

HI-FI CHOICE

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

JUNE 1992 £2.95

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HI-FI CHOICE

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Hi-Fi Choice welcomes any technical questions, although these can only be discussed within the pages of the magazine. Regrettably, *Choice* is not in any way able to offer telephone assistance.

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THE GET OUT CLAUSE

While every care has been taken in the preparation of this journal, the publishers cannot be held responsible for the accuracy of the information herein, or any consequence arising from it. Readers should note that all judgements have been made in the context of equipment available to *Hi-Fi Choice* at the time of review, and that 'value for money' comments are based on UK prices at the time of review, which are subject to fluctuation and are only applicable to the UK market.

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Menu

Which? magazine has got quite a track record when it comes to getting it wrong, based, mainly, on the astonishingly inaccurate 'All CD players sound the same' debacle which it published last year. It has now followed this up with the advice that, at least from a sound quality point of view, it's not worth spending over £200 on a CD player. More importantly, this was picked up by the media, both radio and the newspapers, and presented as if it was based on fact.

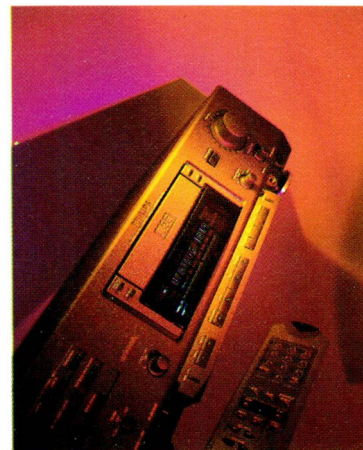
In its April 1992 issue, *Which?* boldly proclaims: 'If you already own a CD player, you might think that investing in one of the higher priced models would be a good way of improving the sound quality of your system. Our tests show it isn't.'

The sample *Which?* chose in order to represent CD players that cost more than £200 consisted of a single model from Kenwood, Marantz, Philips, Pioneer, Sony and Technics, four of which had been superseded by the time the magazine came out! Not a single mention was made of market leading machines such as the Rotel 965 or the Arcam *Alpha*. Obviously if you don't know very much about the market you can end up with ridiculous results.

Even more worrying than the moronic selection of players is the fact that whoever did the listening couldn't tell the difference. When we reviewed the CD players for this issue, all the listening was done under blind listening conditions and each of the players was presented to the panel on at least three separate occasions. The consistency of the results proves beyond any doubt that there are quite major sonic differences between the players and that, more importantly, they are differences which can be repeated under scientific test conditions.

This leaves us with the obvious conclusion that whoever *Which?* used for its tests wasn't really up to the job of hearing this difference. Cynics might argue that from the point of view of the man in the street, the differences may be so small that the *Which?* results are justified, and the only reason we can spot these differences is because we use experienced listeners. The problem here is that if you buy a CD player and play music on it for a couple of years, you are going to become an experienced listener and any short comings in the equipment you purchase are going to become obvious. Sorry, *Which?*, you blew it, and unfortunately the press then disseminated these ridiculous results even further. One can only hope that people are sensible enough to see the report for the travesty it was, otherwise there are going to be an awful lot of disappointed people out there who think that the sound from a sub £200 CD player is as good as it gets.

Andy Benham



Cover photograph by
Garry Hunter.

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and one you can record
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Naim adds power amp

Designed to 'sit neatly' between the **NAP140** and **NAP250**, Naim's latest stereo power amp goes by the name of the **NAP180**.

Priced at £900, the amp features a substantial 430VA transformer with separate windings for the rectified supplies to each channel, with **NAP250** type circuit boards and Naim's own **NA001** output transistors. A low noise 24volt preamp power supply is built in for use with Naim preamps and the units should be available from your local Naim dealer from the end of May.

Breaking the connection barrier

Arcam is joining the rapidly growing AT&T club with its new Delta **170.3**. However, the optional provision of the sonically superior, high speed optical link is far from the only change incorporated into the latest version of the UK's most popular CD transport.

The **170.3** is also equipped to take advantage of the current trend towards cross referencing the clocks in both transports and DACs. To this end it comes equipped with a Toslink input socket designed to accept data from an external clock running at 2.8224MHz. According to Arcam, activating this system brings a

clear audible improvement and can deliver 'world class CD sound at a surprisingly modest cost'.

It doesn't take a genius to work out that Arcam must be working on an outboard DAC to take full advantage of this system, and given the Far Eastern implications of the number four (it means death or worse), the **Black Box 5** cannot be far off the launch pad.

Sticking with the **170.3**, the new unit also features a new digital output board which Arcam claims reduces the jitter by a factor of three compared to the

170.2, and a new transformerless output buffer with an accurate 75ohm impedance to ensure correct coupling with DACs, provided, of course, that they also comply with the 75ohm standard.

For those not prepared to pay the extra money for the AT&T output, the standard **170.3** comes complete with co-axial (phono) and BNC electrical outputs.

The new model will cost £650 when it goes on sale in May with the AT&T output bringing the price up to £800. Owners of **170.2** transports can have their machines upgraded to the new spec for £150.

Breaking the ton

Although well known in the professional world, particularly for its installations in leading record stores such as the *Virgin chain*, *Databeat* has, so far, not attracted a lot of attention from your average domestic consumer.

This could be set to change with the introduction of the snappily titled **CD3101 FPS** system, which is a computer controlled CD library capable of storing all your CDs in 100 disc caddies and playing the disc you require at the touch of a button.

As well as providing your not quite so indestructible discs with added protection, the system also ensures that the discs are never handled and as an added bonus the computer interface that controls the system is completely incapable of losing your favourite disc down the back of the sofa.

As well as selecting individual discs or tracks, users may store up to 100 different 'concerts', each concert consisting of any combination of tracks or whole CDs and the whole system furnishing anything up to 100 hours of non-repetitive play.

For those PC wizards among you, *Databeat* can also provide a computer interface to enable the whole system to be run from an external computer rather than the processor situated in the CD player/control unit.

Nakamichi explores the final frontier

High-end cassette deck manufacturer Nakamichi is entering the premium priced lifestyle market, which has previously been the province of companies such as *Bang & Olufsen* and *Bose*.

Nakamichi's first venture in this new area is the *Sound Space 7* which will, according to the company's publicity, 'be bought as much for its style and appeal as an artefact as it will for the... playing of music'.

Those who do get around to playing music on it will discover that the *SS7* is essentially a music centre for the well heeled and style conscious. It consists of a 35watt per channel amplifier, an FM tuner and one of Nakamichi's *Music Bank CD*

players. This CD machine has the useful capability of storing and playing seven CDs. The optional matching loudspeakers feature a titanium coated dome tweeter and a six inch bass unit.

The entire system is finished with a hard rubber material which is intended to be easy to clean and resist scratches. The *Sound Space 7* retails for £1,296 with the speakers and for £996 without.

No more black boxes, the design conscious can have grey slabs.



Philips unveils brown goodies

Philips used this year's Brown Goods show to unveil a plethora of new products, including CD-I, DCC, an entirely new range of hi-fi separates and widescreen televisions with a 16x9 aspect ratio rather than the more familiar 4x3.

Philips first DCC deck, the *DCC900* is covered on page 24 of this issue, but it forms the heart of a new range of separates that the Dutch giant is billing as its 'biggest ever investment in a new product range.'

As well as the DCC machine, there are no fewer than five new CD players, two amplifiers, three cassette decks, two tuners (one featuring RDS) and the digital speakers which we previewed back in the April issue (no 105).

There are several new features on offer, including an 'intelligent' interface bus common to all the components which enables such functions as one touch operation and automatic



On the fiddle again, Philips' new 'grey' 900 Series separates.

source selection. Ergo, touching a button on the tuner will activate that unit and the amp and turn off any other unit that happens to be playing at the time. The RDS

tuner also includes a clock/timer and, when used in conjunction with a *900 Series* cassette deck, enables you to perform unattended radio recordings.

Obelisk has got its beady Ion new

Ion systems of Newtown, Powys, has introduced a new family of amplifiers and tuners, dubbed the *Obelisk* range. According to the company, we can expect these to be 'minimalist designs' which dispense with 'superfluous gadgets in the quest for the purest standards of musical reproduction'.

The first amplifier in the new range is an integrated design, the *Obelisk 100* which retails at £299, complete with six inputs and a moving magnet phono stage. For £499 the *Obelisk 200* offers similar features but 'enhanced circuitry' and a phono stage that accommodates both moving coil and moving magnet inputs. The top of the range pre-power combination is the *Obelisk 300*, consisting of a £399 preamp and a £499 100watt stereo power amp. The *Obelisk FMT 100* tuner is FM only and retails for £349.



Standing in the shadows; Obelisk 100 and FMT.

Amplifier evolution for Aura

Aura has launched a new integrated transistor amplifier known as the *Evolution* or, more formally, the *VA-100*, which is essentially an evolved version of the company's *VA-50* design.

The *VA-100* consists of a MOSFET power amp, a passive preamp and, increasingly unusual these days, a phono stage. It features 70watts per channel output, six inputs and the minimum of controls: just input select, tape monitoring facilities and an Alps volume control. The phono stage is moving magnet only, the amp will accommodate bi-wiring, with two pairs of matched binding posts linked by

van den Hul cabling and the speaker terminals accept banana plugs or bare cables.

Aura is retailing the amplifier

for either £270 or £300 depending on the finish, you can have mirror black or an appealing shade of chrome.



Back in chrome, Aura's fully evolved VA-100 integrated amp.

Arnie slips out on disc

This month sees new Laser Disc film releases back in the shops after an absence of seven years. The films are being released by Pioneer Laser Disc Corporation Europe (LDCE) and will be in the standard British PAL television format.

Initially four films will be available, Arnie's *Total Recall*, Oliver Stone's *The Doors*, Alan Parker's *Angel Heart*, and revenge thriller *Next Of Kin* starring Patrick Swayze.

The four releases are the first fruits of a deal between LDCE and Guild Entertainment, the total package accounting for some 140 films comprising all films distributed by Guild up to and including 1994.

The titles will be available from Virgin Megastore, Tower Records, some HMV stores and other specialist audio-visual outlets. Prices will start at around £20.

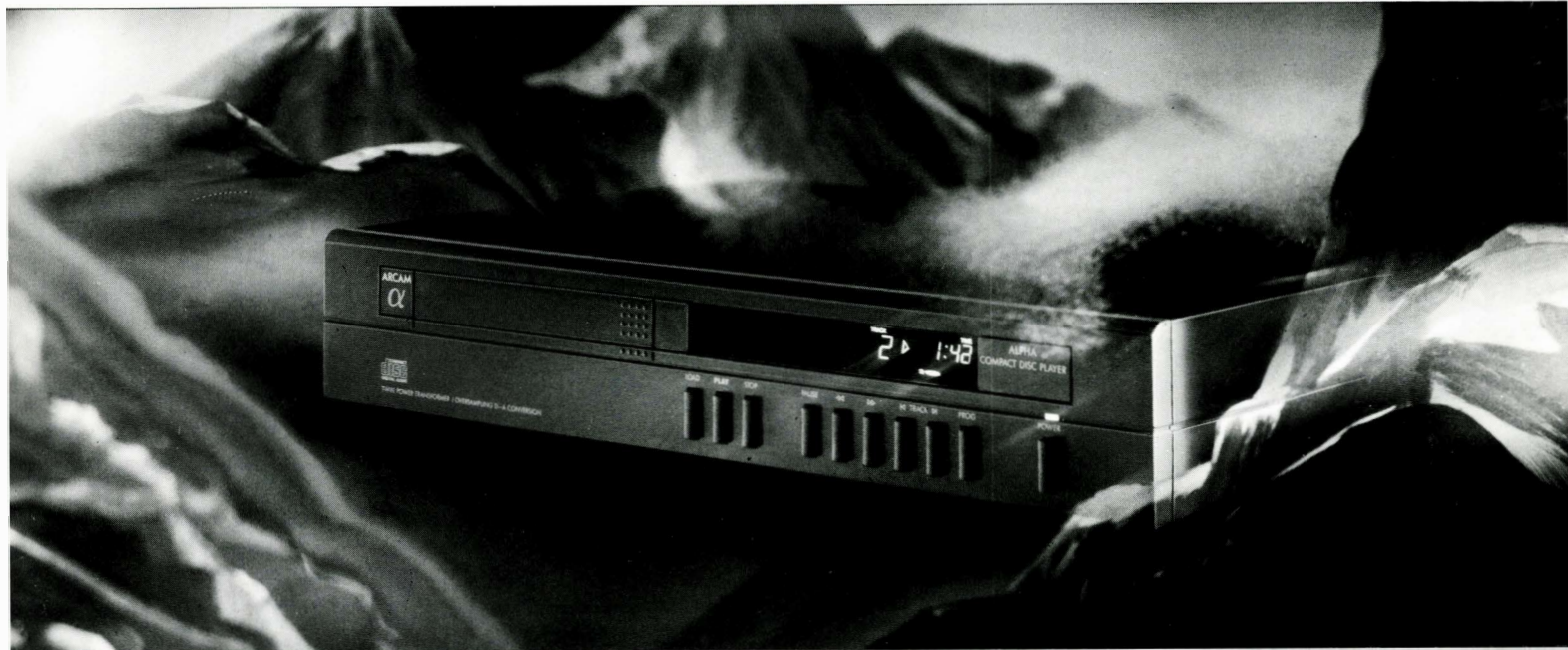
Checking Sony's Pulse

Sony launched a rash of new products at the Brown Goods show this year. As yet there don't appear to be production samples of Mini Disc players, just the portable that Sony's Eric Kingdon was seen demonstrating on *Tomorrow's World*. What we could see was the new *Pulse* range of CD players, these incorporate four D/A converters per channel which enable differential composition of two mutually complementary PLM (pulse length modulation) waveforms.

The range starts at £140 with the *CDP-397* and works up through three players of full and midi width to the £200 *CDP-597*. There are two effectively identical multidisc players, the midi width *CDP-C325M* costs £190 while the full width *CDP-C425* costs £200.

There are also two new ES CD players, these are equipped with the Advanced Pulse DAC which has been integrated onto a single chip. The *CDP-339ES* costs £450 and incorporates a switchable dot matrix display and Edit Navigation, a prompting system which guides you through complex procedures. Construction is beefier than usual and attention has been paid to resonance damping and RFI. The top of the range *CDP-X559ES* costs £650 and adds a copper plated interior chassis, extra power supplies and a higher precision drive to the *339's* already impressive feature list.

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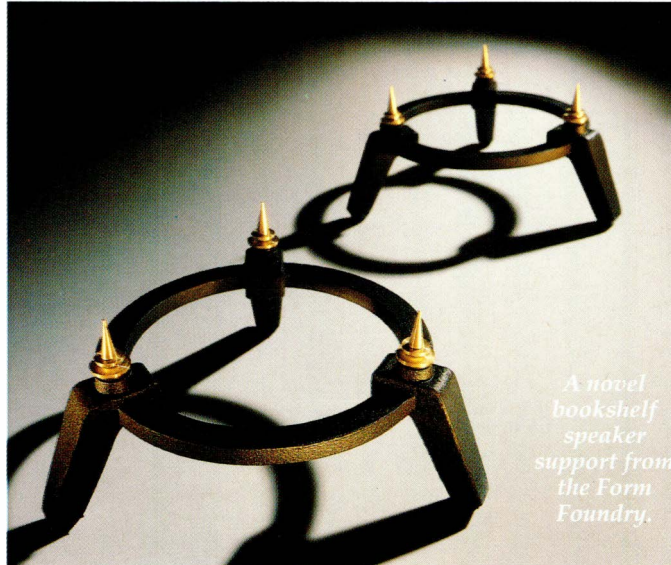
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In Canada: Avalon Audio Ltd, Unit 17, 975 Frazer Drive, Burlington, Ontario L7L 4X8 Tel: (416) 333 4633

A new Form for the bookshelf

A new solution to the problem of getting bookshelf mounted loudspeakers to perform optimally had been put forward by Carrington based Form Foundry. The *A.RM 030* is a cast three legged base fitted with three turned brass spikes and damping action feet. The idea is that you place the *A.RM 030* between speaker and shelf in order to isolate the two from one another. This should significantly reduce resonance in the supporting structure which can colour the sound.

The *A.RM 030* can also be used between speakers and flat topped stands to similar effect. The cost of a pair is £84.25 plus £5 P&P, for further information call (061) 432 8980.



A novel bookshelf speaker support from the Form Foundry.

Pioneer joins the recordable CD arena

Digital Compact Cassette is about to be launched upon a largely unsuspecting populace, with the assembled might of the software and hardware manufacturers behind it (see Perspectives in this issue). However, DCC is only one of three digital recording formats currently available and now might be a good time to consider the pros and cons of alternatives such as recordable CD (CD-R). This medium is currently supported by a relatively small number of recorders, but that number is steadily growing and this month Pioneer announces that it is joining the fray with its own CD-R.

Like many DAT machines, the new Pioneer is aimed initially at the professional market. It's called the RDP-1000 and in Japan broke price barriers by being the first CD recorder available for less than a million Yen (roughly £4,300). The RDP-1000 is a single box unit fully compatible with conventional CD players. Digital to analogue conversion and analogue to digital are 1-bit. Pioneer has announced that it will be marketing its own blank recordable CDs; prices have yet to be announced. At present a 74 minute blank CD-R disc retails for £18.

Initially available to the professional market in Japan, the RDP-1000 will be on sale in the UK in early 1993.

The box of tricks . . .

Purple Pitch Audio Paraphernalia of Durham is a new manufacturing company aiming to produce accessories for the hi-fi market. Their first product is a turntable stand called the *Music Box* which, as the name suggests, is a solid-sided cube-shaped little critter.

The *Music Box* is intended to isolate your turntable while blending in with 'normal' pieces of furniture in the domestic environment. The composition of this structure is informatively described as being a 'combination of wood, plastic and mineral based materials.' So, no metal, anyway. The *Music Box* can be bought in a variety of decorative finishes involving hardwood corners and textile covered side panels, which can be 'tailored to suit most colour schemes.'

The *Music Box* retails for £174. Purple Pitch can be reached on (091) 386 2101.

The AMC tube amp arrives

First samples of the AMC CVT 3030 budget hybrid tube amplifier have finally arrived. This integrated amplifier, the creation of ex Hi-Fi Markets supremo Malcolm Blockley, has been touted for nearly a year now without actually appearing in the flesh. Now we have a transpar-

ency and some details.

Due to retail at £459, the CVT 3030 uses four EL34 output tubes and 14 MOSFETS in the preamp, it is said to produce 30 class A watts per channel. Unusually it features cooling fans which are said to be silent and thus produces a lot less heat than your average valve amp. Apparently it will be the first amp of its kind to comply with the tough Scandinavian SEMKO safety standards.

Available in black or off white, the CVT 3030 should be available in early June.



In Brief

Mordaunt-Short has outgrown its premises and has moved to larger ones "just down the road", it is now based at 3, Ridgeway, Havant, Hampshire, PO9 1JS. Telephone (0705) 407722.

This year's hi-fi shows:
 28th - 31st May - Summer CES, Chicago
 5th - 8th August - Harrogate Audio and Video fair
 10th - 13th September - Penta, Heathrow
 18th - 20th September - Northern Video show, Manchester
 25th - 27th September - National Sound and Vision show, Bolton
 10th/11th October - Swards, Reading
 23th - 24th October - Northern Ireland Hi-fi show, Belfast
 30th Oct - 1st November - Scottish Hi-fi & Video show
 28th/29th November - Paul Roberts Hi-fi show, Weston-Super-Mare

Doug Brady Hi-fi of Otley in Leeds will be holding an Arcam musical evening at the Chevin Lodge Hotel, Otley on the 27th of May. Entrance is £1, all proceeds will go to charity. For further details and booking contact Roger Raymond on (0943) 467689.

Bohemian Design has produced a new heavyweight turntable table. A 60mm thick slab of marble is supported by sand filled chrome steel columns, and the steel base is covered with a sheet of polished black acrylic. The marble platform and base are fitted with metal cones, the whole thing weighing a substantial 80lbs.

The amount and placement of legs depends on the turntable to be supported. Price is £399, for more information contact Vladimir Pinsker, 8 Cameron House, Highland Road, Bromley, Kent, BR1 4AG.

Audio-Technica has extended its cartridge trade-in scheme which was due to have finished at the end of March. If you trade in your old MC cartridge when you purchase any A-T OC Series or the ART-1 cartridge, the price will be reduced by 30 per cent.



The Pioneer A400 amplifier.

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

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

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

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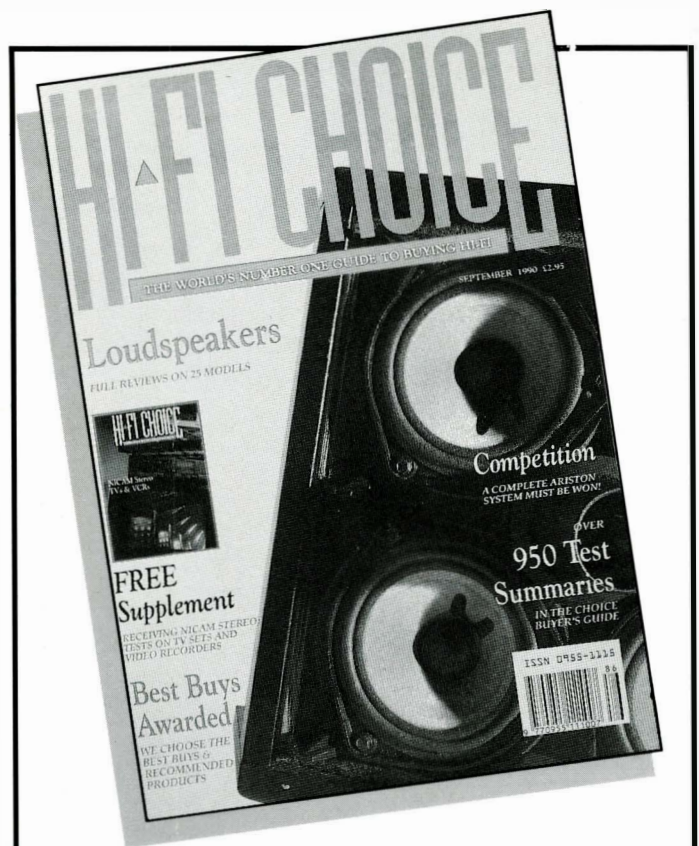
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This month we appraise a new valve preamp and offer you a glimpse of a possible future for music on digital media.

Choice Sessions

Bad timing

Will CD prove to be the best format for launching new musical talent? Andrew Cartmel isn't convinced.

Say what you like about CDs; they do at least provide meaty minutes of music for your money. Or do they? According to the *Hi-fi Choice* digital boffins, the maximum playing time for a CD depends on the Constant Linear Velocity of the disc: at the slowest CLV (1.2 as opposed to 1.4 metres per second) your maximum allotted time is about 74 minutes.

In the photograph accompanying this article you will see two new CDs, featuring British performers, the Katydids and Jan Cyrka. One feature that links these two discs together is the running time. The Jan Cyrka weighs in at 36 minutes and six seconds; the Katydids offer 20 seconds more than that. In other words, these fairly typical CDs each offer less than half the possible playing time.

Normally this would be all the information necessary before launching into a full scale rant about record company greed versus value for money, crucifying both the guitarist with a funny name and these new age popsters en route.

One slight problem. The Katydids and Jan Cyrka are both new acts and they're both good. Perhaps not everyone's cup of tea but both are examples of a new wave of British musical talent which deserves to live long and prosper. Their musical styles, which range from eloquent electric guitar instrumentals to rapturous, phasey pop, would be unlikely to have arisen ten years ago, but if they had there would have been few obstacles to them conquering the musical world. Their debut albums would indeed have been albums, on funny black vinyl discs spun at 33 and a third RPM, retail prices would have been realistic and playing times in the mid 30 minutes would have been perfectly respectable.

But for better or worse, that world is gone forever and unfortunately new recording artists are going to be caught in a crossfire. By now you'll be more than

familiar with the great analogue-digital debate where the pillars of the hi-fi community square off against the dark riders of Mordor, er, marketing. Large corporate interests are phasing out vinyl willy nilly while they bulldoze forward with CD and other digital formats.

The resistance to this initiative is on two fronts: the current limitations of digital sound quality and the inflated price of the software.

In fact this debate is in some ways a non-event; CD is here to stay and vinyl, as



As a format for new music CD may be short of time in more ways than one.

a mass market format is dead. There is no question that CDs are massively over priced in Britain, as a matter of deliberate marketing policy, seeing just how far the consumer can be squeezed. But people seem to be prepared to pay these prices, so where's the problem?

The problem comes with new talent. Every month the record companies and retailers push new releases by aspiring hopefuls you've never heard of before. A lot of these you will be glad to never hear from again, and they duly fall by the wayside.

But there are others that are good, original and deserving of success. Performers like Jan Cyrka and the Katydids. And these are the performers who are directly endangered by the current situation with CD in Britain.

From now on anyone who wants to listen to new music will inevitably be listening to it on CD, because it will only

be released on CD. And who wants to listen to new music? I'm sure that there is a section of the older population which is adventurous and eager to experiment, constantly on the look out for new material. But by and large people become less adventurous and pursue the musical tastes which they formed earlier in life. The current healthy level of CD sales is largely fueled by this group, buying back-catalogue material as it ditches LP collections and upgrades to CD. So far, so good, at least as far as the manufacturers and retailers are concerned.

But perhaps somebody should take note of the fact that the baby boom looks like a python swallowing a water buffalo, as seen from the side. There is a large population of ageing thirty somethings turning into forty somethings. These are the people currently busy replacing their Eric Clapton LPs with CDs.

But as far as exploring and experimenting with new music is concerned, it is a different, younger audience which is significant. And here are two facts about young people which the marketing forces may not have taken into account. Firstly, they don't have enormous spending power, even in times when the economy is thriving. Not nearly as much as their older brothers and sisters who are settled in careers and jobs. And secondly, there are far fewer of them. This is the narrowing tail of the population python; the water buffalo is long since gone, heading for middle and old age.

Who is expected to buy new music, and buy it as 35 minutes of digital sound on prohibitively expensive CDs? The same young people who have little money and who are rapidly shrinking as a portion of our population. This is a demographic, economic fact.

Of course, the price of CDs won't make much of a dent in the sales of a Tina Turner or a Bryan Adams or a Prince, all acts who were solidly established back in the days before digital dominance. Inflated prices probably won't even inhibit the arrival of the Next Unstoppable Thing from the USA.

After all, in America the price of CDs is vastly lower than it is here and the average income is vastly higher. So a band which becomes huge in the US will be massively promoted over here and no doubt will succeed.

Some of these bands may even be British; the conquer-America-first routine as practised by The Police or Dire Straits (remember them?).

But basically you can kiss new homegrown British talent goodbye. So savour the Katydids and Jan Cyrkas of the early Nineties. You may well be enjoying the end of an era.

Get your active together

Like a moth to the flame, Andrew Cartmel is drawn towards the glowing valves of a new British preamp.

The Sound Research CD 3/5 is a new line-only active preamp which retails for £295. Enough dry, factual detail. This is a handsome piece of equipment, solid and chunky and distinctly compact in comparison with a lot of its valve brethren. Despite being a black box, it's quite nicely styled with a slanting, recessed front, though some of the other design decisions are a trifle bizarre. For example, why the twin volume pots? And why is the on/off switch so thoroughly and annoyingly hidden under the sloping face of the unit?

Also tucked away down there is a mute switch, presumably to compensate for the difficulty in spinning two thimble sized pots simultaneously to zero when you need to answer the phone or respond to the SWAT team commander giving you the final warning with his megaphone outside.

The input select control on this particular sample was stiff and difficult to move, in stark contrast to the left channel volume control which after the first few moments of use became loose and began to spin freely towards infinity in both directions.

But let's stop quibbling about build details. It has to be said that my immedi-

"The more complex tracks were deep and intricate with a real pulsation of rhythm on the background instruments . . ."

ate reaction to the sound quality of the Sound Research was favourable. The vinyl source was sweet and precise, giving a clean, deep sound.

Further listening seemed to suggest that the Sound Research displayed a particular affinity with electronic instruments, where its forceful presentation was

at its best, and with more elaborate recordings where its ability to push forward detail was a real asset. The most disappointing performance it offered on vinyl was with a sparse but superbly recorded acoustic bluegrass set which mysteriously lost some of the delicate upbeat prettiness I normally enjoyed.

With early Little Feat, however, things were hunky dory again; *Tripe Face Boogie* drove out full force and *Willing* had my head bobbing worshipfully; *Apolitical Boogie* was big and chunky and strong. I imagine these tracks were engineered to sound raw and forceful and that was the message the preamp was delivering loud and clear. Not that the Sound Research

quite different perspective on some old favourites, blowing cobwebs away and making the familiar sound new. I was hearing music with a big clean impact and better definition than I'd previously been accustomed to.

This had its down side, though. When I moved on to CD my first response was entirely positive and in keeping with the LP listening. Again the Sound Research was providing an energetic attack and offering new impact and depth. Unfortunately these same qualities rapidly proved counterproductive. The CDs I auditioned were uniformly very fatiguing and I was repeatedly reminded of a comment by John Bamford about a certain CD player;



The Sound Research CD 3/5 preamp, poised and waiting to begin active service.

was incapable of providing subtlety. Sting's *Nothing Like the Sun* sounded tighter and more dynamic than I'd ever heard it before, but it also offered well rounded musical detail. The more complex tracks were deep and intricate with a real pulsation of rhythm on the background instruments. Percussion had an echoing roundedness and a subtlety of character that were new to me. *They Dance Alone* suddenly seemed to have sprouted some new instrumental filligree while the flute solo had shadings of expression I hadn't heard before; and behind all this there was always that faultless punchy beat of percussion.

If I had to summarise my response to the music I played on vinyl I'd say that it had acquired a new drive and urgency that was often very refreshing, giving a

"It's all right," he said, "it won't take the back of your head off." The more I listened to digital selections, all old favourites, and usually the source of an evening's pleasurable listening, the more worn down I became by an aggressive, unstoppable sound. I fled back to vinyl before the back of my head began to tingle.

This unit will appeal to someone who doesn't want a huge piece of kit in their system, and to those who will appreciate its conservative but stylish appearance. As for sound quality, my subjective listening suggests that the Sound Research might well be worth shortlisting for a vinyl based system, giving punchy and energetic performance when partnered with a suitably tasty phono stage.

If you are thinking of building a CD based system around it, my personal experiences would seem to suggest that it will require some quite careful and sympathetic partnering.

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If marks are ever awarded for perseverance then Electrofluidics' Paddy Handscombe is going to be close to the front of the queue.

Some six months or so ago he phoned up the *Choice* offices with news of a speaker he was building, and as is often the case with these things, he was fobbed off with the usual excuses and asked to phone back in a couple of weeks. Some six months and I don't remember how many follow up calls later, I was finally persuaded to spend a wet and windy evening over in East London checking out Paddy's creation, the *Sonolith 1*.

To say that the unit is unusual would be an extreme understatement. On the driver side it uses the highly acclaimed EJ Jordan drivers that have built up such a loyal following over the years, perhaps most notably when used, in modified form, in the Townshend *Glastonbury*. Unlike the *Glastonbury*, the *Sonoliths* also employ the Jordan tweeter, although whether you can call a device which is only rolled out of the circuit at 400Hz a tweeter is probably a mute point.

Heavy metal

The Jordan drive units are both hand built, aluminium alloy cone designs, the bass unit being the standard 125mm device which comes complete with an unorthodox rear spider operating via a pin in the centre of the cone, while the tweeter is a 50mm unit.

The construction of the beast is even more interesting. For a start the cabinets are made out of a high-tech mineral-filled polymer (placrete), developed specifically for this application. The treble/mid unit sits in its own sealed enclosure on top of the 50 litre reflex loaded bass enclosure. The cabinet material itself is as dead as the proverbial dodo and to reduce cabinet colorations even further, all internal surfaces are arranged so that no side is parallel to any other. The bass unit is set into a ducted port towards the top of the enclosure and reflex loading is accomplished by means of a second ducted port towards the base of the unit which is fitted with a flared throat.

The *Sonolith 1* is in fact the first in a range of speakers, all of which will be assembled using various combinations of the building blocks described above. The next model will probably have another bass driver instead of the reflex port and Handscombe even plans to produce a model with up to five tweeter 'rings' and two main cabinets, one on top of the other, giving a total of four bass units and five



This month Andy Benham turns his shell like ears to Electrofluidic's new Sonolith 1 loudspeakers and the Copland CTA501 amplifier.

tweeters in a column over seven feet tall!

When wired into a system the first thing that hits you is the amazing quantity of bass they are capable of producing. In-room measurements down at Paul Messenger's produced the amazing result that the response is still completely flat at 20Hz. Firing up the KLF produced some prodigious bass levels and the synth bass at the beginning of Madonna's *Vogue* had the windows shaking in their frames.

The down side is also immediately obvious; this is a very insensitive speaker, Electrofluidics quoting some 84dB per watt at one metre and our own measurements suggesting that even this is on the optimistic side. However, I've only got a relatively small listening room in the first

place and by using a fairly chunky amplifier the *Sonoliths* proved themselves to be capable of delivering fairly healthy sound pressure levels, although if you try and push a Van Halen track you are likely to hear the main driver start to bottom out. To quote Paul Messenger, who borrowed a pair at much the same time that I did: "They're pretty damn good, but entirely incapable of kicking ass. *The Last Train to Transcentral* ain't going to get up steam until well past *3am Eternal*."

If sensitivity is the down side then it is balanced by the cabinet which, as well as being nicely presented, is substantially uncoloured and basically pretty damn good. The combination of cabinet and drivers means that the presence band is

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HIGH-END UPDATE

particularly good. In common with other designs using these drivers, it is in fact almost too good because the speakers are extremely revealing when it comes to source material. A decent recording will sound quite marvelous, female vocals and brass being particularly well handled, but lower quality recordings sound dreadful. The *Sonoliths* were particularly unhappy with cheap and nasty multi-track recordings where they were only too pleased to point out phase problems by smearing the previously excellent image.

£1,800 is by no means a small price to pay for a speaker but the *Sonolith* is an immensely interesting design and one whose sound grew on me the more I listened to it. The lack of cabinet coloration and the astonishing bass are major plus points, as are excellent depth of image, coherence and timing, coupled with the ability to produce the sort of dynamic range which will seriously upset the neighbours. In some ways the speakers remind me of the Townshend designs, in that they have the same ability to pull the music apart and produce incredible results with the right source material. They don't like poor source material, but this can hardly be described as the fault of the speaker. Provided you don't expect them to double as PA speakers and use an amp with plenty of grunt, the *Sonoliths* are capable of producing quite excellent results. In fact, I can't wait to get my hands on the bigger ones.

The 501 is the big brother of the Copland CTA401 which Malcolm Steward wrote about (in issue 103), although the two units are quite different in design philosophy. While the 401 is an integrated unit, the 501 is more of a power amp, but it does have two switchable inputs and a meaty looking Alps pot. The idea is that you connect a CD player or DAC to the CD direct input and then use the pot to control the volume, the 501's input sensitivity being high enough to ensure that you won't have any problems when the unit is used in this manner. Thus for £1,500 you can put together a decent system without having to invest in a preamp.

Of course if you want to go for a multi-source system then a preamp can be wired into the other input and the 501 used as a power amp.

The 501 is some 40 per cent more powerful than its little brother, offering 30 watts per channel into eight ohms. This is provided by means of two matched pairs of Golden Dragon EL34 pentodes, run in ultra-linear mode. What this means in practice is that although the unit uses

pentode valves, with the associated gain in output power, the feedback inherent in the system makes them behave more like triodes in terms of linearity.

The trick to getting this to work properly lies in the winding of the output transformer, and in the case of the CTA501 these were designed by Copland boss Ole Moller himself. Each transformer is constructed from soft iron laminations and the E1 core is welded to ensure a tight coupling between primary and secondary sections. In order to minimise the output impedance of the transformer, the secondaries are wound in parallel while

bass that normally has valve units running for cover, but the 501 was more than capable of clearing the cobwebs from the ceiling and controlled the bass drivers far better than I had expected. It also has a lot more guts than you would expect of a mere 30watter. Indeed, during the three months or so I spent with the unit, the only time I was left wishing for a little more power was when I hooked up the *Sonoliths*, but they are very inefficient.

In terms of mid-band transparency the Copland is simply superb, female vocals come across particularly well and Sinéad O'Connor's cover of Elton John's *Sacrifice*



Andy Benham heads for the hoe-down with the Copland CTA501 amplifier.

the primaries are coupled in series, with six separate sections being used in all.

You get a choice of either black or aluminium finishes and the whole bag of tricks is fully enclosed in nicely finished casework which is vented on the top. The only clue to give away the fact that this is a valve amplifier is a sedate glow which issues from the top of the case when the unit is in use.

The front panel has just three large rotary controls; the aforementioned volume control, the on/off switch and the CD direct/preamp selector. I used the unit with a variety of speakers, but mainly the Celestion 100s, Snell Type Ks and the *Sonoliths*, and with a Meridian 600/602 front end.

Anyone who read the Celestion 100 review (also issue 103) will already know that I'm quite keen on the 501, which, in a nut shell, provides the sort of power and control in the bass normally associated with a good tranny amp with the freedom and naturalness in the mid-range that is the hallmark of decent tube designs.

Funnily enough, modern electronic music comes across a treat on the Copland. The KLF's *White Room* album is rapidly becoming the *Hi-Fi Choice* standard test disc and the bass levels you can get from this CD are quite alarming. It's the sort of

from the *Two Rooms* album quite literally had the hairs standing up on the back of my neck. Kate Bush's marvelous *Rocket Man* from the same album was, if anything, even better, with superb imaging, particularly depth, and that sense of communicated emotion that makes listening to hi-fi such a pleasure.

The term 'high-end' is a much maligned one, but it is an epithet that I feel justified in applying to the 501. Quite simply, it's the sort of product that can really produce an emotional response from the listener, the sort of product which makes 'listening to music' an involving experience rather than something you do at the same time as reading a book or whatever. The Copland lets the music grab your attention and refuses to let go until the disc has stopped spinning, and let's be honest, there aren't a lot of products at this price point that are capable of doing that.

I don't often say that a product is cheap, but at £1,500, the Copland is one hell of a bargain, opening up a world of enjoyment which is on an entirely different level from that produced by even the best 'budget' equipment. Do yourself a favour and give it an audition. But be warned, this sort of sound quality can be extremely addictive.

MATERIAL VALUES

This month Dan Houston meets an audiophile whose aspirational system includes components, and even a material, he designed himself.

Melvin Holmes is an audiophile in the committed sense of the word. That isn't to say he should *be* committed, though some may feel that his audio experiments verge on the point of an obsession; to the point where he has developed his own 'inert' material which he uses in his loudspeakers and turntable.

Our host lives in a village in the Fenlands of Norfolk — a superbly quiet location but for the occasional American Air Force jet, passing overhead on a low level anti-audiophile mission. But these are the only disturbances apart from birdsong, the house standing on its own in a quite cul de sac.

Melvin's listening room is practically a text-book shape for acoustics, being an oblong with a concrete floor. At one end French windows give access to a rather more open acoustic, but Melvin's concern for his neighbours keeps the windows closed.

