40cm stands	91.5dB/W 55Hz		53
Apogee Caliper £2550	n/a Very Good	Near state of the art performance, not materially worse than bigger Apogees, just less bass. Rich, subtle and slightly dull, with a clear, articulate midband, but uncommonly system fussy.	122.5 x 71 x 10cm ex. rear foot, free standing, away from walls	n/a n/a	R	This
Apogee Scintilla £4990	Good Very Good	These take-me-to-your-leader speakers gave exceptional transparency and can achieve excellent results in a true audiophile system	145 x 88 x 9cm free space on floor	79dB/W 20Hz	R	46/Coll
ARR 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
ARR Arcam Two £250	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "bailly" character though lacking weight... a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/W 55Hz		59
ARR Arcam One Plus £359	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 QLN1 £350	Very Good Good+	This very sophisticated loudspeaker has much of the euphony of a LS3/5A but with rather more 'oomph'. A little 'romantic' for some tastes - Schubert and Sting rather than Stockhausen or the Stones perhaps?	35 x 25 x 26.5cm free space, 24 inch stands	84.5dB/W 65Hz	R	59
Audiostatic ES200 £1495	Average Average+	Sounding forward and unbalanced with limited bass power, these excelled in transparency and detail, and might suit some tastes	150 x 53 x 23cm low stands, free space	79dB/W 45Hz		46
Audiostatic ES300 £1995	Average+ Good	Marred by similar problems to its cheaper ES200 stablemate, this line source electrostatic was superb in the upper-mid and treble but lumpy in the bass	44 x 5 x 93cm free standing	82.5dB/W 30Hz		46
Avance 120 £279	Average+ Average+	This unusual "after eighties" looking speaker has the recipe for success, but not quite the right seasoning yet	42 x 30 x 30cm 30cm from wall on 40cm stands	86.5dB/W 60Hz		53
Avance Concrete 2000 £970	Below Average Below Average	Very low cabinet talk, but the system sounds terminally uneven - lumpy bass and over-forward midband dominate	86.5 x 29.2 x 43cm clear of walls	94dB/W 40Hz		This
B&W DM100i £120	Good Average	Not universally liked on test, but the consensus view was positive, the best feature being a sharp, clear midband	37 x 22 x 22.6cm free space or near wall, on stand	88.5dB/W 90Hz	R	59
B&W DM110i £159	Very Good Average	On the hard and aggressive side of neutral, this is a tactile and detailed transducer that remains musically adequate, if slightly intrusive.	48.7 x 26 x 27cm open space, on high stands	88dB/W 60Hz		59
B&W LM1 Mk II £249	Average+ Average	Probably one of the best 'micros' ever made, worth considering for special applications (boats or vehicles). Upgraded since our review	24 x 15.5 x 20cm shelf or flush mount	86.5dB/W 80Hz	*	31
B&W DM1600 £399	Good Good	Crisp, dynamic loudspeaker with tight but not especially deep bass and a tweeter that sometimes sounds overcooked	49 x 23.6 x 30cm free space, open stands	87.5dB/W 60Hz	R	59
B&W Matrix 1E £595	Very Good Good+	There was enthusiastic and consistent praise for these speakers with their "revealing and seductive" midrange	41 x 23 x 32cm free space on 35cm stands	85.5dB/W 50Hz	R	53
BBC LS3/5A £265	Good+ Average+	As a working tool it does its job but as a piece of value engineering this old-timer is beginning to look a bit grey-haired (recent revisions not yet checked)	30 x 18.5 x 16cm open stands, free space	81.5dB/W 57Hz	R*	Coll
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 6.2 £570	Average— Average—	Wishy-washy (but not unpleasant) sound and vague imagery are the hallmarks of this unusual design	25.4 x 50.8 x 24.4cm free space, on stands	87.5dB/W 55Hz		59
Boston A4011 £110	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
Castle Clyde £139	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 Durham £189	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 £289	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
Celestion DL6 Series Two £149	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

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 50

# DIRECTORY

## LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
<b>Celestion DL8</b> £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
<b>Celestion SL6S</b> £350	Good Good +	A luxury compact speaker that gives a sweet treble sound with fine musical detail	37.5 x 20 x 27cm free space on 40cm stands	84dB/W 50Hz	R	46
<b>Celestion SL600</b> £700	Good Good + +	Clearly an exceptional device in terms of design and transparent sound quality. An audiophile miniature	37 x 20 x 25.5cm open space on stands	83dB/W 55Hz	R	46
<b>Celestion SL700</b> £1220 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		This
<b>Celestion 6000</b> £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	This
<b>Chameleon 500</b> £349	Average – Average –	Sounding badly coloured, dull and compressed, it is also amateurishly constructed, despite using good quality materials	38 x 25.3 x 31.3cm free stands	89.5dB/W 75Hz		59
<b>dx 1000</b> £450	Average – Average –	This system sounds soft and woolly, with an effusive bass, an occasionally sharp treble, and a recessed midband. Stereo positioning is poor.	78.7 x 35.6 x 27.9cm against rear wall	91dB/W 60Hz		59
<b>Diesis Sapphire</b> £329	Average – Average –	Poor driver integration and a thin, wispy treble spoil this otherwise neat and solid sounding design	35 x 20 x 24cm open space, on high stands	90dB/W 90Hz		59
<b>Gale 301</b> £279	Average Average +	Of unusual, distinctive appearance this produced a mixed response, being lively but lacking depth	44 x 23.5 x 22cm on stands quite near wall	86.5dB/W 63Hz		46
<b>Gale GS402</b> £599	Average + Average +	Clean but rich and powerful bass; stereo focus was not a strong point, but it is worth considering	61 x 35.5 x 28cm on matching stands near wall	88dB/W 48Hz		46
<b>Goodmans Maxim Two</b> £80	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	BE	59
<b>Goodmans Point 3</b> £90	Average + Average –	Recommended as good value for money, but our listeners' differing opinions mean your ears should judge for themselves	47 x 25 x 20cm shelf/high stand near wall	90dB/W 80Hz	R	53
<b>Goodmans Point 7</b> £170	Average + Average	Basically competent performance-mix and a lot of speaker for the money, but a certain lack of refinement nonetheless	69 x 33 x 26cm free space on 35cm stand	85dB/W 47Hz		53
<b>Harbeth HL Compact</b> From £455	Very Good Average	The clean and neutral sound lacks resolution and gives rather unobtrusive 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
<b>Harbeth HL Mk 4</b> £525	Good + Good +	Recommended for the good results at its price, and only mildly criticised for heavy bass and a mild 'chestiness'	64 x 33 x 30cm free space on 46cm stand	89dB/W 40Hz	R	53
<b>Heybrook Point Five</b> £139	Average Average	Disappointingly prosaic performance on listening tests; wooden and hollow, with restricted dynamics and 'space'. Earlier samples sounded better	37.5 x 23 x 23cm near wall, on matching stands	86dB/W 85Hz		59
<b>Heybrook HB1</b> £189	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
<b>Infinity RS2000</b> £130	Good Good +	Fast, detailed and assured miniature with quick but not very deep bass. The top end is detailed but sometimes jangly	36.2 x 22.5 x 20cm near rear wall, high stands	91.5dB/W 70Hz	BE	59
<b>JBL TLX-3 GI</b> £130	Average Average –	Lively and punchy but also untidy this little speaker may have deviated from the Hi-Fi standard but cannot be summarily dismissed	38 x 25.5 x 22cm free space on stands	87dB/W 55Hz		46
<b>JBL L 60T</b> £399	Good + Good	Well balanced and offering realistic value for money, the fine treble and extended bass make it suitable for larger rooms	78 x 30.5 x 26.5cm low stands or floor	88dB/W 40Hz	R	46
<b>JBL L80T</b> £549	Good Average	Large scale, dynamic if rather unwieldy sounding, this is a performer of integrity, if not much subtlety	85.1 x 35.6 x 30.3cm floorstanding, open space	89.5dB/W 55Hz		59
<b>JBL 18Ti</b> £599	Good + Good	Beautifully engineered, well finished miniature with many good points, but unexceptional overall. Try the cheaper L20T	34 x 24 x 22.5cm 50cm from wall on rigid stands	85.5dB/W 53Hz		46
<b>JBL 250Ti</b> £3599	Good + Good +	In general this speaker did not show the required level of dynamic presentation transparency and stereo depth expected of a pricey flagship model	132 x 57 x 36cm free space on floor	89dB/W 53Hz		46
<b>JPW P1</b> £125	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	85dB/W 60Hz	R	59
<b>JPW AP2</b> £145	Good Average +	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	85dB/W 65Hz	R	53
<b>JPW AP3</b> £210	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
<b>KEF C10</b> £94	Good Average –	Listening panelists gave this a poor reception	30 x 20.5 x 17.5cm stand near wall	87.5dB/W 75Hz		46
<b>KEF C40</b> £209	Average + Average –	Criticisms were made of a lack of fine detail and loss of depth and transparency, but it could handle power well	65 x 24.5 x 26.5cm free space on stands	90dB/W 55Hz		46
<b>KEF RI 02</b> £335	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; what would an audiophile Kube sound like?	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/W 60Hz	R	59
<b>KEF 103/3</b> £630	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	90.5dB/W 35Hz		53
<b>KEF 104/2 (inc KUBE equaliser)</b> £806 (£905)	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	This
<b>KEF 107</b> £1890	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	This
<b>Linn Nexus</b> £350	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	85dB/W 60Hz		59
<b>Linn Sara</b> £729	Good Very Good	The new Sara is now much smoother and sweeter, with much better imaging. Bass power and dynamics are as good as ever, and the system is no longer as fussy as before	43 x 34.4 x 26.5cm stand mounting, near wall	88dB/W 50Hz	R	This
<b>Linn Isobarik</b> £1695	Good Good + +	Exceptional capabilities in the dynamic range and bass performance; demands serious consideration as a state of the art contender, but odd stereo	76 x 33 x 41.5cm low stands against rear wall		R*	Coll II
<b>Magneplanar SMGa</b> £697	Average – Average	Totally '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
<b>Magneplanar MG2.5R</b> £1897		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		This
<b>Magneplanar MG11a</b> £2650	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		46
<b>Marantz LD20 DMS</b> £140	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
<b>MB Quart 390</b> £499	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

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Meridian M30</b> £725	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
<b>Mission 70 II</b> £110	Good Average	Lively and transparent, the 70 II was favoured for its speed, though the sound had a mildly 'thin' tonal balance	35 x 21 x 21cms on stands or shelf near wall	89dB/W 68Hz	BB 46
<b>Mission 700LE</b> £140	Good Average	Mission re-submitted this popular model and again got a positive review – which proclaims their (and our) consistency	38 x 21 x 21cm straight ahead stand near wall	89dB/W 66Hz	R 59
<b>Mission R737 Renaissance</b> £250	Average Average	Effusive, over-the-top bass and obtrusive treble get in the way of a marvellously lucid and transparent midband. Inconsistent on audition – wonderful piano, bloated orchestras etc	54 x 25 x 27cm near wall on dedicated low stands	88.5dB/W 60Hz	59
<b>Mission Argonaut</b> £700	Good Good	Perhaps not the most subtle or sweet these were recommended for their excitement, drama, power handling and... good looks	95 x 23 x 31cm floor-standing near wall	91dB/W 40Hz	R This
<b>Monitor Audio R100</b> £139	Average + Average –	Tonally quite neutral, but with small box character, negligible low bass and a rather 'hard' midrange	40.5 x 25 x 21cm free space on stands	87.5dB/W 70Hz	46
<b>Monitor Audio R252</b> £159	Average + Average	Rating well for its price this model displayed a rather rough top end and a generally dry character helped by good detail and focus	47 x 25 x 24cm stands quite near rear wall	89dB/W 62Hz	R 46
<b>Monitor Audio R352</b> £250	Good Average	Well-built and finished, 'sensitive' speaker which is easy to drive and capable of extracting good results from any good amplifier	64 x 25 x 32cm on stands in free space	90dB/W 50Hz	R 46
<b>Monitor Audio R700 MD</b> £269	Average + Average +	Lively and involving with good, punchy, if rolled off bass. The metal dome speaker gives a clean and open treble	32 x 21.5 x 25cm on stands 0.4m from wall	87.5dB/W 62Hz	R 46
<b>Monitor Audio R352 MD</b> £299	Good Average +	Better suited to CD than vinyl perhaps, this is clearly good value for money. But some found it coarse while others praised its cleanliness	64 x 25 x 32cm 25cm stands in free space	89dB/W 42Hz	BB 53
<b>Monitor Audio R452/MD</b> £350	Average Average	This big, efficient, dynamic sounding loudspeaker has a clean, open treble but a pinched, two-dimensional midband. Can be tiring in the long run	64 x 25 x 31.8cm open space, low stands	89dB/W 55Hz	59
<b>Monitor Audio R652 MD</b> £369	Average Average +	Mild bass and crossover weaknesses were criticised, but the sound was quite well liked and it is decently built	51 x 20 x 26cm free space on 40cm stands	86.5dB/W 45Hz	53
<b>Monitor Audio R852/MD</b> £380	Good + Good	This finely crafted design has a sharp and clear if occasionally rather rough sound quality. Bass is light but qualitatively very good – an intriguing performer	45 x 25 x 27.5cm open space or near rear wall, high stands	89dB/W 68Hz	R 59
<b>Mordaunt Short MS10 II</b> £90	Average Average –	One of the best miniatures around. A borderline Best Buy because of the bass limitations, which may depend on your taste	29 x 20 x 17cm wall bracket	86dB/W 75Hz	R 53
<b>Mordaunt Short MS100</b> £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
<b>Mordaunt Short 45Ti</b> £230	Good Average	A sensitive tandem-bass number that can be driven loud but loses its balance a bit and can be unsuitable	63 x 26 x 30cm low (20cm) stand near wall	90.5dB/W 52Hz	53
<b>Mordaunt Short MS300</b> £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
<b>Mordaunt Short 442</b> £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 This
<b>Musical Fidelity MC-2</b> £300	Very Good Very 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 59
<b>Musical Fidelity MC-4</b> £499	Very Good + Very 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
<b>Quad ESL-63</b> £1459	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 This
<b>Rogers LS2</b> £170	Good Average +	A coherent and polite speaker considered more suited to classical music. Tonally well balanced, neutral and with good power handling	36 x 23 x 22cm on stands near wall	86.5dB/W 51Hz	R 46
<b>Rogers LS6</b> £240	Good + Good	Sonically fitting in between the LS2 and 7, the 6 was a consistent success on audition – well balanced with an open and informative nature	51 x 27 x 28cm open stands, free space	87.5dB/W 50Hz	BB 46
<b>Rogers LS7t</b> £360	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
<b>Roksan Darius</b> £1285 inc. stands	Average Poor/Very Good	A controversial speaker which when set up right can deliver impressive performance, but with a far from neutral balance	98 x 31 x 51cm integral stands near side walls	88dB/W 50Hz	53
<b>Rotel RL850 II</b> £120	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
<b>Royd A7 Series 11</b> £99	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
<b>Royd A25</b> £100	Average + Average –	Receiving mixed reactions on audition, the A25 is flawed but offers a lot of speaker for the money	51 x 29.5 x 24cm, stands near wall	87dB/W 52Hz	R 46
<b>SD Acoustics SD1</b> £1050	Average Good	A large scale, airy and unusually detailed system with excellent dynamics. Balance is light and bright, and can upset some systems/listeners	123.5 x 38.2 x 31.9cm free standing, away from walls	90dB/W 50Hz	R This
<b>Sony APM 10ES</b> £100	— Average	An obvious Best Buy at its highly competitive price point, it can do justice to a good hi-fi system of Sony or specialist origins	40 x 25 x 20cm, 40cm stands 40cm from wall	87dB/W 55Hz	BB 59
<b>Sony APM 22ES</b> £249	Good + Good	Sounding notably clear, the 22ES scored well on listening tests was easy to drive and achieved high sound levels	51.5 x 29 x 30cm free space on 40cm stands	88.5dB/W 46Hz	R 46
<b>Sony APM 66ES</b> £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
<b>Spendor Prelude II</b> £350	Good + Good	Good clarity and detail were evident everywhere in this speaker. Though a little boxy or muddy in the midrange it is strongly recommended	50 x 26 x 28cm open stands in free space	88dB/W 52Hz	R* 46
<b>Spendor SP2</b> £450	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
<b>Spendor SP1</b> £680	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	87dB/W 41Hz	R This
<b>Spendor SA3 Passive</b> £1400	— Good +	Same as Spendor SA3 active	85 x 38 x 46cm low	89dB/W 32Hz	R 46
<b>Spendor SA3 Active</b> £2708	Good + Very Good	Substantial speakers designed to deliver high sound levels and killer bass. Suited to larger rooms and power hungry ears	85 x 38 x 46cm low rigid stands in free space	89dB/W 32Hz	R 46
<b>Spica TC-50</b> £595	Average + Good	These American wedge-shaped-cabinet speakers just merit recommendation at their price and were detailed and clear	40 x 33 x 28cm free space on 50-60cm stands	85dB/W 48Hz	R 59
<b>Spica Angelus</b> £1195	Good Average	A little bass shy and soft in the bass and lower mid, the Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm free standing away from walls	86.5dB/W 50Hz	This

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Tannoy Eclipse £120	Average + Good	Although a little bright, the essentials are right: hear-through clarity at all frequencies, good dynamics, firm bass	38.8 x 22.6 x 21cm semi open on stands	87dB/W 65Hz	BB 59
Tannoy Mercury II £160	Good Average +	This genuine allrounder represents an exceptionally accurate free-space system for the money. Recent modifications as yet unchecked	50 x 25 x 23.5cm open space 45cm stands	88dB/W 55Hz	BB* 53
Tannoy Westminster £3500	n/a Good +	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few panckels and rooms	Huge, flat against rear wall, away from corners	96dB/W (manuf.)	R Coll
Technics SBC 250 £130	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
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 £99	Average + Average -	Given the price this was a mild disappointment - there is nothing obviously wrong but it just seemed a bit mundane	48 x 27 x 19cm near wall on 40cm stands	88dB/W 55Hz	53
Wharfedale Diamond 111 £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 504 £139	Average + Average	Acquitting itself well on audition, the 504 produced a clear, reasonably balanced sound with above average treble	21 x 18.5 x 20cm stands, near wall	85dB/W 75Hz	R 46
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 510.2 £299	Average Average -	Even in it's latest guise, this loudspeaker still sounds hard, cluttered and lacking innate clarity. The bass is uneven and midband coloured	61.5 x 28 x 29.6cm near wall, high stands	89dB/W 50Hz	59
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 dependant 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
Aiwa AD-F260 £90	Good Poor	Well equipped conventional budget recorder measured rather better than it sounded	Dolby B, C, bias adjust		52
Aiwa AD-F360 £110	Good Average	Soft, somewhat amorphous sounding deck which is, however, very easy to use	Dolby B & C, bias adjust, 2 Head		57
Aiwa AD-R460 £149	Average Average -	Some worthwhile features but sound quality was not especially liked	Auto reverse, Track search, Dolby B, C, bias adjust		52
Aiwa AD-WX707 £180	Poor Average	Not bad value for a twin deck, but marginal from the high fidelity viewpoint. The review sample was poorly set up.	Dual deck, auto-reverse, Dolby B & C, bias adjust		57
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	BB	This
Akai GX-52 £249	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 local features	BB	57
Akai GX-6 £350	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
Denon DR-M07 £140	Average + Excellent	Despite minor operational and measured shortcomings, sound quality is excellent for the price	Dolby B, C, bias adjust	R	52
Denon DR-M12HX £220	Good Good +	Well constructed and pleasant to use, a lack of true pitch constancy kept it from sounding superb	Track search, Dolby B, C, HX Pro, bias adjust	R	52
Denon DR-M24HX £290	Good Good +	This deck will slot into many high grade systems without disgracing itself - or the cassette medium. Very presentable high resolution sound with good stereo with or without Dolby	Dolby B, C, HX Pro, bias adjust, 3 Head	BB	This
Denon DR-M30HX £319	Good Good +	Ergonomically fine with infra red remote, the M30 fared well on pre-recorded material and was at its best with ferric tapes	Dolby B, C, Hx Pro, bias adjust, 3 Head, remote control	R	52
Denon DR-M44HX £400	Excellent Excellent	A well designed deck that also performed fine sonically, working very well with ferric and metal tapes	Real-time counter, Dolby B, C, HX Pro, tape alignment adjust, remote control, 3 Head	R	This
Harman Kardon TD202BL £249	Average Average	A competent middle-ranking performer but lacks sonic incisiveness and is a bit expensive	Dolby B, C, bias adjust		52
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		52
Hitachi D-003 £199	Average - Average -	Dry, slightly 'wobbly' sound quality but suitable for many non-critical applications. The manual tape direction switch is poorly designed	Dual deck, auto reverse, Dolby B		57
Hitachi D-007 £300	Average - Poor	This double 'dubbing' deck proved a mixed bag - good in parts but disappointing overall	Dual deck, auto reverse, track search, Dolby B & C		52
Kenwood KX550HX £150	Average Average +	This well-laid-out and attractive deck ultimately lacks the edge to stand out in a competitive field	Track search, Dolby B, C, HX Pro		52
Luxman K-100 £199	Average + Average +	Poorly laid out but it fared quite well on metal tapes. Commercially recorded tapes sounded bright and cramped, however	Dolby B & C, remote control		52
Luxman K-105 £349	Average Average	Rating quite well for an auto reverse deck, and featuring complex track search facilities, it was not sonically competitive on price	Auto reverse, track search, Dolby B & C, remote control		52
Luxman K-112 £349	Average Average	Build quality is not truly consistent with the price. Nor is sound, which veers on the warm, lousy side of neutral	Dolby B, C, HX Pro, bias adjust, 3 Head		57