The speakers are placed in front of these windows firing down the length of the room at a couple of arm chairs. Along the wall the rest of the hi-fi system stands atop a teak veneer cabinet, which Melvin built to contain his record and CD collection. He describes himself as 'not the world's greatest carpenter' but nevertheless has also built his own loudspeaker cabinets and turntable — all of which have a finish belying his claimed amateur status. These now sit in a system which includes a Teac CD drive unit with Deltac *Bigger Bit* DAC, a Pink Triangle *Pip*

preamplifier and EAR power amplification, an Aiwa cassette deck and an Hitachi tuner.

Melvin has been building his own hi-fi equipment since he bought his first turntable, a kit-form Sugden *BD1*.

"It started like that because in those days I didn't have two pennies to rub together," says the 44 year old insurance brokers director. "But I have also been aware that you can often have a better product for the same money if you are prepared to make it yourself. Making my own turntable and then loudspeakers and stands has been a means to an end. But I have had a lot of satisfaction from the design and construction; a good understanding of the principles is a pre-requisite to engineering and that gives you a good idea on what affects sound quality."

Holmes made

Melvin's very own, unique turntable is based on several ideas culled from various manufacturers and magazine articles. It uses a silicon-filled radial trough *a la* Townshend *Rock*, a product originally researched by the Cranfield Institute of Technology. The idea behind the trough is that it stabilises the otherwise unsupported end of the tonearm creating the best working environment for the cartridge. The trough here is made from two pieces of brass, cut and sandwiched together and then chrome plated. It has to be swung out over the record, bolted down firmly, and the tonearm's headshell paddle (Townshend sourced) has to be placed



When the going gets tough: Melvin Holmes' handmade turntable, the Q Dek, and the man himself (inset).

in the viscous fluid each time a record is played.

Melvin swears it makes a difference to the sound quality, and that difference is big enough to warrant executing the manoeuvre each time he listens to vinyl. "It improves the bass," he says, "it becomes deeper but clearer. It also gets rid of a lot of background noise." He's called his turntable the *Q Dek* because the trough looks like the tail of a Q across the platter. A cynic would find the name equally apposite to the time it takes to cue up each and every record! The tonearm is a Roksan *Artemiz*, fitted with an Ortofon 3000 cartridge.

Melvin designed his own floating sub-chassis for the *Q Dek*. He wasn't a complete novice in this department, having previously made one for his Thorens *TD 150*. "I went to the library and read up the subject," he explains. "You have to make it so that its resonant frequency is bouncing at four times per second. A good tonearm and cartridge combination will have a resonant frequency of ten times



per second, and of course the worst thing would be to have them both bouncing at the same time; they would excite each other. Once you have worked out the relative masses involved it's just a question of finding the right type of springs (to support the sub-chassis)."

He bought a new motor, bearing, inner and outer platters from Thorens — using standard *300 Series* parts. The plinth is fashioned from solid Burma teak while the sub-chassis and armboard are made of a sandwich type material he developed himself. This consists of light metal plate glued either side of a light softwood filling; he won't be drawn to be more specific. The properties are similar to that of aerolam, used by Celestion, and the material is extremely rigid and inert, and of course very lightweight.

"I wanted to make a light and rigid sub-chassis, like that used by Pink Triangle," he says. "The idea is that if there are any extraneous noises or rumbles in the turntable they would be damped out by the time they reach the arm. The armboard

is bolted onto the sub-chassis, which is unlike the Linn turntable where the armboard and sub-chassis are decoupled. I think in that system you would lose information."

Melvin says that the hardest part of the design came in positioning the components in three dimensions. "You can start with a thorough plan, but when it comes to positioning something like the motor you also have to start thinking on your feet as well. It's really a question of getting stuck in and trying out the options."


The finished turntable sits on Michell *Tender Feet* cones, on a piece of his material, on a Target wall shelf at waist height.

His phono stage is a standard High

End Audio Device, *The Head*, made by EAR, an improvement on the phono input provided on the *Pip* preamplifier, he affirms. His *Pip* also sits on cones, on a slab of the aforementioned inert material. Later models of the *Pip* use battery power supplies but Melvin opted for a custom-built EAR mains regulator, which he believes would be as quiet as a DC power supply from batteries.

The EAR influence continues with a pair of 509 valve monoblocks, the *MK II* version, but dated by their black chrome finish. He's had them for three years. "I didn't buy these because of the valves," Melvin explains, "I actually had a valve phobia before. I thought valves would blow up and they would be difficult to adjust. But when I heard them I didn't hear a valve sound as such — I just heard a very, very good sound. My criteria for improvements in sound quality are that it needs to get clearer and closer to the source. So when I was building my equipment or auditioning new stuff I would listen to acoustically flat recordings with

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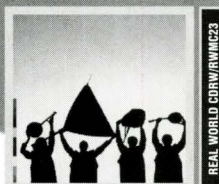
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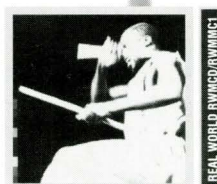
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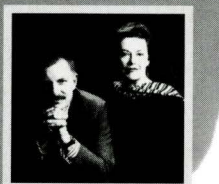
Debut studio release from the London-based Industrial/Jazz collective.



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acoustic instruments."

The monobloks were sent back to EAR for service and to be 'quasi bi-amped' when Melvin built his loudspeakers, which have two sets of terminals for bi-wiring. The EAR amps have two sets of speaker outputs each, allowing bi-wiring of bass and treble signals to be configured out of phase. The cables are therefore balanced as opposed to most amplifiers where two lengths of speaker cable are merely attached to the same output on the amplifier.

Melvin decided to upgrade his existing loudspeakers — also built from a kit, using his newfound material. "The material was a success in the turntable and so I decided to see if it worked in loudspeakers," he says.

He was aware of Celestion's use of aerolam in its *SL600* loudspeaker and needed to source drive units which had been developed to work in a lossy, lightweight, rigid cabinet. "It was a gamble really," he admits, "I wanted to see whether my material would duplicate or even better the performance of the *SL600* drive units." He got in touch with Graham Bank, Celestion's director of research and was able to buy *SL600* tweeters, bass drivers and crossovers, the latter being housed externally next to the amplifiers.

The price is right

It all sounds incredibly simple, although Melvin says he's been making his own hi-fi for 22 years! The best aspect of this system is the price. He says the turntable has cost him around £200, the speakers £300, and the stands £50. You would hardly expect a high-end sound from these components but when we listened to the system it was extremely revealing. It's impossible to make a judgement of Melvin's kit against, say, the *SL600* production model and its proprietary stands, but the sound here was certainly as good as other *SL600* systems I have come across. One might expect a home-made turntable to chew up the performance of such fine-tuned instruments as the Roksan arm and Ortofon cartridge, but here the opposite is the case.

The system immediately presented itself with the grace and control you would expect from the more exotic of hi-fi marques. The effortless bass was there and the speakers' decay belied the acoustics of the room, disappearing behind a three-dimensional sound stage. The sound of a kick drum was delivered with a real-



Leaning tower of power. Melvin's home built speakers and stands.

ity I had only previously heard from a *Rock*, and a *Rock Reference* at that.

We listened to a variety of vinyl records, including Fairground Attraction's *First of a Million Kisses*, The Gypsy Kings' eponymous debut album, and Buddy Holly's *The Legend* album, remastered by MCA. It was this last album, digitally remastered, which persuaded Melvin to stop metaphorically making the sign of the cross every time he heard the word digital.

"I must say it softened the armour. Before that I hadn't thought much of digital at all," he says. Forays into the world of CD players resulted in his buying, not a kit, but a *Bigger Bit*, and Teac *P10* drive unit. "I heard these as a combination and decided not to look further. And now I find myself listening to CD more than vinyl." Melvin describes himself as still in the first flush of a youthful romance with CD and he appreciates the user friendly aspects of the medium.

But it's also hard not to agree with him on sound quality, especially since he has duplicated much of his record collection with silver discs. On his system the Teac-Deltec partnership delivers an immediacy to Buddy Holly's voice which makes it sound more articulate than the vinyl version. Sadly we couldn't listen to some of the old analogue recordings against their modern digital versions — so we were comparing both records and CDs which

had been mastered to 16-bit standards. On a *Shadows Greatest Hits* album — the very first record he bought in 1963, Melvin's record player really came to life, bringing *Apache* to my ears as I have never heard it before. It really is hard to believe that something recorded so long ago, transferred to plastic and run over with diamonds for the best part of 30 years, could still knock most of the contemporary stuff for six.

But that of course is a credit to the *Q Dek*, and the rest of Melvin's system, including his unique material, which brings out the best from recordings — even those which aren't a patch on *Apache*.

The System:

<i>Q Dek</i> turntable:	£N/A
Roksan <i>Artemiz</i> zi tonearm:	£255
Ortofon <i>MC3000</i> cartridge:	£850
EAR <i>The Head</i> phono stage:	£488
Pink Triangle <i>Pip</i> preamplifier:	£400
EAR <i>509</i> valve monobloks:	£2,308/pr
Teac <i>P10</i> CD drive unit:	£1,499
Deltec <i>Bigger Bit</i> digital to analogue convertor:	£650
Target isolation furniture from:	£51
Sound Organisation tables from:	£55
Loudspeakers and stands:	£N/A
Interconnect from van den Hul and Aperture from:	£61/M
Rotel <i>Supra 4</i> and <i>Supra 10</i> loudspeaker cable:	£3/£9/M

Imagine Spike Milligan in a lift. He doesn't want to get out because he's enjoying the music. But he's annoyed because he'll miss an appointment if he stays to listen to the end. What to do? It's one of life's dilemmas and, he says, it's getting worse. For the 74 year old comic genius, music has been one of life's mainstays, he plays it, has written it, listens to it and used it widely in shows like *The Goons*.

And yet, quite passionately, he says music is now degraded to the status of rubbish, as a background in lifts, toilets, telephone switchboards and shops.

I wonder if these are just the musings of old age, but he presses his point: "What can be more condemning to contemporary music than a toilet where you go inside, put the seat down and music starts to play? I don't know any composer who writes music to crap to. I think people are becoming insensitive to music; it is like sewage and it won't go away."

He's equally scathing about the ubiquitous personal stereo, seeing its user as fair game to run down when he's out driving his yellow Mini. "People with *Walkmen* don't look normal, they have that strange glazed look; they always seem surprised — the best time to get them is when they're crossing the road." Adopting the famous *Goon Show* falsetto voice he sketches a likely courtroom defence: "He couldn't hear me coming your honour!"

Music as a portable package, as something to be sampled in bite size chunks, obviously doesn't appeal to Spike. "Look at CDs," he says, "now there's a new mini CD coming out (Sony's Mini Disc). Soon they'll have it down to pill form. You'll just swallow this thing and a few minutes later you'll hear Beethoven's *Fifth* in your head. It'll be a case of: 'What are you listening to darling? Debussy? Is that the green pill? I'll have the brown one . . . ah! Lucio de Mamore!' Obviously some people will finish before others won't they? But you won't know that until they stand up and leave the room. They could call it the *Swallowman*!"

We get the point, as far as Spike's concerned a *Swallowman* really would turn music into sewage.

But what about music in the home — that's not sewage is it? "Yes but every song has to have a video as accompaniment, in fact the song is becoming less and less important; a lot of the time you can't

What is a Swallowman?

Why should personal stereo

users avoid yellow Minis?

Did World War II really end

because of a jazz band? Dan

Houston speaks to Spike

Milligan who answers these

and other questions.

Milligan on Music

hear the words, which is depressing, especially for the person who wrote the lyrics. I'm impressed with the sheer energy of people like Madonna on stage, but I think rap music is just rubbish. I don't dig that current aspect of culture. I'd like to make a video of Schubert's *Serenade*; I'd have a public hanging in the background . . ." Phew! The death of real music, could it make the charts?

Spike is a champion of live music, of real instruments used in clubs and bars without PA. For him the 60,000 seat stadium pop concert is anathema. "That's turning it into religion," he says. And what's wrong with religion? Does he believe in God? "Not today," he answers.

Tomorrow then? "I don't know I just take it day by day. I come from a good Catholic background . . . but I don't know what the foreground's like." He adds that if you go to church you should go to midday mass because the wine's better quality, but there is no forthcoming advice on the best time to go to a pop concert.

Pizza to go

"Go and see Blossom Dearie next time she's at Pizza on the Park in London," he enjoins. "She won't allow drinks or food to be served during her sets. She used to be a stunning beauty and still has a wonderful voice, like a little girl. And it's 100 per cent acoustic. She's one of the delights of my life."

Spike's always been a jazz fan and adopted his professional name after hearing Spike Jones and the City Slickers on Radio Luxembourg. His given name of Terry sounded too much like chocolates he said. For the first three years of the Second World War he was in the Royal Artillery based at Bexhill in Sussex, and played trumpet in his regimental jazz quartet, The Boys from Battery D. "That was a good time," he remembers. "We used to get excused duties because we said we had to practice, and then we'd skive off and drink beer in the woods. We

had the use of army transport and we played at all the dance halls between Eastbourne and Brighton; we were the only entertainment on the South Coast. Being in a band was great for pulling the birds, I pulled mine until she was nearly eight feet long!"

Later after being wounded and shell-shocked in Italy, he joined the army Combined Services Entertainment, playing guitar in the Bill Hall Trio. He finished the war as an entertainer rather than a gunner. "Yes, I finished the war as an entertainer," he puns proudly. "People still come up to me and say 'Hey you, didn't you finish the war as an entertainer?!'"

The rest as they say, is history, although the musical performance gave way to comedy; he wrote the majority of the *Goon Show* scripts for radio and was responsible for the zany Seventies' TV Series, *Q*, which Monty Python used as a kind of style sheet. *Q* stands out as the one that got away in terms of BBC repeats. "I'm very hurt they haven't repeated it when they've repeated everything else," Spike says seriously, and, one hopes,



Goon but not forgotten: Gunner Milligan contemplates life and music.

thinking of more than his royalty fee. "But they probably don't know if it's funny, and what can I do? I can't go to them cap-in-hand can I?"

In spite of describing himself, half-jokingly, as *passé*, he's still writing novels and has just completed Volume Seven of his war memoirs. Sitting in an armchair surrounded by genteel antique furniture in his home near Rye in Sussex, he churns out jokes as though he were describing the weather, hugging his now-frail legs to his chest and rocking along with the laughter.

Burying elephants

He wouldn't have been like this last year he says. "I've just come out of a deep depression which I'd had for two years. It was unbelievable — like being under a blanket, a great heavy blanket where you couldn't move. If you'd been here I'd have seen you as you are but you'd have sounded as though you were talking down a long tunnel — there would be no emotional presence. I've been on medication since the war, and every so often I go to a clinic near Maidstone and they put me in a deep sleep for 14 days which is supposed to remove all the stress. You come to a shallow sort of consciousness at times when they give you concentrated vitamin drinks and iron bars to bend, elephants to bury, that sort of thing."

His living room contains little to suggest it is 1992, although when the new south coast motorway is built across the marshes below his house his valley will seem far from green. In one corner a wind-up gramophone will play his collection of 78s with some dubious acoustic accuracy, while a valve radio set still lists stations like Hilversum on the dial. He has a grand piano here too. Does he still make music? "Yes, I'm making a piece upstairs at the moment."

He has written musical pieces, such as a piano tune for his daughter and a Nativity spoof called *Joseph I'm Having a Baby!* That didn't get very far; "I don't think it got further than Lewisham," he qualifies. He gives credit for the *Goon Show* music to Wally Stott and the BBC Dance Orchestra: "He was stunning, he could turn his hand to any theme, like writing a genuine Chinese tune, which set the stage perfectly. The success of *The Goons* was people making up their own pictures in their head."

He listens to a collection of jazz tapes on an old Ferrograph and cites Ronnie Scott as one of his top 20 (saxophone) tenors. "I used to go to Ronnie's club a lot when I lived in London, but everybody ate and talked through the acts — which was very frustrating for me. So they put a

pair of headphones in a corner for me to listen undisturbed."

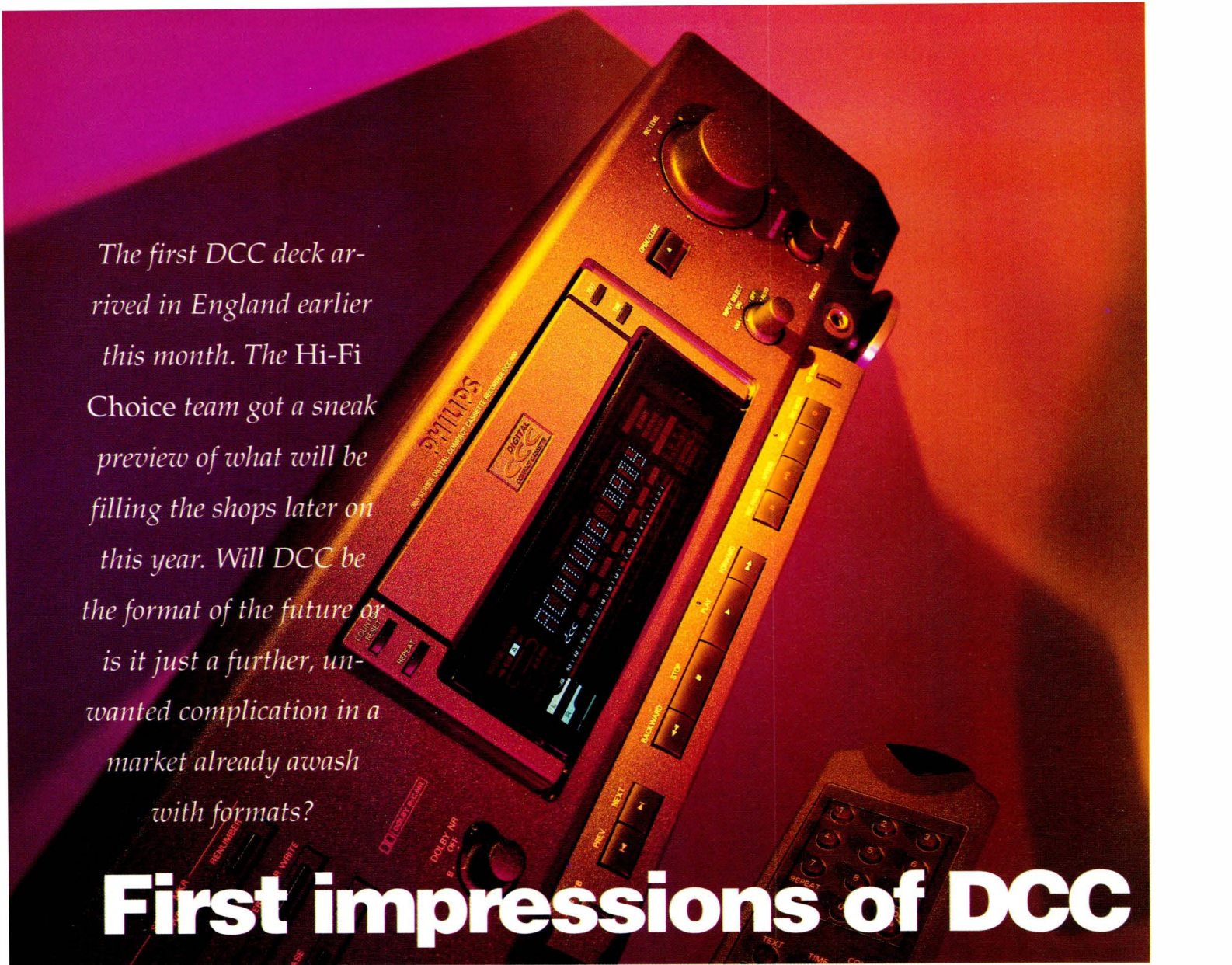
Many of his favourite jazz musicians are from the swing era and he calls Duke Ellington the Black Ravel. He reels off a list of favourites like the Tommy and Jimmy Dorsey orchestras and some of the luminaries of the post war and Fifties eras like Charlie Parker, Clifford Brown, Benny Goodman, Zoot Simms and Chet Baker.

Sketches of Spike

"I knew Chet Baker," he name drops, "We came out of Ronnie Scott's one night and a man came up to him for an autograph. While Chet was writing it he told him he was also a musician and he played the banjo, and Chet looked up and asked: 'Why?'" Another favourite trumpeter is Miles Davis. "I loved his *Sketches of Spain* and he used to be witty and articulate," Spike says, "but he went out of his mind with the later stuff. I'm glad he went bald before he died."

Well that seems a bit rich, how can Spike Milligan say anybody is out of their mind, when he is plainly mad himself? "Oh no," he counters, "I'm not plain mad, I'm rather decoratively mad."

Unintentionally he's right; imagine modern humour without an architect like Spike to decorate the backdrop, a drab Goonless, Q-less world. Imagine a lift without Spike Milligan inside.



The first DCC deck arrived in England earlier this month. The Hi-Fi Choice team got a sneak preview of what will be filling the shops later on this year. Will DCC be the format of the future or is it just a further, unwanted complication in a market already awash with formats?

First impressions of DCC

For the last year or so the subject of DCC has received a vast amount of coverage in the hi-fi magazines. To date this coverage has been based on fleeting glimpses of prototype machines at trade shows and the odd listening session down at Philips' HQ. However, this month all that has changed with the arrival of the first samples of Philips' new DCC900 machine, which will spearhead the format's launch in September.

The *Hi-Fi Choice* team assembled one rainy Wednesday morning round at Jason Kennedy's flat for an informal introduction to the new format. Various Philips luminaries duly rocked up with not one but three DCC decks, including an early prototype of a DCC personal.

The DCC900 was duly wired into JK's system and we proceeded to make a number of recordings. Both digital and analogue sources were used, the digits being provided by a Meridian 606 drive, while the analogue source was a Voyd fitted with Denon DL304. We also had a number of prerecorded DCC cassettes and had managed to assemble the Compact Disc equivalents to enable direct com-

parisons to be made. The results of the listening session are detailed later on in this article, but let's start by giving you a run down on some of the features included in the new format and how they will effect the end user.

Digital recording

The first point that becomes obvious is that direct digital recording is quite remarkably easy. All you have to do is find a suitable interconnect, connect up the CD transport and the DCC machine, press play on the CD player and record on the DCC. That really is all there is to it: no setting of record levels, no fiddly bias adjustment, and no noise reduction systems to come to terms with. Digital recording is so simple that everyone will be able to get the best results from it and not just the determined few who are currently prepared to spend a considerable amount of time setting up an analogue cassette deck.

This was something we had already discovered after playing with CD-R machines, but it is a fact that will revolutionise the way tapes are made. Because you

are recording digits rather than a musical signal, all the problems associated with biasing the tape correctly, and indeed taking into account the self biasing action of the music itself, are no longer a crucial part of the recording process.

Every tape tells a story

Another factor that immediately became obvious, at least with prerecorded material, is the usefulness of the text display on the machine. Rather than having to find the jewel case, discover the position of the track that you require, and then enter that number into the CD player, the DCC machine will obligingly scroll through the actual track names, even while it is playing another track, and then fast wind to the track you have selected.

Although this is an extremely useful device, it is also the point at which the prerecorded tapes start to deviate from what can be achieved at home. With a prerecorded tape the album title, track title and, in the future, even the lyrics, are stored on a data track which is completely separate from the data tracks carrying the music itself.

On the *DCC900* this information is used to drive a 12 character alphanumeric display which will tell you the name of the album and the name of the track being played. If you look at this month's cover photograph, the DCC player is displaying the name of the U2 album which it had read from the tape.

A great display

Although this first player only has a 12 character display, the information capacity of the tape is far larger. Players with a two line display of up to 40 characters are planned, the DCC standard even has provision for a maximum display size of 21 lines, each of 40 characters, which would be more than enough to show lyrics or even addition material such as the sleeve notes.

This ability to find a track by its name is very useful, but has to be organised in a slightly different way from Compact Disc, where the player knows what is on a disc by reading the table of contents at the start. If this were the case with DCC then the system would only work if the DCC tape was inserted at the start of a side, otherwise the machine would have to fast wind to the table of contents, read it, and then go and find the track. This would be very time consuming and DCC gets around the problem by using a constantly repeating data track which can be read from any portion of the tape. Thus, as soon as you press play the machine waits for the equivalent of the table of contents to come by and then reads the information into a RAM chip where it is stored for future use. On the sample we had, the time taken to do this varied from practically instantaneous to five seconds or so.

As well as the text information, the data track also contains information such as absolute time, track numbers, track time and remaining tape time. All this information is stored in a series of stacks, so if you have a lot of information, such as lyrics, the stacks become larger and the control information becomes more widely spaced. Thus the time it takes the machine to read in control data becomes longer.

Do It Yourself

Although this approach works a treat with prerecorded material it does present problems when you are making your own tapes. The first point is that none of the control or text data is copied when you copy a DCC: all you get is the music. This has obviously been done to appease the record companies and to give prerecorded cassettes an edge over pirated equivalents. Because the text and control data is a constantly repeated block rather than

being attached to each individual track, it isn't possible to record your own text and control data to anything like the degree of sophistication that can be done with a prerecorded tape. With a prerecorded tape all the tracks will be in a certain order and the company producing the tape will know exactly what is going to go on it and the exact start and stop points of the various tracks. Thus it is quite easy to produce the control block which the DCC will use to handle the tape.

A question of timing

With a home recorded tape, however, this information won't be available until you have completely filled the tape. Even then there might be breaks in the time code laid down during the recording or tracks may have been laid down in the wrong order.

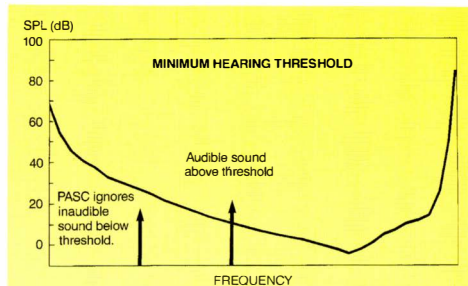
DCC gets around this problem in one of two ways. Basically any home recorded DCC is classed in one of two categories, Superuser or User. In order to qualify as a Superuser tape the selections recorded onto the DCC must have a continuous run of time code and sequential track numbers, although the track numbers can be sorted out using a renumber key if they are out of order. Providing the time code is OK, the DCC machine will make what is effectively a temporary table of contents at the start of each side which speeds up functions such as track access. Where the time code is split up the tape is simply classed as a User tape and the machine then fast winds looking for gaps between songs to find the next selection rather than fast winding to a particular point on the tape.

Obviously this will be a lot slower, particularly where the track you want is on the other side of the tape, as the machine will go all the way to the end of one side, not find the track it wants, and then go and look on the other side until it comes up with the selection you require. In Superuser mode it knows that the selection you require isn't on that side of the tape and so goes straight to the correct point on the other side. In Superuser mode you can also give the tracks a title, and there is the facility for future machines to be able to use this in much the same way as they use the prerecorded track title, although this is not available on the *DCC900*.

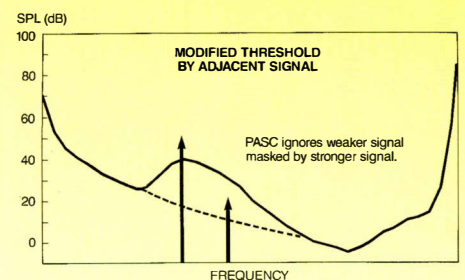
Making up tapes which qualify as Superuser tapes isn't as difficult as it sounds, thanks to an extremely useful Append key which goes to the end of the recorded section of a tape, reads in the correct number and time code for the track you are about to record and then sets the deck into record pause mode.

The controlling interest

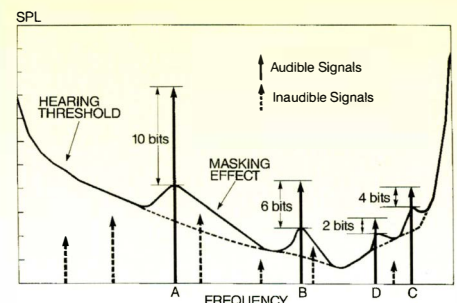
DCC also provides the user with the ability to write a number of control facilities directly onto home recorded tapes. Start of track markers can be both inserted and removed manually and you have the facility to write next and reverse markers. A next marker instructs the machine to fast wind to the beginning of the next track while a reverse marker changes the direction of tape travel. The reverse marker is extremely useful when you have come near to the end of a side and find that you can't fit in a complete track. Rather than have the tape play all the blank space before the end of side and then turn over before the music starts, you can simply tell it to reverse the direction then and there, which only takes about a second. Obviously the down side is that you lose the corresponding length of tape at the beginning of the other side but I'm sure



PASC Rejects Inaudible Signals



PASC Rejects Masked Weak Signals



Adaptive Bit Allocation by PASC

that this is a price that most people will be more than willing to pay for this convenient feature. Both reverse and next markers can be erased using the marker erase facility and both are written 'retrospectively' so that a reverse marker actually turns that tape at the point you desire rather than at the end of the marker.

Conclusion

From a convenience point of view DCC is miles ahead of the compact cassette and offers many of the facilities available on Compact Disc, although obviously access times are longer. Just how much longer depends on the software. With prerecorded material the access time can be surprisingly quick, although Superuser tapes are slower and normal recordings even slower still.

The text facility is excellent and locating tracks by name rather than by number is something that will save a lot of time when it comes to finding your favourite track, although it would have been nice to see this facility closer to the heart of home recordings as well. Although the facilities have obviously been stacked in favour of prerecorded cassettes to appease the record companies, there are also technical

reasons why you can't do quite the same thing with home recording. However, the format is flexible enough that third party developers will be able to increase the facilities available, perhaps by adding a PC interface or up and down cursor keys for text entry for example.

This exposure to DCC, in Jason Kennedy's listening room, with the assistance of Gerry, our Dutch remote control and technical spokesperson, was considerably more congenial than my previous experience, in the sweatbox at Philips' exhibition tent in Battersea Park. The Kennedy reference system (consisting on this occasion of John Shearne amplification and Audio Note speakers) also managed to give the tricky little digital cassettes a more appealing sound than I'd previously heard.

In this context my ears made the following value judgements.

For Rickie Lee Jones' *Last Chance Texaco* the 'original' (in this case a CD-R recording from CD) had better, more specific imaging, notably on the vocals. DCC seemed to spread Rickie Lee's voice across the soundstage, though this wasn't neces-

sarily an unpleasant effect.

Our token Free track fared less well. Compared with the CD-R version, DCC made the instruments sound substantially smaller, with less ambient sound. The rather unkind phrase 'shrivelled husk' crops up in my listening notes at this point. More dryness adjectives were applied to Rickie Lee Jones' *Easy Money* where DCC failed to capture the solidity and three dimensional quality of the CD-R original.

Just to confuse you with another trio of initials, KLF on DCC lost out to the CD version of *The White Room*. The original was noticeably more spacious, intricate and punchy, giving the correct impression of a deranged beast loose in the room. However, the John Mellencamp test track which followed was terrific. Big, fierce, jagged and bluesy, with considerable depth of image — and all this on the DCC copy. Admittedly, the CD original had more pronounced percussion and a bell-like clarity to the guitar which the tape lacked, but the taped version nonetheless had my head bobbing happily and I can't escape the fact that my initial reaction to the DCC copy was a big thumbs up. If I hadn't been involved in a methodical A/

Understanding PASC

Why has it taken so long for the humble cassette to go digital? The answer is that the sheer quantity of digital information contained on a Compact Disc, around 650Mbytes, won't fit onto a conventional cassette. To get digitally recorded music onto tape you have to either increase the tape's information storage capacity, as with DAT, or somehow decrease the amount of information that has to be stored. DCC adopts the latter approach and employs a system known as PASC.

PASC stands for Precision Adaptive Sub-band Coding and is a multi-stage process aimed at encoding only that information that can actually be heard, and doing so in the most space efficient manner.

The first stage in the process of reducing the data is to determine what proportion of the signal can actually be heard by the human ear. As you probably know the ear is most sensitive to the frequencies used in human speech and gets progressively less sensitive as you move away from this central area. This sensitivity can be expressed as a graph known as the threshold of hearing (see the top graph on the previous page). Basically if a sound lies below the line then you won't be able to hear it and vice versa. Obviously the exact position of the line will vary from individual to individual and part of the design process for DCC was to choose a position for the line such that the minimum number of listeners would be able to tell that some

information had been removed. The exact curve chosen by Philips for the system is part of the technical spec of the machine, and we will be exploring that at a later date, but we can expect that a decent margin of error has been incorporated.

Once the PASC system has decided what can and can't be heard the redundant information is discarded, but this still leaves too much information to be encoded into the space available. The next step is to discard more information according to a process known as masking. Put extremely simply, masking is the process by which loud sounds cover up quiet ones. Thus if someone sets off a pneumatic drill in your ear you are unlikely to be able to hear a flute being played a couple of blocks down the street. Obviously the exact process is far more complicated than this and takes into account the frequency of the signals involved, as a loud noise is more likely to cover up frequencies close to the original noise than it is to cover up frequencies which are further away. (See middle graph on previous page.)

Once the effects of masking and the hearing threshold have been taken into consideration it is time to code what is left.

With a conventional CD all the information in the signal is given an equal weighting, and as a result long numbers are used to store relatively little data. To use the decimal number system as an example, let's say the biggest number you can count up to is one million,

1,000,000 and the smallest number you can cope with is one. The problem with the way that Compact Discs store data is that the number one is stored as 0000001 rather than just 1. As you can see this wastes a lot of space. Similarly you don't really need all six zeros after the one to denote the fact that the number you want is a million. You could simply store the first part of the number and the number of zeros that are to follow. Thus one million (1,000,000) would become 1,6.

The above is a very simplistic treatment of the way PASC works. The real system obviously works on binary numbers made up of ones and zeros and results in a series of what can best be described as digital words, each representing a given number. The first part of the word consists of a scale factor, which can be up to six bits long, and the second part, called the quantization bit, varies in length from two to 15 bits depending on the signal being encoded.

By applying all these functions to the incoming signal it can be reduced in size to such an extent that what is left can be squeezed onto a humble chrome cassette. On replay the reverse process is employed and the signal is effectively rebuilt. The result is a standard 16-bit datastream as employed in CD which can then be fed either to a DAC within the DCC machine itself or fed to anyone of the vast number of outboard DACs currently on the market.

Bcomparison procedure, I probably could have listened to the DCC quite happily.

The Violent-Femmes-on-vinyl test was rather an odd episode. The DCC recording sounded pretty terrible, like something that had been recorded in a damp cardboard box, but the LP original didn't sound a hell of a lot better. DCC offered a prominent vocal but otherwise presented instrumentation which was a bit of a blur. On vinyl, the finger snapping and individual guitar notes had a well rounded reality and an appealing quality quite lost on the DCC, where they were just separate specks of sound. There was more tonal variation and more reality to the vocals on LP, but as I said, in this case there wasn't a gobsmackingly clear over-all winner.

Much the same could be said of Jesus Jones on CD and DCC. The pre-recorded digital cassette was a mish mash while the CD had a better differentiated, more sculpted sound, but the medium was hardly likely to stand or fall on this particular comparison.

Again on pre-recorded DCC, U2's *Achtung Baby* sounded very good indeed, solid and authentic, with a pleasurable measured beat to the music. It's only fair to say that CD was still tangibly better, though, with more space and vibrancy, more emphatic piano, and a meatier drum sound.

Finally, the Mozart piano concerto on vinyl proved a more demanding test than the Violent Femmes. Compared to the LP original, the DCC copy offered a piano sound that was blunted, shrunken and softened, and woodwinds that seemed an order of magnitude smaller. It has to be said, though, that the DCC copy had a very clean and quite delicate sound that was far from being unpleasant.

Andrew Cartmel

DCC; a vinyl junkie's impressions

I expect you'll have gotten an impression of the scene by now. My not overly large listening/living room invaded by three Philips chappies, Andy Benham and Monsieur Cartmel. Hardly the perfect environment for assessing what could end up being the number one software format for the mass market. However, after a couple of hours of A/B dems with recordings of CDs and LPs and a couple of comparisons between CDs and pre-recorded DCCs, an impression of the new format's character began to emerge. It must, of course, be remembered that these were among the first DCC decks in the world and therefore are probably not entirely representative of what will arrive

on the market this Autumn, but they were as close as we were going to get in mid April.

Comparing recordings of CDs with the originals, I noticed several aspects where the DCC had lost, or PASC'd out musical information. There were two key areas that this affected, most obvious of them being a rolling off of the defining edges of high frequency notes. With DCC you get a softer less precisely defined sense of image and attack, everything sounds smoother. The other area that was significantly effected was low level detail, specifically harmonics which almost disappeared in some instances. In practice this means that acoustic instruments sound less acoustic, losing some of their character and naturalness. The only other aspect that I found wanting was bass extension, although this could possibly be tied into the harmonics loss. I was most surprised to note that on two occasions the CD reproduced much deeper bass than the DCC. On the KLF track there were occasions when the room shook with the CD but failed to even quiver with the DCC, this despite the fact that theoretically very little information is left out below 750Hz.

That's what it doesn't do. What it does do is produce open, wide bandwidth, reasonably dynamic and rhythmically quite coherent recordings. Its character is very well suited to casual listening, ie, on personals or for those of you that don't have to sit in the sweetspot for every track. It appears to be superior to compact cassette in most respects, but it must be said that rare are the occasions when I sit down and listen seriously to cassettes.

An interesting medium. Perhaps more interesting, however, will be the software battles that it fights with MD.

Jason Kennedy

View from the top

Deciding on the sonic merits of a new format is always going to be a stressful operation, particularly when Philips is claiming that DCC is as good as CD. Sitting down with the DCC900 with Philips personnel present is perhaps not the best way to judge the new format and we'll have to wait until we can get a sample into a properly controlled blind listening situation before you can really begin to tell just how close the two formats really are, for the simple reason that there is a massive pressure on people to say that they can hear a difference, if only to justify their claims to being a good hi-fi reviewer. Obviously the brain is quite capable of imagining differences because the listener expects there to be some.

So with that caveat, what about DCC? Well my first impression is that the format is very good indeed, and certainly far better than I had expected. However I don't think that the DCC900 is as good a digital front end as a Meridian 602 transport. Note that I'm not saying that DCC is worse than CD, simply that with the two front ends we used, the Meridian came up top on just about every track.

The difference can be summed up quite simply; the Meridian's music has more ambient information.

Listening to the two Rickie Lee Jones tracks we used there appeared to be a better sense of space with the CD version than with DCC. This album is a marvellous recording with a very good soundstage and quite simply the DCC copy we made didn't have as much information about the recording venue as the original CD. I also thought that Rickie's voice was more natural via the CD than on the DCC copy and that the sharp intakes of breath sounded more accurate via CD.

We aren't talking chalk and cheese here, DCC is massively superior to compact cassette, most notably in terms of dynamic range, and the sort of differences I could hear between the DCC900 and the Meridian 602 were akin to the sort of difference you would expect between budget CD player and a decent DAC/transport combination.

Using the KLF album I thought that the Meridian had the edge in the bass with more weight and a faster feel to the notes, there being a slight trace of overhang with the DCC version. This was also evident with the U2 track *So Cruel*, where the kick drum from the CD sounded like a kick drum and the DCC recording sounded more like a very good drum machine imitation, with less detail to the sound, particularly the actual impact against the drum skin.

Obviously there will be an awful lot of debate on this subject and as I stressed in the introduction, *Hi-Fi Choice* would rather leave our final verdict until we've had a chance to do our auditioning under blind conditions without the pressure of needing to be able to perceive a change for the sake of proving a point.

Certainly on the basis of what we heard, DCC works, and works well. It is far better than an equivalently priced conventional cassette deck, at least those with which I am familiar, and if similar standards of performance can be obtained in both the in-car and portable machines, then it looks like a worthy replacement for the compact cassette format.