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Marantz SD-35 £169	Good Good+	Rock steady tape transport gives very competitive sound quality for the price, but the slightly bright replay may not appeal to some	Dolby B & C, bias adjust	BB	52
Marantz SD-4511 £209	Good+ Good+	Well built and dynamic sounding player, working better as a recorder than with musicassettes	Dolby B & C, bias adjust Auto selection	R	52
Marantz CP230 £260	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz SD-55 £349	Good Very Good	Slightly tacky feel and restricted signal/noise performance are the main shortcomings of an excellent sounding piece of kit	Real-time counter, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
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 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-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	This
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 musiccassette replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote		This
Nikko D-80II £309	Average Average	Easy and rewarding to use (apart from the mannered aesthetics), but sound quality is below par for the price, especially with dbx	Real-time counter, auto reverse, track search, Dolby B, C and dbx, bias adjust		57
Onkyo TA 2130 £140	Average+ Average+	Rating fairly well on both pre-recorded and record/playback, ergonomics were a little poor but overall performance was generally consistent	Track search, Dolby B & C, bias adjust	R	52
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 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-880 £130	Average+ Average	Fair sound quality, veers in direction of maximising information, not sophistication. But output varies with tape-to-head contact and speed stability is iffy	Track search, Dolby B & C		57
Pioneer CT-1380WR £400	Good Good	Impossibly clumsy ergonomics are the main snag. There are plenty of features, some quite useful, and sound quality is detailed and lively	Dual deck, auto reverse, track search, Dolby B & C, remote control	R	57
Proton AD-200 £139.50	Poor Poor	Sound quality is essentially on a par with many portables, and has nothing to do with high fidelity. The main problems are an unrelenting hardness and an almost total lack of detail	Dolby B & C		57
Proton AD-300 £249.50	Average- Poor	High levels of flutter give sound a roughness and coarseness that rules it out for high quality work. The record and replay electronics certainly deserve better	Auto reverse, Dolby B & C		57
Revox B215 £1461	Good Average+	Superb engineering and good sound, but lacking the subjective qualities that characterise the very best hi-fi equipment	Real-time counter, Dolby B & C, tape alignment adjust, remote control		52
Rotel RD-830 £110	Average- Poor	A pretty fundamental if slightly dated design with little sonic merit but an attractive enough price	Dolby B		52
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
Sony TC-FX 150 £90	Average+ Average+	Recording and playing back on this deck itself gave acceptable results, whereas prerecorded stuff was a joke. But it's a good £90 worth	Dolby B & C	R	52
Sony TC-W250 £149	Average- Average-	Rather rough and ready but a nonetheless honest and tolerably transparent sounding deck. Acceptable sound at the price	Dual deck, Dolby B & C		57
Sony TC-R303 £179	Good Good	Bright, detailed but not especially refined sound quality, makes excellent Dolby recordings, but has slightly suspect pitch stability	Auto reverse, Dolby B & C, remote control		57
Sony (WMD6C) ProWalkman £249	Good+ Excellent	"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	This
Sony TC-R503ES £299	Good Good+	High grade auto-reverse cassette deck with a very clean, articulate sound. What might it have been like with a more stable transport?	Real-time counter, auto reverse, track search, Dolby B, C, HX Pro, bias adjust, remote control	R	57
Sony TC-K444ESII £349	Good Average	Even the best this deck has to offer is not truly commensurate with the price	Real-time counter, Dolby B & C, bias adjust, remote control		52
Sony TC-K700ES £499	Excellent Excellent	Firmly in the esoteric league, this is easy both to operate and to listen to. Best points: first class imagery, focus and stability	Auto reverse, track search, Dolby B & C, tape alignment adjust	R	This
Tandberg 3014A £1650	Good Very Good	Very exactly engineered but excessively complex to use. Test sample had poor response for prerecorded tapes, but recordings were unusually stable and clean	Real-time counter, track search, Dolby B & C, bias adjust, remote control, 3 Head		57
Teac V-200 £80	Average- Average+	At this price you don't get fireworks, but it offers real value for money and sounds open and honest	Dolby B	R	52
Teac V-210C £99	Poor Poor	It could have been our sample but we found inadequate speed stability and a 'messy' sound	Dolby B & C, bias adjust		52
Teac W300 £115	Poor Average-	Sonically a mixed blessing, it does well with pre-recorded tapes but home-made recordings sound a little rough	Dolby B		52
Teac W-310C £129	Average- Average-	Dubbing performance is poor, especially using the high speed mode but normal record and replay performance standards are not too bad	Real-time counter, Dolby B, C, Hx Pro, bias adjust		52
Teac R-515 £299	Average+ Average+	Expensive, this deck is basically a competent but pedestrian performer which will not fully satisfy the critical user	Real-time counter, auto reverse, Dolby B & C, bias adjust		57
Teac V-970X £499	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
Technics RS-B305 £140	Good+ Excellent	Well built and offering excellent sound quality at the price, working well with metal tapes if not so hot on pre-recorded material	Dolby B & C	R	52
Technics RS-T22 £150	Excellent Average	Good value for a twin deck machine, and fairly simple to use, but sonically no competition for single transport machines	Dual deck, auto reverse, Dolby B & C		52
Technics RS-B505 £160	Average+ Average+	Neatly made recorder with Dolby HX Pro that sounds precise and stable, though sometimes a little processed and grainy too	Track search, Dolby B/C/HX Pro		57

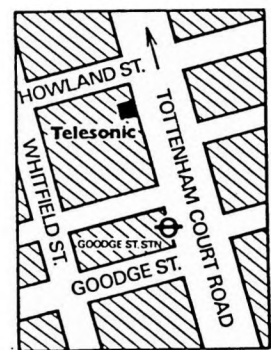
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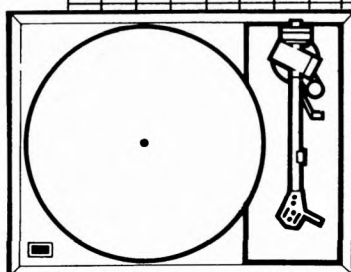
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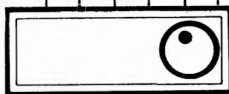
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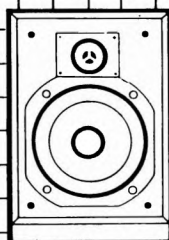
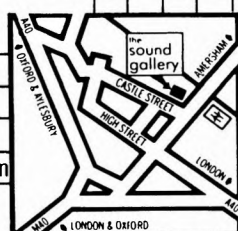
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# DIRECTORY

## CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Technics RS-B605 £180	Good Average+	Mixed but generally good sound. Weakest points are dbx and prerecorded sound, best are Type IV (metal) recordings which sound sharp and precise	Track search, Dolby B/C/HX Pro & dbx	R	57
Technics RS-B705 £250	Average Average—	3 heads for the price of two, but not the sound quality to go with them	Track search, Dolby B, C, HX Pro, bias adjust, 3 Head		52
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
Technics RS-T80R £400	Poor Poor	Flexible and pleasant to use but poor transports led to poor sound on our latest sample	Dual deck, auto reverse, track search, Dolby B, C, dbx		52
Yamaha KX-200 £140	Good— Good	Cheap, well-equipped and workmanlike with the sound quality less obviously processed than most – the whole is more than the sum of the parts	Track search, Dolby B & C, remote control	BB	52
Yamaha KX-300 £150	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-400 £200	Good Good+	A highly commercial package with every widget under the sun. Happily it sounds good too.	Auto reverse, track search, Dolby B, C, HX Pro, remote control	R	52
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-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 control, track search, Dolby B, C, dbx, HX Pro, bias adjust, remote control		52

## CD PLAYERS

This new all-digital music source is now 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 CD's 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 pre-amp, there are no problems connecting a player to a normal amplifier.

BB = Best Buy  
R = Recommended

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research CD-04 £290	Good Fair	Stylish but basic player, based on Philips 14-bit 4 x oversampling with respectable sound and remote control	Remote Control, headphones		51
ADC CD-250X £230	Good+ Fair	Well made and engineered, and average soundwise; trumpets could sound 'thin' though violins were liked so it may prefer Stephan Grappelli to Miles Davis	Skip and search, manual, repeat and 16-track programming	R	58
Arcam Delta Black Box £249	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	This
Arcam Delta 70 £500	Good Very Good	This solidly built British player has attractively understated presentation with straightforward, simple ergonomics. The very good sound quality shows a steady improvement over earlier samples.	Simple remote, headphones etc.		58
Aiwa CD-001 £350	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
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
Cambridge Audio CD2 £600	Fair Very Good	The finest midrange in digital audio is sufficient grounds for Recommendation, though there remains a tinge of disappointment that the CD2 didn't get closer to big brother elsewhere, notably in the bass.	16x oversampling, remote control	R	58
Cambridge Audio C01 £1500	Good+ Excellent	Advanced design and circuitry give this top class two-box machine exceptional performance, so the intrinsic qualities of CD, (eg. silent surfaces) make themselves felt	No headphones, seven audio filters, skip and scan	R	Coll
dbx DX5 £640	Good Poor	Sound quality proved a signal 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
Denon DCD-800 £300	Good Good	A generally good subjective and objective performance, a comprehensive range of remote controllable facilities, plus Denon's good reputation for build quality and field reliability.	Track entry remote, menu display etc.	R	58
Denon DCD-1500II £500	Very Good Very Good	The extra build quality over cheaper Denons is justified in terms of sound quality and lab performance, while the feature list is comprehensive and quite nicely presented.	Track entry/volume remote, menu display etc.	R	This
Denon DCD 1700 £650	Good+ Very Good	The overall sound was strong and coherent approaching reference standards. Fine build quality and facilities make this a firm contender	Remote, skip, scan, headphones, programmable	R	58
Denon DCD-3300 £1200	Good+ + Very Good	Sounding tight and coherent though not significantly better than the cheaper 1700. Very well built and comprehensively equipped	Remote control, with volume, keypad programme, scan, search, headphones		51
Goodmans GCD-500S £150	Average— Poor	User-friendly but flimsy build quality and second class sonics make this poor value even at the price	Audible scan and track skip, programming		51/45
Harman Kardon HD100 £399	Average Poor	With a mixed subjective performance this well built player failed to make the grade in its price class	Skip and scan, programmable		51
Hitachi DA-7000 £180	Good Fair	Generally competent, especially considering the price, this was well built and styled if lacking in some facilities – a good budget starter	Memory and repeat, plus the basics	R	58
Hitachi DA7200 £220	Good Fair	Distinctly more competitive than the '009, the '7200 remains undistinguished in the current state of compact disc technology and sound quality.	Simple remote etc.		58
Hitachi DA007 £300	Average Fair	Unusually fitted with wooden end cheeks and comprehensively kitted out, but only average in sound quality	Full remote control, adjustable headphone output keypad programming		51
Hitachi 009 £300	Good Fair	Despite a pretty clean bill of technical health and an extensive range of facilities, the 009 failed to inspire the subjective enthusiasm needed for recommendation at its £300 price level.	Random, 'roulette' play, menu display, complex remote		58