Andy Benham

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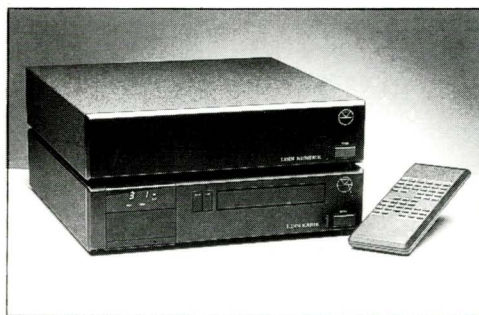
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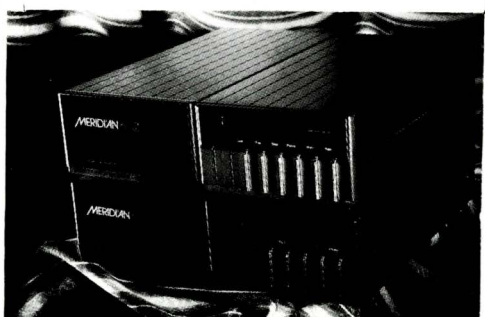
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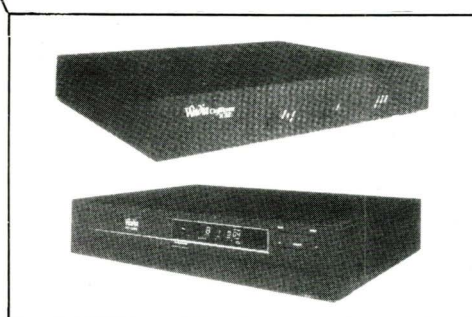
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CHOICE ANSWERS

Get rid of that annoying curtain

My system consists of a JVC QL-A5R direct drive turntable with a Shure M95HE cartridge and an old Philips CD-101 CD player going through a JVC A-X3 amp, driving a pair of AR19Bs. The amp also has a JVC tape deck, tuner and Panasonic hi-fi video attached to it.

The sound from the turntable and CD is OK but it isn't really 'involving', there's something missing. Comparing my system to a friend's, it seems like I'm listening through a curtain; the treble seems OK if a little fizzy, but the bass is awfully muddy and the midrange is almost non-existent. I've now reached the fortunate position where I can afford to upgrade most, if not all, of the system, and I'm finding the available choice bewildering.

Having immersed myself in the hi-fi press for the last couple of months, I thought I'd like to try out the *Little Pink Thing* with an RB300 arm and an AT-OC5. In the amp stakes I was thinking of trying out the Rotel RB/C-360BX pre/power combination (or possibly the Audiolab 8000C/P combination), and for speakers I was thinking of something in the Tannoy sixes range (605, 609, 611). I'm not so sure that I want to replace the CD player just yet, but I probably will in a couple of years. I like all sorts of music and listen almost equally to rock/pop and classical/opera.

Is this upgrade too ambitious from my current system? If not, have I chosen a reasonably balanced set of components and what else should I look at to give

myself some choice? Could I, say, combine the Rotel preamp with a different power amp? If so, what? Is it realistic to expect the old CD player to sound OK through a better amp and speakers or should I go for an upgrade now? I've got a budget of £2,000. The magazine is great! Keep up the good work.
Nigel Hall, Stevenage, Herts.

OK, £2,000, turntable, amp and speakers. The options are multifarious but there are certain choices which stand out above the rest. For my money the most natural sounding option is as follows: Voyd Valdi/Rega RB300/Roksan Corus Black (£1,117) front end, Audio Innovations Series

300II (£500) amplifier and Audio Note AN-K loudspeakers (£500). This system breaks the budget, won't go seriously loud and doesn't yet include cables and stands. But, it represents the highest fidelity you can get for your money — and you won't want to buy any more Compact Discs. If you're after a bit more power and need to get the ancillaries into the £2K budget then swap the Series 300II for a Pioneer A-400 and start saving for a Series 200 preamp.

Listen to the system that you have selected, then listen to the one listed above and see what you think. But don't forget to take your classical records to both dems.



Valdi tasty: a turntable to fill the Voyd in your system.

An escape from the ghetto blaster

I am currently playing my CDs on a Panasonic RX-DT5 ghetto blaster through Linn Kans via a Sansui AU-217 II amplifier. You will no doubt agree that it's time for a fairly serious upgrade. The amp has clipped since I bought it, the advice I received from my dealer at the time was 'don't play it so loud'.

I have since deduced that the problem is the inefficiency of the Kans, but as I wish to retain them and mostly play my

music loud I am considering the Audiolab 8000A along with the legendary Rotel RCD-965BX CD player.

What is your opinion of this set up? And what type of cables do you recommend?
Graeme Billet, Currie, Midlothian.

Yep, the Audiolab does indeed look like a good option but then again so does the Cyrus II (£380), the Creek CAS-6060 (£470) and, if you place volume

above all else, the 133W Marantz PM-80 (£400). A couple of others which we haven't tested but are likely to fit the bill include the current Musical Fidelity B200 and Rotel's biggest integrated, the RA-980BX which delivers a hefty 100W.

As far as cables go, Rotel Supra 4.0 is a reasonably priced (£3/m) and good sounding speaker cable and Deltec Slink at £32 is a very competent interconnect.

The works

My wife has finally taken leave of her senses and is allowing me to spend some cash on a new hi-fi system. I have waited for this moment for many years and would therefore greatly appreciate a little advice.

I have a budget of £1,000 with which I have to purchase 'the works'. I have an idea of some of the items I would like to obtain, having scoured your good magazine over the last few months but confidence could be higher.

I have short listed the following: Technics SL-PG200A CD player, Aiwa AD-F810 or JVC TD-V541 cassette deck, Rotel RA-930AX or NAD 3020i or Pioneer A-400 amplifiers, and some wall mountable speakers, a tuner and a turntable.

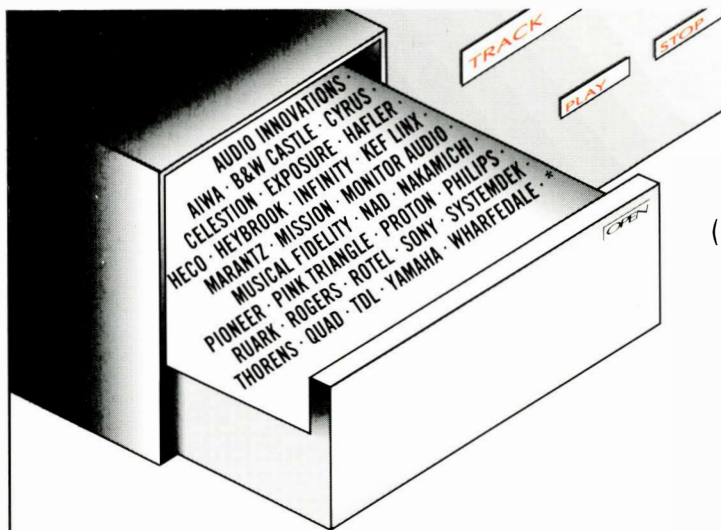
Most of my software is of the cassette persuasion.
Andy Peacock, Portland, Dorset.

You really do want the works don't you?

To start with I'd suggest you think hard about the practicality of a turntable, as new software isn't that well distributed any more and while the used record trade is still alive and kicking, finding secondhand stuff is a bit hit and miss and doesn't necessarily cater for all tastes. However, vinyl is cheaper and debatably more enjoyable than polycarbonate, so as I say, weigh up the pros and cons before splashing the dosh.

Assuming you don't go for the turntable the following line up fits the budget and will do the biz; Marantz CD-52 CD player, JVC TD-V541 cassette deck, Denon TU-260L tuner, Rotel RA-930AX amp and Arcam Alpha loudspeakers. This little lot will cost you close to £940 and was selected for the following reasons: given your music collection it would make sense to go for the better cassette deck, the Rotel amp would probably work better than the Pioneer in this context, and SL-PG200As are virtually extinct. If you want a turntable as well, save up for an Ariston Pro (£160).

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In search of a system for the L-shaped room

You people deserve some praise, particularly in this instance Alvin Gold. Over the past few months Alvin Gold has communicated his appreciation of the Systemdek IIX/900. On the strength of his review I went and heard one, and bought it, with Moth arm and an AT-110E cartridge, as an upgrade from a Dual 505-3 which I bought 3 years ago, following a review in *Choice*.

Now I know what he was talking about. For two days I have been listening almost non-stop and to my mind the Systemdek is an education in the meaning of the term 'high fidelity'.

But I think it's time to change my speakers, which are JPW P1s on Heybrook HBS 1 stands, through a Cyrus I with Cyrus cable. I also have a Rotel 855 CD player which may see no further action for quite a while.

My listening room, which doubles as a bedroom, is 'L' shaped with a listening area of 11ftx12ft and a curved back wall into the 'L'. The P1s were probably never right for this room as they require a total of four metres across (one either side, two between them) and a metre behind for optimum performance. I didn't know about such things when I got them; however, they've not been bad.



Tall dark and NADsome — the 8100s might be just the thing.

Would floorstanding speakers be wasted in such a situation, about 4-5ft from the foot of the bed? Would Heybrook HB1 S3s be a better idea? I'd like speakers which

cover the lower frequencies, and have well behaved treble. My budget stretches no further than £300-£400 and I'm not keen on the idea of sub-woofers. Is this mission

impossible?
Mark Wilson, Bristol.

I'm glad you appreciate the Systemdek; it's probably the best inexpensive turntable on the market. Put it this way, if every midi system sold had been equipped with a IIX then CD wouldn't have got off the ground. If you fancy improving, then get the acrylic platter — a simple but extremely effective and cheap upgrade.

As far as speakers go your brief is a little tricky, but there are some options that should come close. Bass is the main problem, good quality extended and controlled bass is just not available at the price you want to pay. You either have to sacrifice extension or control. In the former camp the best options are the Audio Note AN-K (£495 — OK, it's a bit expensive, but worth it), Tannoy 609 (£250), Epos ES11 (£300) and the HBS1 S3 you mention. On the greater weight but less subtlety side we have the Boston T830 (£399), JBL LX33 (£259), NAD 8100 (£269), TDL Studio 0.5 (£399), these latter models all being floor-standing.

Most of these speakers need a bit of space to give of their best; if you have to place them near to the walls try the KEF Q60 (£349) or Linn Index II (£235).

Seeking to tweak those indivisible digits

Am I mistaken in believing that a CD is just a string of numbers in a binary format?

If so, with a big enough computer, and a good copyright lawyer, you should be able to copy the entire contents of a CD, tweaked and untweaked.

You could then compare them bit by bit to determine whether there really is a difference and, if so, what it is exactly.

The results should not only be interesting, but also completely objective.

Nicholas Taylor, Berks.

Even if you could harness enough RAM to store this sort of



information, merely comparing 1s and 0s wouldn't give you the whole story. It would be a lot easier if all it came down to this simple criterion but as readers of last month's Perspectives piece (Copy Cats, issue 106) will have ascertained there are rather more sides to the story.

For a start jitter caused by timing errors represents an uncertainty in the exact position of digital 'edges', which gives rise to very audible but complex distortions after D-to-A conversion.

Leave those fiddly digits to the DACs, that's our advice.

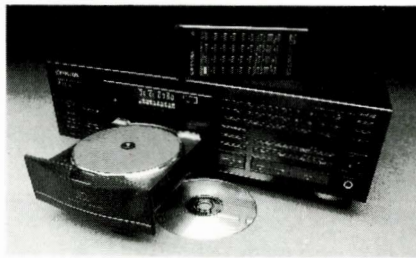


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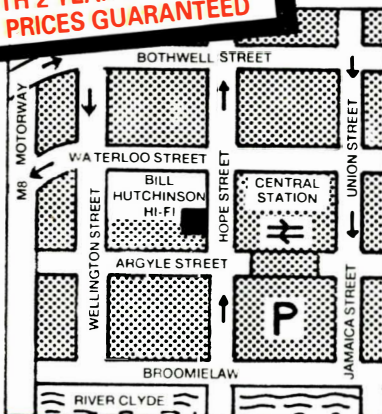


PD8700 Compact Disc Player

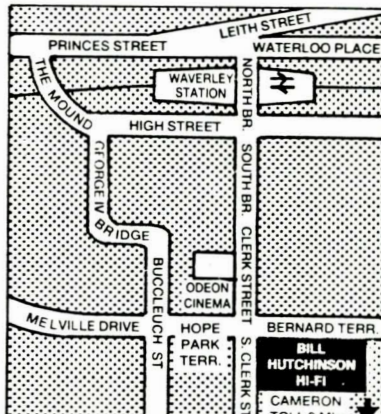
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Write on . . .

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

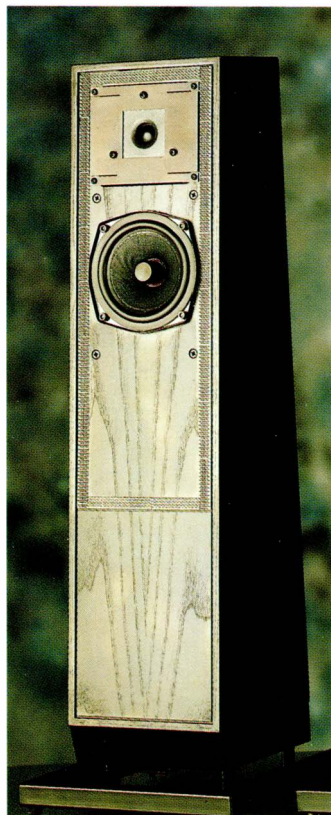
Those old speaker upgrade blues

Six months ago, I decided to buy some new hi-fi. I'd been perfectly happy with my system, but I was aware that a number of significant advances had been made, and I was becoming increasingly dissatisfied with my existing loudspeakers. My budget was around £600 and I listened, in all, to nine different pairs, three of which had been highly praised in *Choice*.

By the time I got to the third dealer and seventh pair of loudspeakers, I was becoming increasingly despondent. All the speakers sounded pretty good, but nothing set me on fire. Nothing sounded *that* much better than the speakers I'd recently sold.

Then it occurred to me that as I had a Linn and Naim system, it would be sensible to listen to the Naim IBLs. My dealer set them up, I put on Paul Simon's *Boy in the Bubble* from *Graceland* and simply couldn't believe my ears. As the music continued I realised that I'd never really heard this LP at all. I was now hearing a clarity, ease and precision which I was beginning to think didn't exist.

In great excitement I played other music I thought I knew well. I suspected, after three minute's listening, that the IBLs were for me. Prolonged listening confirmed it, and I have never for a



A Naim IBL, proving very popular in SE26.

moment regretted buying them. They have simply become better and better as they've acclimatised themselves to my listening room.

A month or so after buying the IBLs I came across a couple of magazine reviews. Both reviews were exceptionally complimentary, and both mentioned the stunning clarity and presence the IBLs offer. Then, in utter astonishment, I read the IBL review in *Hi-fi Choice* last month. Not even a 'Recommended' tag. Were you, I wondered, listening to the same speakers? Had the specification suddenly changed? How could you come to this conclusion?

No doubt you would say that reviews are simply meant to be initially informative, so that a potential buyer can create a short list and then take things from there. The trouble is, if I'd seen your review of the IBLs in the first place, they would certainly never have even reached my short list, particularly as I consider *Hi-fi Choice* to be an excellent magazine of great integrity. I would then have been deprived of the best hi-fi purchase I have ever made.

Perhaps this letter can go a little way towards redressing the balance, and remind readers how absolutely essential it is to listen to as wide a range of equipment as possible . . . even if it hasn't been well reviewed by magazines you trust.

Mike Kent
London SE26

Enlightenment at last

In a moment of unparalleled enlightenment I believe I have solved one of life's great mysteries; the art of review writing. My solutions are presented in what they say / what they really mean form.

1. "The effect was to send shivers down my spine." — Audio Note Ongaku spontaneously combusts.
2. "Tangible, yet warm and seductive." — Reviewer's mind clearly on other things.
3. "A curious peak at 16kHz." — Reviewer is half man, half spectrum analyser.
4. "Superb lab performance." — Component survives Paul Miller's loving attention.
5. "Small channel imbalance." — One speaker is missing.
6. "Some 'grain' in treble." — Local dog population organises protest march.
7. "Deliciously full bodied." — Reviewer finds bottle of home made wine.
8. "A muddled, fuzzy perspective." — Wine more potent than anticipated.
9. "Everything seemed to snap into focus." — Reviewer's liver turns in a stunning performance.



Specialist service — or maybe not

The following two incidents occurred when I was looking for new speakers.

Shop A. Upon my asking the sales person for recommendations: "You'll love these speakers. They're a beautiful piece of furniture."

Shop B. Upon my entering the shop for a pre-booked demo: "I'm sorry. We can't demo you the Linn *Kan*

speakers as we promised, so instead we'll demo you the Rogers. They sound the same." And when I said that I really didn't think Linn *Kans* sounded anything like the Rogers, the salesperson scowled at me and said, "Well, they're the same shape and size."

I wish I could tell you that these two incidents occurred in high street multiples. Alas, they

both occurred in specialist shops. Shop B in particular is a highly regarded audiophile haven.

I did manage to purchase new speakers, from a specialist shop. And learned never to assume that going into a specialist shop is any guarantee of good service.

Lillian Wachbroit
London N10

Lastly, I have a great idea for a tie-break for your next competition:

Complete in less than 20 words — "Fitting a new mains spur may be your final upgrade because . . ."

Paul Burnley
South Yorkshire

The Reference Review

PRETTY IN PINK

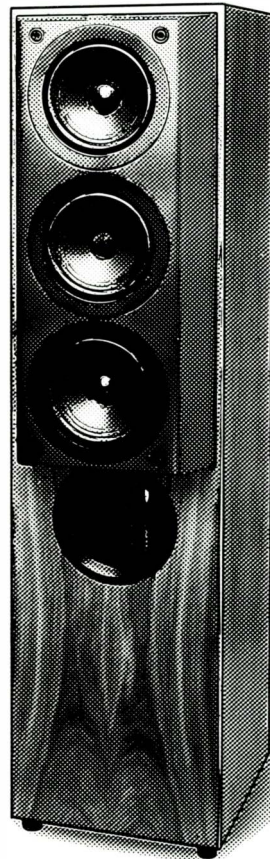
Spring finds nearly the whole of the Pink Triangle range in upgraded form. Improved bearing, flexi-link and revised PSU re-confirm the Anniversary as a reference player par excellence, whilst the Export, too, sports a significantly improved PSU. The Little Pink Thing continues, of course, but is now also available in a trendier "GTI" format. Smoke signals from Camberwell hint at new products from Arthur and the team – informed speculation and general rumour-mongering available from Matt and Lee on request.

ROKSAN ROLLS ON

Equally at home in hi-fi systems and art galleries, the new Roksan CD transport is a visual and sonic stunner. If you're looking to get the most from your CD collection you really do owe it to yourself to hear this unit. The new transport complements perfectly the existing and much acclaimed Xerxes and Radius record players.

MICHELL GOES TO OXFORD

A phone call to Jaz at our Oxford branch should be enough to elicit words of wonderment from our Welsh wizard about the new Michell Argo line-level pre-amp and Hera PSU. An audition is a must, particularly for record deck owners already bowled over by the exquisite Iso.



The complete range of KEF Reference Speakers are now available from stock.

Demonstrations available in your own home.

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Acoustic Energy, Arcam, ATC, Audiolab, Audio Alchemy, Cyrus, Deltec, Denon, DynAudio, Exposure, E.A.R., Furukawa, John Shearne, Kef, Musical Fidelity, Mod Squad, Nakamichi, Pink Triangle, ProAc, Quad, Roksan, Ruark, Systemdek, Teac and others.

THE MPI COLLECTION

Looking for something a little bit different? Distributors MPI import some of the world's most exotic hi-fi components and accessories. The acclaimed Accuphase CD players from Japan, Counterpoint amps and Thiel and Genesis loudspeakers from the USA are but a few examples. Please call for details of an outstanding range.

BETTER EXPOSURE

Exposure kicks off the new season with a new logo, new facilities, new models and a special edition of an old favourite. The superb XV and XX integrated amps now feature separate listen and record selectors and sport the company's new livery. The all-new XVII/XVIII pre-power is likely to set new standards at £1350 the pair. To celebrate their tenth anniversary, Exposure are producing a special edition of their famous VII/VIII combination. Phone or write for details.

ESSENTIAL ACCESSORIES

Everything makes a difference, so much is obvious. But what's worthwhile? After exhaustive and exhausting experimentation we now recommend cables and interconnects from Audioquest, Cable Talk,

Exposure, Furukawa and Isoda. Advice about which wires will best suit your boxes is only a phone call away; we will happily "custom build" all manner of audio and AV leads.

The Reference Rooms

109-113 London Road, Sevenoaks, Kent. Tel: 0732 742299 Ask for Matt or Lee
41 St. Clements Street, Oxford. Tel: 0865 794906 Ask for Jaz

21st Century Fox

Many of us have grown up to the sound of BASF singing the praise of chromium dioxide tape — and sniping at the Japanese for pushing ferric cobalt as an alternative Type II, high coercivity coating.

Many record companies have been using chrome for their musicassettes, too. This has put BASF in an embarrassing position. One half of BASF has to stay friendly with the record industry. The other half wants to fight the record industry on its lobby for a tax on blank tape, while demonstrating how recordings of CDs made on chrome tape are indistinguishable from the original.

And all the time BASF has been fighting the Japanese who made tape which did not confirm to the international standard which was set with chrome as the reference.

There was also the question of head wear. Early on in the chrome wars, the Japanese said chrome audio

Barry Fox reports on matters ranging from the future of chrome tapes, to Q-Sound and getting the best from your 78s.

tape wore out the recording heads more quickly. Later they retracted this. But Philips only guaranteed the heads of the first *N1500* video cassette recorders for 500 hours with chrome tape. 3M offered cobalt ferric VCR tape for the *N1500* and promised thousands of hours. Then BASF improved chrome, and the headwear argument went away.

Now, suddenly, adverts are appearing in the US music trade press, 'introducing BASF ferric cobalt'.

"When you use BASF's newest audio duplicating tape, you had better get ready for a ferric cobalt blast. By enhancing ferric particles with magnetic cobalt we have developed a tape with significantly higher coercivity . . . it'll blow you away".

So has BASF finally abandoned chrome, without telling anyone? "No", says BASF in Germany, "domestic cassettes will still use chrome". But in the US, the music industry has never adopted chrome. When BASF bought Agfa, it seemed the ideal opportunity to switch and use Agfa's ferric cobalt technology.

But that is not all. There is also a major shift in policy in Europe. BASF will soon start offering the duplicators in Europe a new 'Chroco' tape. This is chrome tape, doped with up to 20 per cent cobalt. BASF says it is 'better' and 'more reliable'. How long, I wonder, before we see a domestic version of Chroco.

The gramophone revival starts here

While the record industry remasters old records using either the Cedar or Sonic Solutions No-Noise computer clean up systems, Nimbus is following another route. "We are not restoring old records", it says. "We are re-presenting them"

Nimbus works on the principle that there was nothing wrong with 78s in the first place. You get nasty noises from them when you play them on modern equipment, simply because you are playing them on modern equipment. If you play them on the equipment for which they were recorded, the me-

chanical sound transfer path irons out a lot of the unpleasant sounds. And by golly, it's true.

A couple of years ago Nimbus launched the Prime Voce label, with 're-presentations of old recordings'. The technique is really very simple. The original 78rpm pressing is played on the best possible old gramophone available and the sound it makes is recorded digitally in stereo.

But it is not quite that simple. Old 78s were seldom recorded at exactly 78rpm. So Nimbus checks the pitch and playing speed by ear with a piano. The mechanical motor of the gramophone is replaced by a Technics *SP-15* direct drive unit with electronic speed variation and the setting adjusted to match the recorded pitch.

An original mechanical sound box diaphragm is used but mounted on a carefully made modern tube. The needles are fibre, and often need sharpening several times during the reproduction of a single loud side. The takes are then edited together. The sound box pick-up arm and tube feeds a modern horn, two metres long and one metre wide at the mouth. The microphones used are a coincident pair of Schoeps with a single Brüel and Kjær.

The 'live' sound of records dating back well over half a century is really remarkable. There is background noise, of course, but mechanical damping of the system removes the vicious spikes you hear from a modern electronic pick-up, amplifiers and loudspeakers. The human ear and brain have no difficulty filtering out what remains. Within a few minutes of listening, you just don't notice the background noise.

Q-Sound can't dance

It is only a year ago that Polygram was getting excited about Q-Sound. Recently, while talking to Polygram people about DCC, I threw in the side question, 'How goes Q-Sound?'. All I got was blank faces.

Q-Sound was just one more in a long line of stereo enhancement systems. They all create artificial phase and intensity shifts between the left and right channels to throw the sound outside the loudspeaker arc. Each system has its own variation on the old theme of distorting phase/intensity relationships, and each new inventor comes up with new and clever words to describe the distortion. There is usually a lot of talk about computer processing and algorithms. This impresses the music press, the record companies and gullible investors. The effect can be dramatic, too.

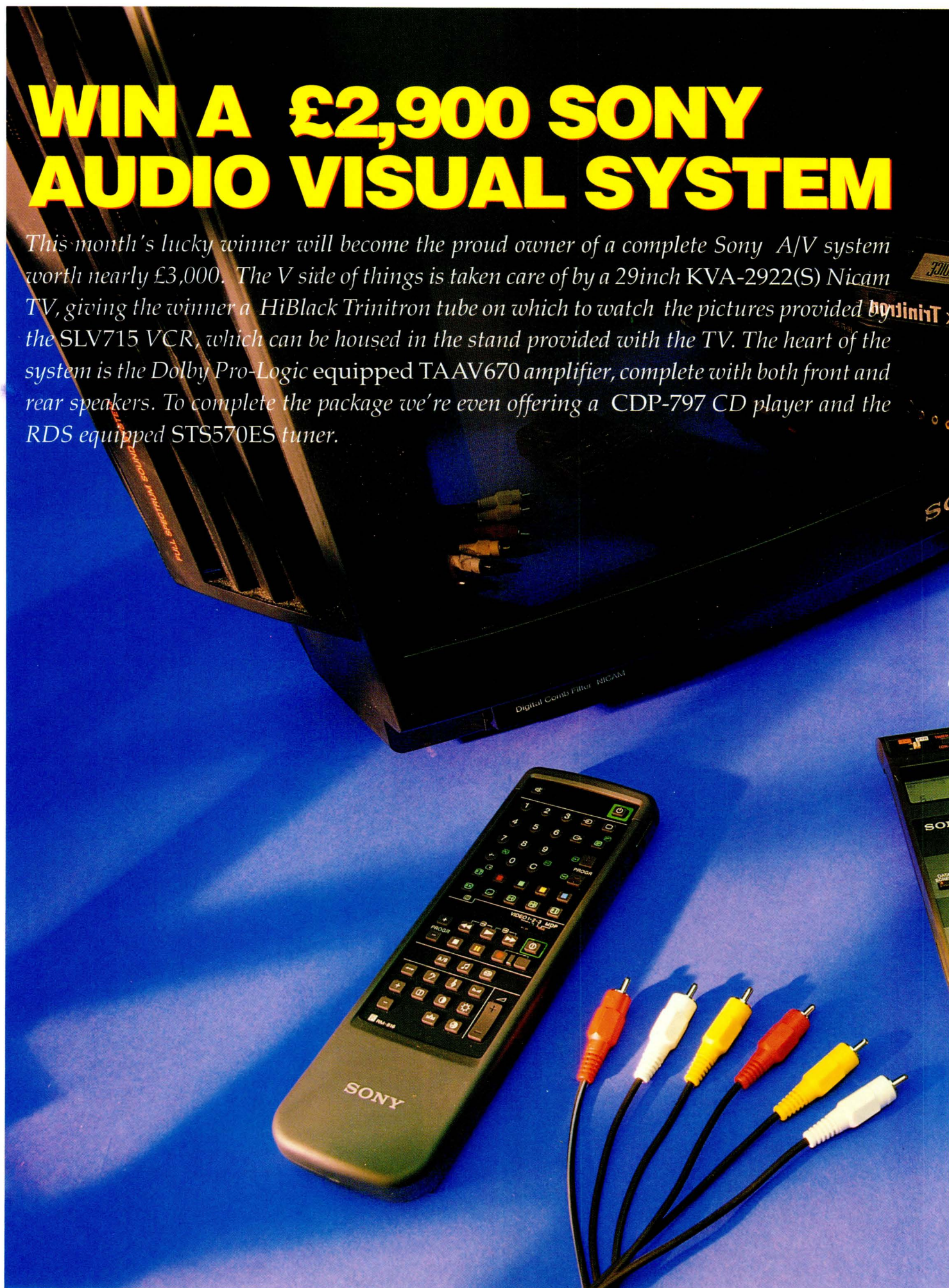
But the effect is also fatiguing, and it plays havoc with mono compatibility. The more dramatic the effect, the more the phase shifts cancel in mono. This worries radio and TV stations, who are still catering for a large number of mono receivers.

Roland's RSS system works in much the same way as Q-Sound. But whereas Roland had the good sense to offer RSS simply as a special effects toy for record producers, Archer Communications, the Canadian company behind Q-Sound, told us it was going to change the face of recording.

Archer's big breakthrough was persuading Polygram to back the system. So those blank faces at Polygram just a year later say it all. I suspect that we have now heard the last of Q-Sound. Which new super stereo system will be next?

WIN A £2,900 SONY AUDIO VISUAL SYSTEM

This month's lucky winner will become the proud owner of a complete Sony A/V system worth nearly £3,000. The V side of things is taken care of by a 29inch KVA-2922(S) Nicam TV, giving the winner a HiBlack Trinitron tube on which to watch the pictures provided by the SLV715 VCR, which can be housed in the stand provided with the TV. The heart of the system is the Dolby Pro-Logic equipped TAAV670 amplifier, complete with both front and rear speakers. To complete the package we're even offering a CDP-797 CD player and the RDS equipped STS570ES tuner.



How to enter

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

The Prizes

The first correct entry out of the postbag wins the lot. Everything. The entire system. This consists of the *KVA2922(S)* 29inch colour television complete with stand (£900); two pairs of speakers: the *APM-141ES* (£220), and *APM101ES* (£110); the new *TAAV670* amplifier (£650); the *CDP797* CD player (£200); the *SLV715* VHS video recorder (£600); and the *STS570ES* tuner (£220). So get clipping.

The Questions

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

1. Which former Goon is featured in the magazine this month?
2. What does Melvin Holmes call his home made turntable?
3. The *Sonolith* is a new loudspeaker. Name the company which manufactures it.
4. Name the *CTA501*'s baby brother.
5. What CD player does Paul Messenger enthuse about this month?
6. Where did the design for the Townshend *Rock*'s silicon trough originate?



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Six months later he came in search of further satisfaction. We delivered and installed a Meridian CD player.

He was back soon after, his passion burning a hole in his pocket. His wife stayed in the car now, looking as abandoned as her antique music centre.

This continued for a few years - the sad story of a man consumed.

The last time I saw him, however, he was triumphant: "I'm retiring, selling my business and moving to Spain

with my Meridian and Ferrari" (his passion for the best didn't stop at hi-fi). "How's your wife?" I asked, naively.

She'd given him an ultimatum. "Either the hi-fi goes or I go."

"What else could I say?!"

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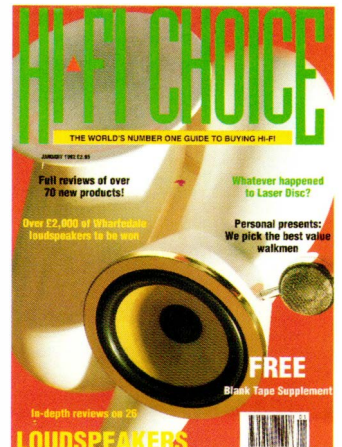
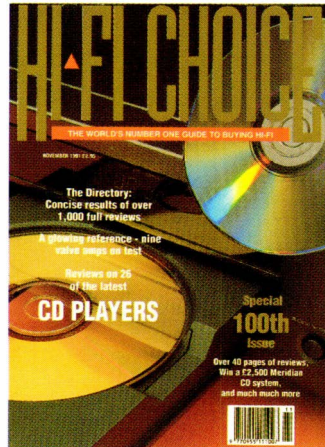
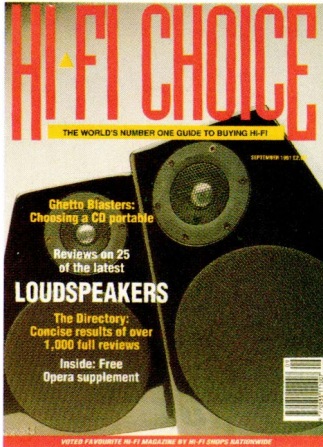


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AUDIO NOTE COPPER & SILVER CABLES

It is perhaps on time that I introduce the most important Audio Note product; the Audio Note cables.

Without the Audio Note Silver wires and cables, none of the qualities of the Audio Note products would be possible, the ONGAKU has several kilometers of 99.99% pure silver wire in its output transformers, the Audio Note lollv and loLtd cartridges have a few centimetres of the same wire, and the wire contribute, in both cases to a great deal of the sonic qualities that both these outstanding products possess, the wire is as integral and proprietary a part of each design, just as silver is central to the total Audio Note philosophy.

Audio Note was the first company in the world to realize and demonstrate that the cable materials and their manufacturing processes affect the sound quality of a hifi system. In so doing Audio Note were also the first to see the benefits of pure silver wire (99.99%) and as such are the originators of audio cables as a science.

Audio Note have since then gained a totally unique knowhow in the art and science of making audio cables and wires that perform far above their price range, regardless whether they have silver or copper conductors.

Audio Note Silver Cables

The first Audio Note audio interconnect cable, the AN-V, was designed in 1974, and offered to audiophiles and music lovers in Japan in 1976. It was produced in very small quantity and only in late 1978 did the AN-V reach Europe. In 1985 the AN-V was joined by the AN-S silver cable, which is basically a downscaled AN-V, its production time, and therefore cost, reduced through the use of less critical materials. The original AN-V remained unchanged until mid 1989, when it was replaced by its current version. The AN-V was replaced at the top of the Audio Note cable range in October this year by the AN-Vx reference, which is the culmination of several years study into all aspects of cable design, suffice to say that all who have heard it agree that it has the most amazingly uncluttered sound they have ever heard.

Audio Note introduced a silver speaker cable in 1979, dubbed the AN-SP. It was unavailable for a considerable time during the 1980's and was reintroduced in 1988 following a substantial order from me.

A fully silver wired system has yet to be assembled here in the UK, although that should happen sometime in 1992, but for every part of the system where copper wire or cable is replaced with Audio Note silver cable

or wire the improvement is always immediate, but don't take my word for it, try for yourself, using our no-nonsense 14 day try-before-you-buy offer.

Audio Note silver cables fall in the following price categories,

Interconnects

AN-S £110.00/m terminated
AN-V £175.00/m terminated
AN-Vx £485.00/m terminated

Speaker cables

AN-SP £110.00/m per channel
AN-SPx £350.00/m per channel

Termination of speaker cable costs £16.00 per set with either gold 4mm banana plugs or spades.

Using the purest available silver as a conductor, naturally has the same effect on price as it has on sound quality, it is automatically high.

Audio Note Copper Cables

The desire to offer some more affordable cables in the Audio Note range as well as ultimate ones, made Mr. Kondo start an investigation into the use of copper wire in audio cables in 1983.

One problem with copper wire is that when it is produced, it is not normally coated immediately after it is drawn and the wire therefore oxidizes before it is coated. The copper wire therefore develops clusters of copper oxide crystals on its surface, which generate a rectifying effect (this is the reason why so many copper and silver cables sound best in one direction, which is the direction where the rectifying effect is the smallest!). This rectifier effect is present in all copper wires, regardless of whether they are oxygen or hydrogen-free or have single crystal structure or not, unless they have been coated immediately upon leaving the die.

If you try to solder a copper wire where an oxide film has formed, the solder will not stick without flux, the oxide layer also has a hardening effect on the wire itself.

Low level electrical signals are not able to pass easily through the oxide film on the surface of the wire, and this worsens an already existing problem in copper wire. The cohesion between crystals in copper is quite poor, and if you stretch a copper wire it breaks relatively easy, this lack of flexibility is caused by weak crystal boundaries. This weakness in the contact between the crystals creates a fairly high "electrical wall" between crystals, which disables small signal transfer between crystals, as the electrons have difficulty passing the "wall".

This is the reason for the continued attempts by many manufacturers of cables and wire to make copper wire with long crystals.

The emergence of oxygen-free coppers like OFC, OFHC, POCC etc., made it possible to design cables around better quality wires provided the wires were manufactured to the right specification.

As a result the first Audio Note audio cable with copper wire, the AN-C (red), was launched in mid 1985, it shared most construction details with the original AN-V silver cable, as it was a twin coax, with symmetrical conductors, in a heavily damped double jacket.

The copper wire used was an OFHC, 99.99% pure copper, drawn in true Audio Note tradition through a diamond die and coated immediately after the die with six coats of polyurethane, to prevent any oxidation forming on the surface.

After six years the AN-C is still available and was joined by the AN-A, yellow, in 1989, both these cables represent exceptional sonic value at a very modest price.

In 1990 the first Audio Note copper speaker cable, the AN-B, arrived. This speaker cable incorporated a number of new ideas, partly to reduce cost without sacrificing sound quality, but also to incorporate reduced RF interference problems, which is not found in the Audio Note silver speaker cables.

The two main problems in speaker cable are caused by the amount of current passing through the cable, this firstly creates considerable "magnetic distortion" in the wire itself, more so in copper than in silver, regardless of copper type and cable design. "Magnetic distortion" is always accompanied by "wire crying", which is a resonance in the surface molecules, this is caused by a weight change in the molecule itself, as the electrons pass. As copper has higher DC resistance than silver, the electrons affect the molecule mass more, with increased "wire crying" as a result.

Secondly, the low frequency content of the signal always leaves an amount of mechanical energy behind, which "smears" the signal following, mainly concealing the low level content of that signal.

To combat this phenomenon, Mr. Kondo chose to use two thicknesses of wire for the AN-B, with the thinner wires bundled tightly at the center of the cable, surrounded by thicker wire bundles on the outside, all very tightly compounded in a vinyl jacket. This provides an efficient and inexpensive damping system (damping by differential masses), which reduces inter-conductor resonance by more than 80% because the different gauges of wire will damp each other as they have different resonance frequencies.

The vinyl jacket is surrounded by a screen, which allows AN-B to be used in a pseudo-balanced mode to reduce incoming RF interference.

To further allow the use of Audio Note quality speaker cables in lower priced systems the AN-D was introduced only a month ago, being a derivative of the AN-B it shares the simple and effective damping arrangement of this Audio Note cable, as well as most of its qualities.

So today Audio Note offers the following audio cables with copper wire,

Interconnects

AN-A £25.00/m terminated
AN-C £49.50/m terminated

Speaker cables

AN-D £6.99/m per channel
AN-B £12.50/m per channel

It is strongly recommended to buy the AN-B in terminated sets to achieve the full benefit of the pseudo-balanced configuration. Termination cost per set with high quality gold plated 4mm banana plugs, £16.00.

Apart from their quite superior sound quality, the AUDIO NOTE cables are very flexible, so if you are tired of the "hosepipe" technology most other manufacturers use, you will be relieved to connect up a set of AUDIO NOTE interconnects or speaker cables, they are flexible and will not pull your speakers off their stand or your amplifier or CD player off its shelf!

Furthermore there are copper or silver wires and cables available for rewiring tone-arms, amplifiers, loudspeakers, most speaker coils, inductors, winding transformers etc., for general systems upgrade and improvement. I should say, however, that these are not available under our try-before-you-buy scheme.

If the above has wet your ears "appetite", then perhaps you should use our try-before-you-buy, guaranteed money back scheme, which allows you to try any standard length interconnect or speaker cable for 14 days and if not satisfied return it for a full refund, all it will cost you is the postage one way.

Peter Qvortrup

**Audio Note Co.
Brighton, UK.**

**Tel. 0273 821371
Fax 0273 771808.**

Choosing and Using . . . Phono stages

What is a phono stage? Well, it's a box of electronics that amplifies the output of a cartridge and equalises it according to the RIAA curve. You plug the turntable into one side and connect the other to a line input on your amplifier. The combination of turntable and phono stage looks like becoming as common a sight as the CD transport and DAC, and though the job it does is very different to a DAC, the end result is the same line level analogue signal.

Phono stages have traditionally been integral parts of amplifiers and preamps, but in these days of CD

With the ever increasing trend towards line only amplifiers, the standalone phono stage is becoming ever more popular. Jason Kennedy takes to the stage.

dominance, their status as a critical part of the amp's performance is dying fast and their existence is under serious threat. Indeed quite a lot of new amps are line only, saving the manufacturers money and making the price more competitive. More insiduously, the quality of phono stages incorporated into budget amplifiers has been dropping with the rise and rise of the silver disc.

One very popular integrated amp, the Pioneer A-400, has been established as a great value line amplifier with a phono stage that's not in the same league as the power amp. John Bamford, our esteemed editor and A-400 acolyte, used a turbo charged Michell Iso with his *Rock Reference* and achieved very creditable results through the awesome Townshend *Sir Galahad* loudspeakers. It's not beyond the realms of possibility that other similarly modest integrated amps would blossom in the company of a good phono stage.

Consequentially, a niche has been carved out for standalone phono stages and quite a few have come along to compete in this specialised market place. Prices vary from £30 for the little QED *Disc Saver* to a serious £9,300 for the Audio Note M7 *Phono* (silver), with about 15 models in between.

For the purposes of this test we have stuck to the middle ground with models starting at £95 and finishing £700 higher.

The system

The system that was used for the evaluation was made up of a Voyd turntable equipped with an Audio Note tonearm. Reference preamplification was provided by an Audio Innovations *Series 1000* step-up transformer and the Audio Note M7 (silver) preamp

(which is referred to as the reference throughout the following reviews).

An Audio Note *Kasai* provided power amplification and a pair of Audio Note *AN-E* loudspeakers revealed the proceedings very effectively. To bring things down to earth somewhat I also used a John Shearne pre/power combo. All cables and interconnect were Audio Note silver.

In order to investigate the full range of each stage's capabilities I used two moving coil cartridges. The Audio Note *IO* which is notorious for its extremely low output (0.08mV) and a distinct preference for a very low load impedance (between 0.75 and 3ohms!). Making a good job out of this sort of output is a very difficult task for your average phono stage, but the *IO* is a superb cartridge and capable of the finest results. The other cartridge was the Ortofon *Quasar* which as well as being far more accessible has a considerably more sensible output (0.2mV) and a flexible attitude to load impedance, the manual suggesting something greater than or equal to 10ohms.

Let's get loaded

Most phono stages in their off the shelf form are designed to deal with moving coil cartridges that deliver 0.15mV or more, but not too much more. Put too many mVs into some stages and they'll run out of headroom, so it's important that the one you buy is set up to suit the cartridge you intend to use with it. Most companies will set-up their phono stages so that it is as near as possible a perfect match for your cartridge if so requested, but most MCs will work very well into the standard settings.

It's the sort of thing that you should discuss with your dealer and/or the manufacturer to ensure the best possible results.

One interesting point that Paul Miller noticed when he lab tested these units was that they all had low output impedances, which means that they would have no difficulty in driving longer than average cable runs. The advantage of this being that the phono stages can be located extremely close to the turntable, so that you can minimise the length of cable coming from the cartridge. Units like Roksan's *Artaxerxes* actually sit inside the plinth of the turntable.

For the purpose of assessing the units I listened to a wide variety of records but the key discs were as follows; Mallard - *Mallard*, The B&W Selection (a classical compilation from the Seventies on the Philips label that sounds remarkably natural), Joni Mitchell - *Miles of Aisles*, Annabel Lamb - *Once Bitten*, John Mellencamp - *Whenever We Wanted* and Violent Femmes - *Violent Femmes*. I also checked out bass extension and resolution with the Dead Can Dance's *Serpents Egg*.

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Lynwood The Equaliser

Lynwood Electronics, Coley Lane Farm, Wentworth, Rotherham, South Yorks S62 7SQ. Tel: (0709) 873 667



Lynwood is a small company which produces a range of amplification products. Neither prices nor appearances are particularly glamorous and ownership involves initiation into the more tweaky circles of audiophilia. But at £110 the Lynwood looks like a very reasonably priced product, and even more so if you go for the plastic cased version which is a mere £95.

This is no all out hairshirt product either, it can accommodate both moving magnet and coil cartridges, though you need to get into the guts and move a couple of plugs to make the change. But as this isn't the sort of thing you have to do every other day it isn't a problem.

It must be said that the wooden cased Lynwood isn't particularly beautiful, the plywood case and glued on perspex fascia are distinctly lacking in finesse. I guess we're spoiled by the standards of finish achieved by the Japanese, even with their modestly priced equipment.

Another whinge is that the length of lead between the basic power supply and phono stage, and that from the supply to the mains were both pretty short, so it needs to be sited close to a socket. In most instances this won't be a problem, but in some circumstances, such as those of the listening sessions, it could be a nuisance. The same could be said of the alternative power supply, a beefy metal cased piece of kit that bears a striking resemblance to Lynwood's mains conditioners, except of course there are no mains sockets in the side. Just mains in, via what looks like Sonic Link cable, and supply out cables. This chunky block costs £125 and delivers a substantial 200VA

Lab report

Tested in its MC guise, Lynwood's *Equaliser* offering is a bit of a mish-mash. On the one hand it enjoys a flat and even frequency response with a sensibly tailored low bass. The low 12ohm output impedance also sug-

gests it'll tolerate long cable runs. But it's downhill from here. Firstly the 0.73mV sensitivity (for 1V out) is not suited to very low output MCs, while its limited headroom puts a damper on high output MCs!

Distortion reaches one per cent with inputs above 3.5mV (1kHz) and 2.3mV (20kHz) through premature slew-limiting, increasing to 2.5 per cent prior to the true hard-clip point. Even here the IEC headroom is just +21dB (1kHz) and +12.9dB (20kHz), well behind that offered by Lynwood's valve *Equaliser*. Just look at the rash of audible IM distortions thrown-up on the 3D plot!

Noise, meanwhile, is dominated by a strong 50Hz drone — without this the A-wtd S/N ratio would improve to a fine -76dB.

With the IO

The *Equaliser* was another phono stage that wasn't entirely suited to the very low output of the Audio Note *IO*, its stated sensitivity is 0.1mV and the *IO*'s output is a mere 0.08mV. Not a massive difference I grant you, but enough to be noticeable as a lack of dynamics and bass power. In other respects it fared quite well, track's like Joni Mitchell's *People's Parties* sounded sweet and open, with no shortage of subtlety and depth. However, other tracks seemed to lack conviction and body.

Another less than appealing aspect was a degree of hardness which became gradually more fatiguing as listening continued. This was not a great combination of cartridge and phono stage, the *Equaliser* hasn't got enough gain and has the wrong input impedance. Given the character of its manufacturer it would probably be possible to get the *Equaliser*'s impedance adjusted to suit specific cartridges, increasing gain, however, may not be on the cards.

With the Quasar

This combination proved to be a much happier one, the *Equaliser* managed to resolve

much of the detail being produced by the *Quasar*. Dynamics had plenty of range and power and generally there was lots of bite to leading edges, which suited electric guitars.

These comments apply to both power supplies, the more affordable of the two, however, adds more than a hint of grain, to the point where it became uncomfortable to listen to for extended periods.

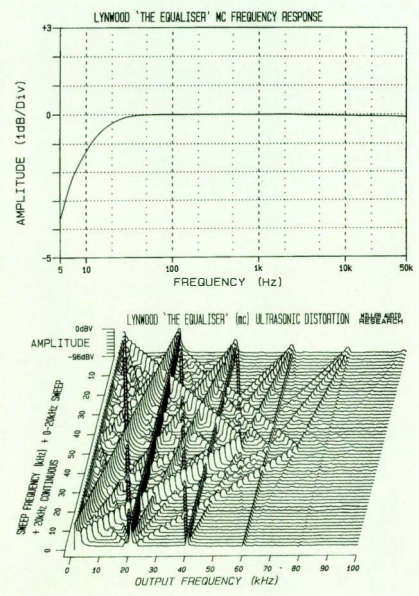
This phono stage, more than any other in the group, improved significantly with the beefier power supply, the extra VAs largely taking the somewhat aggressive edge off the sound.

Conclusion

The Lynwood *Equaliser* is a competitively priced beast that's capable of reasonably good results when used with its more expensive power supply. It isn't exactly romantic, however, and didn't really inspire these ears.

TEST RESULTS

Stereo separation:		
	(20Hz)	74.2dB
	(1kHz)	71.5dB
	(20kHz)	72.7dB
Channel Balance @ 1kHz:		
	(0dBV)	0.21dB
	(-20dBV)	0.18dB
	(-60dBV)	0.17dB
Total Harmonic Dist @ 0dBV:		
	(1kHz)	-34.5dB
	(20kHz)	-20.6dB
CCIR Intermodulation Distortion		
A-wtd	(20Hz-20kHz)	-21.7dB
Residual noise	(unwtd)	-58.7dB
Input Sensitivity	(for -6dBV)	-31.8dBV
	(for 0dBV)	364uV
	(for 0dBV)	728uV
Disc overload:		
	(1kHz)	5.75mV*
	(20kHz)	22.1mV*
	(50kHz)	17.1mV*
Input Loading		100ohm
Maximum Output/Impedance		7.72V / 12ohm
Retail Price		£95 + £125



COALS TO TOKYO

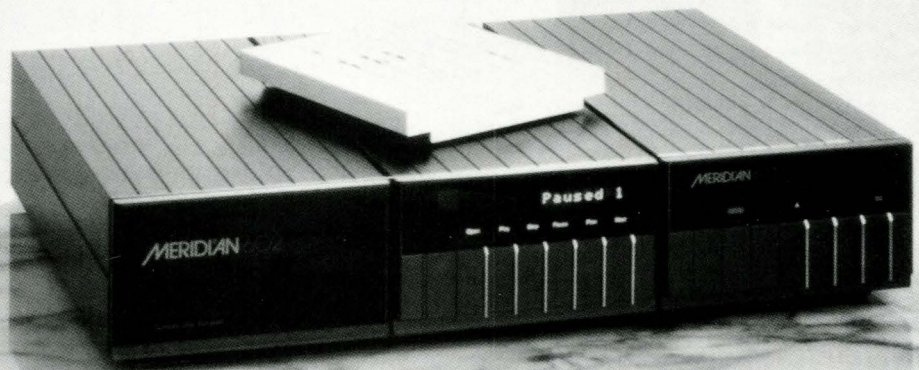
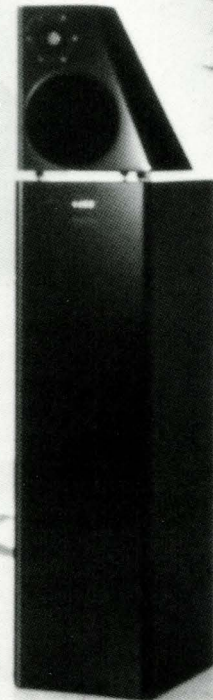
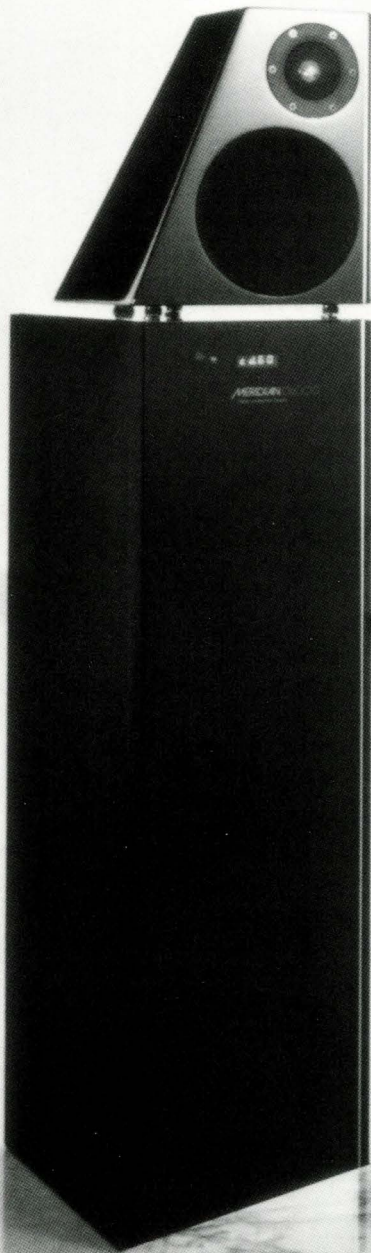
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Lynwood Valve

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The Valve phono stage is the top model in Lynwood's range. It comes in two cases, one for the power supply and one for the equalisation and gain stages. A wise design choice, as phono stages are very susceptible to noise, so keeping them away from the transformers found in a power supply, or any other component for that matter, is a worthwhile cause.

In typical valve tradition it only has enough gain for moving magnet cartridges, so some form of extra gain or stepping up is required with MC cartridges, especially low output ones like the *IO*. Lynwood makes an example of that very rare beast, the solid state head amp, and charges £95 for it.

This is a neat little device that's designed to be bolted onto the turntable plinth thus minimising the length of cable between it and the cartridge. It does the same job as a step up transformer but needs an external power supply to do it.

Build quality and appearance are not among this unit's apparent strengths, as it looks distinctly hand made.

The power supply is housed in an off the shelf case that is functional rather than attractive, but then again it's only a power supply and can be hidden away near the mains plug.

Lab report

Now here's an interesting design! Two Gold Dragon ECC83 double-triodes with solid-state regulation and a solid-state output buffer give you the same low output impedance as the *Equaliser* but with buckets of headroom (+36dB), lower distortion (typ. 0.042 per cent) and lower noise (-75dB, A-wtd).

Though the 7.5mV sensitivity is none too generous, there's still sufficient gain and headroom to thump-out a colossal 42V under extreme conditions! However, noise is substantially higher (-63.2dB) on the left channel as its response is prematurely cut below

500Hz. This evens-out below 20Hz, maintaining a steady -5.7dB from 20Hz to 3Hz.

Meanwhile the thin umbilical cord and 7-pin DIN that carries the 330V HT line from power supply to equaliser is just plain dangerous (not to mention illegal). I trust Lynwood will redress this oversight!

With the IO

As the Lynwood is an MM only device, I started off using it with the head amp mentioned above which produced quite acceptable results, at least until I compared it with the Audio Innovations transformer that I usually use.

The latter, a passive impedance matching model that, admittedly, costs probably three times as much as the head amp, increased gain and reduced distortion.

In use, the Lynwood produced many of the positive qualities that I have come to expect of good tube designs. It sounded very convincing and natural with Joni Mitchell's voice and guitar, and the orchestral piece also sounded open and dynamic.

It produced an engaging version of Lamb's *Once Bitten*, emphasising the mid and high frequencies of the percussion and the leading edges of the synth bass rather than the low frequency power encountered with other units. The result was very pleasing however, and whatever response aberrations existed, they didn't seem to get in the way of the music.

The bass light frequency response was only really obvious with the Dead Can Dance track which featured organ, otherwise it seemed like an emphasis on the midrange rather than a lack of low frequencies.

With the Quasar

In much the same style as with the *IO*, the Lynwood Valve managed to bring out the openness, tonal naturalness and lack of aggression in records when being driven with the *Quasar*. It imaged very effectively,

though the reference found a bit more in the way of space and depth. Its dynamic qualities remained at the forefront however, making all the material I played on it interesting and enjoyable, Mallard's *Reign of Pain* in particular was as coherent as ever.

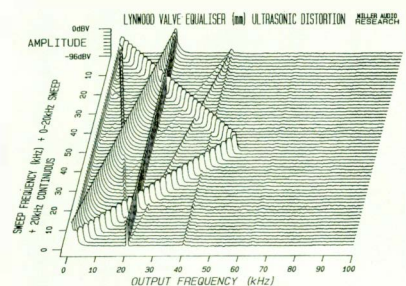
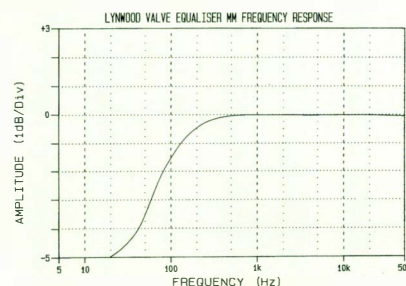
Only comparisons with the reference suggested that some aspects of the music were being omitted, particularly those associated with low frequencies. Going from Lynwood to Audio Note added loads of weight, space, power, bass extension and attitude — but at some twenty five times the price one expects a bit of improvement.

Conclusion

I enjoyed this unit a great deal, its strengths outweighed its weaknesses and it made a good job out of most everything that was played through it. If those 330volts were connected up with something more suitable than a DIN plug it would be Recommended.

TEST RESULTS

Stereo separation:	(20Hz)	81.4dB
	(1kHz)	66.6dB
	(20kHz)	60.4dB
Channel Balance @ 1kHz:	(0dBV)	0.21dB
	(-20dBV)	0.22dB
	(-60dBV)	0.22dB
Total Harmonic Dist @ 0dBV:	(1kHz)	-67.5dB
	(20kHz)	-65.1dB
CCIR Intermodulation Distortion		-52.9dB
A-wtd Noise (20Hz-20kHz)		-75.1dB*
Residual noise (unwtd)		-62.6dBV
Input Sensitivity (for 0dBV)		3.73mV
		7.45mV
Discoverload:	(1kHz)	319.5mV
	(20kHz)	843.8mV
	(50kHz)	756.9mV
Input Loading		46.8kohm/200pF
Maximum Output/Impedance		42.2V/11.8ohm
Retail Price		£295



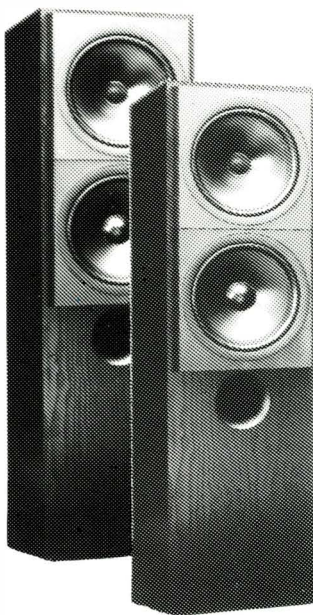


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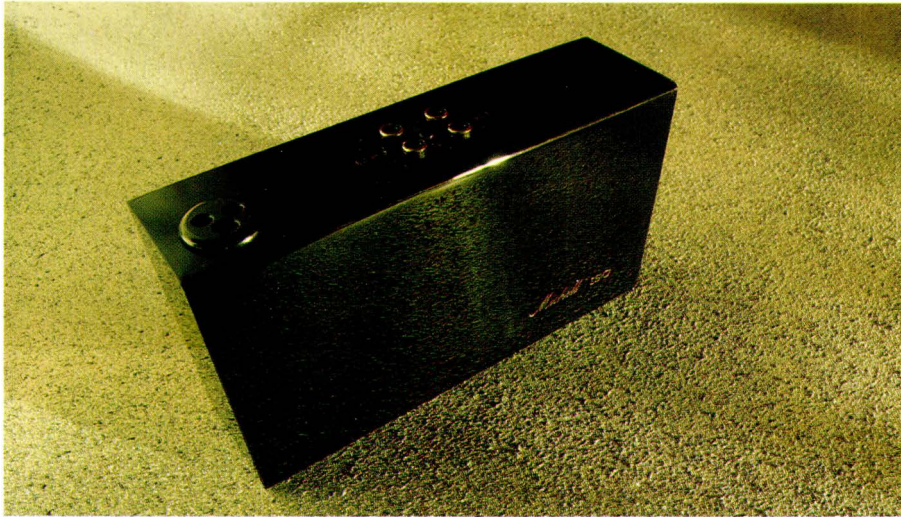


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Michell Iso/Hera

Michell Engineering Ltd, 2 Theobald Street, Borehamwood, Herts WD6 4SE. Tel: (081) 953 0771



The Michell *Iso* is a £393 moving coil only phono stage with an outboard power supply. Up until recently these two elements have been hardwired together but now that a new mega power supply, called *Hera*, has been introduced, the *Iso* has developed a bulgin socket so that you can plug in either supply. Existing *Iso*s can be modified to include this socket for £20, which seems quite reasonable, the *Hera* costs £129.

The *Iso* is built using an attractive small black perspex case, which is supported by four gold plated, 'O' ringed feet and comes equipped with the aforementioned power socket, a cunningly concealed earth point and two pairs of gold plated sockets. It is extremely lightweight, if you use hefty interconnects they'll pull it off whatever it's sitting on, so be prepared to use some Blu-tack to anchor it down. The standard power supply is a 12VA sealed plastic device that can be left to gather dust behind the system. There are no on/off switches on either supply or stage, and Michell recommends that it be left permanently on, which, given the pathetic idling current requirement and the sonic advantages on hand, is a good idea.

The *Iso*, perhaps more than any of the phono stages in this group, benefited from extensive warming up, its character mellowing out significantly with time.

The *Hera* is quite a substantial beast with a cleanly finished medite case and rather a smart plastic laminate fascia into which various legends have been inscribed.

Lab report

This is a very well-balanced design rather than one that's aiming to set new standards. Distortion, for example, is generally very low indeed (typically 0.001-0.0079 per cent across the audio band) while the A-wtd noise of -75dB and low output impedance of just 4ohm are further plus points. The RIAA response is possibly rather over-extended

as a -3dB point of 1.25Hz will boost footfall and structural noise as easily as a 7-15Hz arm/cartridge resonance.

Neither is its input sensitivity as generous as that offered by the Rotel or NVA preamps — very low output MCs (sub-0.1mV) are not especially well suited. Headroom is merely acceptable at +24.6dB. So, not perfect but a very even-handed design nonetheless.

With the IO

The output of the Audio Note *IO* cartridge turned out to be a bit on the low side for the *Iso*. It made a pretty good job of equalising and amplifying this cartridge's pathetic offering (voltage wise) but it was clear that grunt/drive/dynamic power, call it what you like, was not on the menu.

What was on offer was very good dynamic range and subtlety, impressive clarity and a character that is just on the dry side of neutral when compared to the be-tubed reference. The latter, with the advantage of a step-up transformer to impedance match the *IO*'s output, managed to extract a more substantial and dynamic performance. But the *Iso* resolved musical information like a magnifying glass, making a fine job of all the material played through it. I wouldn't recommend this particular cartridge/phono stage partnership, as the *Iso* doesn't have the gain, but it still put in a better than average performance, which can't be bad.

With the Quasar

The story with this somewhat more powerful beast was significantly different. Suddenly there was power behind the music, every note had the drive that it required and there was real range to dynamic swings. It still couldn't quite match the reference for ambient detail and dynamic shading but it turned in a scorching performance with the Violent Femmes, bringing out the frantic nature of the band's playing and singing.



The *Iso* reproduced timbral shading with subtlety and clarified individual notes while maintaining musical coherence.

Hera and now

Switching from the standard supply to the *Hera* brought a variety of sonic benefits, most notably a more relaxed, natural feel. It also added substance to notes which gave subtle inflections that the standard unit failed to retrieve.

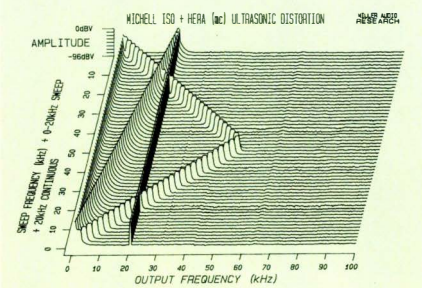
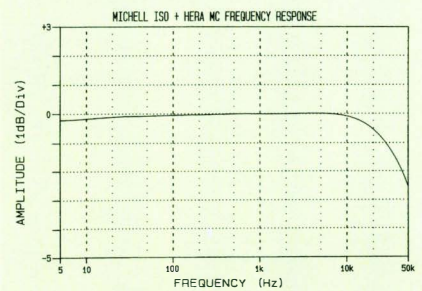
I think I probably expected even greater things of the *Hera*, but that says a lot about the quality of the basic *Iso* which is a first rate component under any circumstances.

Conclusion

The Michell *Iso* came into these tests with a reputation and has survived with it fully intact. This is a very competent and capable unit that will suit all but the lowest output MCs. Recommended.

TEST RESULTS

Stereo separation:		
	(20Hz)	63.9dB
	(1kHz)	66.3dB
	(20kHz)	67.2dB
Channel Balance @ 1kHz:		
	(0dBV)	0.02dB
	(-20dBV)	0.02dB
	(-60dBV)	0.02dB
Total Harmonic Dist @ 0dBV:		
	(1kHz)	-96.4dB
	(20kHz)	-82.1dB
CCIR Intermodulation Distortion		
A-wtd Noise	(20Hz-20kHz)	-75.0dB
Residual noise	(unwtd)	-60.3dBV
Input Sensitivity	(for 0dBV)	434uV
	(for 6dBV)	869uV
Discoverload:		
	(1kHz)	8.49mV
	(20kHz)	50.0mV
	(50kHz)	193.0mV
Input Loading	100ohm	
Maximum Output/Impedance		9.73V/4ohm
Retail Price		£393/£129



Moth RIAA Preamplifier

Moth Group, 10 Dane Lane, Wilstead, Bedford MK45 3HT.
Tel: (0234) 741 152



The Moth RIAA Preamplifier is one of the company's Series 30 range of amplifiers which includes a passive preamp and various power amp options. Each unit comes in a case that is similarly styled to the RIAA preamp reviewed here, though the power amps are a multiple of that in terms of width, so you can build a complete amplifier set-up that takes up little more space than the average integrated in terms of width and looks very neat.

Unusually for this bunch of phono stages, the Moth features switchable gain for both MM and MC cartridges, and it's the least expensive unit at a very reasonable £179. For that price you get a basic 12VA power supply and the neatly encased phono stage itself which has the aforementioned gain switch but no facility for turning the power off. It probably pays in terms of sound quality to leave it on permanently anyhow. Alternatively you can go for the 100VA option, this costs an extra £81 if bought with the phono stage or £100 if purchased as an upgrade.

The 100VA supply is housed in the same case as the phono stage itself and therefore can sit next to it without disrupting visual harmony. It looks like it has been put together in such a way that it can't be taken apart, and the manual warns against doing so, but one of the rubber feet fell off the review sample revealing a screw head, so it's not completely impenetrable.

The only other thing worth mentioning is the use of chunky XLR type plugs and sockets for connection between supply and stage, these are considerably more confidence inspiring than some others in this group.

Lab report

First the gripe. Moth specify an MM sensitivity of 1.5mV for an output of 300mV while, in practice, this turns out closer to 3.4mV. Indeed, the 11.5mV required for a 1V output suggests that high-ish output MMs (and

MCs) are likely to give best results, especially as this preamp offers a potential S/N ratio of 80dB. A cracking result.

Distortion is also supremely low at just 0.0007 per cent (MM) and 0.0046 per cent (MC) while the high overload margins imply an IEC headroom of +32.5dB. Another reason why high output cartridges are a safe bet! Meanwhile both MM and MC responses are sensibly engineered.

With the IO

The first thing that becomes apparent when trying to drive the Moth in either guise with an Audio Note IO is that there is inadequate gain. Given the IO's unusually anaemic output this isn't really a surprise, if there had been enough gain for this esoteric model then the Moth would run out of headroom with cartridges offering a healthier output.

But of course it takes more than this to stop me listening to a few records, and I gave the Moth/IO combination a fair crack of the vinyl. The effect was a relaxed one, even quite soft edged and didn't bring out the dynamic and timbral diversity on offer. The combination was obviously not a happy one and it is probably unfair to criticise its shortcomings under the circumstances. Basically if your cartridge can't come up with 0.15mV or more then this isn't a good option — luckily however, most can.

With the Quasar

Here the story was considerably happier, the Quasar's 0.2mV output proving more than adequate to the task of inspiring the Moth to boogie. In these circumstances the Mellencamp sounded tough and powerful but not too aggressive as it is apt to, and the Mallard could have been more dynamic and open but it boogied along with the best of them. The Mozart was reproduced with delicacy and finesse, the orchestra spreading back and out from the speakers in a reasonably convincing manner. The Moth

managed to resolve much of the dynamic and spatial information on the record and remained enjoyable, neutral and devoid of fatiguing elements.

12 to 100VA and back again

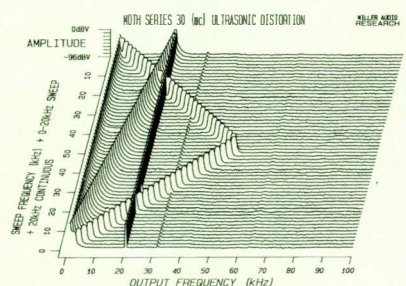
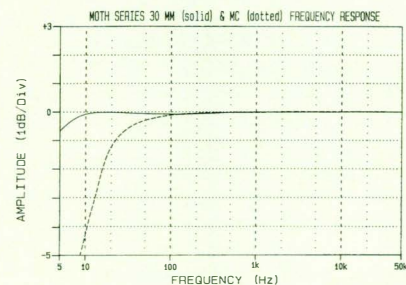
The result when comparing the two power supply options available with the Moth was very similar to that encountered with other units. The more expensive option added depth and tonal colour as well as a more relaxed perspective, and the standard unit sounded a bit lively and hurried by comparison. Both gave a very good result considering the price, but the big'un as well as being far more beautiful added low level information and opened up the sound.

Conclusion

The Moth in either guise is a very good all round performer and excellent value for money. Best Buy.

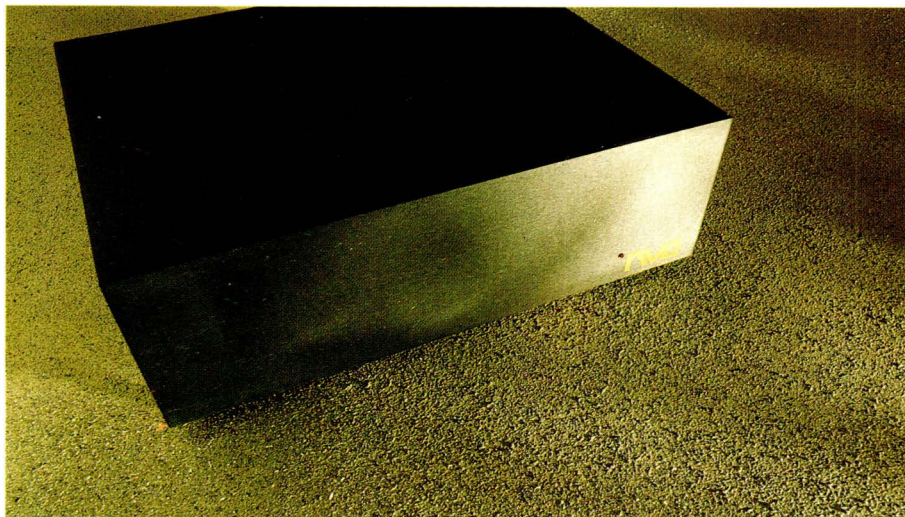
TEST RESULTS

	MM	MC
Stereo separation:		
(20Hz)	94.9dB	95.6dB
(1kHz)	87.1dB	86.6dB
(20kHz)	87.9dB	89.2dB
Channel Balance @ 1kHz:		
(0dBV)	0.15dB	0.22dB
(-20dBV)	0.14dB	0.23dB
(-60dBV)	0.14dB	0.23dB
Total Harmonic Dist @ 0dBV:		
(1kHz)	-103.5dB	-86.8dB
(20kHz)	-96.5dB	-81.6dB
CCIR Intermodulation Distortion		
Distortion	-74.1dB	-67.3dB
A-wtd Noise		
(20Hz-20kHz)	-80.0dB	-77.0dB
Residual noise (unwtd)	-74.5dBV	-73.4dBV
Input Sensitivity		
(for -6dBV)	5.74mV	590uV
(for 0dBV)	11.47mV	1.18mV
Discoverload:		
(1kHz)	209.4mV	21.6mV
(20kHz)	604.6mV	60.6mV
(50kHz)	529.5mV	56.1mV
Input Loading	45kohm/300pF 47ohm	
Maximum Output/Impedance	18.2V / 104.9ohm	
Retail Price	£172/£265	



NVA Phono 2

NVA, Unit 1 CD, 6 Watermill Industrial Estate, Aspenden Road, Buntingford, Herts SG9 9JS. Tel: (0763) 72707



NVA, or Nene Valley Audio to give it its full title, is a small company that produces a wide range of hi-fi components including a turntable, several amplifiers and some interesting loudspeakers.

The £530 *Phono 2*, as one might surmise, isn't the only phono stage that the company makes, the other, you can guess what it's called, costs a mere £200 and is a one box affair. The *Phono 2*, on the other hand, is made up of two anodised aluminium cases which are made out of individual plates that are glued together to avoid electrical connection. NVA feels that cases built in this fashion have a less deleterious effect upon the performance of components than do the bolted together variety.

The overall effect of this construction style is a bit sharp edged but quite solid, if a shade handmade next to some of the competition. The gold NVA logo looks neat but I couldn't figure out why it was on the other side of the box on the power supply, possibly in order to discourage stacking, but it doesn't do much for the product's image.

The two boxes of the *Phono 2* comprise the power supply, which puts out a substantial 300VA, and the phono stage itself. This has been designed for use with passive preamps and has two gain stages, each with separate regulation. The effect when used with a conventional pre or integrated amp is, surprise, surprise, loads of gain, so much so that the *IO*, with its anaemic output, didn't even ruffle its electronic feathers.

If that isn't OTT enough for you, there's an option to add a second power supply, giving one supply per channel for an extra cost of £230. This wouldn't increase gain but presumably infer the sort of advantages found when upgrading supplies on other units, ie greater substance and naturalness.

Lab report

A tad idiosyncratic, this one. Looking on the bright side it does offer a useful 0.63mV

input sensitivity, a very healthy peak output of 13.3V and a vanishingly low output impedance of <math><1\text{ohm}</math>. So long interconnects are no problem. However, noise is a little high at -68dB while distortion climbs through the roof beyond a few kHz. Between 20Hz-1kHz THD hovers around 0.003 per cent yet escalates by a factor of 100 times at 20kHz.

So, though its hard-clip point suggests a headroom of some +24.2dB at 20kHz, in reality any input higher than 2.35mV precipitates slew-limiting and THD between 0.5-1.5 per cent. Based on these figures the real HF headroom is actually 'less' than zero (ie -6.6dB)! Hence the regular pattern of harmonics and IM products visible beyond 20kHz on the 3D plot. Oh yes, the +1.5dB bump at 30Hz is likely to have a 'warming' influence.

With the IO

As previously mentioned the *Phono 2* had no difficulty bringing the *IO*'s insignificant output up to a more than healthy level, which gave it a more than sporting chance at making great music with this thoroughbred cartridge. And that it did with some considerable aplomb, putting in one of, if not the, finest performance in the group.

The 2 made its debut with Joni Mitchell's voice, resolving its superb purity with more verve than usual. It seemed to extract a certain emotive aspect of the music that had previously remained dormant. I initially thought that this must be a characteristic of the stage but it didn't turn up with the *Quasar*. It also highlighted the rhythmic qualities of everything I played through it, bringing out aspects of records that the reference resolved in a less specific fashion. In other words, it got right to the spirit of the music.

If it needs anything, a tad more bite or edge to transients wouldn't go amiss, and the reference managed to find some more expression in the midband as well as having greater clarity.

With the Quasar

Used with the more robust driving abilities of the Ortofon *Quasar*, the *Phono 2* put in a remarkably laid back performance, even more relaxed than the Lynwood tube. It managed to sound adequately powerful while being very listenable at quite high volume levels over extended periods of time.

Comparisons with the reference system highlighted a couple of deficiencies however, most distinctive being a feeling that high frequencies were being curtailed somehow. Less surprisingly, the reference managed to extract a lot more in the way of dynamic and tonal contrast — but this is probably its forté.

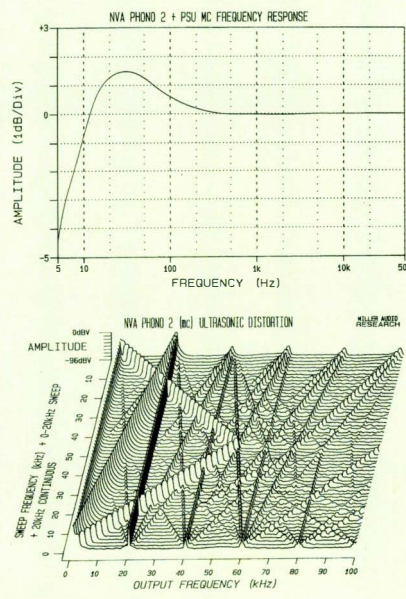
Conclusion

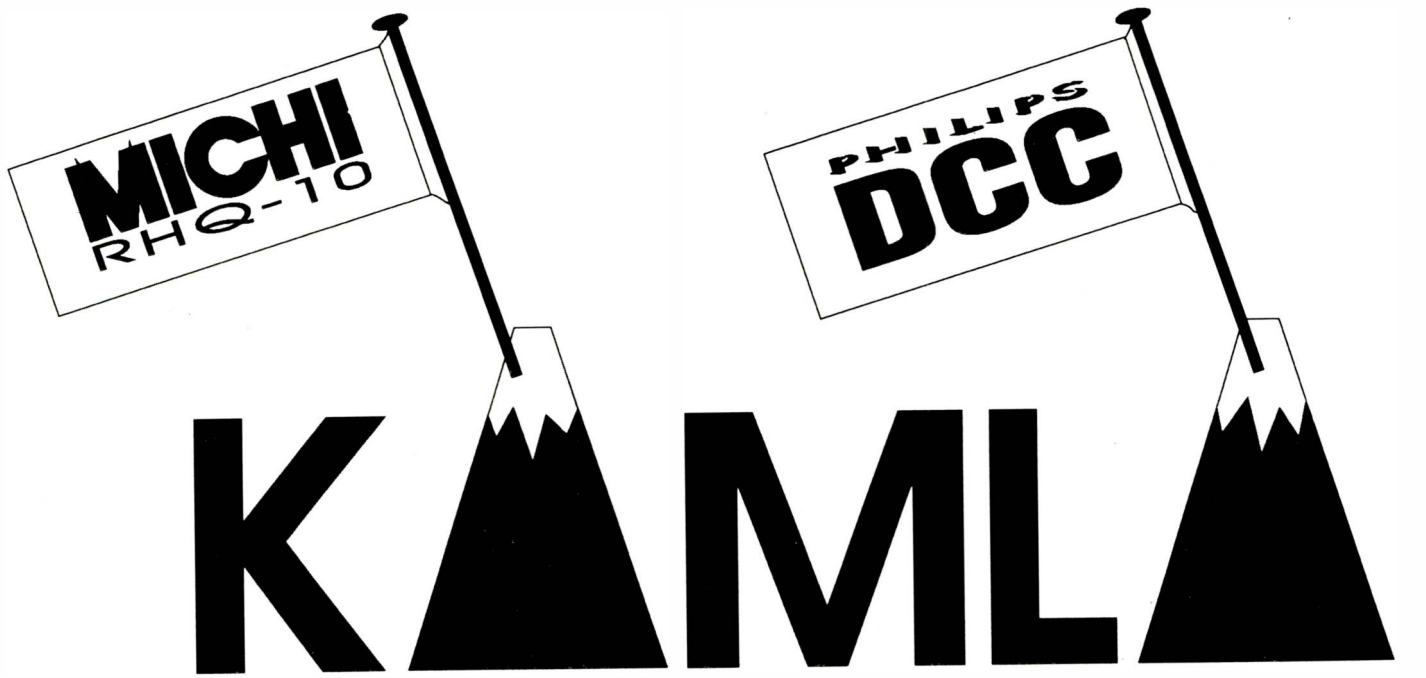
Perhaps not the most neutral of performers, the NVA with the right cartridge (ie an Audio Note *IO*) can perform magical tricks with your records, so I have to Recommend it.