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 50

# DIRECTORY

## CD PLAYERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
JVC XL-V1100 £659	Average + Fair	A substantial and very well built flagship model with 16 bit 4 x oversampling, though sound quality was disappointing at the price	Full remote, headphones, scan, skip, intro-scan		51
Kenwood OP990D £299	Average + Fair	A good all-round package, but comparable sound quality can be found more cheaply elsewhere	Headphones, remote control, (manual override)		51
Kenwood COP990SG £400	Very Good Good	Falling just short of the required subjective standard for Recommendation at this price level, this is a doughty player nonetheless, with a build quality and technical performance that arguably justifies its premium price.	Track entry remote, menu display, sprung feet etc.		58
Kinergetics KCD-30 £1700	Very Good Very Good	Definitely a technical oddball with its distortion-cancelling circuits, the pricey KCD-30 nevertheless does sound very good, and also noticeably 'different' – not necessarily to our collective tastes, but possibly to yours	Favourite track selection, remote, high output (vol, bal)		This
Luxman D-90 £300	Fair Good	Despite technical ingredients that do not seem particularly inspiring, this is a nicely judged package that is ergonomically neater than most, with decent sound quality for the price and distinctive finish and presentation.	Track entry remote, programming etc.	R	58
Luxman D-100 £399	Average Poor	Sparsely equipped with a slightly old fashioned sonic character, offering little but physical weight for a quite high price	Remote control, skip, scan, headphones (variable)		51
Marantz CD273 £199	Good Good	An ambitious machine at the price, offering pretty good sound quality but a slightly below average build standard	Skip, scan, programmable	BB	51
Marantz CD873 £240	Good Very Good	Putting many 'audiophile CDs' to shame in terms of sound quality this proved another winner, though there was slight criticism of control accessibility at times	No remote control, but the usual skip, scan etc	BB	53
Marantz CD-273SE £240	Good+ Very Good	The Euro-tweaked version of the standard 273, this model fulfils pretensions to audiophile standards at a budget price	Manual control, skip and scan (audible), 20 track programming, repeat	BB	51
Marantz CD873LE £250	Good Excellent	This is the outstanding sound quality bargain in the latest review project, with discreet if plasticky presentation and rather lightweight build	Manual repeat, skip, scan, programming	BB	58
Marantz CD94 £800	Good + + Very Good	Clearly the best Marantz CD player, with high build quality and good objective and subjective performance	10 digit keypad, headphones, favourite track selection, remote	R	58
Marantz CD94/COA94 £1600	Very Good Excellent	Taking its logical place at the top of the Marantz CD hierarchy, this two-box combination delivers reference standard lab and listening test results, albeit at a price which seems a little steep. Very refined	Favourite track selection, remote, balanced output etc	R	This
Meridian CD207 £950(+)	Very Good Excellent	Not only arguably the prettiest model around, but also one of the best sounding and most versatile – on-board preamp now accepts vinyl disc for an extra £100, and Meridian plans round-the-house future-readiness	On-board preamp, remote (inc volume)	R	This
Mission PCM7000 £400	Good Very Good	Stylish with a large informative LCD display this deserves recommendation on the basis of sound quality alone	Remote volume control, digital filtering	R	51/Coll
Nakamichi OMS-1E £400	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 OMS-3E £995	Good Good	Superbly built and presented this expensive machine was a bit of a "stuffed shirt" when it came to sound quality	Remote control, skip and scan, headphones		51
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, headphones		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
NEC CD610 £250	Good Very Good	Although NEC's CD players may take a bit of hunting down, the sound/price/build equation comes down firmly in favour of the '610 despite unspectacular lab performance.	Track entry remote, menu display etc.	BB	58
NEC CD810 £400	Very Good Very Good	While the lab performance might have been better still, sound quality, ergonomics and build quality all point towards Recommendation for this rare but attractive example of the CD player maker's art.	Track entry remote, menu display etc.	R	58
Nikko CD200R £250	Fair Fair	This player delivers fair overall performance at what is presumably a fair price, but is insufficiently distinguished to warrant Recommendation.	Simple remote, skip, scan, programming etc.		58
Philips CD371 £180	Fair Good	Though the build and presentation may not be to every taste, this is a fundamentally honest basic player that delivers more than enough of the sonic goods to merit a Best Buy rating.	Skip, scan, programming	BB	58
Philips CD472 £200	Fair Good	Once again one cannot argue with the fine sound quality Philips make available at a modest price – with remote control and extensive facilities besides.	Simple remote, programming etc.	BB	58
Philips CD473 £250	Good Good	In the forefront as regards sound quality, this is one of the best sounding Philips players yet; we were unable to catch it out on classical through Jazz program	Favourite track selection, remote control with volume, headphones etc	BB	58
Philips CD880 £500	Very Good Very Good	The '880 is an impressive blend of luxury build quality and features at a far from extravagant price, and also delivers the subjective goods	Volume remote, FTS, menu display etc.	R	This
Pioneer PD5050 £200	Good Fair	Though this is neither our favourite budget CD player nor our favourite Pioneer, the 5050 delivers a well judged combination of good build, plentiful features and decent sound.	Track entry remote, skip scan etc.	R	58
Pioneer PD-6050 £230	Good Fair	Much liked on Jazz and rock program this was highly rated in terms of value for money. The midrange sounded a little forward and thin though.	Everything but a digital out socket and remote volume control	R	58
Pioneer PD-M50 £280	Fair Fair	This machine would justify its price in features, sound and build quality even disregarding the autochange system.	6-disc autochanger, disc/track entry remote etc.	R	58
Pioneer PD7050 £250	Good Good	This mid-priced Pioneer offered significant sonic and lab performance advances over the cheaper models in the range, more than sufficient to justify the extra cost.	Track entry/volume/fade remote, menu display etc.	BB	58
Pioneer PD-M70 £399	Average Fair	A remarkable catalogue of features justify the price. Soundwise it rated just about average overall	Remote control, 6-disc autochanger, 8 programme memory, headphones etc		51
Revox 8226 £756.70	Good+ Good	The traditional Revox house style is combined with the fine Philips 16 bit chip set, but this player doesn't really offer sound quality to match the price	Infra-red remote control, full search, scan, programming		51/Coll
Rotel RCD820BX2 £300	Good Very Good	Start with a good base and then make it sound better, the '820BX2 CD player maintains the reputation established by its namesakes and comfortably deserves Recommendation.	Direct track entry remote etc.	R	58
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
Sanyo CP17 £200	Average – Poor	A no-frills mid-sized package, this was not up to the usual Sanyo sonic or technical standards but it was well built	Skip, search, repeat, 16-track memory programmable		53
Sanyo CP27 £220	Fair Fair	System remote apart, the CP27 offers no improvement over the cheaper CP17, and neither of these systems-oriented players really are the subjective musical	LCD display, skip, scan, programming		58
Sharp DX-R700H £225	Average – Poor	A workmanlike player that does not offer exemplary lab or sound quality but which is well-built with good facilities and should perform well in use	Remote control, track selection keypad, skip, scan repeat programming		53

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

# DIRECTORY

## CD PLAYERS

NAME 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 CDP-M35 £170	Fair Fair	There is no disguising the lightweight plastic construction of this player, but the technical performance, sound quality, aesthetics and ergonomics all deliver more than one has the right to expect for £170.	Skip, scan, programming etc.	R	58
Sony CDP-M20 £179	Average + Fair	Keeping pace with improvements in the marketplace, it combines decent performance with good build and is competitively priced	20 track programme, skip and scan, repeat and random play	R	51
Sony CDP-M55 £190	Fair Fair	£20 buys a remote control handset to operate your M35. Sony call it an M55 (see CDP-M35 review).	Simple remote, skip, scan, programming etc.	R	58
Sony D30 £230	Average - Poor	At 50p per hour to run, the sound quality is poor compared to mains machines although reasonably competent overall for a Discman	LCD display, skip, shuffle, and repeat, "in-ear" headphones		51
Sony CDP-M75 £230	Good Good	This midi version of the 750 saves £20 on the price (see CDP-750 review).	Track entry remote, menu display ect.	BB	58
Sony CDP-310 £250	Average + + Fair	Fine build, facilities and healthy enough sound quality - recommended, but look around the range	Remote control (+ usual)		51
Sony CDP-750 £250	Good Good	A seductive blend of fine presentation and solid performance, all at a very realistic price that should ensure its success.	Track entry remote, menu display etc.		58
Sony D100 £300	Average Poor	The best all round portable tested, but also the most expensive, and still no substitute for a conventional player	Skip, repeat, 21 track programming, headphones, LCD display		51
Sony CDP-222ES £449	Good Fair	Exceptional build quality and presentation plus respectably good sound quality but some of its kin were preferred	Remote control, 20 digit keypad, track access, programming		51
Sony CDP-333ESD £600	Excellent Excellent	Sony's new '333 represents a triumph for their development department, effectively bringing down the entry level price to 'high end' compact disc replay	Track entry remote, menu display etc.	R	This
Sony CDP 555es £1000	Very Good Very Good	Extravagant build quality, sophisticated features and near state-of-the-art performance, it competes effectively with more expensive models	Remote control, 20 digit keypad, track access, programming	R	51
Tandberg 3015A £1250	Good Fair	Very classy presentation is not enough to compensate for subjectively and objectively fang no better than standard and modified Philips packages that cost a fraction of its price	Simple remote, skip, scan, programming etc.		58
Teac PD135 £180	Fair Fair	Particularly easy to use, this lags a little behind the pack when it comes to sound quality, but it still represents a valid alternative for those who find the presentation attractive.	Skip, scan, programming, repeat		58
Technics SL-P111 £179	Good Fair	An average sound quality at a well below average price, but this is only most things to most men	Skip, audible scan, programme repeat, preset edit play	R	58
Technics SL-P220 £229	Average + + Fair	Sound quality keeps this out of the top ranks but the facilities (wow) and fine technical performance will make it hard to resist for some	Everything except a digital out socket, which is no great loss to most	R	58
Technics SL-XP5 £250	Average - Poor	A contender for the "World's smallest" title, this beautifully crafted miniature falls short in terms of sound quality	Headphones, "high cut" filter, skip, search		51
Technics SL-P520 £350	Good + Fair	With features and facilities to satisfy the most eager button pusher, this also produced decent sound quality	High/Low scan ratios, headphones, memory, programming and more	R	51
Technics SLP 720 £400	Good + + Good	More buttons for sonic pilots - this was the most sonically super of the top Technics models	Search dial cueing, high scan speed optics, disc menu, programming	R	51
Technics SL-P990 £450	Excellent Good	An obvious technical tour de force, with ample engineering and build quality to justify the price, but some subjective reservations nonetheless.	Track entry remote, menu display, search dial etc.		58
Technics SL-P1200 £800	Good + + Good	Looking more like a desk workstation than a stackable component, this will appeal to the creative recordist and semi pro user. Sounded pretty good	Headphones, remote control, search dial cueing, etc		51
Yamaha CD-X5 £180	Average + Fair	Good build quality, respectable lab performance, and decent enough sound delivery for your money	Skip, scan, manual only, etc		58
Yamaha CDX-900 £450	Good Fair	A real button bristler with extensive facilities, well built, but sound quality might suggest a lower price	Programme calendar, remote control, 26 key direct track entry		51
Yamaha CDX-1100 £700	Good + Fair	A pearly king might like the button overkill here . . . yet despite exceptional lab performance, listeners were not unduly impressed. It's worth considering	Volume handset, random play, space insert, 26 direct track entry keys		51