TEST RESULTS

Stereo separation:		
	(20Hz)	76.6dB
	(1kHz)	74.0dB
	(20kHz)	74.1dB
Channel Balance @ 1kHz:		
	(0dBV)	0.21dB
	(-20dBV)	0.22dB
	(-60dBV)	0.22dB
Total Harmonic Dist @ 0dBV:		
	(1kHz)	-90.8dB
	(20kHz)	-48.8dB
CCIR Intermodulation Distortion		
A-wtd Noise	(20Hz-20kHz)	-68.1dB
Residual noise	(unwtd)	-60.6dBV
Input Sensitivity	(for -6dBV)	316.7uV
	(for 0dBV)	633.5uV
Disc overload:		
	(1kHz)	8.42mV
	(20kHz)	81.1mV*
	(50kHz)	79.8mV*
Input Loading		470ohm
Maximum Output/Impedance		13.3V/<math><1\text{ohm}</math>
Retail Price		£530





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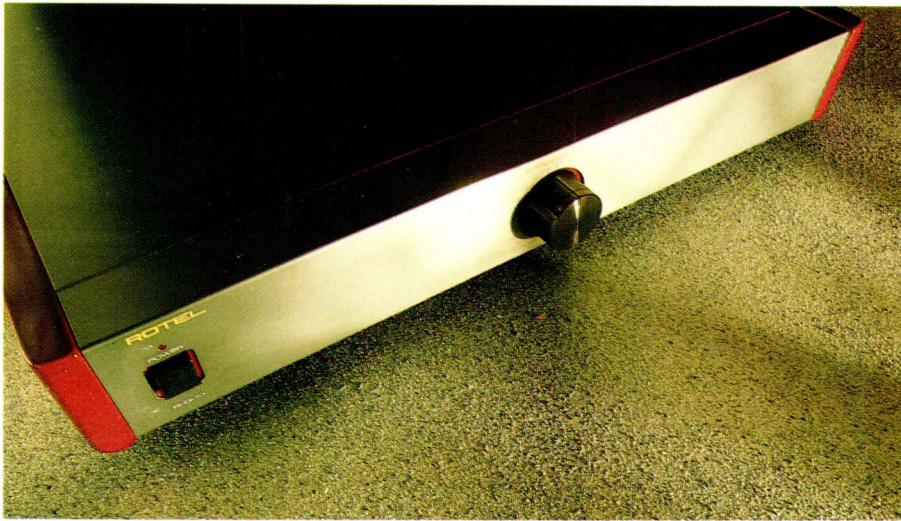
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Rotel RHQ-10

Gamepath, 25 Heathfield, Stacey Bushes, Milton Keynes MK12 6HR. Tel: (0908) 317 707



The *RHQ-10* is the phono equalisation component in Rotel's prestigious *Michi* range. Unlike the more affordable electronics that you are used to seeing from Rotel, the *Michi* range is designed and manufactured in Japan, hence the difference in appearance and pricing. Paul Miller reviewed the matching passive preamp and power amp back in December (issue 101).

The *RHQ-10*, referred to as *Shih* (poetry), in the *Michi* catalogue, is a fairly serious piece of kit. The pricetag of £795 sets the tone and the stainless steel case and wooden end cheeked design lends it not inconsiderable macho appeal. As you will note this is the only phono stage in the bunch, if not the only one in existence, to feature a volume pot. Which could be useful if you only listen to vinyl (I have to admit that I lived with a tube preamp like this for quite a while, but it was a real pain in the butt). Even then, because of its passive nature it will only be suitable for use with short interconnects and high input impedance power amps.

For this review I used one of the sets of fixed outputs, by swapping over some internal pins the variable output can be changed into a fixed output if what Rotel calls a low sensitivity MC cartridge is used.

In its standard guise the *RHQ-10* has two gain settings, for MM and MC, and two impedance settings (47kohms, 100ohms), but if you require something different Rotel can change the resistors. For the purpose of the review Rotel fitted resistors appropriate to the impedances of the two cartridges used in the test. You can swap between these various options with internal pins. These things can be changed on most phono stages, but rarely as easily as this, the Rotel is easily one of the most flexible phono stages on the market.

Lab report

Here's an example of modern no-nonsense engineering. Distortion, as evidenced by the

3D plot, is buried beneath the noise at just 0.001-0.005 per cent. And the A-wtd noise itself is a very respectable -77.8dB, better than many other MM stages. Then there's the unwt'd hum contribution which, at just -76dBV, is lower than many other phono preamps equipped with outboard PSUs. The only surprise is the slight bass 'bump' that's built into the RIAA response.

Stereo separation holds up extremely well though Rotel's proprietary volume control does incur a 2dB tracking error at -60dBV. Headroom seems, well, modest at +24.9dB but it's as well to remember this is a very sensitive preamp and one ideally suited to very low output MCs. The switchable gain stages and loading options further increase the flexibility of this design.

With the IO

Having being equipped with low impedance loading resistors, the Rotel started off with an advantage and made the most of it, despite Joni Mitchell's voice lowering slightly in tone when moving over from the reference. It made a natural and open job of this fine recording. As listening proceeded a very good impression took form, it worked very well at low levels with the classical piece, reproducing nuance and dynamics in an effortless fashion.

The reference seemed to have the edge on clarity, but in many other respects it had to fight hard to justify the significant price difference. Annabel Lamb's *Once Bitten* sounded as dramatic and powerful as ever, with the dynamic swings being tracked well nigh effortlessly. Mellencamp's *Love and Happiness*, sounded lively and hard if a little aggressive, but I suspect that this is a fundamental characteristic of the LP if not the recording itself.

With the Quasar

It made a similarly impressive job of the *Quasar's* output, which is a very competent

cartridge, though it lacks the subtlety of the *IO*.

The same sort of strengths were noticed, an ability to retrieve the last crumb of fundamental detail and a sense of complete control across the audio band, to the extent that other units seem almost unstable. The unit's ability to plumb out the more cerebral aspects of music was perhaps a bit obscure, it could sound mechanical but this is probably as much a reflection of its neutrality as anything else.

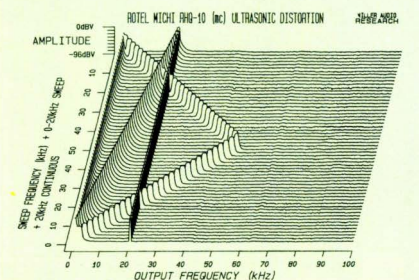
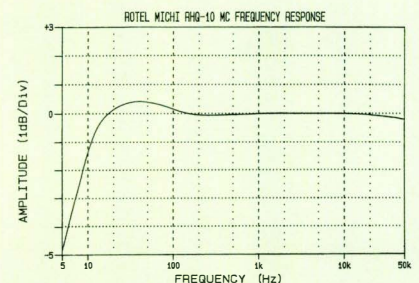
Conclusion

A first class phono stage that's extremely well built, remarkably flexible and capable of very fine sonic results. Although it is one of the more costly units around, the results achieved and the confidence inspired by its construction and finish are second to none. A confident Recommendation would seem to be in order.



TEST RESULTS

Stereo separation:		
	(20Hz)	90.5dB
	(1kHz)	99.6dB
	(20kHz)	94.5dB
Channel Balance @ 1kHz:		
	(0dBV)	0.09dB
	(-20dBV)	0.25dB
	(-60dBV)	2.00dB
Total Harmonic Dist @ 0dBV:		
	(1kHz)	-96.5dB
	(20kHz)	-85.7dB
CCIR Intermodulation Distortion		
	A-wtd Noise (20Hz-20kHz)	-77.8dB
	Residual noise (unwt'd)	-75.9dBV
Input Sensitivity		
	(for -6dBV)	193.4uV
	(for 0dBV)	386.9uV
Disc overload:		
	(1kHz)	8.74mV
	(20kHz)	82.3mV
	(50kHz)	171.5mV
Input Loading		Variable (100ohm)
Maximum Output/Impedance		25.7V/109ohm (fixed)
Retail Price		£795



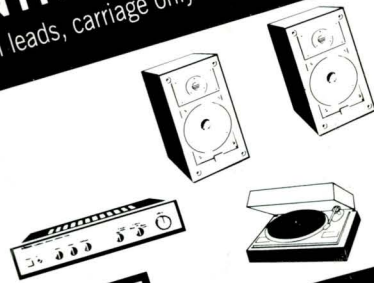


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SUGGESTED SYSTEMS

The suggested systems priced below all include the popular Dual CS503/2 turntable but an alternative turntable or CD player is available at extra cost. Please see "OPTIONS" list below for further details.

SPEAKERS	AMPS	Widale Delta 30.2 JPW Minim Gale SS210 JPW Sonata (vinyl) M/Short 3.10 Celestion DL4	Celestion 3 JPW Sonata W/Dale Diamond 4 Roya A7 Tannoy 603 Mission 760i	JPW P1 (vinyl) Mission 761	Nad 8225e Celestion 5 B&W DM600 Kef K120 Tannoy 605	Monitor Audio R7 Wharfedale 505.2	Mission 762 Castle Warwick Monitor Audio R9 B&W DM610 Tannoy 607	Castle Durham Heybrook HB13 Tannoy 609 Rogers LS4A-2 (Add £30) B & W DM620 (Add £50)
Rotel RA820AX	324.95	336.95	356.95	368.95	388.95	404.95	444.95	
Marantz PM30	299.95	312.95	332.95	344.95	364.95	379.95	419.95	
Kenwood KA3020	308.95	319.95	339.95	352.95	372.95	388.95	428.95	
Pioneer A300	324.95	336.95	356.95	368.95	388.95	404.95	444.95	
Rotel RA930AX	324.95	336.95	356.95	368.95	388.95	404.95	444.95	
Harman HK6100	336.95	348.95	372.95	379.95	399.95	416.95	456.95	
Sony TAF440E	339.95	352.95	372.95	384.95	404.95	419.95	459.95	
Sony TAF540E	379.95	392.95	412.95	424.95	444.95	459.95	499.95	
Technics SUVX500K	324.95	336.95	356.95	368.95	388.95	404.95	444.95	
NAD 3240	356.95	368.95	388.95	404.95	416.95	436.95	476.95	
Marantz PM40SE	388.95	399.95	419.95	432.95	452.95	468.95	509.95	
Kenwood KA5020	372.95	384.95	404.95	416.95	436.95	452.95	492.95	
Nad 3225PE	332.95	344.95	364.95	376.95	396.95	412.95	452.95	
Nad 3020 i	316.95	328.95	348.95	359.95	379.95	396.95	436.95	
Marantz PM 30SE	316.95	328.95	348.95	359.95	379.95	396.95	436.95	
Rotel RA920AX	299.95	312.95	332.95	344.95	364.95	379.95	419.95	
Technics SUVX600K	356.95	368.95	388.95	399.95	419.95	436.95	476.95	

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CDs

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- Denon DCD580
- Denon DCD660
- Denon DCD860
- Denon DCD960
- Marantz CD42
- Marantz CD52
- Marantz CD62
- Marantz CD72
- Nad 5420
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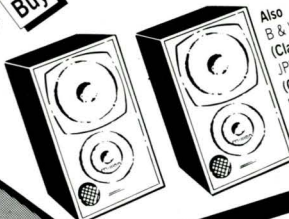
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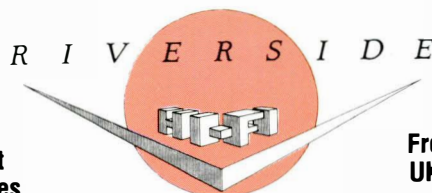
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WHF/5/92

Choosing and Using ... CD Players

Compact Disc has come a long way in eight years, and is now starting to represent a significant percentage of hardware and software sales (particularly by value). Rather surprisingly, the UK has proved one of the slower growing markets, though this partly reflects a greater difference in price between a CD and its LP or musicassette equivalent than in some overseas markets. Whereas disc prices have only reduced slightly since the format was launched (one or two budget labels notwithstanding), player prices have dropped to a third of those charged when the system was first launched. £160 is now a typical budget price, some machines cost as little as £120, and cheap mechanisms are built into systems and portables.

CD players are now the most popular component in the hi-fi chain. For the uninitiated, we explain what's what in today's machines.

CD certainly has a number of advantages over its rivals. It is inherently quite rugged and unaffected by careful use, free of surface and background noise and wow and flutter effects, while signals processed in digital form are theoretically immune from degradation. This said, a book could be written on how the theoretical incorruptibility of digital signals has proved to be something of a red herring. Regular observers of the hi-fi scene will be well aware of the 'discovery' that in CD replay even changing the interconnect cable used to transmit digital data between disc transport and standalone D-to-A converter can alter the perceived sound.

The discs

Only five inches in diameter and attractively silvered, the Compact Disc currently costs up to twice the price of an LP or musicassette (in the UK). It can carry more than an hour of music and comes packaged in an irritatingly fragile and awkwardly designed 'jewel case', containing additional printed 'sleeve' information.

For the record companies in particular, establishing a brand new format is an exceedingly difficult task, in view of the vast inventory needed to represent a play only format effectively, and in this instance, the technical problems of pressing with necessarily great precision. Inevitably there was a learning curve in the disc manufacturing processes, and full quality potential is still not reached in many cases. However, the range of titles available on CD has grown spectacularly, now exceeding those available on vinyl as more and more LPs are being deleted, emphasising the commitment of the record companies to the format.

From the general consumer's point of view, price is still a key factor. While early CD users were clearly prepared to pay a 100 per cent premium, the pricing of CDs has now become something of a political issue as consumer pressure groups are becoming incensed at the lack of freedom of choice.

The players

The conventional CD player may simply be plugged into any hi-fi system, as one would a tuner or cassette deck. The amplifier's 'aux', or 'tape' inputs will be perfectly adequate, though the results might be a little loud through the speakers, and require a lower volume control setting than usual. Many more recent amplifiers have a 'CD' input, and this may have a more appropriate sensitivity. Some specialist amplifier manufacturers have taken the trouble to connect the CD input directly to the preamp volume control, so as to minimise interference of the signal.

There is also a mild risk that a CD user will find his amplifier no longer seems to go as loud. The reason for this is that recording engineers put a wider dynamic range onto CD than most of them did with vinyl. Consequently for the same peak output, the mean (average) output from CD with the same recording will be slightly lower than before. One can of course compensate by cranking up the volume, but if an amplifier is already being used close to its limits, the CD peaks could cause premature 'clipping', for which the only solution is a more powerful amplifier.

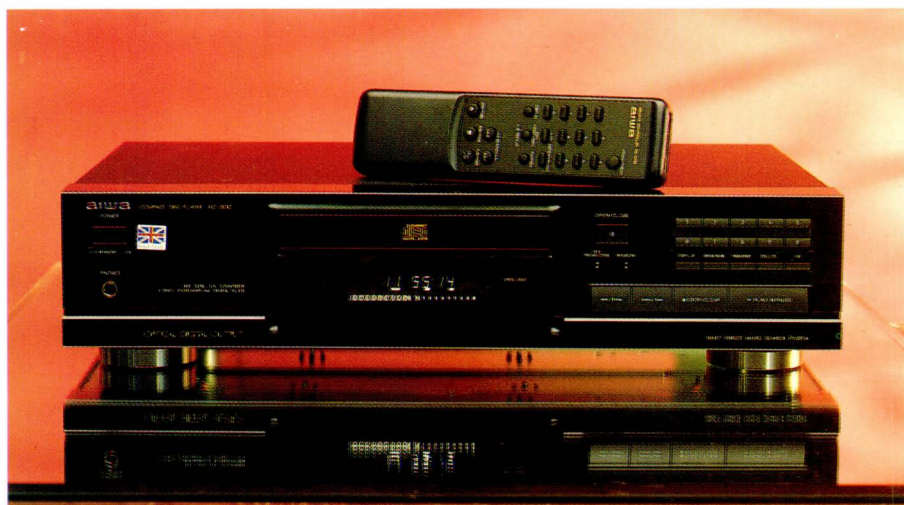
The prospective purchaser faces a wide range of choice at wildly varying prices. Players are available for in-car use, are incorporated in large portables, and exist as tiny personals, with some doubling as unconventional domestic machines. The mains models can be manual or remote controlled, and simple or complicated in terms of ergonomics and programmability. Autochanger variations can accept and play from a caddy of half a dozen discs, selected and programmed remotely. For enthusiasts looking for top quality performance, there is now a preponderance of 'two-box' players, where the disc transport and complex digital-to-analogue circuitry are physically separated and have independent power supplies.

Despite protestations of 'perfect' sound, CD players show significant audible and measurement differences, and these are discussed in our reviews. That said, most machines measure very competently, showing occasional weakness at the cheapest end of the market and among low voltage portable machines. Though correlation with measurement still proves elusive, listening tests prove quite capable of consistently distinguishing between the different decks.

While the poorer examples can make the new medium sound quite unpleasant, the best can provide eminently satisfactory results with refreshing repeatability and the promise of longevity.

Aiwa XC-300

Aiwa (UK) Ltd, Unit 5, Heathrow Summit Centre, Skyport Drive, West Drayton, Middlesex, UB7 0LY. Tel: (081) 897 7000



Once upon a time your average £130 CD player was a truly appalling beast, frugally equipped and quite capable of mis-directing a bat at 20 paces. Not nice. Fortunately Aiwa's *XC-300* shows that giveaway players are not the false economy they once seemed. So its construction is decidedly lightweight and track access sluggish by modern standards, but just look at what's on offer!

You've direct track access, program, repeat and random play available from the black plastic fascia with full track, time and calendar-style information flashed-up on its display. There is even the added luxury of full remote control, something that few sub-£150 players are able to boast. Gripes? Well, Aiwa's optical digital output is a token gesture rather than a potentially useful route for upgrading.

There's interest on the technical front too, as Aiwa is using a very new bitstream DAC from Toshiba, the TC9237N.

My Japanese datasheet suggests it's a genuine 1-bit device, equipped with MASH-style noise-shapers and capable of running at 192 times oversampling.

Lab report

This player has plenty of 'bitstream' hallmarks. Errors of just +/-0.6dB in linearity down to -100dB (1kHz), very low +1.5dB noise modulation and distortion that's typically five to six times lower than the 'average' 16-bit player at -30dB.

Not all is sweetness and light, however, because the performance of Toshiba's DAC is influenced by the eight times oversampling filter found in the partnering CXD1167 signal processor. This flexible Sony chip brings the total oversample rate to 192 times. However, it's also responsible for the 2dB hiccups in linearity at 20kHz (-90dB to -100dB), the -53dB stopband images on the 3D plot, the accentuated ripple seen on the -60dB response and (puff, puff) the 22.05kHz/

44.1kHz drones that poke through the 1kHz/-70dB trace!

Furthermore its 98dB S/N ratio would have been closer to 102-103dB but for other spurious, in-band tones. Oh yes, and the player suffers a basic clock error of 263ppm, equivalent to a 5.3Hz shift at 20kHz.

Sound quality

Lacks a bit of sparkle, muttered our assembled listeners, tempering their criticism by suggesting it was still preferable to the shrill character of others they had endured earlier in the day. So this turns out to be a pleasantly articulate player even if its imaging is a trifle flat. Mary Black, for example, popped-up in the same plane as her accompanying instruments, but for all this loss of depth her voice was neither muddled or confused.

The success of Panufnik's *Concerto* also hinges on the timing and interplay, rather than an exaggerated sense of space, between its various instruments. Chalk-up another point to the *XC-300* which revealed the impetus of this classical selection without exactly revelling in spaciousness.

Its quietness, its freedom from 'digital' nasties attracted favourable comment though we were similarly conscious of a loss in air or sparkle at the very top of its range. It certainly avoided getting into a lather with powerful female vocals yet, on the downside, the splash of percussion was often unexpectedly subdued.

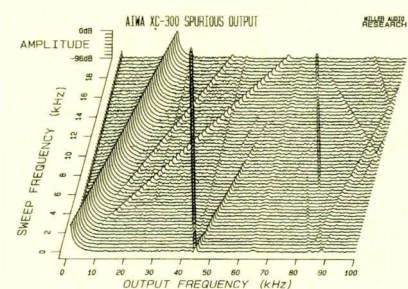
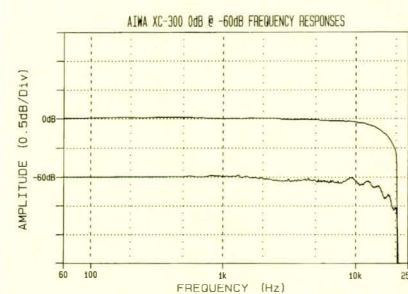
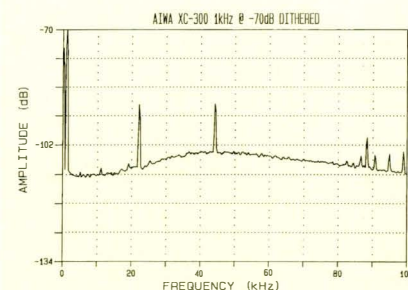
Conclusion

For the price of a few more CDs you could end up with an altogether more thrilling and three-dimensional sound. Nevertheless, at the price, it does represent darn good value and a very acceptable set of compromises for those listeners on a severely restricted budget.

Philips' *CD604* might nudge ahead in the sonic stakes but, featurewise, the *XC-300* wins by a nose, er, remote control.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.26dB	0.26dB	0.16dB
Channel Separation	120.5dB	105.9dB	71.8dB
THD vs Level, 0dB	-89.4dB	-92.7dB	-76.4dB
-30dB	-81.2dB	-79.6dB	-70.4dB
-60dB	-47.4dB	-49.6dB	-40.2dB
-80dB	-19.2dB	-25.8dB	-19.5dB
Dithered, -90dB	-16.5dB	-16.6dB	-8.75dB
Dithered, -100dB		-11.2dB	
Dithered, -110dB		-1.80dB	
Resolution @ -60dB		+0.02dB	+0.04dB
-80dB		-0.65dB	+0.07dB
-90dB		+0.58dB	-2.21dB
-100dB		+0.60dB	-2.00dB
Peak Output Level, L			2.098V
R			2.035V
Relative Output Level			+0.28dB
Output Impedance			1.029kohm
Radio Frequency Spurious	5mV @ 2.1/16.9MHz		
1Hz Noise Modulation			+1.45dB
CCIR IMD, 0dB			-90.7dB
Suppression of stop-band IMD			53.4dB
De-emphasis Accuracy, 1kHz			-0.01dB
5kHz			-0.06dB
16kHz			-0.27dB
S/N Ratio (A-wtd), w emp, 0LSB			97.9dB
w/o emp, 0LSB			97.8dB
w/o emp, 1LSB			97.4dB
Digital Output			Optical
Crystal Clock Accuracy			-263.2ppm
Track Access Time (99)			4.5secs
Typical Retail Price			£130



Akai CD-57

Akai (UK) Ltd, Unit 12 Haslemere Heathrow Estate, The Parkway, Hounslow, Middlesex TW4 6NQ. Tel: (081) 897 6388



Advanced Interpolative Converter huh? This turns out to be the same technology that Yamaha interprets as 'S-Bit' and Denon has referred to as 'Artificial Intelligence'. All of which leaves Burr Brown, who actually manufacture the said converter, somewhat bemused.

So, joining the *DCD-580* and *CDX-450* (issue 100), Akai's *CD-57* is the third sub-£200 player to deploy the PCM67P. This is a hybrid DAC, combining the services of a multibit chain to handle the upper 10-bits and a bitstream-style DAC to handle the subordinate 8-bits. 18-bits in total? Well, yes, because the eight times oversampling filter generates new 18-bit-wide samples from the original 16-bit datastream!

This jiggery-pokery need not concern the average user, however, for the *CD-57* looks and operates just like any other budget machine. True to form, the *CD-57's* black fascia and deep case are grossly over-sized, dwarfing the fiddly direct track access, program, edit and peak search keys. Meanwhile, the low slung transport is virtually lost within the cavernous casework, loading and unloading with alarming speed to the accompaniment of rattling plastic.

Lab report

The mixed parentage of Burr Brown's hybrid DAC was better reflected by Yamaha's *CDX-450* (issue 100) for, in Akai's case, the multibit personality seems to dominate. Distortion jumps from 0.005 to 0.15 per cent between 0dB and -30dB at 1kHz - a good 10 times higher than you'd find with a competent bitstreamer.

Low-level distortion is also poor, particularly with dithered signals, while low-level linearity lurches 1-2dB out of kilter between -90dB and -100dB. But then its genuine 108dB S/N ratio exceeds that of most 1-bit players. Similarly, distortion at HF is seen to reduce because the output of its first-order noise-shapers is more easily filtered.

Neither are the responses or 3D plot strictly comparable with the Denon and Yamaha competition, because Akai has plumped for an 8 times oversampling filter made by Pioneer. Hence the streak of stopband noise (-57dB worse case) and slightly uneven -60dB response are quite unique to the *CD-57*.

Sound quality

Everyone responded favourably to the refreshingly lively and up-beat sound of this player which seemed neither too fierce nor too laid-back. A good compromise, they remarked, in response to the pleasing sense of ambience developed very clearly on both our jazz and classical tracks.

Nevertheless any astringent crispness was just as obviously muted. So though our listeners applauded this player for its refined and civilised demeanour, they were also a little disappointed by its soft focus, loss of 'bite' and slightly uneven bass. A 'smoochy-sounding' player was how one listener described the *CD-57*!

However any shortfall in clarity or tautness was often offset by a fortuitous euphony. Its lumpy bass now seemed in perfect accord with the naturally gruff character of Christy Moore's voice, for example. Female vocals were handled with equal sympathy, almost graceful in delivery and mercifully unaggravated by sibilance.

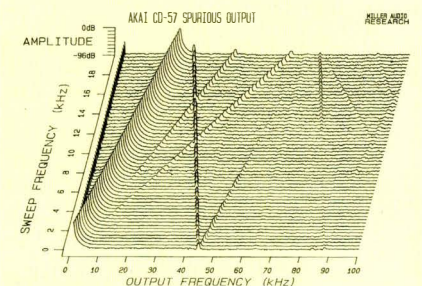
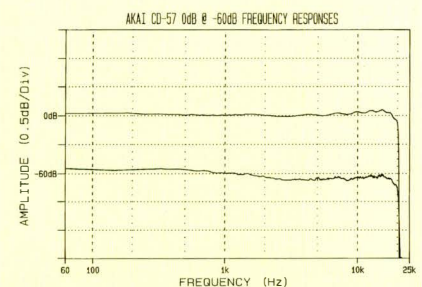
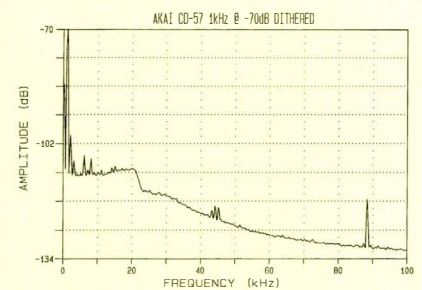
Conclusion

Ok, so the *CD-57* is not quite as 'Advanced' as Akai would have us believe. Sharply-focussed stereo and an appreciation of subtle detail are not its strengths, yet the *CD-57* still emerges as remarkably civilised and engaging player. At this price our panel were genuinely impressed, insisting that I slap on a 'heartily recommendation'. So be it.

Perhaps if Akai had overcome its desire to build everything into over-sized cases the *CD-57* might have been cheaper still!

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.15dB	0.15dB	0.09dB
Channel Separation	93.6dB	109.8dB	79.0dB
THD vs Level, 0dB	-88.7dB	-85.8dB	-69.5dB
	-30dB	-57.1dB	-56.2dB
	-60dB	-33.8dB	-37.3dB
	-80dB	-20.8dB	-19.3dB
	-90dB	-14.5dB	-12.4dB
Dithered, -100dB			-15.0dB
Dithered, -110dB			-2.95dB
Resolution @ -60dB		+0.08dB	+0.01dB
		-80dB	+0.64dB
		-90dB	+2.00dB
		-100dB	+0.96dB
Peak Output Level, L			2.094V
			R
			2.058V
Relative Output Level			+0.32dB
Output Impedance			332ohm
Radio Frequency Spurious		7mV @ 103MHz	
1Hz Noise Modulation			+8.9dB
CCIR IMD, 0dB			-70.6dB
Suppression of stop-band IMD			57.0dB
De-emphasis Accuracy, 1kHz			0.00dB
			5kHz
			-0.01dB
			16kHz
			+0.05dB
S/N Ratio (A-wtd), w emp, 0LSB			108.1dB
			w/o emp, 0LSB
			108.0dB
			w/o emp, 1LSB
			107.8dB
Digital Output			Coaxial/Optical
Crystal Clock Accuracy			-46.9ppm
Track Access Time (99)			5secs
Typical Retail Price			£180



Ariston Maxim CD3

Ariston Acoustics Ltd, Freeport, Prestwick International Airport, Ayrshire, Scotland KA9 2TA. Tel: (0292) 76933



Remember the 'belt and braces' Maxim CD2 from Issue 95? Well, this CD3 is not so much the son-of-Maxim, rather a cross-breed of Ariston's two existing players. Give the CD1's electronics more room to breathe in the substantial CD3 case and, broadly speaking, you've got yourself a CD3!

Visually the CD2 and CD3 are identical, sharing the same extruded alloy fascia and bold fluorescent display. They even share the same features: play, pause, track skip and display off on the fascia with direct track access, programming and repeat play made available by remote control.

Inside, however, you'll find the CD2's 16-bit digital and display boards (as supplied by Philips) but with a separate analogue circuit culled from the cheaper CD1. This uses FET op-amps from Motorola as part of a custom-built filter. Ariston has not gone to the same lengths as, say, Creek, but then the CD3 is aimed at cheaper competition like Arcam's 16-bit Alpha.

Lab report

Any similarity between this player and the fully-fledged Maxim stems from the basic Philips' chipset rather than its CD1 analogue stage. A glance at the 3D plot betrays evidence of the SAA7220 oversampling filter, for example, responsible for the undulating V-shaped stopband images (at -42dB) as well as the mild ripples superimposed on its drooping frequency response.

This plot also highlights its low 0.001-0.007 per cent second harmonic distortion even though this quickly increases to 0.02-0.1 per cent at -30dB and 2-10 per cent at -80dB. Low-level distortion is primarily odd-order, as you can see from the dithered -70dB trace, but this, and the -4.6dB kink in linearity at -90dB, are all hallmarks of the TDA1541A 'Crown' DAC.

Philips' Bit Stream DACs are markedly superior in this regard while also suffering

rather less than +12dB noise modulation. Nevertheless, JVC's PEM bitstream DAC is the only device to match the 110dB S/N ratio achieved with this 'older' 16-bit technology.

Sound quality

'A good show', announced the listeners, reinforcing this profound statement with phrases like 'well balanced and nicely detailed' and 'a good all-rounder'. It was its impression of pace, of grip and definition that most attracted them. Strings seemed particularly well-shaped on the whole, resonant, full but still very clean. Clean, that is, until the going got really tough whereupon brass, strings and percussion alike peppered us with coarse, aural buckshot.

Seeking salvation in the natural but softer hue of Mary Black's *Columbus* we were treated to a very well-defined, very pleasant performance, if one that failed to realise the full expression of her voice. Similarly, the piano also seemed to flow in graceful fashion even though the repetitive shimmer of the cymbal was muted in comparison.

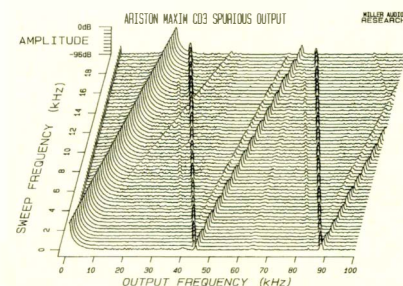
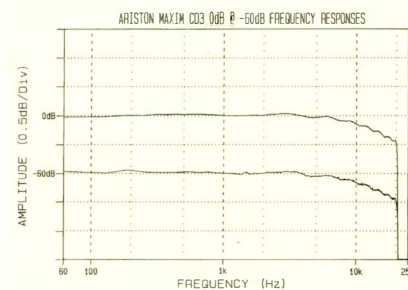
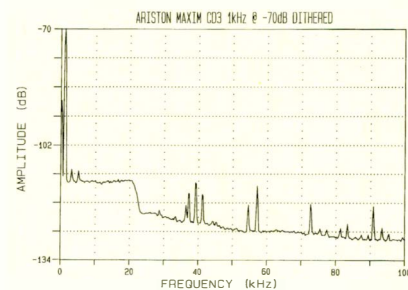
Returning to our classical selection, the bolder plucked strings from Panufnik's *Concerto* also attracted favourable comment, strengthening its grand acoustic and simply adding to our enjoyment of the music as a whole. This sense of drama, the development of musical ambience and the perceived agility of different instruments was appreciated with both jazz and classical selections. Yet if the content became too complex, this precarious mix was easily thrown off balance.

Conclusion

Even with the best features of CD1 and CD2 combined in a single box, the CD3 still faces near-insurmountable competition from fresher designs at £250-£300. Not an overwhelming player, concluded the panel therefore, but competent, somewhat predictable and Recommended by a whisker.

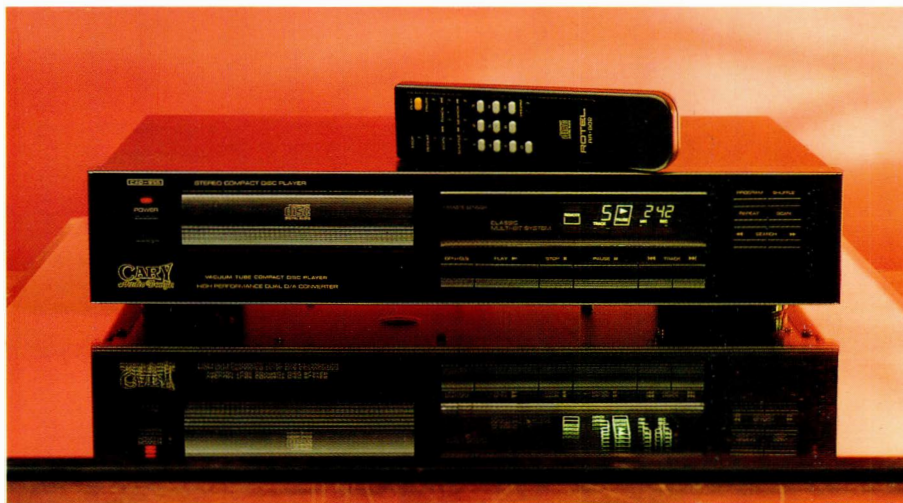
TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.14dB	0.14dB	0.14dB
Channel Separation	129.4dB	113.8dB	74.6dB
THD vs Level, 0dB	-101.6dB	-99.9dB	-82.8dB
-30dB	-74.3dB	-67.4dB	-59.6dB
-60dB	-53.0dB	-51.3dB	-35.0dB
-80dB	-20.0dB	-29.5dB	-33.8dB
Dithered, -90dB	-7.65dB	-17.5dB	-24.9dB
Dithered, -100dB		-15.3dB	
Dithered, -110dB		-0.25dB	
Resolution @ -60dB		-0.05dB	+0.19dB
-80dB		-0.42dB	-0.19dB
-90dB		-4.62dB	-0.63dB
-100dB		-2.05dB	+4.56dB
Peak Output Level, L			1.901V
R			1.870V
Relative Output Level			-0.51dB
Output Impedance			96ohm
Radio Frequency Spurious		4.4mV @ 196kHz	
1Hz Noise Modulation			+12.3dB
CCIR IMD, 0dB			-95.6dB
Suppression of stop-band IMD			41.6dB
De-emphasis Accuracy, 1kHz			-0.01dB
5kHz			-0.09dB
16kHz			-0.25dB
S/N Ratio (A-wtd), w emp, 0LSB			111.0dB
w/o emp, 0LSB			109.9dB
w/o emp, 1LSB			109.8dB
Digital Output			Coaxial
Crystal Clock Accuracy			-26.3ppm
Track Access Time (99)			3.5secs
Typical Retail Price			£430



Cary Audio Design CAD-955

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



Philips-based clones are ten a penny these days, but the Cary CAD-955 is something rather different. For a start Cary has not chosen the usual Philips 600 Series chassis as the starting point for its player. Instead the Cary is based on Rotel's latest RCD-955AX, which is pretty obvious once you squint at the robust alloy fascia.

Its features and facilities remain unchanged, but lift the bonnet and you'll find a new valve analogue stage complete with its own hefty power supply. However, this is not designed to replace Rotel's existing Signetics-based filter circuit but to supplement it!

Cary simply intercept Rotel's main analogue output and pass it across to a pair of 12AU7 (ECC82) double-triodes. This low-impedance cathode-follower is meant to act as a gentle low-pass filter, removing any RF noise in the MHz region. Admirable, if eccentric in its execution.

Lab report

Glance at the 3D plot and you could be forgiven for thinking that Cary's 955 bears little relation to the original Rotel. In fact this 1000-fold increase in mainly second and third harmonic distortion only occurs at peak level. Between -10dB and -70dB, where the music persists, distortion quickly returns to the values normally associated with Philips' 16-bit SAA7220/TDA1541 chipset.

Its 'character', however, is modified with high odd-order components climbing ahead of second and third harmonics. The bold fifth harmonic is obvious enough on the 1kHz/70dB plot even though its ultrasonic tailoring still mimics that of the RCD-955AX.

So Cary's post-analogue stage has no measurable effect up to 100kHz where there's no change in either the frequency response or 42dB stopband rejection. Linearity, too, is kinked in typical fashion at -90dB. The triodes waste some 5dB in S/N over Rotel's solid-state electronics, but

108dB is more than adequate. By contrast the low 1.5V output level and higher 830ohm output impedance certainly betray Cary's mods, so do take account of this in any A/B comparison.

Sound quality

For some bizarre reason every member of the panel reacted to what they thought was 'tape hiss' on our Marty Paich and Julia Fordham tracks. Hiss, I might add, that had previously been inaudible! The unusually parched bass quality attracted equal attention. Sure, it could sound lively but it still lacked the expansiveness, the richness and ebullience of our favourite machines.

The reedy sax sounded great, but the raw, rasping quality of brass was rounded and muted. Its dry bass further weakened the drum line from Julia Fordham's *Swept* as it did the body and weight of our classical tracks. Music simply lacked the resonance, the tension or anticipation to capture our listeners' attention.