## 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 usually 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. BB = Best Buy

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
A&R Arcam Alpha £149	Good Average + +	Attractively classic British analogue tuner with sound quality comfortably better than most	FM/AM Analogue	BB	50
A&R Arcam Delta £270	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder	6AM, 6FM presets. FM/MW. LW display manual tune	BB	55
Creek CAS3140 £150	Very Good Very Good	A true front-rank tuner, excellent ergonomics and audiophile sound quality albeit with the minor handicap of having FM only	FM only	BB	50
Denon TU 450L £130	Average + Average +	Poor AM sound quality may be a deterrent but the FM performance fully merits recommendation	FM/AM Digital	R	50
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 TU915 £325	Good Good	This gave good FM performance but was thought "wretched" on AM. (Psst . . . you don't necessarily buy a tuner for the AM)	FM/AM 16 presets auto seek		50
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	This
Hitachi FT-MD 5500 £230	Excellent Good + +	A powerful, good sounding tuner with versatile facilities	16 presets, FM, AM, MW auto scan digital, signal meter	BB	55
Hitachi FT5500 II £230	Very Good Good +	Soundwise highly rated on FM, and on AM basically satisfactory - a versatile all-rounder	Auto and manual tuning. 16 presets	R	44
JVC FX-1100 £355	Good + Average +	A sophisticated model with 40 (!) AM/FM presets although the sound was unexceptional at this price level	Multi function computer, signal meter, digital auto tune		55

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# DIRECTORY

## TUNERS

<b>Marantz ST35L</b> £160	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
<b>Meridian 204</b> £495	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
<b>Musical Fidelity TI</b> £300	Good + Very Good	Top class FM stereo sound on good signal strengths from this audiophile model. Watch out for local CBI	FM only, analogue box dial, manual tune, signal meter	R 55
<b>NAD 4020B</b> £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
<b>Naim NAT 01</b> £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
<b>Nakamichi ST-7E</b> £750	Good + + Good +	Exceptionally good for weak-signal areas, and good all round	16 AM/FM presets, Schotz enhanced sensitivity, auto time digital	55
<b>Nikko NT-540</b> £154	Good Average	Lab report was promising but the sound was rather dated	8 presets, AM/FM, digital auto scan	55
<b>Onix B.W.D.1</b> £520	Good + + Good	Unexceptional sound despite the costly power supply option	FM only, manual digital, variable bandwidth	55
<b>Pioneer F551L</b> £100	Good + Good +	High value budget tuner, very little to argue about (includes long wave)	12 FM, 12 AM presets, auto scan, digital and signal strength meter	BB 55
<b>Pioneer F91</b> £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 This
<b>Quad FM4</b> £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
<b>Revox B260</b> £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 This
<b>Rotel RT-830L</b> £110	Good + Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB 55
<b>Rotel RT-850L</b> £150	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
<b>Sansui TU-D99XL</b> £249	Very Good Good +	This slimline compact model gave good FM sound quality and strong RF performance. But the AM sounded unpleasant	FM/AM, 16 presets	R 50
<b>Sony ST 500ES</b> £200	Good + + Average -	Disappointing sound quality but good lab performance. (Includes long wave)	10 AM/FM presets, auto scan digital	55
<b>Sony ST-S 700ES</b> £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 This
<b>Tandberg 3001</b> £1295	Excellent - Good	An enthusiast dx model, versatile performance and generally good sound, excellent build	8 presets, FM only, analogue, manual dial, var. bandwidth, signal meter	55
<b>Technics ST-500L</b> £100	Average + Average +	Fine RF performance and fair FM sound at bargain price = Recommended tag. Alas the AM sounded as if it was coming "down a long furry tunnel"	FM/AM 16 station presets, scan	R 50
<b>Technics STG45AL</b> £140	Good + Good	Good sound on FM, weak AM but clever facilities and a good lab test	16 FM presets or 8 FM/8 MW-LW, digital auto scan, auto memory	R 55
<b>Technics ST-G7</b> £400	Very Good Good +	Muffled AM, but fine stereo FM quality and well built	16 presets, digital	R 50
<b>Yamaha TX-L 400</b> £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
<b>Yamaha TX-500</b> £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

## 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. BB = Best Buy R = Recommended

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Aiwa V-990DX</b> £750	Good Good	Refined up-market system with most modern features. Sound quality is good all round - even the speakers are acceptable	Remote, timer, auto source select	R	54
<b>Aiwa V15000X</b> £999	Good Good	Remarkable features level even includes independent record feeds to each cassette. High class build, satisfying sound, but best without loudspeakers	Separates system, twin auto-reverse cassette, full remote, timer	R	54
<b>Akai 990</b> £1400	Average Average +	A gadget oriented expensive system with good compact disc player and remarkable loudspeakers. Let down by the tuner and turntable and not helped by obscure ergonomics	Twin deck cassette, Auto rev., Remote Control, Auto source selection		Systems
<b>Binatone Laser CD System 2000</b> £270	Bad Bad	A bit of a disaster even at the price. Built to extremely low standard with an appalling turntable. CD and loudspeakers OK, but let down by amp	Twin cassette		Systems
<b>Ferguson HF03</b> £400	Average + Good	An all round success with British built speakers and all sources achieving a reasonable standard. Compact disc was weak compared to other units	Twin cassette	BB	Systems
<b>Fidelity MS202</b> £340	Bad Bad -	Very cheap and poorly finished. Thin, raw sound to match appearance and build	Twin cassette, one-piece system		54
<b>Fisher Midi System M46CD</b> £500	Average Average	Somewhat overpriced, the M46 is let down by a poor amplifier and worse speakers. Other elements perform reasonably. CD being its strongest point	Twin transport		Systems
<b>Fisher Midi System M56CD</b> £580	Average Average	Fitted with a pretty good amp, but dire loudspeakers, otherwise a competent combination including a pretty fair cassette deck	Twin cassette, 5-band graphic equaliser		Systems
<b>Fisher 2400</b> £600	Average Average	An ambitious and competent package with a strong amplifier and CD player. Given its new lower price it would have merited recommendation if the loudspeakers hadn't let it down	Twin deck, Graphic eq, 5-band		Systems
<b>Goodmans 5100</b> £350	Poor - Bad	A combined electronics package, with performance standards only too typical of the breed. Speakers good for type but don't compensate	Twin cassette, one-piece system		54
<b>Goodmans 5200</b> £459	Average + Average +	Offering possibly the best speakers around in this midi system market, the Goodmans wins on a fair standard for the price, though the turntable was not too hot	12 Band Graphic Eq, Twin deck	BB	Systems
<b>Goodmans Maxim-Midi System</b> £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

# DIRECTORY

## CD MIDI SYSTEMS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Hitachi MD280 £430	Average— Average—	Although the CD player tried to change our mind this system was felt too poor a contender for anything but thumbs down	Remote unit TT, twin cassette, no spare inputs		54
Marantz Studio System £449	Average+ Good	More a hi-fi system than a true midi package, it's good if uninspired. A stronger amplifier could help	Only amp, CD, & speakers – rest optional	R	54
Marantz Concert System £649	Good+ Good+	Well matched and achieved high fidelity standards. Strong characterisation with some treble loss – this wasn't quite neutral, but a pleasure to listen to	Only amp, CD & speakers – rest optional	BB	54
Marantz MX673CD System £999	Average+ Average	Tremendously flexible audio/visual system. Sound quality is satisfactory at best and ergonomics a mess	Various A/V inputs, remote, speakers optional	R	54
Mitsubishi CD51 £429	Average Average—	In some ways a well balanced system, in that the amp and speakers smooth the rougher edges of some sources, but not very satisfactory on the whole	Remote, twin deck		Systems
Mitsubishi E602CD £500	Poor— Poor—	Totem-pole aesthetics match the mixed constructional quality. Sound quality is already poor, but featured synthesised bass can make matters worse still	Spare in/output set, twin cassette		54
Mitsubishi 100R £650	Average Average+	A pretty good package, flawed by 'tinny' loudspeakers, but having a fair turntable – a rarity in this category of equipment	Remote, Multidisc CD, Twin	R	Systems
Philips FCD 565 £370	Poor Poor	An unimpressive system. While the compact disc player and tuner were OK, its main tonal characteristic on all sources was a coarse top end	Double deck, 5 band graphic eq		Systems
Pioneer S-7000 £478	Average+ Average+	Excellent beer-budget system that really works, with the exception of wobbly sounding cassette	One piece + (optional) CD and speakers	R	54
Pioneer System 10 £678	Average Average—	Loudspeakers sound cluttered, and cassette unstable and thin, but tuner and CD are fine	All separates, twin cassette		54
Pioneer System 30 £978	Average+ Average+	Odd remote system means two handsets. CD and radio work well, but turntable and cassette weak. Expensive	Remote, separates, twin auto reverse, multi-disc CD	R	54
Sanyo W40CD £380	Average Average	Low cost, no options package with attractive displays, cassette had high wow and flutter, but the rest worked OK	Semi auto T/T, auto record start, twin cassette	R	54
Sharp SA-CD800H £700	Average Average—	A superficially high grade, high spec system, the SA-CD800H actually sounds clean but a little 'synthetic'	One-piece, 6-disc CD, no T/T		54
Sony Compact 310 £450	Average+ Average+	Low cost but well built and finished and better sounding than most at the price	Remote, auto T/T, twin cassette	BB	54
Sony Compact 510 £599	Average+ Average+	Very good control layout. Shabby loudspeakers not up to otherwise uniformly good system	Remote, twin cassette	R	54
Sony Compact 610 £700	Average Average—	Inconsistent. Same turntable used in much cheaper Sonys gave 'iffy' record reproduction. Cassette likewise	Remote, 'shuffle' play CD, twin cassette		54
Sony FH1215CD £800	Average Average+	Probably the ultimate miniature system. The CD player is particularly good. Best to chuck the speakers away though	Miniature, transportable (AC only). Single auto-reverse cassette	R	54
Sony Compact 710 £999	Good Good	Typically well built and presented but complicated to use except via remote. Record deck poor but remainder good, including speakers	Full remote, auto T/T, twin auto reverse cassette	R	54
Sony Compact Series 90 £1500	Good Good+	The best of a not too wonderful bunch, the excellent compact disc player and pretty good speakers make for reasonable sound quality, though the tuner wasn't of quite the same standard	Twin deck, auto reverse, timer, extra tape socket	BB	Systems
Technics X800CD £400	Average+ Good	Very unstable sounding cassette lets system down badly. Tuner a bit dull, but remainder OK	No T/T, twin cassette		54
Technics X820 £580	Average Average	Tuner and CD player work well but the speakers sound ragged	Remote, auto record starts		54
Technics X840 £730	Good Good	Expensive, but well made, good sounding system. Turntable, tuner & CD player similar to X820	Full remote separates system	R	54
Technics X880 £900	Average+ Average+	Complex, high spec unit with good performance except for the indifferent speakers, which are completely out of keeping	Remote, auto source selection, programmable T/T		54
Toshiba V17CD £399	Average Average+	Loudspeakers are the weak link, with cassette and turntable also indifferent. Tuner and CD worked well though, so reasonable value for money	Twin cassette, semi-auto T/T	R	54