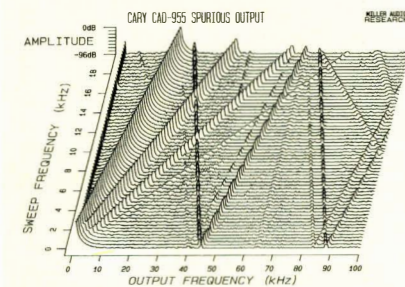
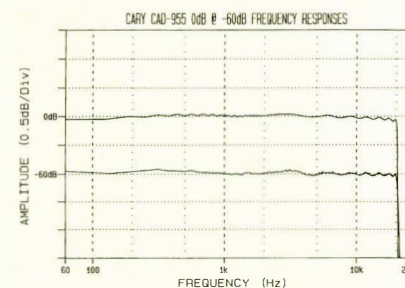
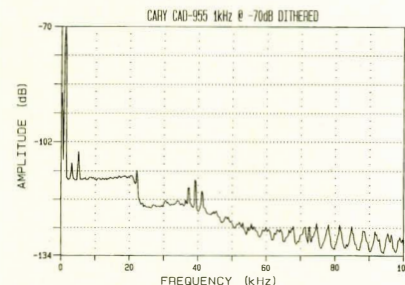
It would be too harsh to imply this player simply goes through the motions. In our experience it performed a number of specific tasks very well indeed, capturing the intimacy of Christy Moore's and Mary Black's vocals to a 'T'. Yet these individual elements rarely combined to yield an especially exciting or convincing sound.

Conclusion

'Nice idea, shame about the price' was the response of the panel upon discovering the nature of the beast. One listener — quite unprompted — thought the Cary CAD-955 was actually the Rotel RCD-955AX from the previous day! But then both players differ from the earlier RCD-855 in that they are chassis-grounded, albeit at different points. It's not impossible that this revision, which practically destroyed the RCD-955AX in our tests, has also undermined the effectiveness of Cary's valve processor.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.11dB	0.12dB	0.08dB
Channel Separation	115.9dB	109.4dB	90.1dB
THD vs Level, 0dB	-40.9dB	-40.1dB	-39.8dB
-30dB	-67.8dB	-62.8dB	-57.7dB
-60dB	-46.7dB	-50.0dB	-35.2dB
-80dB	-17.1dB	-23.7dB	-40.9dB
-90dB	-7.50dB	-15.3dB	-29.1dB
Dithered, -100dB		-13.9dB	
Dithered, -110dB		-2.22dB	
Resolution @ -60dB		+0.02dB	+0.27dB
-80dB		-0.63dB	-0.30dB
-90dB		-6.89dB	-1.77dB
-100dB		-3.40dB	+2.67dB
Peak Output Level, L			1.524V
R			1.507V
Relative Output Level			-2.41dB
Output Impedance			828ohm
Radio Frequency Spurious			1mV broadband
1Hz Noise Modulation			+1.3dB
CCIRIMD, 0dB			-39.8dB
Suppression of stop-band IMD			41.6dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			-0.03dB
16kHz			0.00dB
S/N Ratio (A-wtd), w emp, 0LSB			107.9dB
w/o emp, 0LSB			108.2dB
w/o emp, 1LSB			108.2dB
Digital Output			Coaxial
Crystal Clock Accuracy			+10.3ppm
Track Access Time (99)			3.5secs
Typical Retail Price			£899



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Creek CD60

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Old technology, certainly, but the *CD60* represents a very bold first step for Creek. Bold because Creek has shied away from buying off-the-shelf circuits from Philips and opted instead for its very own implementation.

On the face of it, the *CD60* has all the aesthetic grace of a size 16 boot. Creek's spring-loaded controls take some getting used to while its Philips' *600 Series* display is mounted askew behind a ghostly green filter. The flipside? Well, behind this nightmarish fascia lies a very thoughtful and well-intentioned design.

Creek has stuck with Philips' reliable CDM4 transport mechanism and 16-bit chipset, re-laying the entire circuit to accommodate ideas of its own. A thumping great 35VA toroid, for example, now feeds no fewer than 16 regulators, many of which are placed locally on the board.

Meanwhile the digital output transformer is placed right up against the coaxial socket rather than several inches away. A beefed up driver chip further improves its performance. Then there's the phase-invert facility, almost unique on a Philips-based design, made available by incorporating an exclusive-OR gate prior to the four times oversampling filter.

The analogue output stage is equally novel, for here Creek has used new Burr Brown OPA2604 op-amps for both current to voltage conversion and as part of the third-order filter network. So the design might seem clumsy in places but it's refreshing to find a small outfit like Creek ready to take on the Dutch Giant at its own game.

Lab report

Everything about the *CD60* screams 'Philips 16-bit four times', but then it's nigh-on impossible to conceal this chipset's fingerprint. Take the 3D plot. Sure, this reflects the low peak level distortion of Creek's implementation (typically 0.0008 per cent) but it

also reveals the customary stopband images (-41dB) of the SAA7220 digital filter.

Meanwhile the TDA1541A 'crown' DAC suffers its usual blip in linearity at -90dB, recovering slightly with an error of -2.5dB at -100dB. This DAC is also responsible for the massive increase in distortion that occurs between 0dB and -30dB (0.038 per cent) though Creek's analogue stage knocks about 5dB off the potential S/N ratio with an A-wtd figure of 106dB or so.

The final Signetics output stage lends a +0.5dB boost at 20kHz but any RF rubbish is firmly stomped on, I'm glad to report.

Sound quality

Regular readers will know that our listening is conducted at precisely calibrated levels. Nevertheless, all agreed this was a 'loud' sounding player. Not loud in an intrusive sense but loud in the way it filled the room with its bold and purposeful sound.

It exerted a powerful grip on the instruments from Panufnik's *Concerto*, allowing each note to develop and decay in a realistic fashion rather than stopping abruptly short. By contrast Prokofiev's *Symphony* did not enjoy this same sense of scale; instruments had bite and 'clout' certainly, but the soundstage did not grow and contract in such a responsive fashion.

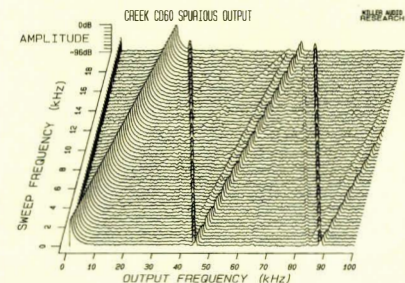
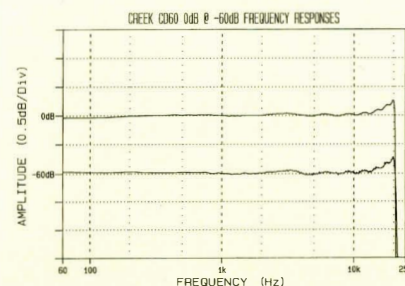
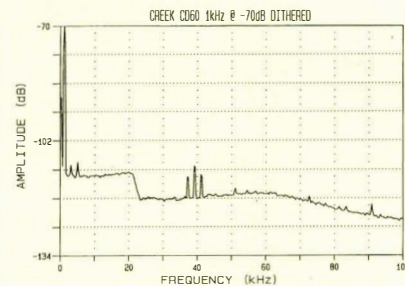
It's worth mentioning that one listener was less impressed overall, finding its music oddly processed. Marty Paich's jazz selection was spoiled by weak and vague imaging in his view, which gave a very 'hi-fi' feel to what should have been a track bustling with rich detail.

Conclusion

Creek's home-grown *CD60* certainly lacks the hi-tech appeal of its £500 competition, for here orthodox engineering practice is valued ahead of style and innovation. A very nice try, but a little too costly for formal *Choice Recommendation*.

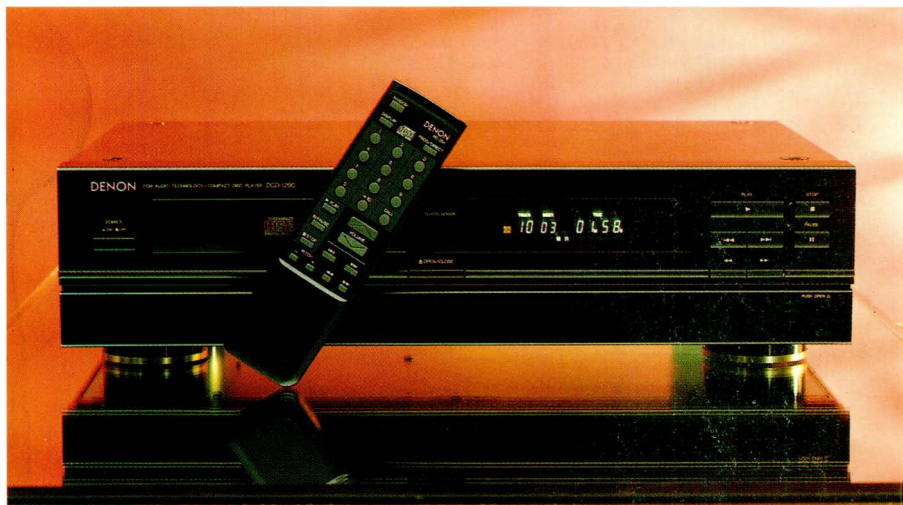
TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.09dB	0.08dB	0.08dB
Channel Separation	115.7dB	98.2dB	72.0dB
THD vs Level, 0dB	-112.7dB	-101.8dB	-87.8dB
-30dB	-72.8dB	-68.5dB	-56.8dB
-60dB	-51.7dB	-48.8dB	-31.5dB
-80dB	-19.9dB	-28.6dB	-32.8dB
Dithered, -90dB	-9.55dB	-17.5dB	-23.6dB
Dithered, -100dB		-12.5dB	
Dithered, -110dB		+0.55dB	
Resolution @ -60dB		-0.01dB	+0.20dB
-80dB		-0.47dB	-0.21dB
-90dB		-5.19dB	-0.77dB
-100dB		-2.50dB	+4.34dB
Peak Output Level, L			2.311V
R			2.287V
Relative Output Level			+1.21dB
Output Impedance			213ohm
Radio Frequency Spuria			1mV broadband
1Hz Noise Modulation			+7.8dB
CCIR IMD, 0dB			-98.9dB
Suppression of stop-band IMD			41.3dB
De-emphasis Accuracy, 1kHz			-0.06dB
5kHz			-0.35dB
16kHz			-0.14dB
S/N Ratio (A-wtd), w emp, 0LSB			109.0dB
w/o emp, 0LSB			106.1dB
w/o emp, 1LSB			105.9dB
Digital Output			Coaxial
Crystal Clock Accuracy			+8.8ppm
Track Access Time (99)			3.8secs
Typical Retail Price			£500



Denon DCD-1290

Hayden Labs Ltd, Hayden House, Chiltern Hill, Chalfont St Peter, Gerards Cross, Bucks, SL9 9UG. Tel: (0753) 888 447



If nothing else, you have to admire Denon for its tenacity. At least that's what I thought a year ago when we reviewed the *DCD-2560*. Now, with the launch of yet another player featuring a 'Real 20-bit Lambda Super Linear Converter', I'm beginning to have second thoughts.

Ostensibly the *DCD-1290* is just as polished a player as either the *DCD-2560* (issue 95) or *DCD-1460* (issue 100). In fact it shares the same black alloy fascia with peripheral features like pick-and-link tape edit, index skip, peak search, direct track access and fade options all hidden away behind a retractable flap.

The UK-version lacks a headphone socket and motorised volume control, releasing extra cash for Denon to spend on the player's analogue electronics, including the use of Silmic electrolytic capacitors.

Nevertheless, the digital topology is classic 'Denon'. Here we find a pair of 18-bit Burr Brown DACs, controlled by its 'Lambda' processor which creates a differential datastream (R+/R- and L+/L-). Meanwhile, low-level information is offset from the MSB, limiting the effects of zero-cross distortion to louder signals.

Presumably, Denon feels this scheme justifies a '20-bit' tag. But wouldn't it be easier to use genuine 20-bit DACs (like the PCM63P) and save a lot of hard work?

Lab report

What can I say? Typical multibit stuff from the massive lurch in distortion (0.00075-0.053 per cent) that occurs between 0dB and -30dB to the high +7.9dB Noise Modulation. This test also precipitated a huge +28dB increase in 44.1/88.2kHz sampling components, while the offset digital zero triggered a peculiar instability in its noise-floor. Crystal selection is very poor.

Still, Denon has meticulously adjusted the resolution of this player to within tight 0.8dB limits (1kHz only). The slightly wobbly

frequency response and strong images on the 3D plot? Well they're caused by the eight times oversampling filter, a lesser version of the SM5840 used by Kenwood and Teac.

Sound quality

What began as a vibrant, exciting and dynamic-sounding performance quickly deteriorated, even by the end of the second track we listened to, into something that lacked space and charisma. Throwing detail to the periphery of the soundstage certainly gets this player noticed, but there's very little remaining warmth to 'flesh-out' the body of the music.

But don't get the impression that Denon's player is all flashing lights and firecrackers. Something of a two-minute wonder, sure, but none of our panel thought it edgy or grainy.

Our listeners were simply left with the impression that some elusive, emotive quality was 'missing'. Take Mary Black for instance; this elegant track lacked its traditional ambience, her voice forward yet so smooth it actually sounded 'slower' than usual. Detailed, certainly, but convincing? Never.

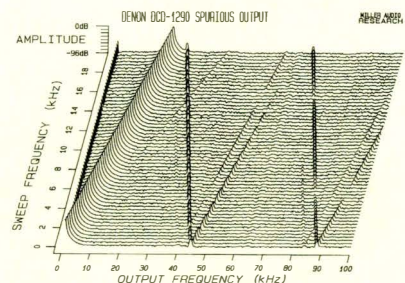
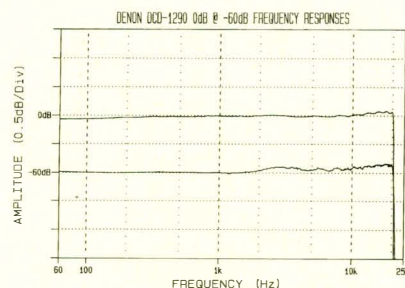
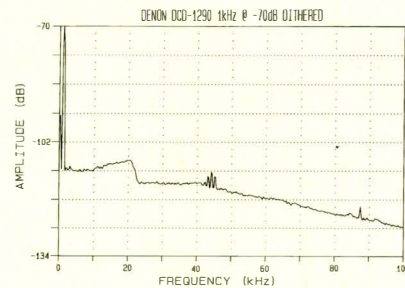
Conclusion

Denon has suggested that its new baby is actually a £500 player 'priced-down' to a bargain £320. Far be it from me to undermine its generosity, but compare the engineering of the *DCD-1290* with, say, Kenwood's *DP-7040* and you'll discover the player is not exactly under-priced. Subjectively, too, it's got enough problems at £300 let alone £500.

So even if the initial reaction of our panel was very enthusiastic, for one reason or another, their attention was not engaged for more than a few minutes. Didn't we reach similar conclusions about the *DCD-1460* and *DCD-2560*?

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.03dB	0.03dB	0.07dB
Channel Separation	130.7dB	103.3dB	94.7dB
THD vs Level, 0dB	-107.3dB	-102.5dB	-86.3dB
-30dB	-67.2dB	-65.5dB	-66.2dB
-60dB	-41.6dB	-45.1dB	-49.2dB
-80dB	-27.2dB	-32.8dB	-22.5dB
-90dB	-15.4dB	-17.2dB	-8.04dB
Dithered, -100dB		-9.05dB	
Dithered, -110dB		-0.55dB	
Resolution @ -60dB		-0.05dB	+0.02dB
-80dB		-0.05dB	-0.24dB
-90dB		-0.80dB	-0.02dB
-100dB		-0.55dB	+4.10dB
Peak Output Level, L		2.280V	
R		2.270V	
Relative Output Level			+1.12dB
Output Impedance			116ohm
Radio Frequency Spurious		5mV @ 28MHz	
1Hz Noise Modulation			+7.9dB
CCIR IMD, 0dB			-95.4dB
Suppression of stop-band IMD			61.0dB
De-emphasis Accuracy, 1kHz			+0.01dB
5kHz			+0.03dB
16kHz			+0.05dB
S/N Ratio (A-wtd), w emp, 0LSB			110.2dB
w/o emp, 0LSB			110.9dB
w/o emp, 1LSB			103.6dB
Digital Output			Coax/optical
Crystal Clock Accuracy			+329.4ppm
Track Access Time (99)			3secs
Typical Retail Price			£319



Dual CD1080RC

RAM Projects, Unit 27, Stretford Motorway Estate, Barton Dock Road, Stretford, Manchester M32 0ZH. Tel: (061) 866 8101



Talk about hedging your bets. Just in case the wind changes direction, Dual has chosen to include a 16-bit, an 18-bit and a bitstream model in its current range. The *CD1080RC* is the bitstreamer of the bunch, equipped with one of Technics' popular MASH/PWM DACs but supported by a host of Sony peripherals, including what looks like one of its old yoke-style CD mechanisms.

This is an unusual looking player, not only because of its slate-grey fascia but also for its distinctive, yellow-green display. This is no ordinary fluorescent panel, however, but a back-lit liquid-crystal jobby designed for economy but preferred for its freedom from RF garbage. The only problem is that it can lack the visual clarity of a fluorescent panel, particularly when viewed off-axis.

Still, there's no confusing Dual's range of facilities which extend from a 20-key direct access keypad and 25-track memory to full repeat, tape edit, random play and intro scan features. Then there's the obligatory remote which adds a digital volume control to the role-call of widgets. A tidy enough package for the money even if its internal design lacks any spark of ingenuity.

Lab report

Built by the book, Dual's *CD1080RC* clocks up a series of equally predictable measurements. The partially submerged stopband pattern on the 3D plot and slight kink in its -60dB response all point to Technics' MN6471 DAC, features the *CD1080* has in common with Harman's *HD7500* (issue 95) and *HD7600* (issue 100).

Most of Dual's competitors are using Technics' MN6474 DAC these days, a pin-for-pin replacement with the same fourfold-PWM output stage and 32 times oversampling filters. However, the MN6474's MASH network produces slightly less ultrasonic noise, avoiding the very pronounced 'hump' evident on the 1kHz @ -70dB plot.

Nevertheless Dual's implementation enjoys very low levels of distortion, typically between 0.0011-0.02 per cent at 0dB and 0.0018-0.13 per cent at -30dB — it even holds out to 25 per cent at -110dB. Linearity is straight out of the Technics' textbook but so too is the 'cheat mode' exposed by the S/N ratio tests. The coaxial digital output is uncommonly free of jitter, I might add.

Sound quality

The lab tests might have passed off without incident but our exposure to the *CD1080* in the listening room was far from uneventful. Quite toe-tapping, observed one listener, who then proceeded to slam the player for its 'strident, bright and rather boring presentation'. Emotion in all its forms was singularly lacking. Our Panufnik *Concerto* sounded disparate and discordant. Good depth, they concluded, but poor music.

Then there was Julia Fordham's voice which sounded very big and well projected but lacked commitment, vibrancy and passion. Everyone sensed something peculiar about its music. Marty Paich's vibes, for instance, sounded top-heavy and synthetic while the piano, from Mary Black's *Columbus*, lacked form and discipline.

Heaping insult upon injury, Christy Moore's voice was smothered by his backing instruments, the warmth and richness we had come to relish was lost.

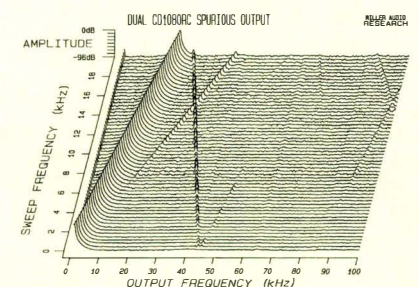
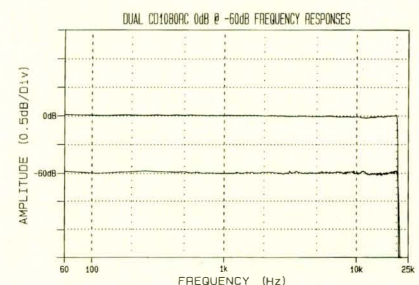
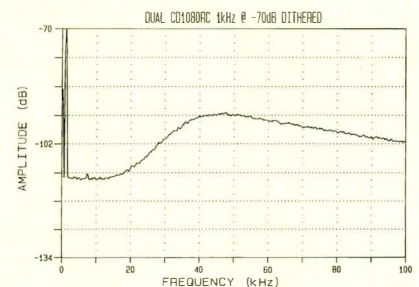
Conclusion

Not a complete disaster, gasped the panel after being informed of the price, yet the sheer strangeness of its presentation was evidently off-putting. Put bluntly, the *CD1080* lacks oomph. So, although it conceals this with a certain whimsical character it's unlikely to seize your attention for more than a moment or two.

As things stand it looks as if the old-timer *CD5150* remains the Dual (aagh - Ed) in the company's crown.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.09dB	0.08dB	0.11dB
Channel Separation	90.1dB	88.8dB	72.9dB
THD vs Level, 0dB	-91.7dB	-99.3dB	-74.0dB
-30dB	-95.0dB	-81.0dB	-57.6dB
-60dB	-61.8dB	-52.4dB	-31.3dB
-80dB	-27.8dB	-32.8dB	-11.8dB
Dithered, -90dB	-17.5dB	-20.3dB	-3.05dB
Dithered, -100dB		-15.6dB	
Dithered, -110dB		-12.0dB	
Resolution @ -60dB		-0.03dB	-0.01dB
-80dB		-0.15dB	-0.07dB
-90dB		-0.82dB	+0.01dB
-100dB		-0.75dB	-1.05dB
Peak Output Level, L			1.990V
R			2.010V
Relative Output Level			0.00dB
Output Impedance			849ohm
Radio Frequency Spurious		17mV @ 45MHz	every 2.8MHz
1Hz Noise Modulation			+2.6dB
CCIR IMD, 0dB			-95.7dB
Suppression of stop-band IMD			84.5dB
De-emphasis Accuracy, 1kHz			+0.02dB
5kHz			0.18dB
16kHz			+0.09dB
S/N Ratio (A-wtd), w emp, 0LSB			108.1dB
w/o emp, 0LSB			105.1dB
w/o emp, 1LSB			101.4dB
Digital Output			Coaxial
Crystal Clock Accuracy			+48.8ppm
Track Access Time (99)			3secs
Typical Retail Price			£200



Harman Kardon HD7400

Harman Audio, Unit 1B Mill Street, Slough, Berks SL2 5DD.
Tel: (0753) 576 911



On the face of it the *HD7400* is an attractive enough player, featuring the same contoured plastic fascia and curved display window that's become synonymous with all HK's current range. On-board facilities are limited to track skip, search, repeat and program play but, never fear, a handy remote control brings the convenience of direct track access to bear. Lose the remote and you've got yourself an *HD7300*.

Sluggish track access already suggests its transport and servo electronics are outdated. But it's only when you peer under the bonnet that HK's rather mis-placed ideals become apparent. The reason? Well Harman has made such a virtue out of discrete componentry that this feature alone has come to dominate the design of the entire product.

Avoiding any ICs in the buffer amp and filter stages has meant ploughing in extra resources while accepting compromises elsewhere in the design. As a result the *HD7400* must be the only 'modern' 18-bit player in existence to use a mono, time-shared DAC.

Lab report

Those of a nervous disposition might like to skip this part. On the bright side a multiplexed four times datastream is well within the compass of Burr Brown's PCM61P DAC and it even manages to squeeze-out a creditable 104dB S/N ratio. However, even by using an external sample-and-hold-de-glitcher (an LC4966) this technique still results in an interchannel phase error of 35 degrees at 20kHz — something I haven't seen for three or four years.

But the technical nightmare has only just begun. Take a look at the unstable noise-floor and gross aliasing distortion that infests the 3D plot, the bold ripple and erratic nature of the responses plus the distortion-ridden plot of a 'dithered' 1kHz/70dB signal.

Then turn to the review of Philips' *CD604*. And all because HK has opted for the same one-chip decoder, error corrector and four times oversampling filter.

This filter, and I use the term loosely, is responsible for the premature 1.29dB cut at 20kHz, the appalling 16-17dB stopband rejection and proliferation of sampling IM distortions that cloud the high treble. Then there's the compression of -100dB signals by +4.3dB at 1kHz and +13dB at 20kHz.

Sound quality

Quite unaware that this player had put my HP spectrum analyser into intensive care for a week, our listeners were initially quite gracious in their criticism. Slightly edgy and forward, especially with the jazz vibes, they suggested. But they felt this was adequately compensated for by its very spacious and airy presentation.

The collective reaction to Prokofiev's *Symphony* was also fairly positive, its grand but delicate sound complimented by an attractively deep soundstage. Bass was strong too, they remarked, pulling out the woody resonance of the plucked bass to good effect and generally enhancing the boldness of its sound.

Nevertheless our pop selection betrayed an abundance of 'fizz', its sterility wearing on the patience of our panel. One listener thought it subjectively noisy, his impression of all forms of music being tainted by a grating, hiss-like coloration.

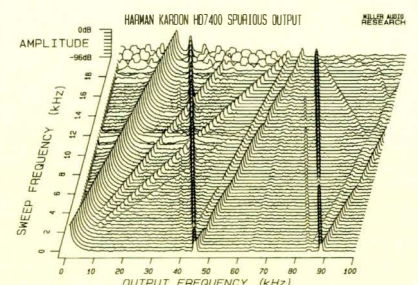
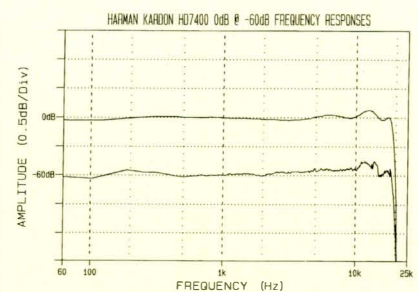
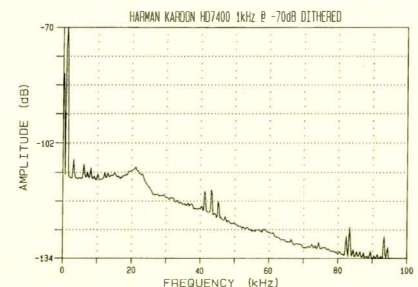
Conclusion

I've been deliberately tough on Harman because players like the *HD7500II* (issue 95) prove the company is capable of delivering the goods.

By contrast the *HD7400* is a mish-mash of somewhat cock-eyed priorities that, though initially appreciated for its big and airy sound, failed to inspire much confidence from the panel.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.00dB	0.00dB	0.08dB
Channel Separation	86.4dB	88.5dB	86.8dB
THD vs Level, 0dB	-82.9dB	-80.6dB	-60.6dB
-30dB	-70.5dB	-68.7dB	-78.8dB
-60dB	-45.7dB	-45.8dB	-51.9dB
-80dB	-17.6dB	-21.4dB	-34.3dB
-90dB	-5.75dB	-15.9dB	-21.4dB
Dithered, -100dB		-9.25dB	
Dithered, -110dB		+12.5dB	
Resolution @ -60dB		+0.19dB	+0.33dB
-80dB		+0.58dB	+1.44dB
-90dB		+0.19dB	+4.54dB
-100dB		+4.31dB	+13.3dB
Peak Output Level, L			1.967V
R			1.967V
Relative Output Level			-0.15dB
Output Impedance			108ohm
Radio Frequency Spurious	12mV @ 70MHz pulse		
1Hz Noise Modulation			+7.5dB*
CCIR IMD, 0dB			-63.2dB
Suppression of stop-band IMD			16.5dB
De-emphasis Accuracy, 1kHz			+0.03dB
5kHz			+0.23dB
16kHz			+0.36dB
S/N Ratio (A-wtd), w emp, 0LSB			106.6dB
w/o emp, 0LSB			103.5dB
w/o emp, 1LSB			103.7dB
Digital Output			None
Crystal Clock Accuracy			-44.4ppm
Track Access Time (99)			5secs
Typical Retail Price			£229



JVC XL-Z441

JVC (UK) Ltd, JVC Business Park, Priestley Way, London NW2 7BA. Tel: (081) 450 3282



It pays to keep on your toes when dealing with JVC, a company with the irritating habit of sneaking in important technical revisions without so much as a whisper. So it is with the XL-Z441. A player that, for all the world, looks like a XL-V241 with a few extra widgets thrown in for good measure. After all, the differences between past 200 and 400-series models have been little more than cosmetic.

So the XL-Z441 employs the same titanium-grey chassis and centralised drawer mechanism as the 241 but features an enlarged fluorescent display to accommodate its 'clockface' level meter and DDRP facility. DDRP is a peak-search feature which optimises the level of matching JVC tape decks prior to recording. Neat but incompatible with other brands.

The glories of Pulse Edge Modulation (PEM) are also splashed across the fascia alongside its various repeat, program and editing options. PEM, for new readers, is a rather natty technique involving a composite of two PWM bitstreams together with noise-shaping that varies from fourth-order to second-order at higher frequencies.

In this instance JVC is using its son-of-PEM DAC, a busy little chip with its digital and analogue components fully shielded even though they're all mounted on the same substrate.

Lab report

For all the guff in JVC's brochure, it's only by drafting in a high quality eight times oversampling filter from NPC that its new JCE4501 PEM DAC now offers a hint of its true potential. Unlike the XL-V241 (issue 100), the XL-Z441 uses this primary oversampling stage to increase the overall rate to 64 times, eliminating the gross filter ripple of its cheaper sibling at a stroke.

Sure, there's a slight ripple left on the frequency response together with a loss of 0.4dB at 20kHz, but just look at the textbook

handling of the dithered -70dB signal with its full 113dB dynamic range. Even with an offset digital zero input this player's 111dB S/N ratio is state-of-the-art, toppling Sony from its perch with equally impressive figures for low-level linearity and distortion. All this implies a resolution in excess of 18 bits without resort to digital subterfuge . . .

Sound quality

Bass a touch shy, the panel thought, but everything else was so clear and tonally even that it really didn't seem to matter. Female vocalists actually sounded 'like women' on this occasion, rather than sounding electronic or, at least, decidedly processed. Furthermore, the player also brought out those background synth lines that had previously been hovering in the recesses of Julia Fordham's soundstage.

This said, its development of our pop tracks was hardly three-dimensional nor exactly sharp of focus, yet there always seemed to be plenty of uncomplicated detail. Bustling, the listeners ventured, but not at all taxing. Likewise the violins that populate Panufnik's *Concerto* were silky-smooth, still thrilling but free of any gritty harshness.

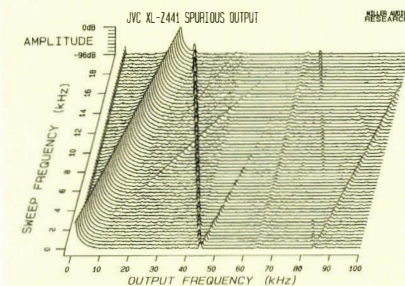
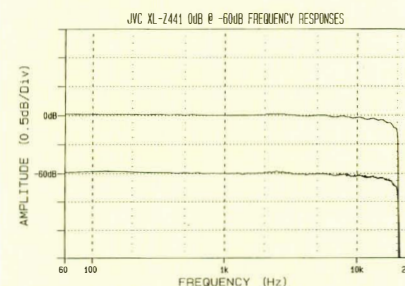
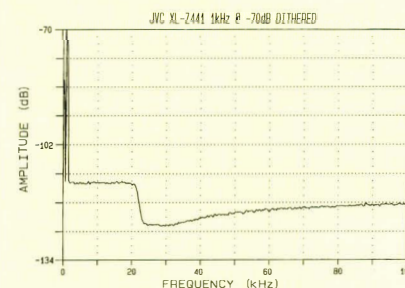
Backgrounds were remarkably 'quiet' too, a freedom from electronic hash that served to reinforce its graceful, subtly-textured sound. A quality that allows its music to appear at once delicate but also powerful and confident; bold but never abrasive.

Conclusion

Informed of the price our listeners proclaimed it one of the very best of that day, obviously relishing its relaxed but very confident and detailed sound. So don't labour under the misapprehension that JVC's XL-Z441 is simply a more flexible version of the low-cost XL-V241. It is an altogether more advanced and successful implementation of its PEM technology.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.05dB	0.04dB	0.08dB
Channel Separation	125.6dB	124.7dB	95.1dB
THD vs Level, 0dB	-108.3dB	-108.1dB	-94.7dB
-30dB	-90.3dB	-82.5dB	-77.9dB
-60dB	-54.7dB	-48.1dB	-53.3dB
-80dB	-28.0dB	-35.5dB	-34.3dB
Dithered, -90dB	-18.3dB	-24.2dB	-26.5dB
Dithered, -100dB		-23.5dB	
Dithered, -110dB		-13.4dB	
Resolution @ -60dB		-0.01dB	-0.02dB
-80dB		+0.03dB	+0.06dB
-90dB		-0.42dB	-0.22dB
-100dB		-0.13dB	+0.61dB
Peak Output Level, L			2.080V
R			2.069V
Relative Output Level			+0.32dB
Output Impedance			470ohm
Radio Frequency Spurious	9mV @ 1MHz/56MHz		
1Hz Noise Modulation			+7.8dB
CCIR IMD, 0dB			-100.4dB
Suppression of stop-band IMD			61.8dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			0.00dB
16kHz			-0.12dB
S/N Ratio (A-wtd), w emp, 0LSB			112.8dB
w/o emp, 0LSB			113.4dB
w/o emp, 1LSB			110.6dB
Digital Output			optical
Crystal Clock Accuracy			+150.6ppm
Track Access Time (99)			5.4secs
Typical Retail Price			£200

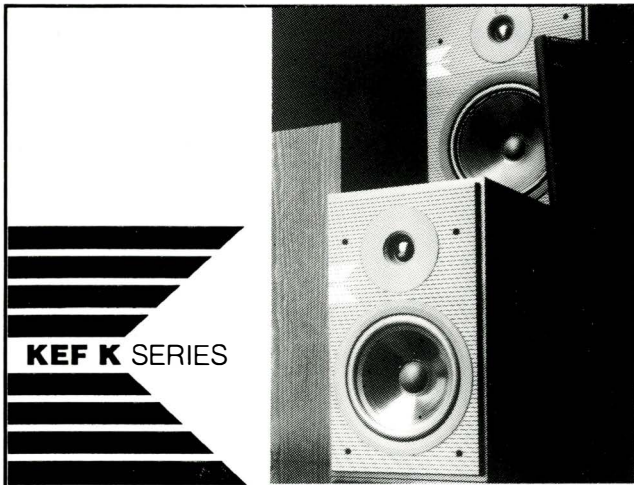


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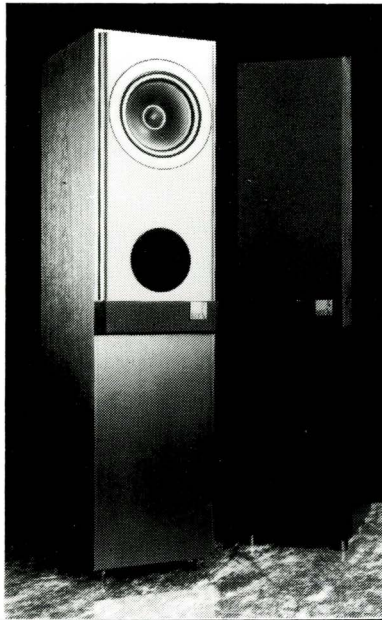
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ZO 33	ADD ON UNIT 169mm HIGH	35.75
ZO 33 A	ADD ON UNIT 254mm HIGH	35.75
ZO 34	SELF ASSEMBLY THREE SHELF RACK	67.50
ZO 34 AD	ADAPTORS FOR ADD ON UNITS (4)	5.00
ZO 35	COMPACT DISC STORAGE RACK	15.25
ZO 38	SELF ASSEMBLY FIVE SHELF RACK	99.95
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Kenwood DP-5040

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



Our last CD players' issue saw Kenwood doing rather well with other manufacturers' technology. The other manufacturer was Sony, of course, helping Kenwood on the way to a recommendation with its *DP-5030*. Seven months on and that player has just been superseded by the space-age *DP-5040* — same price, same core technology but a whole new appearance.

Aside from looking positively weird, Kenwood's deftly-contoured, top-heavy fascia is part and parcel of its new 'High Rigidity Chassis' which features thicker metal plate throughout.

The player oozes sophistication and is equally slick in operation, but the thickness of the curved display window means the readout is not always visible from all angles.

Over to one side, repeat and program play supplement the direct track access facility. Meanwhile peripheral gadgets like index skip, tape edit, peak search, random and time-play plus control over the motorised volume knob are squeezed onto a remote handset. The old *80-CD Disc File* has been dropped, however.

In its place you're paying for improved construction, a new laser servo amp, separate FET-based master clock for the bit-stream DAC and an additional FET-based differential amp as part of the final analogue stage. Plenty of blood, sweat and tears for the money.

Lab report

Kenwood has stuck with the same basic combination of NPC's SM5840 oversampling filter and Sony's CXD-2552 PLM DAC. So the V-shaped stopband images on the 3D plot, the gentle lift on the frequency response and ultrasonic pattern from the plot of 1kHz/-70dB all resemble those in issue 100.

However, Kenwood's latest refinements have reduced distortion to record lows, es-

pecially at 20kHz where the figure of 0.0023 per cent betters that of Sony's newest bit-stream DACs. As a consequence the 3D plot is utterly free of conventional harmonic distortion.

Linearity has not altered for the better yet Kenwood has stretched the player's S/N ratio by another 5dB to 105dB. A fabulous result, and Kenwood has even had the good manners to disable Sony's 'cheat mode'. Blots? Well the +8.3dB noise modulation seems rather high and the 2.3V output level might confuse A/B listening tests. Otherwise all seems very well.

Sound quality

Very well, that is, until the *DP-5040* was introduced (incognito) to our pack of rabid listeners. A bit untidy, they muttered, shifting about uneasily on their chairs. This was one player that left everyone feeling rather uncomfortable for some reason.

Its detached, exposed treble quality is certainly rather unusual, drawing attention to the splash of percussion in what can seem an unnatural and forceful way. Vocals were strewn over the soundstage, leaving Mary Black to wander aimlessly. At least that's what our listening panel would have me believe.

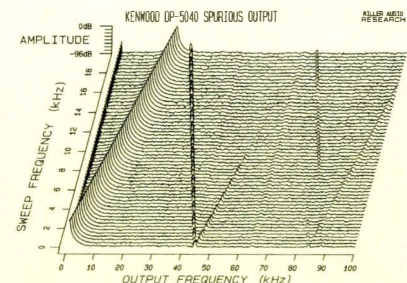
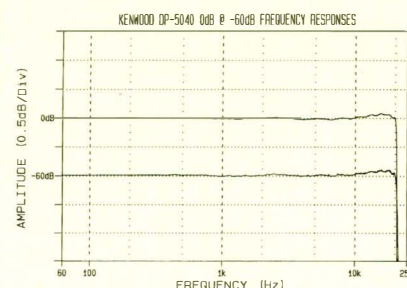
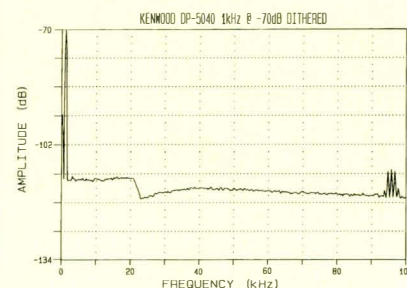
With simple, expressive material it succeeded in communicating a positive sense of rhythm — there was space, detail and a feeling of 'balance'. Yet, at the expense of sounding cliched, when the going got tough the player lost its grip, its balance dissolving into a melee that obviously irritated the panel.