## 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 Jocklin 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	SOUND COMFORT	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Audio Technica ATH 909 £54.95	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 £64.95	Good Average	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
Beyer DT330 Mk II £45	Poor Good	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
Beyer DT550 £59	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 DT990 £130	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
Jocklin Float Model One £75	Very Good 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
Jocklin Float Electrostatic £375	Excellent Good	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
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 PWB 65 £69.90	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

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 50

# DIRECTORY

## HEADPHONES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Sennheiser HD30 £12.99	Poor Good	Built specifically for the personal stereo market these small and light Sennheisers have a slightly synthetic sound, but are an upgrade on the average Walkphones	Supra-aural, semi-open back, dynamic		55
Sennheiser HD410SL £26	Good Good	The 410s have a tight clear presentation underlined by a slightly forward top end, and can be a bit raw with less than adequate sources	Supra-aural, open-back, dynamic	BB	55
Sennheiser HD420SL £45.50	Good Good	The 420s gave a full and tangible quality to instruments and voices; whilst not the most revealing headphones around they would suit slightly brash sources	Supra-aural, open-back, dynamic		55
Sennheiser HD540 Ref Gold £150	Very Good 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 MDR-E272EX £30	Average Poor	These in-ear 'fontopid' type phones are intended for upmarket personal stereos, and sound reasonably good for their size, but are plagued by hiss	Intra-aural, 'open-air', dynamic		55
Sony MDR-A60 £40	Poor Poor	Unusual lightweight intra-aural types, the A60s are pretty stylish but failed to deliver the goods logically	Intra-aural, 'open-air', dynamic		55
Sony MDR V4 £50	Fair Good	These folding closed-back phones are nicely made but didn't sound too great, the tonal balance being on the 'cold' side	Supra-aural, closed-back, dynamic		55
Sony MDR V6 £70	Good Very Good	A lot more civilised and dynamic than the V4s, these were pretty good for their type and fold up to boot	Circumaural, closed-back, dynamic	R	55
Stax SR34 £140	Very Good Fair	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 SR Gamma £199.85 (SRD-6 Adaptor £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 £360 (SRD-7SB Mk 2 Adaptor £185)	Excellent Very Good	A bit of an industry reference the Pros are frighteningly revealing, bringing across more information than budspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55

## PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than CDs and LPs combined and as such should not be ignored. Since the introduction of the Sony Walkman in the early eighties, more and more people have adopted these diminutive machines and consequently the market has become saturated with a vast assortment of players. This is obviously good for competitive pricing but bewildering if one is trying to select a reasonable machine. Prices start incredibly low (around £10) and wind themselves up

to close on £300, although the sub-£50 sector is the most popular.

There seems to be almost no end to the features that appear on personals; some of them have specifications like a midi system! Graphic equalisers are very popular, for what they're worth, and Dolby is fairly common on the £40 plus models, though the quality of noise reduction systems seems to be pretty poor. You can expect more useful features such as autoreverse and ferric/chrome-metal tape type compatibility on many machines and

some even record, but usually only from a microphone or built in radio where it exists.

The sound quality available tends, not surprisingly, to increase with the price of the machines but even quite expensive players are prone to wow with critical material, so if classical piano music is your bag then steer clear of the cheaper (sub £50) players

Note that our value judgements relate to the personals group as a whole, and are not comparable with separate hi-fi ratings



MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa HS-G35 MkII £35	Poor Fair	A reasonable player for the price but not well suited to classical material and let down by the headphones	Autoreverse, graphic EQ, types I & II		56
Aiwa HS-J36 £89	Good— Average	Comprehensive facilities and reasonable sound are no mean feat for the price.	Dolby, autoreverse, types I, II & IV, AM/FM, recorder	R	56
Aiwa HS-PX101 £149	Average— Good	A very slick little number with soft touch controls and remote control headphones	Dolby B, C, autoreverse, types I, II & IV R		56
Aiwa HS-J101 £170	Poor Good—	Let down by cheap headphones, this is otherwise a quite nice machine with radio presets and electronic transport controls	Dolby, autoreverse, graphic EQ, tape types I, II & IV, AM/FM, recorder		56
Ferguson JT46 £35	Very Poor Poor	Not particularly subtle but having reasonable speed constancy, it's OK with most material but can get painful	Autoreverse, AM/FM		56
JVC CX-7 £111	Poor Average +	Quite attractive and unusual in appearance, the CX-7 sounded pretty good and came close to recommendation	Dolby, autoreverse, types I, II & IV, rechargeable		56
JVC CX-RTK £188.77	Poor Good	Maximum feature count from this expensive JVC, including soft touch record and stereo microphone. Sound quality however, could be better for the price.	Dolby, autoreverse, types I, II & IV, AM/FM, record, rechargeable		56
Panasonic RX-SA78 £100	Very Poor Fair	Not particularly good value with poor speed stability and irritating hiss levels, the latter can be improved with better headphones.	Autoreverse, graphic EQ, AM/FM		56
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
Sanyo MGR-77 £35	Very Poor Very Poor	Rather a basic machine with a raw edgy sound, not helped by poor speed stability	Graphic EQ, AM/FM		56
Sanyo MGR-87 £50	Very Poor Fair	The 87 came up with a slightly fast but rhythmic sound. Although lacking in finesse, it worked OK with pop material	Autoreverse, graphic EQ, AM/FM		56
Sanyo MGP 600D £50	Average + Average—	With styling aimed at the fairer sex the 600D sounded a little better than the similarly priced MGR-87. Lacking in clarity, it was still quite durable	Dolby, autoreverse, graphic EQ, types I, II & IV		56
Sanyo JJ-P4 £100	Poor Good	Claimed by its makers to be the world's smallest personal stereo the JJ-P4 is a tasty looking object that's capable of good sounds to boot	Dolby, autoreverse, tape types I, II & IV, rechargeable		56
Sony WM-34 £40	Poor Average	This straightforward no frills Walkman makes pretty plausible sounds at a reasonable price and apart from the Walkman Pro was the only model to earn a Best Buy rating	Dolby, types I, II & IV	BB	56
Sony WM-F38 £70	Average— Average	A quite stylish player, the F38 delivered good performance for the price and also had reasonable headphones	Dolby, types I, II & IV, AM/FM	R	56
Sony WM-F63 £100	Average— Average—	This attractive Sports Walkman is nicely built but sonically flawed by rather hissy intra-aural headphones	Dolby, autoreverse, types I, II & IV		56
Sony Walkman Pro £249-£289	Good + Excellent	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		52/56
Toshiba KT-4027 £35	Very Poor Very Poor	Not a very wonderful machine, the 4027 sounded pretty appalling with all but the most unsubtle music	Graphic EQ, AM/FM		56
Toshiba KT-4047 £60	Average Average	This model proved capable of making the most of better recordings, and sounds reasonably tuneful	Dolby, autoreverse, graphic EQ, types I, & II, AM/FM	R	56

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 50

# SELECTED DEALER DIRECTORY

Choosing a good hi-fi dealer is the most vital step in acquiring the system that is right for you. This unique directory gives full information on dealers in your area.


## AVON

**ABSOLUTE SOUND AND VIDEO**, 65 Park St, Clifton, Bristol. (0272) 264975. A&R, Denon, Dual, Linn, Mission, NAD, Quad, Roksan, Rotel, Yamaha, etc. (closed Weds). BADA MEMBER   
**PAUL GREEN HI-FI LTD**, Kensington Showrooms, London Rd, Bath. (0225) 316197. A&R, Creek, Dual, Heybrook, Linn, Musical Fidelity, Rotel, Systemdek, Wharfedale. Dem facilities available, ring for appointment, car park. Open Tues-Sat, 9.5.30. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa. BADA MEMBER 



## BEDFORDSHIRE

**ASHTON AUDIO**, 6 High Street, Dunstable. (0582) 608003. AR, Akai, Ariston, Cambridge Audio, Denon, Dual, Incatech, JVC, Linn, Monster, NAD, Nakamichi, Proton, Quad, Rotel, Sony, Trio Kenwood. Instant credit up to £1,000. Credit cards: Access, Amex, Diners, Visa. Service department. Open 9.5.30. Open to 6p.m. Friday. No early closing.

## BERKSHIRE

**READING HI-FI CENTRE**, 4-6 Harris Arcade, Friar St, Reading. (0734) 585463. "The best equipment, advice and service from Berkshire's premier Hi-Fi emporium". BADA MEMBER 

## BUCKINGHAMSHIRE

**AUDIO INSIGHT LTD**, 53 Wolverton Rd, Stony Stratford, Milton Keynes. (0908) 561551. A&R, Audiolab, Heybrook, KEF, Linn, Mission Cyrus, Musical Fidelity, Nakamichi, Nitech, Rotel. Dem facilities available. Open Tues-Sat. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept. BADA MEMBER   
**AYLESBURY HI FIDELITY**, 98 Cambridge St, Aylesbury. (0296) 28790. Dual, Heybrook, Linn arms, Musical Fidelity, Mission, NAD, Nakamichi, Quad, Rotel. 2 Dem rooms available, ring for appointment. Open 10-6 Mon-Fri, 9.30-5.30 Sat. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Amex, Diner, Visa. Service dept. BADA MEMBER 



## CAMBRIDGESHIRE

**CAMBRIDGE HI FI**, 1 Hawthorn Way, Cambridge. (0223) 67773. AR, Mission Cyrus, Monitor Audio, Panasonic, Pioneer, Sony ES, Technics, Thorens, Kenwood, Yamaha. Demonstration facilities. No appointment required. Open 9.30-5.30 Mon-Sat. Free installation. Credit facilities. Up to any amount. Credit cards: Access, Barclaycard. Service dept. available. BADA MEMBER   
**STEVE BOXSHALL AUDIO**, 41 Victoria Rd, Cambridge. (0223) 68305. Quad, Rotel, Dual, Denon, Krell, Nakamichi, Marantz, Monitor Audio, Tannoy. Demonstration facilities. No appointment required. Open 10.00-6.00, Mon-Sat. Home trial facilities, free installation, credit facilities. Credit up to £3,000. Credit cards: Access, Barclaycard, Service dept.

## CHESHIRE

**ASTON AUDIO**, 4 West St, Alderley Edge. (0625) 582704. Wide selection of equipment in N.W. Two-year guarantee. Dem facilities: 3 dem rooms, appointment required. Open 10-6 Tues-Sat. Home trial facilities, free installation. Instant credit up to £1,000. Credit cards: Access, Amex, Diners, Visa. Service dept. BADA MEMBER   
**DOUG BRADY HI-FI**, Kingsway Studios, Kingsway North, Warrington. (Padgate 0925) 828009. 1986 Sony/Hi-Fi News Best Dealer in N.W. England and Wales. "Largest choice of specialist Hi-Fi in N.W. £100-£20K". All credit cards. 3 Dem Rooms. Dem facilities. BADA MEMBER   
**HI FI CENTRE**, Green Lane, Wilmslow SK9 1LQ. Tel: (0625) 522112/524766. B&O, Technics, Sony, Panasonic, Nakamichi, Quad, Revox, Teac, Harman Kardon, Marantz. Demonstration facilities - no appointments required. Open 9-1, 2.5.30 (closed Wed). Open all day


Sat. Home trial facilities, free installation, credit facilities. New customers up to £500 credit. Credit cards: Access, Visa, American Express, Diners Club, Wilmslow Card. Service dept. available.

**NEW DAWN HI FI**, 1-3 Castle St, Lower Bridge St, Chester. (0244) 24179. Linn, Quad, Technics, National Panasonic, Denon, Rotel, Dual, Meridian, Aiwa, Philips. Dem facilities: 2 dem rooms. Open 9.00-5.30 Mon-Sat, closed Wed. Free installation, instant credit. Credit cards: Access, Visa, Trustcard. BADA MEMBER   
**SWIFT OF WILMSLOW**, 4-8 St Annes Parade, Wilmslow. (0625) 526213. A&R, Aiwa, Denon, Dual, Marantz, Mission, Monitor Audio, Pioneer, Trio, Yamaha, NAD. Dem facilities available. Open Mon-Sat 9.15-5.45. Closed 1-2 Lunch. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept. BADA MEMBER 

## CORNWALL

**TRURO HI FI & E.T.S. Ltd**, 25 King St, Truro (0372) 79809. A&R, Denon, Dual, Heybrook, Linn, Mission Cyrus, Nad, Quad, Rotel, Thorens. Dem facilities: Single speaker studio. Open Mon-Sat 8.45-5.30. Home trial facilities, credit up to £1,000. Credit cards: Access, ETS Visa. Service dept.

## DERBYSHIRE


**ACTIVE AUDIO**, 12 Osmaston Rd, The Spot, Derby. (0332) 380385. Meridian, Mission, Denon, Yamaha, Rotel, A&R Cambridge, Monitor Audio, Trio, Marantz. Demonstration facilities. Open 9.30-6.00 - early closing Wednesday. Home facilities: credit up to £1,000. Credit cards: Access, Barclaycard, Diners, American Express. Service dept. BADA MEMBER 

## DEVON

**PETER RUSSELL HI-FI ATTIC**, 58 New George St, Plymouth, Devon (0752) 659511. Quad, Linn, Mordaunt-Short, A&R Cambridge, Revolver, Heybrook, Denon, Harmon-Kardon. Dem facilities - no appointment required. Open Mon-Sat 9.30am-5.30pm. Home trial facilities. Free installation. Credit facilities. Credit cards: Visa, Access. Service dept.

## ESSEX



**A.T. LABS**, 442/4 Cranbrook Rd, Gants Hill, Ilford. (01) 518 0915. Open Mon-Sat, 10-6. Two single speaker dem rooms. Credit cards: Access, Amex, Visa.

**BADA MEMBER**   
**RAYLEIGH HI-FI**, 44a High Street, Rayleigh, Essex. (0268) 779762/747571. 216 Moulsham St. On-the-Parkway, Chelmsford, Essex. (0245) 265242. A&R, Audiolab, Beyer, BLQ, Cyrus, Celestion, Denon, DNM, Epos, Gale. Access and Visa. 3 years parts and labour guarantee on hi-fi systems.

**BRENTWOOD MUSIC & HI-FI CENTRE**, 2 Ingrave Rd, Brentwood. (0277) 221210. Alphason, B&W, Cambridge Audio, Denon, Harmon Kardon, Marantz, QED, Quad, Yamaha. Dem facilities available. Open Mon-Sat 9.30-5.30 (Thurs from 10am, Sat from 9am). Home trial facilities, free installation, credit facilities. Credit cards: Access, Visa, Hi-Fi Markets. Service dept.

**LYON AUDIO**, 16 Peartree Business Centre, Peartree Road, Stanway, Essex CO3 5JN. (0205) 560259. QED, Rogers, Denon, Systemdek, Nad Monitor, Rotel, Pink Triangle, JBL, J.A. Michell, Exposure, Mission. Dem facilities available. Open Mon-Sat 9am-6pm. Home trial facilities, installation, credit facilities up to £1,000. Credit cards: Access, Visa, Hi-Fi Markets, Eurocheque. Service dept available.


## GLOUCESTERSHIRE

**ABSOLUTE SOUND AND VIDEO**, 40/42 Albion St, Cheltenham. (0242) 53960. A—R, Denon, Dual, Linn, Meridian, Mission, NAD, Rotel, Technics, Yamaha, etc. (Closed Wed). BADA MEMBER   
**AUDIO EXCELLENCE**, 58 Bristol Road, Gloucester. (0452) 300046. Audio Research, Dual, Krell, Linn, Magneplanar, Naim, NAD, Yamaha and lots more. Closed Mon. BADA MEMBER 

**ROBBS OF CHELTENHAM**, 3 Clarence St, Cheltenham (0242) 584404. Sansui pure hi-fi, Kenwood, Sony ES, Dual, Technics, QED, Heybrook. Dem facilities. Open 9-5.30 Mon-Sat. Instant free credit. Credit cards: Visa, Access. Service dept.

## HAMPSHIRE


**ABSOLUTE SOUND AND VIDEO**, 4 Feathers Lane, Basingstoke, Hants RG21 1AS. (0256) 24311. A&R, Audiolab, Denon, Dual, Linn, Mission, NAD, Rotel, Technics, Yamaha. Dem facilities. Open: Mon, Tues, Thurs, Fri 9.30-6.00. Sat 9.30-5.30. Closed Wed. Home trial facilities. Free installation. Credit facilities. Credit cards: Access, Barclaycard, Connect, Amex, Diners. Service dept.

**HAMPSHIRE AUDIO Ltd**, 2-12 Hursley Rd, Chandlers Ford. (0703) 252827/265232. Quality CD and analogue agencies. 5 dem studios. Large free car park. BADA MEMBER 

**TRUE FI SOUND AND VISION**, 10/12 Grosvenor Rd, Aldershot. (0252) 26390. Akai, Aiwa, B&W, Nakamichi, Hitachi, JPV, Mission, Mordaunt-Short, Nagaoka, Sony, Technics. Dem facilities available. Open 9.30-6.00 Mon-Sat. Free installation, instant credit up to £1,200. Credit cards accepted: Access, Barclaycard. Service dept.

## HERTFORDSHIRE

**ACOUSTIC ARTS Ltd**, 101 St Albans Rd, Watford, Herts (0923) 45250. A&R, Audiolab, Denon, Magneplanar, Quad, Rogers, Meridian, TDL, Jadis, Krell. Dem facilities: 2 dem studios, ring for appointment. Open Mon-Sat 9.30-5.30. Home trial facilities, free installation. Instant credit up to £1,000. Credit cards: Access, Visa. Service dept.

**BADA MEMBER**   
**THE AUDIO FILE**, 40 Hockerill St, Bishops Stortford, Herts. (0279) 506576. Linn, Roksan, Rega, Naim, A&R (Camb), Heybrook, Rotel, Denon, Epos, QED. Demonstration facilities, no appointment required. Open 9.30-5.30 Mon-Sat. Home trial facilities. Free installation, credit facilities up to £1,000. Credit cards: Access, Visa, Diners, Amex. Service dept available.

**W. DARBY & CO Ltd**, St Peter's St, St Albans. (0727) 50961. B&O, SonyES, Quad, A&R Cambridge, Revox, Denon, Yamaha, Luxman, Ariston, Thorens. Demonstration facilities, no appointment required. Open Mon-Sat 9.00-5.30. Home trial facilities, free installation, credit facilities. Credit cards: Access and Barclaycard. Service dept.


## ISLE OF MAN

**ISLAND COMPACT DISC CENTRE**, Parliament Square, Ramsey. (0624) 815521. Musical Fidelity, Sugden, Celestion, Harman Kardon, Teac, Castle Acoustics, Philips, A&R, JBL, Luxman. Open Mon-Sat 9.00-5.00pm. Dem facilities. Home trial facilities, free installation. Full credit, no limit. Credit cards: Access, Visa, elite. Service Dept.

## 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 facilities available. Open Mon-Sat 9.00-5.30. Closed Thurs. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa, Creditcharge. Service dept.

## LANCASHIRE

**CLEARSTONE HI-FI**, 235 Blackburn Rd, Bolton. (0204) 31423. Best makes, Linn, Creek, B&W, etc. Dem studios. Laser vision and compact disc centre. BADA MEMBER   
**HI TECH AUDIO**, 7 Moor Lane, Clitheroe, Lancs. BRY 1BE. (0200) 26563. Mission, Audio Innovations, Rogers, Quad, Rotel, NAD, Elite Rock, B&W, Castle, Wharfedale. Dem facilities, appointment required. Open 9.30-5.00, closed Wednesdays. Home trial facilities, free installation, credit up to £1,000. Credit cards: Access, Visa.



Amex, Diners. Service dept. Mail order.  
MONITOR SOUND, 54 Chapel St, Chorley. (02572) 71935.  
A&R, Dual, Mission, Quad, Rogers, Rotel, Spondor, Thorens, Nakamichi, Yamaha, etc. Dem facilities, 2 dem rooms. Open Mon Sat, closed Weds. Free installation, instant credit up to £1,000. Credit cards: Access, Visa, Service dept.

## LEICESTERSHIRE

SOUND ADVICE, The Sound Factory, Duke St, Loughborough LE11 1ED. (0509) 218254. A&R, Creek, Linn products, Epos, Mission Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Dem facilities, domestic size and furnished studios. Callers welcomed. Demonstrations by appointment. Open 9.30-6.00 Mon-Sat. Free installation. Credit facilities. Credit cards: Access, Visa, Amex. Service dept.