Conclusion

Voted the worst of our initial two days listening, the *DP-5040* was continually rebuked for its confused sense of space and unnaturally 'loud' vocal quality. Proof, if ever proof were needed, that great test results do not necessarily a great CD player make.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.06dB	0.07dB	0.07dB
Channel Separation	102.7dB	103.8dB	85.2dB
THD vs Level, 0dB	-98.6dB	-97.3dB	-92.8dB
-30dB	-89.9dB	-81.4dB	-76.7dB
-60dB	-53.4dB	-47.0dB	-48.5dB
-80dB	-27.8dB	-33.8dB	-28.8dB
Dithered, -90dB	-17.8dB	-22.4dB	-20.7dB
Dithered, -100dB		-16.8dB	
Dithered, -110dB		-6.85dB	
Resolution @ -60dB		-0.04dB	-0.02dB
-80dB		-0.17dB	-0.05dB
-90dB		-1.07dB	-0.43dB
-100dB		-0.68dB	+0.27dB
Peak Output Level, L			2.339V
R			2.323V
Relative Output Level			+1.33dB
Output Impedance			384ohm
Radio Frequency Spurious		10mV @	84.5MHz
1Hz Noise Modulation			+8.3dB
CCIR IMD, 0dB			-95.4dB
Suppression of stop-band IMD			61.6dB
De-emphasis Accuracy, 1kHz			+0.01dB
5kHz			+0.02dB
16kHz			+0.08dB
S/N Ratio (A-wtd), w emp, 0LSB			104.8dB
w/o emp, 0LSB			104.7dB
w/o emp, 1LSB			104.7dB
Digital Output			Optical
Crystal Clock Accuracy			+64.4ppm
Track Access Time (99)			4secs
Typical Retail Price			£199



Kenwood DP-7040

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



Technically there's very little difference between Kenwood's *DP-5040* and *DP-7040*. In practice, however, the extra £100 buys you a massive increase in the quality and quantity of engineering. A chunkier version of Kenwood's chamfered fascia is the most obvious improvement, concealing a decidedly hi-tech CDM-19 transport that's isolated within a secondary alloy casement.

Fewer facilities are retained on the fascia in this instance, bringing extras like index skip, Disc File and erase to a remote control already bursting with buttons. Second only to Sony, the Kenwood players are gloriously over-equipped.

Lift the lid and you'll discover Kenwood's audio engineering is equally lavish. The same combination of NPC eight times oversampling filter and Sony DAC is used but the implementation is more sophisticated. Here Kenwood has shaved-off the RF, servo, decoding, microprocessor and Disc File functions onto one board leaving the signal processor, digital filter, DAC, cascade and output amp on another.

A secondary 16.93MHz clock feeds the eight times filter and processor while a 45.15MHz master oscillator accurately controls the pulses created by the DAC's differential PWM output. These are all efforts ranged against digital jitter — the bane of all high-speed bitstream systems.

Lab report

And if proof were needed, Kenwood's *DP-7040* betters the technical prowess of the old *DP-7030* (issue 95). Distortion, for example, is still incredibly low at 0.0005 per cent midband while its resolution has tightened up from +1.7dB to +0.5dB limits, any frequency, any level (maximum -100dB).

The marked reduction in second harmonic distortion is shown by the 3D plot, leaving the digital filter's stopband images (-62dB) exposed above the noise. This pat-

tern is endemic to the NPC filter, so you'll see a similar result with Teac's *CD-P4500* as well as Kenwood's own *DP-5040*.

Kenwood has disabled the 'cheat mode' in Sony's CXD-2552 DAC, yielding an entirely realistic 104-105dB A-wtd S/N ratio. Noise modulation is a little high, however, even if every other measurement is beyond reproach.

Sound quality

A classy act, commented one. Polished certainly, added the others, but not particularly strong in emotional content. Everything fell neatly 'into place' but our listeners were not really captivated by its performance; impressed with its sobriety and refinement, yes, but left unmoved by the untapped passion of the music.

The size and authority of Julia Fordham's voice was very compelling, a feature shared by both Mary Black and Christy Moore who made their presence felt without aggressiveness or persistence.

This civility worked against it as our busier, classical works occasionally appeared to 'glaze over'. Bass was uncommonly strong in these instances but also slightly soft, filling in spaces between individual performers. Spaces that should have been left to encourage a sense of air and atmosphere through the performance.

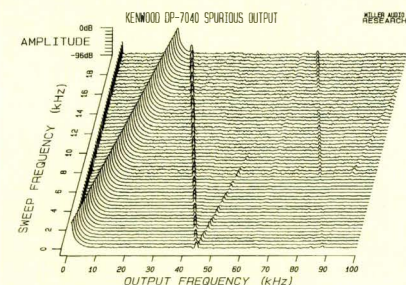
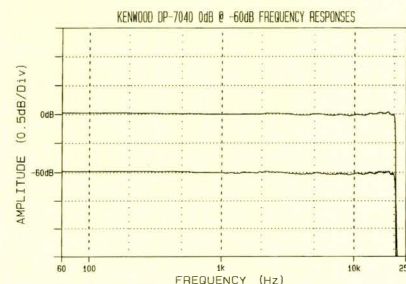
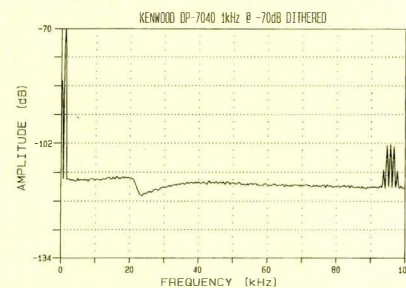
Conclusion

Huddled in conference, our listeners applauded this player's rich and expansive sound. Yet it lacks the thrill, the sparkle and freedom of our most entertaining, if not necessarily most expensive players.

Sound familiar? Well this verdict is a carbon-copy of that meted out to the *DP-7030* in issue 95. Then Kenwood achieved a Recommendation by the skin of its teeth. Now, one year on, only its superb standards of engineering keep the Recommendation ticking over.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.09dB	0.09dB	0.10dB
Channel Separation	111.4dB	96.8dB	78.6dB
THD vs Level, 0dB	-109.4dB	-106.2dB	-86.9dB
-30dB	-84.0dB	-81.0dB	-77.4dB
-60dB	-53.9dB	-47.0dB	-48.2dB
-80dB	-27.9dB	-33.7dB	-27.5dB
Dithered, -90dB	-18.6dB	-22.2dB	-17.9dB
Dithered, -100dB		-18.1dB	
Dithered, -110dB		-11.8dB	
Resolution @ -60dB		-0.03dB	-0.02dB
-80dB		-0.04dB	+0.02dB
-90dB		-0.35dB	-0.33dB
-100dB		-0.03dB	+0.47dB
Peak Output Level, L		2.103V	
R		2.082V	
Relative Output Level			+0.39dB
Output Impedance			392ohm
Radio Frequency Spurious	6mV @	135MHz	
1Hz Noise Modulation			+5.9dB
CCIR IMD, 0dB			-101.6dB
Suppression of stop-band IMD			61.7dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			0.00dB
16kHz			+0.01dB
S/N Ratio (A-wtd), w emp, 0LSB			105.3dB
w/o emp, 0LSB			105.1dB
w/o emp, 1LSB			104.4dB
Digital Output			Optical
Crystal Clock Accuracy			+49.4ppm
Track Access Time (99)			3.8secs
Typical Retail Price			£299



Marantz CD-42

Marantz Hi-Fi (UK) Ltd, Kingsbridge House, Padbury Oaks, 581 Bath Road, Longford, Middlesex UB7 0EH. Tel: (0753) 680 868



Being in the right place at the right time is important in this business, but you've got to tie the two together with the 'right' product. So no sooner had Technics vacated the sub-£200 niche than Marantz leapt wholeheartedly into the breach with its new *CD-42*, a budget version of the popular *CD-52*.

The *CD-52* romped home with a Best Buy in issue 100 so expectations were obviously high for this cheaper version. And deservedly so, for Marantz has not weakened the heart of its player. Instead the company has nibbled away at the cost of tooling for the casework and abandoned one or two frivolous facilities. Measures that have simplified its appearance while leaving you £20 better off.

Importantly, the heart of the *CD-52*, with its Philips' CDM4 mechanism, eight times oversampling filter and BS DAC remains quite untouched. In fact the *CD-42* uses exactly the same circuit board, components and layout as the *CD-52*, right down to the NE5532 op-amps in the filter network. And neither is it any less flexible, for those direct access, repeat, program and edit facilities plucked from its fascia remain quite untouched on Marantz's remote control.

Lab report

If linearity were the key to success then Marantz' *CD-42* already has a head start on the *CD-52*, 62 (issue 100) and 72. Tolerance of manufacture plays a part, of course, yet our sample suffered errors of less than 1dB all the way down to -100dB at 1kHz. On the other hand, its spread of distortion (from 0.0012-0.028 per cent at 0dB) remains faithful to the pattern established by the *CD-52*.

Where genuine differences do arise they can be attributed to changes in the player's electrical environment. Leaving the PCF3523 digital output IC switched permanently on has certainly influenced the nature of its local RF interference. This, in turn, seems

linked to the analogue S/N ratio which has contracted by 3dB to just 97.5dB (A-wtd). The 1kHz/70dB plot suggests a similar reduction in dynamic range.

Sound quality

Anyone eagerly expecting the hearty, full-bodied sound of the *CD-52* to gush from their speakers might come away disappointed. The *CD-42* is a first-rate performer with a big and expansive sound, sure, but it sounds closer to competition like the Technics *SL-PG520A* than the *CD-52*. That's the impression of our panel at any rate, listeners who were quite unaware of the type or manufacture of any machine in our survey.

Key qualities include its subjective 'quietness', the way that individual notes drift into a dark rather than a hazy or uncertain acoustic. Its soundstaging won applause too, particularly with the Panufnik *Concerto* which possessed drama and tension — something rarely encountered with other players. Nevertheless our bolder classical selections did start to sound a little strained, Prokofiev's strings losing their warmth and composure during the busiest sequences.

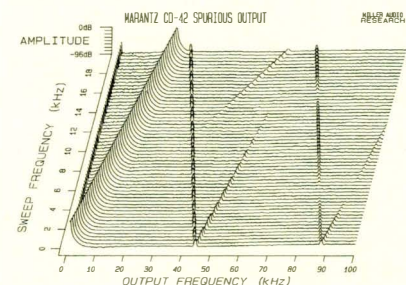
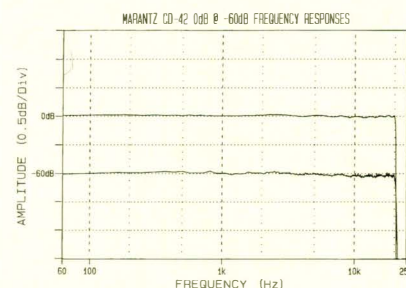
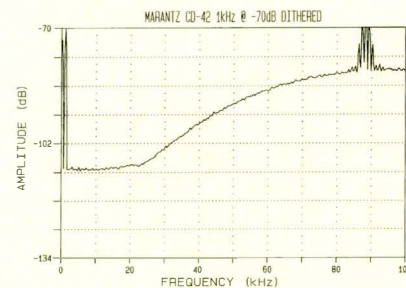
More importantly, they thought, that elusive, intimate quality had returned to Christy Moore's voice, complimented by the delightful shimmering of bells and a deep, inviting ambience. It was these delicate, subtle features of its music that made the *CD-42* so attractive but also served to contrast with the unabashed, gutsy performance of the *CD-52* in issue 100.

Conclusion

An all-round good egg was the verdict, a budget player capable of delivering a decidedly classy sound. So, it's let down on the odd occasion by a shortfall in headroom or dynamics; but such foibles pale into insignificance against the transparent, lively yet subtle sound of this budget wonder. This, then, is the sub-£200 player of the moment.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.03dB	0.02dB	0.05dB
Channel Separation	117.9dB	110.1dB	85.2dB
THD vs Level, 0dB	-98.3dB	-96.0dB	-71.0dB
-30dB	-84.2dB	-76.7dB	-47.6dB
-60dB	-52.0dB	-44.5dB	-17.2dB
-80dB	-27.1dB	-29.9dB	-0.75dB
Dithered, -90dB	-16.1dB	-20.2dB	+9.50dB
Dithered, -100dB		-11.7dB	
Dithered, -110dB		-4.35dB	
Resolution @ -60dB		+0.02dB	+0.01dB
-80dB		+0.34dB	+0.40dB
-90dB		+0.48dB	+1.14dB
-100dB		+0.90dB	+3.23dB
Peak Output Level, L		2.107V	
R		2.111V	
Relative Output Level		+0.46dB	
Output Impedance		207ohm	
Radio Frequency Spuria		14mV @ 88.2kHz	
1Hz Noise Modulation		+3.6dB	
CCIR IMD, 0dB		-97.5dB	
Suppression of stop-band IMD		61.4dB	
De-emphasis Accuracy, 1kHz		0.00dB	
5kHz		+0.01dB	
16kHz		-0.01dB	
S/N Ratio (A-wtd), w emp, 0LSB		100.3dB	
w/o emp, 0LSB		100.1dB	
w/o emp, 1LSB		97.5dB	
Digital Output		Coaxial	
Crystal Clock Accuracy		+27.5ppm	
Track Access Time (99)		4secs	
Typical Retail Price		£170	



Marantz CD-52SE

Marantz Hi-Fi (UK) Ltd, Kingsbridge House, Padbury Oaks, 581 Bath Road, Longford, Middlesex UB7 0EH. Tel: (0753) 680 868



After a decidedly nervous start, Marantz is now very much at ease with Philips' Bit Stream technology. So much so that it has launched its first *Special Edition* 1-bit player, based on the hugely successful *CD-52*. Externally you're stuck with the same clumsy-looking plastic fascia, dotted with buttons for direct track access, programming, repeat, edit and FTS facilities. But inside, that extra £80 buys you no less than 17 crucial modifications.

One of Rotel's favourite Rubycon Black Gate electrolytics finds its way into the power supply, for example, while Nichicon Muse capacitors are exchanged for Elna Silmic varieties in the analogue filter network. The industry-standard Signetics op-amps are out too, in favour of JRC 'equivalents' preferred for their improved low-level performance.

Marantz has even squigged a rubber grommet over the 11.3MHz crystal in an effort to reduce the effects of vibration. This simple mod also influences the performance of its coaxial digital output, strengthening the position of the *CD-52SE* when the time comes to upgrade.

Lab report

Compared with the standard *CD-52* (issue 100), this *SE* version offers lower levels of distortion at all frequencies below -80dB. Its resolution has also tightened up from +4.8dB to +1.6dB at -100dB while the -60dB response is visibly flatter. The 3D plot remains utterly characteristic of the NPC filter/ SAA7350 DAC combination however, as does the 61dB stopband rejection and +4.6dB noise modulation.

Nevertheless, by increasing the value of the filter caps from 100µF to 440µF, Marantz has forced the inevitable re-quantisation noise slightly further from the audioband. The plot of 1kHz/70dB shows this as a flat, rather than curved, noise floor up to 20kHz just as the overall S/N ratio is seem to

improve by 1dB to 101.6dB. All very worthy improvements.

Sound quality

A row of nodding heads and imaginary batons greeted the sound of this player, our listeners becoming quite animated in response to its compelling tide of music. Let's take Prokofiev's *Symphony* as an example, for here its music seemed to have everything: clean, sharp violins, flutes, horns and cellos all building to a marvellous climax.

It was the sheer boldness of the sound, a confidence achieved without roughness which lent an unswerving impetus and impact to individual instruments. Performers were set free, notes expanding and decaying without compression and giving full rein to the emotion of the music.

Switching to our jazz selection found the panel exchanging their batons for 'air trumpets', capturing the mood and swing of the music with unselfconscious enthusiasm. Its tenor was gripping, vivid, its soundstaging broad, deep and gratifyingly stable; a big but highly controlled sound, they announced.

It was not beyond fault however, as the laid-back character of deeper male vocals came in for token criticism. On the whole, though, female vocals were 'absolutely superb', Julia Fordham and Mary Black being described in feverish tones as 'liquid gold'. Up until this point everything had sounded, well, so very ordinary.

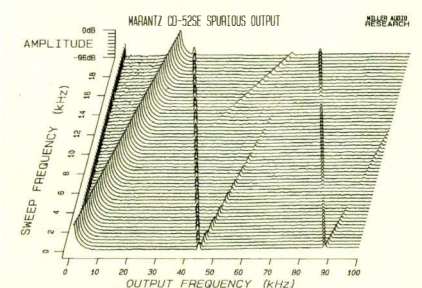
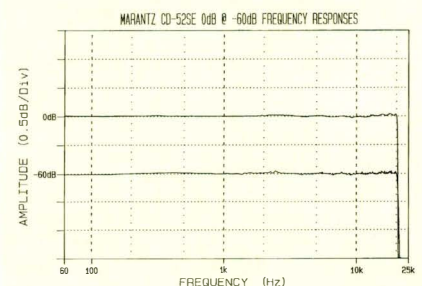
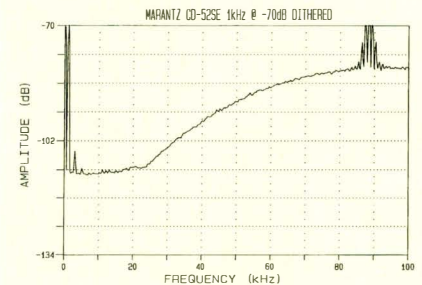
Conclusion

This player revealed that bold and vibrant quality we had relished back in issue 100 but, on this occasion, no mention was made of any mellow or falsely euphonic quality.

A potent foil for both the Pioneer *PD-8700* and Rotel *RCD-965BX*? Perhaps. For though these proven favourites retain a sonic edge, Marantz's £20 advantage converts what would have been a strong Recommendation into a fully-fledged Best Buy.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.06dB	0.05dB	0.05dB
Channel Separation	110.5dB	112.3dB	88.2dB
THD vs Level, 0dB	-96.8dB	-96.9dB	-70.8dB
-30dB	-80.7dB	-76.2dB	-48.0dB
-60dB	-46.5dB	-43.3dB	-17.6dB
-80dB	-26.4dB	-34.4dB	-0.75dB
Dithered, -90dB	-16.1dB	-20.6dB	+8.45dB
Dithered, -100dB		-16.5dB	
Dithered, -110dB		-8.50dB	
Resolution @ -60dB		+0.03dB	+0.02dB
-80dB		+0.65dB	+0.51dB
-90dB		+1.07dB	+1.20dB
-100dB		+1.55dB	+3.40dB
Peak Output Level, L			2.142V
R			2.128V
Relative Output Level			+0.57dB
Output Impedance			201ohm
Radio Frequency Spurious		7mV @	88.2kHz
1Hz Noise Modulation			+4.6dB
CCIR IMD, 0dB			-95.8dB
Suppression of stop-band IMD			61.4dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			+0.01dB
16kHz			+0.01dB
S/N Ratio (A-wtd), w emp, 0LSB			102.6dB
w/o emp, 0LSB			102.7dB
w/o emp, 1LSB			101.6dB
Digital Output			Coaxial
Crystal Clock Accuracy			+23.1ppm
Track Access Time (99)			3.2secs
Typical Retail Price			£280



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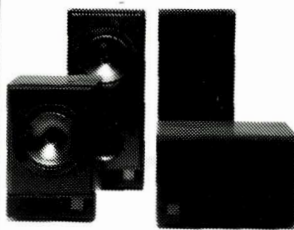
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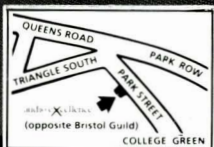
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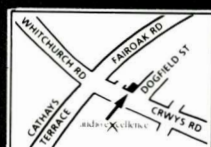
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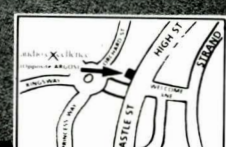
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Marantz CD-72

Marantz Hi-Fi (UK) Ltd, Kingsbridge House, Padbury Oaks, 581 Bath Road, Longford, Middlesex UB7 0EH. Tel: (0753) 680 868



Looking within the bowels of the CD-72 is the ultimate version of Marantz's CD-42 and CD-52, what it describes rather fancifully as 'Victorian over-engineering'. Same chips, same CDM4 transport but a much improved power supply feeding separate lines on new transport/servo and digital/analogue PCBs.

Marantz has drafted in a new crystal oscillator which is less susceptible to vibration while specifying high slew-rate op-amps from JRC to drive the analogue filter stages. Elna Cerafine electrolytics are dotted about for good measure.

So the CD-72 is no tarted-up CD-52 but an entirely new layout plonked in an equally new metal case. At first glance it looks like a mix between the CD-62 and CD-80 (issue 95). Similar, certainly, but the layout of FTS, random, repeat, programming and digital output facilities is specific to the CD-72. There are plenty of widgets in tow, including a motorised volume control connected to the main variable outputs. The headphone socket must be adjusted manually.

Lab report

Technically at least, all Marantz' efforts are quite in vain as the CD-72 offers no advantage over either the CD-42, CD-52 (issue 100) or CD-52SE. Where differences do exist, such as in linearity or noise modulation, they're just as easily explained by the production spread of Philips' SAA7350 BS DAC. Just compare the figures.

The technical 'character' of all three players is overwhelmed both by the combination of NPC SM5840 oversampling filter and SAA7350 DAC, especially as Marantz has chosen the lower 11.2896MHz clock frequency (256 times) to accommodate Philips' SAA7310 decoder.

A look at the plots shows it's this low clock rate that causes the vast hump of requantisation noise visible on both 3D and -70dB plots. Noise that's decimated in play-

ers like the Teac CD-P4500 and Aiwa XC-900 (issue 100) which run the DAC at 16.9MHz. Not only does this make the subjective performance slightly unpredictable with different amplifiers, but it also gives an over-inflated figure for THD at 20kHz.

Sound quality

Talking of unpredictability, this player proved something of a shock to our listeners. The first few bars knocked them, metaphorically speaking, from their seats — the sheer solidity and focus of its sound contrasting with the softer presentation of the Philips CD604 we had just auditioned incognito.

One listener found the sheer immediacy of its sound too much to bear. He felt intimidated by our Marty Paich selection, as if 'the whole lot of them were sandwiched between us and the speakers'.

Other listeners interpreted this bold presentation more favourably, re-adjusting their senses to cope with the player's feverish enthusiasm. They did not find it scratchy but highly composed, very detailed and spacious. You could 'walk into the soundstage and touch Mary Black' suggested one.

They were also mightily impressed with its string tone which, whether from the bass of Prokofiev or violins from Panufnik, sounded clean and bitingly resonant. A little too clean perhaps, lacking the emotive character of less fierceome players.

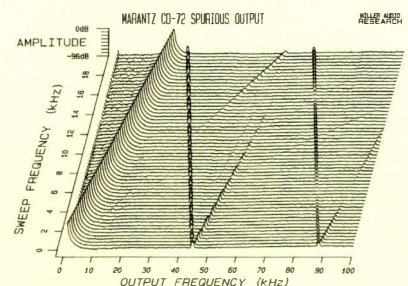
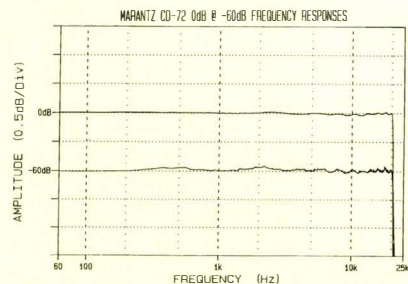
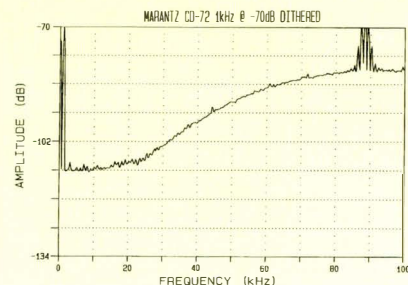
Conclusion

Not everyone's cup of tea, by all accounts. A player that consistently sounded louder than everything else in the test despite being precisely level-matched for our auditioning. The 'loudness' in this instance is a genuine side-effect of its forward presentation.

Still, Marantz is offering a thoroughly well-engineered and flexible player in the CD-72, although with an asking price of £400 it is just too expensive to justify a formal *Choice* Recommendation.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.07dB	0.07dB	0.05dB
Channel Separation	119.9dB	123.2dB	108.4dB
THD vs Level, 0dB	-93.5dB	-92.4dB	-70.2dB
-30dB	-78.8dB	-78.1dB	-46.9dB
-60dB	-45.2dB	-45.1dB	-18.3dB
-80dB	-27.1dB	-33.1dB	-0.65dB
Dithered, -90dB	-16.0dB	-17.7dB	+10.0dB
Dithered, -100dB		-15.2dB	
Dithered, -110dB		-6.45dB	
Resolution @ -60dB		+0.01dB	+0.04dB
-80dB		+0.41dB	+0.65dB
-90dB		+0.40dB	+1.73dB
-100dB		+0.85dB	+4.04dB
Peak Output Level, L			2.252V
R			2.269V
Relative Output Level			+1.06dB
Output Impedance			205ohm
Radio Frequency Spurious		4mV @ 88kHz	
1Hz Noise Modulation			+3.1dB
CCIR IMD, 0dB			-95.2dB
Suppression of stop-band IMD			61.5dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			0.00dB
16kHz			+0.01dB
S/N Ratio (A-wtd), w emp, 0LSB			102.9dB*
w/o emp, 0LSB			102.9dB*
w/o emp, 1LSB			101.9dB
Digital Output			Coax/opt
Crystal Clock Accuracy			+1.25ppm
Track Access Time (99)			3 secs
Typical Retail Price			£400



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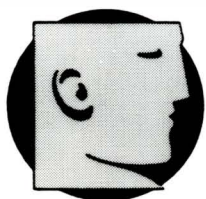
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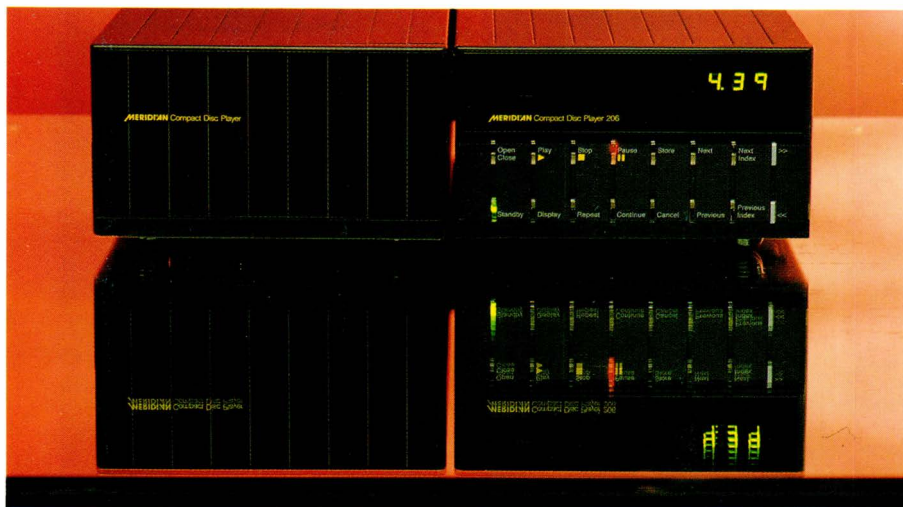
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Meridian 206B (DAC7)

Meridian Audio Ltd, 13 Clifton Road, Huntingdon, Cambs
PE18 7EJ. Tel: (0480) 434 334



It was inevitable that having DAC7'd every bit of electronics it could lay its paws on, Meridian would finally get around to modifying the 206B CD player. Yet today's 206B looks no different from the original 206 with its siamesed two-box chassis, cute but useless display and ordered row of buttons.

However, though Meridian has never updated the player's fascia, its internal architecture has metamorphosed from traditional 16-bit through differential '7321 Bit Stream to the top-flight DAC7 implementation found here. OK, so the 206B employs a three-layer rather than four-layer PCB but the complement of SAA7310 decoder, SAA7321 oversampling filter, SAA7350 noise-shaper and TDA1547 DAC mirrors that of its latest 203 outboard converter.

Meanwhile Meridian's one-piece drawer and CD transport mechanism remains unchanged as does the rather archaic Philips-issue remote control. In spite of this, however, the player still retains a uniquely conservative and purposeful image that sets it apart from glossy, Far Eastern competition.

Lab report

Technical comparisons with Meridian's 203 DAC (issue 101) are very interesting, for though the rippled frequency response and 3D plot are virtually indistinguishable, the 206B is both more linear and offers lower distortion at low signal levels. Errors of -0.8dB (re -100dB) compare very favourably with the 203 just as the -70dB trace reveals an absence of the second to fourth harmonics that cropped up in issue 101.

Yet certain features, including the wash of re-quantisation noise that sweeps across the -70dB and 3D plots, remain undisturbed. The same passive LC filter also drops its output by 0.23dB at 20kHz — harmless but characteristic. Just as typical is the S/N ratio compromised, once again, by 11.025kHz spurious despite settling at a realistic 104dB using the 1-LSB offset digital zero.

Sound quality

Plenty of bass definition, remarked the panel, as the listeners proceeded to compliment this player on its full, detailed presentation. The strung bass from Panufnik's *Concerto* rippled convincingly, sounding deep and resonant but not bloated. Images were sharply etched too, almost as if they were indented in the broad soundstage. Similarly, most listeners thought the player separated out the mass of instruments from our jazz selection with great poise and clarity.

Furthermore Julia Fordham was not, for once, draped unceremoniously between the speakers but pulled into focus, her crisp vocals remaining quite unperturbed by the instruments around her. Nevertheless the 206B failed to win unanimous praise, a few listeners finding it rather 'sparse' at times. Not thin tonally, but stilted rather than flowing. This, its detractors suggested, could lend its music a rather mechanical 'feel'.

It managed to retain its quiet composure with Mary Black's *Columbus*, however, temporarily reassuring us with its typically confident, clean and very detailed sound. Yet Christy Moore's voice lacked a little of his usual warmth, a sanitising influence that caused our panel to remark upon its continual struggle for technical rather than emotive accuracy.

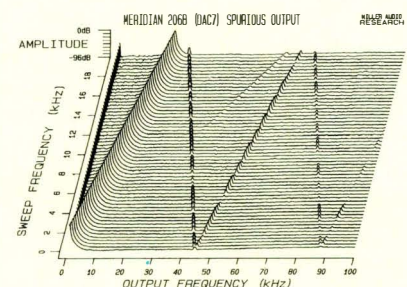
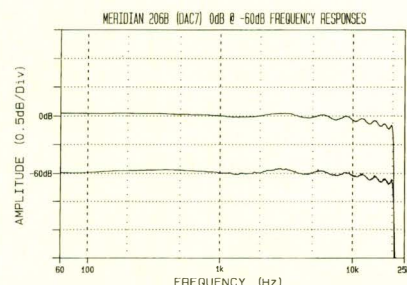
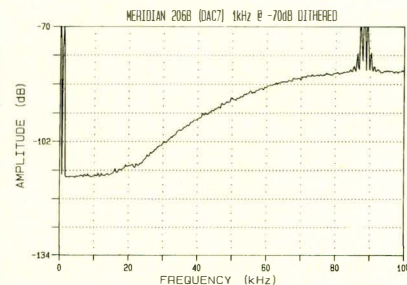
Conclusion

In terms of engineering, Meridian has clearly done a great job bringing the old 206B up to DAC7 scratch. But then so it should, having already implemented similar changes to both 203 and 606 outboard converters.

Meanwhile its cost has risen, putting today's 206B in direct competition with a 203 and any quality £400 CD player/transport. If you already own a decent player equipped with a digital output and fancy dabbling with the Meridian 'sound', then perhaps you should choose the 203 and not the 206B as the vehicle to upgrade.

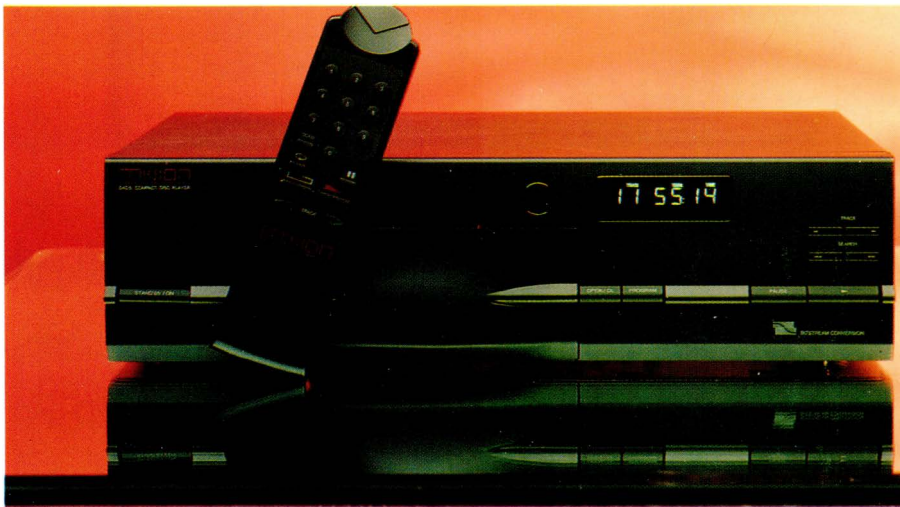
TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.06dB	0.06dB	0.07dB
Channel Separation	130.0dB	132.4dB	121.5dB
THD vs Level, 0dB	-111.3dB	-106.1dB	-73.5dB
-30dB	-94.4dB	-82.2dB	-47.4dB
-60dB	-60.0dB	-54.5dB	-17.8dB
-80dB	-27.0dB	-34.5dB	-9.55dB
Dithered, -90dB	-20.6dB	-21.8dB	+9.95dB
Dithered, -100dB		-19.5dB	
Dithered, -110dB		-10.6dB	
Resolution @ -60dB	-0.02dB	-0.02dB	0.00dB
-80dB	-0.18dB	-0.04dB	
-90dB	-0.79dB	-0.27dB	
-100dB	-0.80dB	+0.20dB	
Peak Output Level, L			2.365V
R			2.383V
Relative Output Level			+1.49dB
Output Impedance			21.3ohm
Radio Frequency Spurious		7mV @ 1.4MHz	
1Hz Noise Modulation			+5.7dB
CCIR IMD, 0dB			100.7dB
Suppression of stop-band IMD			55.1dB
De-emphasis Accuracy, 1kHz			-0.04dB
5kHz			0.24dB
16kHz			-0.28dB
S/N Ratio (A-wtd), w emp, 0LSB			110.0dB
w/o emp, 0LSB			106.4dB*
w/o emp, 1LSB			103.7dB
Digital Output			Coaxial/Optical
Crystal Clock Accuracy			+13.8ppm
Track Access Time (99)			3.9secs
Typical Retail Price			£995



Mission DAD5

Mission Electronics, Unit 2,3,4 George Street, Stonehill, Huntingdon, Cambs PE18 6ED. Tel: (0480) 52777



DAD, if you can remember that far back, is a prehistoric acronym for Digital Audio Disc. Nowadays the five inch silver discs are known as CDs, but this hasn't prevented Mission keeping the old logo alive with a new and mildly eccentric Bit Stream player.

This then is the *DAD5*, a dumpy-looking player put together by Philips under strict instruction from the chaps at Huntingdon. It's not a straight rip-off of a *600 Series* model, however, for the *DAD5* is equipped with a new derivation of Philips' CDM4 mechanism, held captive within a mobile loading tray.

Hit the eject key and this lightly-sprung mechanism, complete with motor spindle and swing-arm laser, slides ponderously into view. It looks like a cheap and cheerful version of Meridian's CD transport, but just be careful not to leave fingerprints on the exposed laser.

This drawer occupies a large portion of Mission's cast alloy fascia, leaving little room for a decent display or widgets like direct track access. So Mission has relocated the features department onto the remote control, leaving the *DAD5* with play, pause and search but no separate 'stop' button.

Lab report

Peer behind the bulbous fascia and a standard Philips chassis is revealed, complete with off-the-shelf Bit Stream PCB, SAA7310 decoder and SAA7321 DAC. As a result the technical brief for Mission's *DAD5* is broadly similar to Philips' *CD618*, *CD624* and *CD634*, AR's *CD-07* and Marantz' old *CD-41* (issues 95 and 100).

So the frequency response(s) and stopband images on the 3D plot are both rippled in typical fashion, courtesy of the first four times oversampling stage. Stopband rejection is also limited to 55dB, rather poorer than most hi-tech Japanese filters, I might add.

Meanwhile THD follows an established pattern with odd-order components pushing distortion from a minimum of 0.0011 to 0.04 per cent at 20kHz. Still, it makes a decent job of the dithered -70dB signal even if the near-ultrasonic region is blighted by a 22.05kHz drone at -96dB.

Sound quality

As the sixth track faded into silence the enthusiasm of our panel also seemed to wane. A pity, because the player's fine sense of detail, life and bounce had initially stirred their interest. Eager to please, they thought, but tends to trip over itself in the process.

The Panufnik *Concerto*, for instance, had sounded both dynamic and fresh with a decent sense of scale and weight, a positive and compelling performance that seemed spacious without exactly wallowing in depth. Our listeners also appreciated the naturally ambient, lively character of the Marty Paich selection with its crisp percussive quality.

Nevertheless its handling of bass detail was sloppy in comparison, not boomy but slightly loose and vague. Simple vocal tracks also sounded very 'big' though some performers, Julia Fordham included, were unnaturally bold. Mary Black, by contrast, sounded lethargic, almost as if 'she had performed every night in the same club with the same musicians for months'.

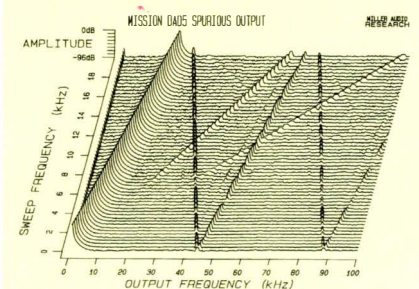
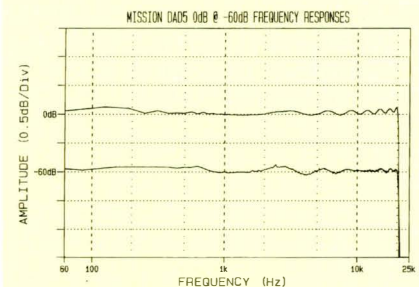
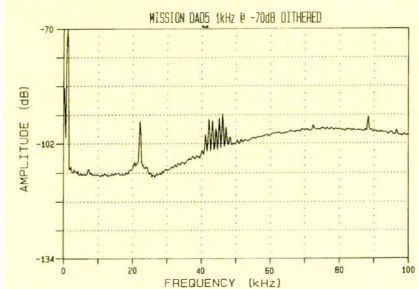
Conclusion

Mission has plumped for a very fresh, spacious and airy balance that's initially very attractive. Musically, however, it just seems to be 'going through the motions', a trait that continued to tax the enthusiasm of our panel as the minutes ticked away.