## LONDON

A.T. LABS, 159 Chase Side, Enfield, Middlesex. (01) 367 3132. Open Mon-Sat 10-6. Two single speaker dem rooms. Export worldwide. Service dept, car park. Amex, Visa, Access. BADA MEMBER

AUDIO T, 190 West End Lane, London NW6. (01) 794 7348. Open Mon Sat, 10-6.00. Two single speaker dem rooms. Access, Amex, Visa. BADA MEMBER  
CORNFLAKE SHOP, 37 Windmill Street (just off Tottenham Court Road), London W1. (01) 631 0472. 10am-7pm, Mon-Sat. Cambridge, DNM, Epos, Koetsu, Naim, PS Audio, Roksan, SME, Van den Hul. Excellent demonstrations, 2 demo rooms, full delivery and installation service. Full credit facilities. Credit cards: Access, Visa.

COVENT GARDEN RECORDS, 84 Charing Cross Road. (01) 379 7635/7427. Quad, B&W, Meridian, Mission, Yamaha, Sony, Philips, A&R Cambridge, Nakamichi, Rotel. Dem facilities - no appointment required. Open Mon-Sat 10am 7.30pm. Home trial facilities, free installation - to suit the customer. 7.30am-11.30pm weekdays, 9am-9pm weekends. Credit cards: Access, Visa, American Express, Diners Club. Service dept.

DOUG BRADY HI-FI, 18 Monmouth St, London WC2H 9HB. (01) 379 4010. Wide range of top specialist hi fi from Britain, America and Japan. Dem facilities. 3 Dem rooms. All credit cards. BADA MEMBER

GRAHAM'S HI-FI, 86-88 Pentonville Rd, London N1. (01) 837 4412. 'FBA Dealer of the year 1985'. Linn, Naim, Rega etc. £300-£3,000-£13,000. BADA MEMBER

H.L. SMITH & Co Ltd, 287-289 Edgware Rd, London W2 1BE. (01) 723 5891. Aiwa, B&W, Denon, Dual, KEF, Ortofon, Panasonic, Sony, Technics, Yamaha. Dem facilities available. Open Mon-Sat 9-5.30, Thurs 9-1, instant credit up to £1,000. Credit cards: Access, Visa, Diners. Service dept.

KJ WEST ONE, 26 New Cavendish St, London W1M 7LH. (01) 486 8262. A&R Cambridge, Audio Lab, B&W, Audio Res - Krell, Rogers, Gale, Musical Fidelity, Linn, Magnea Pan, Nakamichi. Dem facilities available - appointment required. Open Mon-Sat 10am-6pm. Limited home trial facilities. System Design & Installation. Credit facilities - Credit cards: Visa, Access. Service dept available. BADA MEMBER

SUBJECTIVE AUDIO LTD, 12 Park Avenue, Palmers Green, London N13 5PF. (01) 882 4975. Air Tangent, Apogee & Alphason, Audio Research, Koetsu, Krell, Magneplanar, Meridian, Nakamichi, Oxford Acoustics, Tandberg. Dem facilities: 2 single speaker dem rooms, appointment required. 10-6 Tues-Fri, 9-5 Sat. Home trial facilities. System design & installation service. All major credit cards. Service dept.

TELESONIC Ltd, 92 Tottenham Court Rd, London. (01) 636 8177. A&R, B&O, B&W, Hafler, Luxman, KEF, QED, Quad, Nakamichi, Rogers. Dem facilities available. Open Mon-Fri 9-6, Sat 9.30-4. Home trial facilities, free installation, credit facilities. Credit cards: Access, Amex, Diners, Visa. Service dept.

THE SOUND ORGANISATION Ltd, No. 1, Cathedral St, London Bridge, London SE1 9DE. (01) 403 2255/3088. Counterpoint, Denon, Exposure, Koetsu, Linn, Naim, PS Audio, Roksan, Rega, SME and others. Dem facilities available, ring for appointment. Open Tues-Sat, 10-7. Free installation. Credit cards: Access, Visa. Service dept. BADA MEMBER

## MANCHESTER

CLEARTONE HI-FI, 62 King St, nr. Kendals. (061) 835 1156. Best makes, Linn, Creek, NAD, Naim, etc. Dem studio, Compact Disc centre, video and TV. BADA MEMBER

## MIDDLESEX

UXBRIDGE AUDIO LTD, 278 High St, Uxbridge, Middx UB8 1LZ. (0895) 33474/31993. Music from the best equipment at all price levels. Acoustic Energy, A&R Cambridge, AR, Ariston, Audio Lab, Cambridge Audio, Canton, Creek, Cyrus, Denon, Dual, Epos, Exposure, Heybrook, JPW, KEF, Linn Products, Manticore, Marantz, Meridian, Michell, Mission, NAD, Naim, Nakamichi, Onix, QED, Quad, Revolver, Rotel, Stax, Tannoy, Wharfedale, Yamaha. Two demonstration rooms, system design and installation, two year guarantee, seven day equipment exchange. 10am-6pm six days a week. BADA MEMBER

## MERSEYSIDE

ABOUT SOUND, 116 Bold St, Liverpool L1 4JA. (051) 709 4865. Mordaunt Short, Musical Fidelity, Myst, Quad, Revox, Sansui, Sugden, Thorens, Walker, Yamaha. Dem facilities, single speaker room. Ring for appointment. Open Tues Sat 9-5.30. Free installation, instant credit up to £1,000. Credit cards: Access, Diners, Visa. Service dept.

W.A. BRADY & SON, 401 Smithdown Rd, Liverpool. (051) 733 6859. 'Largest choice of specialist Hi-Fi in N.W. £100-£20K'. All credit cards. 3 dem rooms. BADA MEMBER

## NORFOLK

SOUND APPROACH, 161 Unithank Road, Norwich. (0603) 622833. Ariston, AR, Claymore, Castle, Elite Rock, Haybrook, Matra, Musical Fidelity, Revolver, Yamaha. Dem facilities. Open 9-6.30 Mon-Sat. Home trial facilities. Free installation. Credit up to £1,500. Credit cards: Visa, Access, Diners Club. Service dept available.

## WEST MIDLANDS

SOUND ADVICE, 162 Alcester Road, Moseley, Birmingham B13 8HS. (021) 449 3328. A&R, Creek, Linn, Epos, Mission Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Dem facilities, domestic size and furnished studios. Callers welcomed. Demonstrations by appointment. Open 9.30-6pm Tues Sat. Free installation. Credit facilities. Credit cards: Access, Amex, Visa. Service Dept. BADA MEMBER  
ALTERNATIVE AUDIO Ltd, 93-95 Hobs Moat Rd, Solihull. (021) 742 0254 (sales), 0248 (service). A&R, Audiolab, Denon, KEF, Marantz, Meridian, Mission, M.A., The Source, Philips. Dem facilities available, appointment required. 10-6 Tues-Sat, closed Mon. Home trial facilities, 3 demo rooms, service dept, free installation, instant credit. Credit cards: Access, Visa, Amex.

FIVEWAYS HI-FIDELITY Ltd, 12 Islington Row, Edgbaston, Birmingham. (021) 455 0667. A&R, Denon, Dual, KEF, Meridian, Musical Fidelity, Nakamichi, Philips CD, Quad, Revox, etc. Dem facilities. Single speaker dem room. Open 9.30-6 Tues-Sat. Home trial facilities, free installation, credit facilities. Credit cards: Access, Visa. Service dept.

GRIFFIN AUDIO Ltd, 94 Bristol St, Birmingham. (021) 692 1359. Linn, Naim Audio, Rega, Creek, Denon, Nakamichi, Quad, Mission, Monitor Audio, Rotel. Dem facilities 2 single speaker rooms. Open Mon-Sat 9.30-6. Home trial facilities, free installation, interest free credit up to £1,000. Credit cards: Access, Visa. BADA MEMBER  
NORMAN H. FIELD LIMITED, 35-37 Hurst Street, Birmingham B5 4BJ. (021) 622 2323/3619. AR, B&W, Denon, Dual, Monitor, Audio, Kenwood, Mordaunt Short, NAD, Technics, Yamaha. Dem facilities available. Open 9.15-6.00, Saturday 9.00-6.00. Closed Weds. Home trial facilities on selected systems. Credit up to £1,500. Credit cards: Access, Visa. Service dept.

## OXFORDSHIRE

ABSOLUTE SOUND AND VIDEO, 19 Old High St, Headington, Oxford. (0865) 65961. A&R, Denon, Linn, Mission, NAD, Rotel, Yamaha. Also 256, Banbury Rd, Summertown. BADA MEMBER

ASTLEY AUDIO LTD, 3 Market Place, Wallingford. (0491) 39305/34349. A.R. Dual, Kenwood, Mordaunt Short, Mission, Monitor Audio, Philips, Technics, Tannoy, Yamaha. Open Tues-Fri 9-5.30, Sat 9-5. Records, tapes and 1000+ CDs. Service dept. Access, Visa, Diners.

WESTWOOD AND MASON, 46 George St, Oxford. (0865) 247783. Linn, Naim, Rega, A&R, Heybrook, Dual, Mordaunt Short, Spondor, Tannoy, Quad, etc. BADA MEMBER

WITNEY AUDIO, 28 High St, Witney, Oxford. (0993) 2414. A&R, Aiwa, Akai, Dual, KEF, Mordaunt Short, Pioneer, Philips, Sony, Yamaha. Dem facilities. Open Mon-Sat 9-5.30. Free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept.

## SHROPSHIRE

AVON HI-FI Ltd, 12 Barker St, Shrewsbury. (0743) 55166. A&R, B&W, JBL, Dual, NAD, Nakamichi, Revolver, Trio, Quad, Yamaha. Dem facilities available. Open Mon-Sat 9-5.30, closed Thur. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept.

## SOMERSET

WATTS RADIO - THE ENGINEERS, Jim Badman, 1 West Street, Somerton. (0458) 72440. Castle, Dual, Denon, KEF, Mordaunt Short, Ortofon, Quad, Rogers, Thorens, Yamaha. Dem facilities available. Open Mon Sat 9-1, 2-5.30, Wed 9-1. Home trial facilities, free installation. Credit up to £1,000. Credit cards: Access, Visa. Service dept.

## STAFFORDSHIRE

GRANGE HI-FI LTD, 153 Branston Road, Burton-on-Trent. (0283) 33655. Pink Triangle, Systemdek, Denon, Audio Innovations, A&R, Cambridge, Quad, Rotel, Elite Rock, Snell. Dem facilities - no appointment required. Open Mon, Tues, Thurs, Fri, Sat. 9-6.00pm, Wed 9-1.00pm. Free installation. Credit facilities. Credit cards: Visa, Access. Service dept.

## SUFFOLK

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