So the *DAD5* is no hot contender at £300, even if its potential as a CD transport looks rather more promising. Coupled with Mission's forthcoming *DAC5* outboard converter, the *DAD5* could yet discover a niche in the market.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.02dB	0.03dB	0.01dB
Channel Separation	84.2dB	91.7dB	87.8dB
THD vs Level, 0dB	-97.7dB	-98.9dB	-68.0dB
-30dB	-83.2dB	-75.2dB	-65.5dB
-60dB	-50.7dB	-50.0dB	-35.1dB
-80dB	-21.0dB	-26.0dB	-12.9dB
Dithered, -90dB	-9.45dB	-12.6dB	-3.45dB
Dithered, -100dB		-10.1dB	
Dithered, -110dB		-1.20dB	
Resolution @ -60dB		-0.07dB	-0.10dB
-80dB		-0.79dB	-0.89dB
-90dB		-2.37dB	-2.69dB
-100dB		-3.27dB	-2.63dB
Peak Output Level, L			1.916V
R			1.910V
Relative Output Level			-0.37dB
Output Impedance			200ohm
Radio Frequency Spurious		5mV @ 67.7MHz	
1Hz Noise Modulation			+3.5dB
CCIR IMD, 0dB			-95.9dB
Suppression of stop-band IMD			55.0dB
De-emphasis Accuracy, 1kHz			-0.18dB
5kHz			-0.09dB
16kHz			+0.09dB
S/N Ratio (A-wtd), w emp, 0LSB			-99.3dB
w/o emp, 0LSB			-97.3dB
w/o emp, 1LSB			-97.1dB
Digital Output			Coaxial
Crystal Clock Accuracy			+29.4ppm
Track Access Time (99)			3secs
Typical Retail Price			£300



Musical Fidelity CD1

Musical Fidelity, Unit 15/16, Olympic Trading Estate, Fulton Road, Wembley, Middlesex HA9 0TF. Tel: (081) 900 2866



Taken at face value, the slimline Musical Fidelity *CD1* is a model of elegance if not heavyweight engineering. Clearly-marked controls cater for index and track skip, scan, repeat and program play. Its remote control is singularly worthless, however, but then it's pretty similar to the handset adopted by NAD's 5425 (issue 95).

In practice the *CD1* is operable from most Philips-based CD handsets, stirring 'hidden' features like direct track access, random and A-B repeat into life.

Inside, the *CD1* is equipped with an SAA7323 DAC which returns to the 352kHz dither scheme used by Philips' original SAA7320. This latest Bit Stream DAC has also inherited the tendency to whistle and burble at inopportune moments, forcing MF to add an extra muting circuit. The company has added its own transformer and display boards too but the main PCB with its CDM4 mechanism, digital and analogue electronics, is culled straight from Rotel's *RCD-965BX*.

The board layout is identical (HQ300B mkII) but where Rotel has specified Panasonic HF/HFS (power supply and decoupling) and Rubycon BGF electrolytics (audio and decoupling), Musical Fidelity is using standard Nichicon and Nichicon Muse. Interestingly, the *CD1* is also equipped with the same Raytheon op-amps that were present in the Rotel-built *AR CD-07* (issue 100).

Lab report

The *CD1* has all the hallmarks of Rotel's *RCD-965BX* (issue 100) or, more appropriately, the SAA7323 DAC. Hence the rippled stop-band images on the 3D plot (caused by its integral filter), the strong third and fifth harmonic distortions and even the slight bass 'hump' on its -60dB response.

More importantly, the *CD1* is also compromised by breakthrough from the CLV

frame tone at 7.35kHz (see the 1kHz/-70dB plot)

Yet there are differences between the two players. The Musical Fidelity model suffers slightly higher levels of THD at 0dB but any deviation in resolution occurs more smoothly (-1dB @ -80dB and -3dB @ -100dB). Then again its noise modulation is higher (+2.8dB) but it has stretched the overall signal to noise ratio by 4dB to 98dB. Its 2.4V output is too high.

Sound quality

A bouncy, lively sound greeted our listening panel, a sound that easily conveyed complex interactions between individual performers, especially with our classical selection. However this keen, bubbly quality is also its Achilles heel; the interaction so welcome on Prokofiev's *Symphony* was also responsible for the merging and muddling of percussion with Marty Paich's jazz ensemble.

This was clearly less of a problem for some listeners than others. Those that took to its sound found its vigour, gripping imagery and soundstaging very attractive, very fluid and inherently natural. You could hear the 'steel' of strings ringing from Julia Fordham's Compact Disc, these listeners remarked.

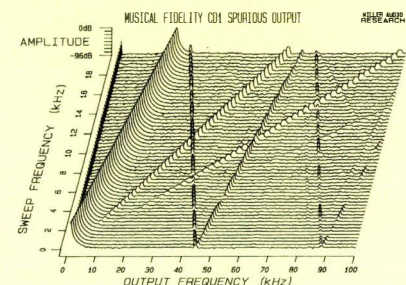
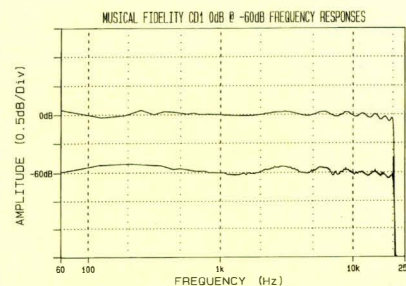
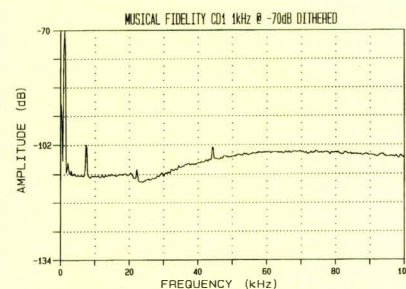
Those who were somewhat less impressed cited 'thinness and tinniness' as persistent colorations. There were gritty and abrasive qualities in the sound that wore them down, and the longer these members of the panel listened, the more fatigued they became.

Conclusion

All of this leaves Musical Fidelity with plenty of untapped potential in the *CD1*. It is a player that lacks the solid construction and 'special' ingredients of Rotel's *RCD-965BX* but that'll also set you back an extra £100 into the bargain . . .

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.05dB	0.05dB	0.05dB
Channel Separation	92.9dB	96.4dB	97.5dB
THD vs Level, 0dB	-93.6dB	-89.3dB	-62.6dB
-30dB	-82.6dB	-74.4dB	-66.7dB
-60dB	-50.0dB	-47.3dB	-40.6dB
-80dB	-24.5dB	-21.3dB	-17.5dB
Dithered, -90dB	-13.8dB	-13.4dB	-6.95dB
Dithered, -100dB		-11.7dB	
Dithered, -110dB		-1.85dB	
Resolution @ -60dB		-0.10dB	-0.07dB
-80dB		-1.07dB	-0.82dB
-90dB		-2.56dB	-1.75dB
-100dB		-3.00dB	+0.82dB
Peak Output Level, L			2.435V
R			2.420V
Relative Output Level			+1.68dB
Output Impedance			206ohm
Radio Frequency Spurious		9.5mV @ 28MHz	
1Hz Noise Modulation			+2.8dB
CCIR IMD, 0dB			-95.8dB
Suppression of stop-band IMD			55.3dB
De-emphasis Accuracy, 1kHz			-0.05dB
5kHz			-0.09dB
16kHz			-0.05dB
S/N Ratio (A-wtd), w emp, 0LSB			101.0dB
w/o emp, 0LSB			98.8dB
w/o emp, 1LSB			98.2dB
Digital Output			Coaxial/Optical
Crystal Clock Accuracy			+9.4ppm
Track Access Time (99)			3secs
Typical Retail Price			£400



Philips CD604

Philips Electrical Ltd, City House, 420-430 London Road, Croydon, Surrey CR9 3QR. Tel: (081) 689 2166



Question: what to do with a warehouse full of *CD610MkII* circuit boards? Answer: Stick them in a budget *600-Series* case, lose the remote control and call it a *CD604*. Simple huh? One of the best £160 CD players is effectively reduced to £130, foregoing the convenience of remote control and letting Philips run-down its stockpile of low-cost 16-bit chipsets.

What you are left with is a lightweight but very securely constructed player, complete with a reinforced plastic chassis and floating CDM4 transport mechanism. Philips' standard fluorescent display casts its glow over the full and A-B repeat, random play and fast search facilities while, over to the right, you've track skip, intro scan, edit and a 20-track program to toy with.

Everything you had on the *CD610II*, in fact, save for a volume control on the headphone socket. However you care to look at it, the *CD604* is likely to be Philips' last multibit CD player.

Lab report

When Philips' updated the original *CD610*, enthusiasts in this country were told that 'MkII' meant a new headphone facility. Secretly, Philips had also opted for a more cost-effective signal processor, Mitsubishi's M50423P, to handle the decoding, error correction and four times oversampling. You might also be interested to learn that the *CD610MkII* was called the *CD614* everywhere else . . .

Anyway, this same processor is used in the *CD604* where it proceeds to dominate whole areas of performance. Philips' cheap TDA1543 DAC is responsible for the 99dB S/N ratio and the jump in distortion from 0.004 to 0.046 per cent between 0dB and -30dB. But the 1.2dB treble cut, appalling low-level linearity and swathes of stop-band noise are the preserve of the M50423P (see the 3D plot).

Is this also behind the thumping 51dB increase (350 times) in leakage of 44.1/88.2kHz sampling tones, triggered during the noise mod test? Oh yes, the digital output is also governed by this processor, in contrast with Philips' *CD618/624/634* etc.

Sound quality

Not terribly spacious and slightly ponderous in tenor but this player still had a very polite and interesting sound, a sound made all the more credible by its small but crisply focused soundstaging.

From this tentative position the enthusiasm of our panel steadily grew, the coloured yet intriguing sound of this player constantly introducing new twists to otherwise familiar pieces of music.

They described how the 'picture' of Prokofiev's *Concerto* built rapidly, lacking a certain clarity or freshness yet emboldened by a wealth of low frequency ambience. Our pop selection also sounded rolled-off or tailored while string and percussive details would merge through the treble.

Meanwhile its bass was actually too extended, too full and mellow. So while this verdant, syrupy quality was often attractive, it could just as easily soak-up top-end detail.

More sonorous than Rotel's *RCD-955AX*, the panel remarked, but just the tonic for someone who finds CD bright or tiring.

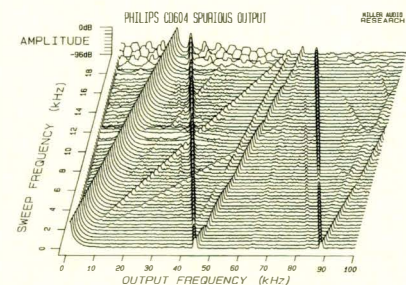
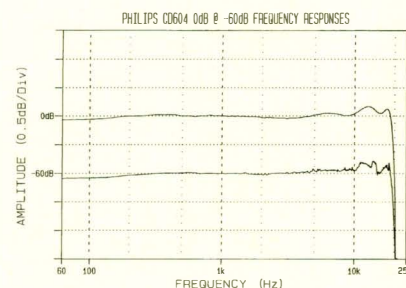
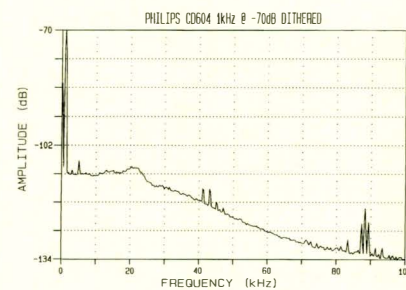
Conclusion

Basically, the inherently rugged sound of Philips' 16-bit DAC helps the *CD604* pull through. As a result simple tracks can sound positively glorious, free of sibilance and thoroughly captivating.

Still, our listeners were at pains to qualify their reaction by pointing to its 'fudging' of more complex material, especially as strong bass can quickly grow out of control. Despite this and the missing remote control, Philips' *CD604* retires with a hearty Recommendation.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.06dB	0.07dB	0.00dB
Channel Separation	77.7dB	98.1dB	83.9dB
THD vs Level, 0dB	-90.0dB	-88.1dB	-63.5dB
-30dB	-68.7dB	-66.8dB	-72.0dB
-60dB	-45.5dB	-46.2dB	-41.6dB
-80dB	-17.4dB	-26.0dB	-24.9dB
Dithered, -90dB	-6.45dB	-18.6dB	-21.2dB
Dithered, -100dB		-7.75dB	
Dithered, -110dB		+9.95dB	
Resolution @ -60dB		+0.29dB	+0.42dB
-80dB		+0.98dB	+1.96dB
-90dB		+0.95dB	+6.06dB
-100dB		+4.73dB	+14.6dB
Peak Output Level, L			2.047V
R			2.061V
Relative Output Level			+0.23dB
Output Impedance			1.04kohm
Radio Frequency Spurious		5mV @ 67.8MHz	
1Hz Noise Modulation			+6.4dB*
CCIR IMD, 0dB			-63.1dB
Suppression of stop-band IMD			16.4dB
De-emphasis Accuracy, 1kHz			-0.01dB
5kHz			-0.05dB
16kHz			-0.19dB
S/N Ratio (A-wtd), w emp, 0LSB			102.9dB
w/o emp, 0LSB			99.1dB
w/o emp, 1LSB			99.2dB
Digital Output			Coaxial
Crystal Clock Accuracy			+56.9ppm
Track Access Time (99)			3.9secs
Typical Retail Price			£130



Pioneer PD-75

Pioneer High Fidelity (GB) Ltd, Field Way, Greenford, Middlesex UB8 8UZ. Tel: (081) 575 5757



Is it a turntable or simply a CD player with an identity crisis? Either way Pioneer's *PD-75* is certainly a novel design, something of a necessity at this end of the market where expensive fully-integrated players are finding it tough to compete with £250-£300 budget wonders — budget wonders that include Pioneer's own *PD-8700*.

In common with that £300 Best Buy, the *PD-75* also features an inverted 'Stable Platter' mechanism which supports the CD from below while reading its silver-surface from above. Naturally enough, the whole shebang is beefed-up for the *PD-75* but the principle remains the same: suppress vibrations in the CD itself and you reduce the demands placed on focus, tracking and CLV servos. In theory this means less jitter and, potentially, a better sound.

In addition to its hi-tech mech, the character of this glossy machine is also moulded by its top-of-the-range Pulseflow DACs. Built for Pioneer by an un-named specialist, these true 1-bit DACs include four second-order noise-shapers and a total of eight differential PDM output stages, all running at 384 times oversampling.

The standard of construction, finish and sheer weight of this beastie is no less impressive. But lose the remote and you lose access to its direct track selection, index skip and programming facilities.

Lab report

Top-of-the-range they might be, but Pioneer's PD2028A DACs are no more linear or lower in distortion than the PD2026As used in the *PD-7700* and *PD-8700* (issue 100). Still, their superior stopband rejection (103dB) is reflected in the 'clean' appearance of the 3D plot while even the S/N ratio has inched-up from 102.6dB to 105.4dB. The 2.55V output level is guaranteed to muck-up any A/B listening test (remember, ours are all level-matched). Otherwise the *PD-75* is a textbook bitstream performer.

Sound quality

This player is the antithesis of models like the *DCD-1290* from Denon, cultivating a sound that takes time to appreciate. Listen for just a few minutes and you'll retire underwhelmed. These were qualities easily recognised by our panel who described it as both civilised and natural in tenor if lacking the bite or astrigency of the most exciting players. Individual instruments were beautifully focused, the soundstage poised by a wonderful sense of ambience as bold classical movements grew in confidence.

One listener was less convinced, claiming that a loss of weight and body tugged at the momentum of Prokofiev's *Classical Symphony*. By contrast Julia Fordham strode forward as bold as brass, both her voice and the accompanying instruments growing to larger-than-life proportions.

Is this player really most comfortable with simple pop and folk recordings? In the end it boils down to a matter of style. For instance, the grander scale of our jazz and classical CDs was certainly reflected in the 'size' of its performance. Yet the importance of the orchestra as a whole tended to undermine the inspired, virtuosic flashes of individual performers.

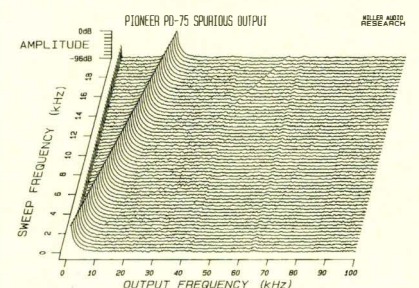
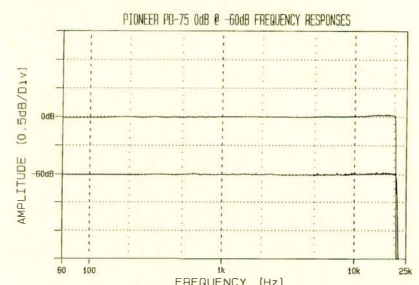
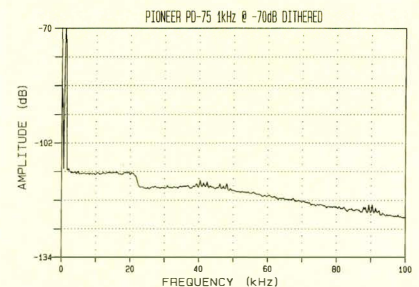
So the gentler acoustic of Mary Black's *Columbus* is like putty in its hands. Beautifully represented, her voice was placed way back in the soundstage, supported by an ambient 'glow' which protected her from the mesh of piano and strings. Lovely stuff.

Conclusion

A player that exudes refinement and craftsmanship. Unfortunately, pride of ownership is an irrelevant issue for our hard-bitten panel of 'blind' listeners. And their verdict? A natural and civilised sound, scrubbing out any hint of digital 'nasties' without bleaching its music in the process. Well worth checking out by the one consumer who's got some cash left . . .

TEST RESULTS

	20kHz	1kHz	20kHz
Channel Balance	0.12dB	0.12dB	0.11dB
Channel Separation	155.8dB	139.6dB	123.5dB
THD vs Level, 0dB	-87.4dB	-94.7dB	-87.2dB
-30dB	-87.8dB	-83.0dB	-79.1dB
-60dB	-57.9dB	-53.7dB	-52.9dB
-80dB	-28.3dB	-33.5dB	-31.8dB
Dithered, -90dB	-17.9dB	-21.1dB	-20.5dB
Dithered, -100dB		-18.4dB	
Dithered, -110dB		-14.1dB	
Resolution @ -60dB	0.00dB	-0.01dB	
-80dB	-0.11dB	+0.02dB	
-90dB	-0.46dB	-0.28dB	
-100dB	+0.22dB	-0.17dB	
Peak Output Level, L		2.553V	
R		2.515V	
Relative Output Level		+2.06dB	
Output Impedance		477ohm	
Radio Frequency Spurious		1mV broadband	
1Hz Noise Modulation		+7.4dB	
CCIR IMD, 0dB		-101.5dB	
Suppression of stop-band IMD		102.5dB	
De-emphasis Accuracy, 1kHz		+0.03dB	
5kHz		+0.22dB	
16kHz		+0.16dB	
S/N Ratio (A-wtd), w emp, 0LSB		112.9dB	
w/o emp, 0LSB		111.2dB	
w/o emp, 1LSB		105.4dB	
Digital Output		Coaxial	
Crystal Clock Accuracy		+12.5ppm	
Track Access Time (99)		2.5secs	
Typical Retail Price		£800	



Rotel RCD-955AX

Gamepath, 25 Heathfield, Stacey Bushes, Milton Keynes
MK12 6HR. Tel: (0908) 317 707



Bound to be another Best Buy, we thought. After all Rotel has simply lifted the old *RCD-855* out of its box and surrounded it with new *900 Series* livery. How wrong we were.

There is absolutely no difference in layout or component count between *855* and *955*, we were told. Same over-specified power supply, CDM4 transport mechanism, display board, facilities, digital and analogue electronics. Only the alloy fascia and remote control have received attention, bringing them into line with Rotel's new *900 Series* amps, tape decks and tuners.

All the *855*'s treasures are retained: polypropylene caps on the DAC's ladder network, the Signetics op-amps, the BGF capacitors and fully symmetrical layout.

Great so far. So why did the *RCD-955AX* bomb-out in our listening tests? Well, take out a magnifying glass and you'll discover that the *RCD-855* and *955AX* are not as identical as Rotel would have us believe.

Someone, somewhere has made the decision to connect an earth tag between the circuit ground and the player's metal chassis. Connect a 100 ohm resistor in its place and the *RCD-955AX* is restored to its former glory...

Lab report

Once again we find a series of measurements that are highly typical of Philips' SAA7220/TDA1541 16-bit chipset, with or without the new ground tag. Features that include the rippled frequency response and undulating stopband images that wend their way up the 3D plot. Features that mirror the Ariston *CD3* and Creek *CD60* also reviewed in this very issue.

Similarly, distortion stays at a very low 0.00058-0.0018 per cent at 0dB but advances rapidly below -10dB, reaching 0.02-0.09 per cent at -30dB. At progressively lower levels odd-order components tend to dominate. So the third and fifth harmonics

poking clear of the dithered 1kHz/70dB noise floor are as characteristic as the -4.2dB 'glitch' in linearity at -90dB.

Unique qualities? Well Rotel has stretched a record 113.4dB S/N ratio from this DAC (equal with Marantz's *CD-80* in issue 95).

Sound quality

One of our listeners, who consistently manages to identify Rotel product in every listening test, utterly failed to do so on this occasion. As it was, his negative reaction was a foretaste of things to come.

Superficially very polite, the listening panel suggested, but lacking substance. Certainly, the player's overall balance was neutral enough but any meaningful sense of atmosphere or subtle detail was sadly missing. The vibrant ambience of Marty Paich's jazz, for instance, was described as threadbare: the music's frame, the overt detail was obvious enough but there was very little 'filling'.

This prevents the *955* from sounding processed or electronic but many listeners still found it hard-edged. Likewise, sibilance on the Christy Moore CD was more noticeable than usual, Mary Black sounded strained while Julia Fordham was a bland facsimile of her normal, highly emotive self. Panufnik's *Concerto* was eager but untidy while Prokofiev's violins sounded aimless.

By way of conclusion it was judged a very, very 'rough diamond'.

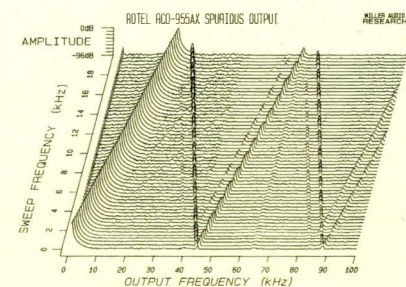
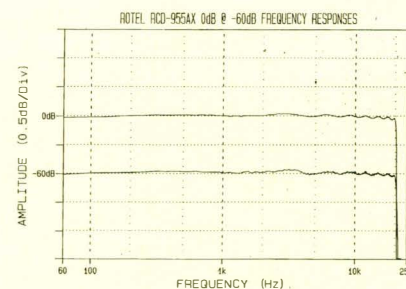
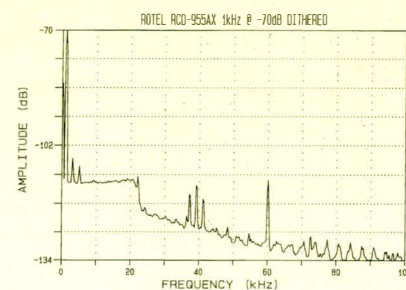
Conclusion

Auditioned on no less than four separate occasions, Rotel's son-of-*855* prompted a very mixed but generally unenthusiastic reaction. Oh well, as we are always saying, you should never have preconceived notions about a player.

By attempting to fix what was never broken the company has unfortunately plummeted from a potential Best Buy to the obscurity of an also-ran.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.07dB	0.05dB	0.04dB
Channel Separation	119.3dB	110.5dB	96.0dB
THD vs Level, 0dB	-104.7dB	-101.1dB	-95.0dB
	-30dB	-73.3dB	-67.8dB
	-60dB	-45.8dB	-46.9dB
	-80dB	-20.2dB	-28.6dB
Dithered, -90dB	-7.65dB	-17.0dB	-29.0dB
Dithered, -100dB		-15.5dB	
Dithered, -110dB		+0.15dB	
Resolution @ -60dB		-0.01dB	+0.21dB
	-80dB	-0.24dB	-0.01dB
	-90dB	-4.24dB	-0.27dB
	-100dB	-1.69dB	+5.00dB
Peak Output Level, L			1.966V
			1.951V
Relative Output Level			-0.18dB
Output Impedance			203ohm
Radio Frequency Spurious			3mV broadband
1Hz Noise Modulation			+9.5dB
CCIR IMD, 0dB			-96.0dB
Suppression of stop-band IMD			41.6dB
De-emphasis Accuracy, 1kHz			-0.01dB
	5kHz		-0.10dB
	16kHz		-0.14dB
S/N Ratio (A-wtd), w emp, 0LSB			113.8dB
			113.4dB
	w/o emp, 0LSB		113.4dB
			113.4dB
Digital Output			Coaxial
Crystal Clock Accuracy			+28.1ppm
Track Access Time (99)			3.5secs
Typical Retail Price			£260



Sansui CD-X317

Sansui UK, 93/95 Gloucester Place, London W1H 3PG.
Tel: (071) 487 4844



Very, very hot off the production line comes this new player from Sansui, one of two related bitstream models destined to replace existing units at the 'business end' of its range.

The *CD-X317* is actually the costliest of the pair at £270, complete with softly contoured fascia and warm, orange display.

A slimline transport mechanism is mounted amidships, as is common these days, while a host of function keys decorate the right of the fascia. This provides access to the continue, random and program play modes together with full tape edit, synchronised recording, repeat, digital fade, display dimmer and peak search options.

Direct track access is supplemented by a music calendar on Sansui's display which also holds full track, index and timing information. Then there's the *RS-1390* handset which offers the entire menu with extras like index skip and mastery of the motorised volume control. Comprehensive stuff, if not quite up to Sony standards.

Lab report

On the face of it, the digital gubbins inside Sansui's *CD-X317* are not too far removed from the older *CD-X311* we reviewed in issue 100. Both players use Technics' MN6474 DAC with its third-order noise-shaping and four 32 times oversampled PWM networks, yet only the *CD-X317* is equipped with balanced LC filter stages.

This player has a mild +0.35dB boost at 20kHz but HF distortion has actually halved to 0.022 per cent. So there's obviously less third harmonic distortion on the 3D plot even if its characteristic splash of stopband noise (-83dB) remains intact. The broad output of re-quantisation noise is also pretty characteristic (see 1kHz/-70dB plot), trailing the Sony and JVC DACs.

Furthermore, the 1.2dB and 2.7dB errors in linearity are unusually poor for the MN6474 even if its Noise Modulation (+2.8dB) has

mysteriously improved. This is particularly relevant because Sansui has squeezed an extra 3dB of S/N ratio from the DAC. A pity, then, that this genuine result is tarnished by artificial figures of 110-111dB as the DAC slips into 'cheat mode'.

Sound quality

Technical embellishments aside, the sound of this more 'advanced' player has lost the warm, lush if slightly fat quality of its £250 predecessor. There's certainly a fair degree of 'bounce' to its sound but the overall presentation was described as both fuzzy and splashy with a restricted view of musical dynamics.

All but one listener felt its music suffered for playing 'at one level only', lacking the responsiveness, the freshness and freedom of the best at this price. Ambient detail was still quite impressive at times, particularly during the quieter interludes from our Panufnik and Prokofiev selections.

However, as each piece built to a crescendo the balance between bass and strings was disturbed, the music trading its 'bounce' and body for an unpleasantly stilted quality. Vocals that had previously sounded very expressive now lacked lucidity, though one listener still considered it articulate, even majestic at times.

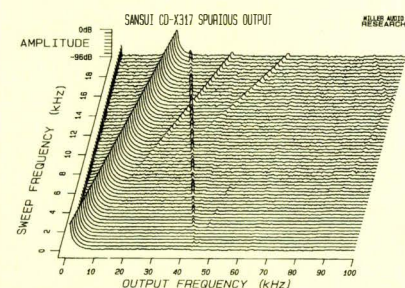
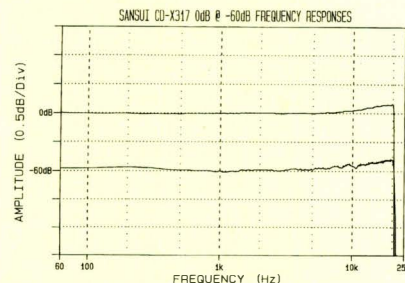
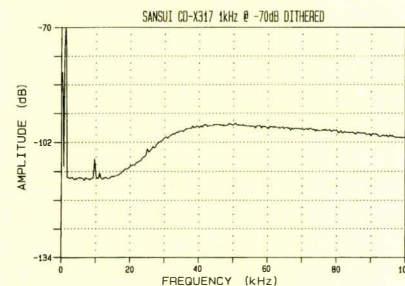
Nevertheless this was a lone opinion, everyone else condemned it for sounding 'bunched-up'.

Conclusion

A flawed player, by all accounts, and one that prompted a splintering of opinion. Nevertheless, following two listening sessions, the *CD-X317*'s detractors carried the day, relegating Sansui's efforts to 'worth considering'. A pity, bearing in mind that the older *CD-X311* had provided us with some entertaining music just six months ago. Unfortunately for Sansui, progress does not always represent improvement.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.07dB	0.08dB	0.07dB
Channel Separation	125.8dB	98.7dB	70.3dB
THD vs Level, 0dB	-82.7dB	-100.4dB	-73.0dB
-30dB	-82.2dB	-82.5dB	-61.5dB
-60dB	-62.5dB	-52.5dB	-32.0dB
-80dB	-28.3dB	-31.9dB	-13.1dB
Dithered, -90dB	-15.5dB	-19.9dB	-3.19dB
Dithered, -100dB		-16.6dB	
Dithered, -110dB		-11.9dB	
Resolution @ -60dB		-0.02dB	-0.01dB
-80dB		-0.27dB	-0.29dB
-90dB		-1.20dB	-1.20dB
-100dB		-0.98dB	-2.70dB
Peak Output Level, L			2.278V
R			2.297V
Relative Output Level			+1.17dB
Output Impedance			935ohm
Radio Frequency Spurious		4mV @ 1.4MHz	
1Hz Noise Modulation			+2.8dB
CCIR IMD, 0dB			-96.0dB
Suppression of stop-band IMD			82.6dB
De-emphasis Accuracy, 1kHz			+0.01dB
5kHz			+0.20dB
16kHz			+0.34dB
S/N Ratio (A-wtd), w emp, 0LSB			111.3dB
w/o emp, 0LSB			109.6dB
w/o emp, 1LSB			102.9dB
Digital Output			Optical
Crystal Clock Accuracy			+45.0ppm
Track Access Time (99)			3secs
Typical Retail Price			£270



Sony CDP-797

Sony UK Ltd, Sony House, South Street, Staines, Middlesex TW18 4PF. Tel: (0784) 467 000



Following its disastrous showing in our last CD players' issue, Sony has had a comprehensive spring-clean. The *CDP-X222ES* is the only player to survive this corporate broom though, strictly speaking, none of the seven new machines actually replace existing models. Instead Sony has made a fresh start, deploying players with superior componentry but slightly fewer facilities, each hitting new price points between £139 and £649.

So the *CDP-797* is not related to the older *CDP-791*, despite appearances. The company has continued to develop its 'softer' look by gently contouring the fascia and rebating the main transport controls. Above, a small crop of buttons offers direct access with peak search, intro scan, edit and time fade options thrown-in for good measure.

A remote control adds index cueing, slow music search, auto track cueing and control over the motorised volume knob. And Sony claims to have cut back on features. As promised, however, the *CDP-797* is graced by a new circuit configuration, including Sony's latest eight times oversampling filter and CXD2561 bitstream DAC.

In common with the previous two generations of players this DAC employs a third-order Multi-stage noise shaper (MASH). However, this now feeds a total of eight PLM DACs all on the same IC substrate. The result? Full complementary DAC operation with lower distortion and lower noise without the need for two separate bitstream ICs.

Lab report

Proof? Well take a look at the 3D plot where any stopband noise is buried 104dB into the page along with the very last vestiges of third harmonic distortion. At 20kHz, for example, THD has improved from 0.01 per cent (original CDX-2552 DAC) to 0.0036 per cent (new CXD-2561 DAC).

More importantly, just compare the egress of re-quantisation noise on this (al-

beit dithered) 1kHz/70dB plot with those taken from the *CDP-990* (issue 95) and *CDP-991* (issue 100). Textbook stuff.

But the bizarre +19.8dB noise modulation and miraculous 122dB S/N ratio? Just read my Lab Report on the review of the Sony *CDP-X339ES* (facing page).

Sound quality

Comparing notes with those of six months ago, I'd have to say the performance of Sony's budget player has come on apace. Our panel certainly found it an improvement over the Sansui (which they'd just heard), even if it was not in the 'top-flight'.

Here was a player at its strongest with our jazz selection, its taut imaging and dry bass complementing the natural vibrancy of the music. As a result the reedy quality of sax strode confidently from the speakers, augmented by an equally expressive double bass. Everything had a realistic sense of scale, even the double bass and cello from the Panufnik *Concerto* were neatly distinguished. Clean-sounding and building to a coherent climax, they summarised.

Regrettably this impressive facade began to crumble when faced with the delicate wash of violins from Prokofiev's *Classical Symphony*. Now our panel felt the need to advance the volume, frustrated at the sense of constriction which held these instruments too firmly in check. This dry and measured delivery also sucked at the warmth of vocalists like Christy Moore.

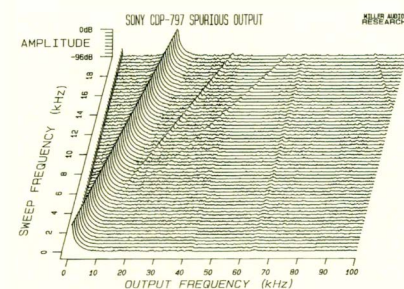
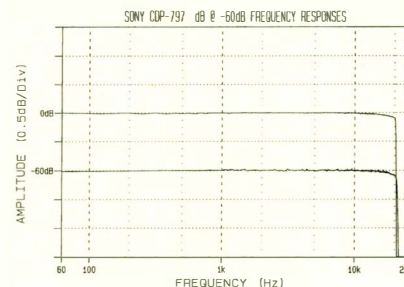
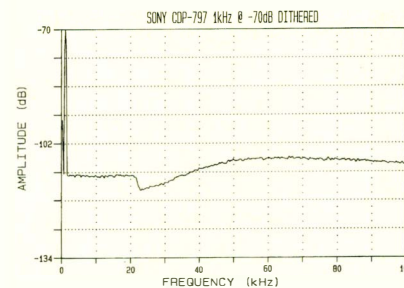
Conclusion

So the *CDP-797* is a bitter-sweet player, its slightly lean, dry but searching quality better suited to some musical styles, and systems, than others.

The new oversampling filter, bitstream DAC and updated analogue components have clearly found their mark. By addressing the areas that really count, Sony has placed the player well inside Recommended territory.

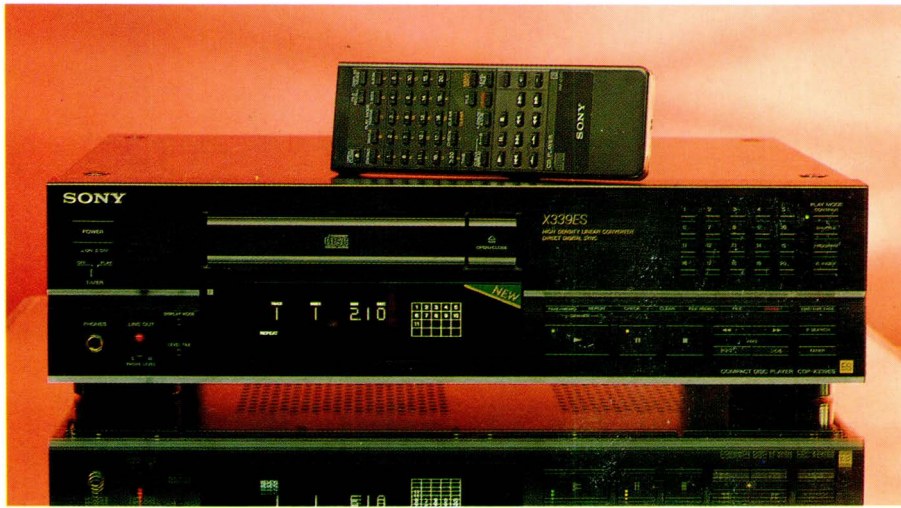
TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.03dB	0.03dB	0.02dB
Channel Separation	134.2dB	112.9dB	90.6dB
THD vs Level, 0dB	-99.5dB	-98.7dB	-88.7dB
-30dB	-93.7dB	-80.7dB	-70.9dB
-60dB	-57.9dB	-52.9dB	-42.3dB
-80dB	-28.5dB	-30.6dB	-21.1dB
Dithered, -90dB	-18.2dB	-20.8dB	-12.2dB
Dithered, -100dB		-14.2dB	
Dithered, -110dB		-10.1dB	
Resolution @ -60dB	0.00dB	-0.01dB	
-80dB		-0.04dB	
-90dB		-0.45dB	
-100dB		-0.18dB	
Peak Output Level, L			2.084V
R			2.092V
Relative Output Level			+0.37dB
Output Impedance			921ohm
Radio Frequency Spuria		7mV @ 28MHz	
1Hz Noise Modulation			+19.8dB*
CCIR IMD, 0dB			-91.1dB
Suppression of stop-band IMD			103.6dB
De-emphasis Accuracy, 1kHz			-0.09dB
5kHz			-0.09dB
16kHz			-0.14dB
S/N Ratio (A-wtd), w emp, 0LSB			121.8dB
w/o emp, 0LSB			121.6dB
w/o emp, 1LSB			121.8dB*
Digital Output			Optical
Crystal Clock Accuracy			45.0ppm
Track Access Time (99)			3secs
Typical Retail Price			£200



Sony CDP-X339ES

Sony UK Ltd, Sony House, South Street, Staines, Middlesex TW18 4PF. Tel: (0784) 467 000



Turned-on by state-of-the-art technology, matchless flexibility and lavish build quality? If so then pause awhile at Sony's *CDP-X339ES*, a very new player that's ousted the older *CDP-X333ES* from its frame-and-beam chassis. Favourite features like continuous play, shuffle, program and Custom File play modes remain untouched as do the peak search, fade and tape edit options. The remote control would take a week to explore.

If all this sounds rather complicated then Sony has thoughtfully included a new 'Edit Navigation System'. This guides you through its more sophisticated features using a running text display.

Inside, however, it's all change. Here you'll find Sony's very latest bitstream DAC using, I believe, the first single-stage third-order noise-shaper to emerge from Japan. The CXD-2562 still runs off a 45MHz clock but truncation has been reduced to a 16-3.9 bit range, giving the PLM DACs a total of 15 (rather than seven) different pulse widths to play with.

Full details have to await the approval of Sony's patent application.

Lab report

Cast your mind back to issue 100 and you'll remember that Sony, along with Technics and Pioneer, was found to use DACs that had been programmed to recognise the digital silence signal used in S/N ratio measurements, shutting it down to give an impressive but false reading.

A new signal (digital silence offset by 1LSB) fooled the DACs into remaining 'on' and allowed us to obtain a genuine figure for S/N. Since then Sony has developed its CXD-2561 and CXD-2562 DACs which, along with improved performance, have been re-programmed to recognise my crafty digital silence track.

So the *CDP-797* and *CDP-X339ES* continue to clock up figures of 119-122dB under

all test conditions. But this lie is exposed by the Noise Mod test which forces the DAC back 'on' to reveal an outrageously large 'jump' in the noise floor (+17 to +20dB).

A pity, because Sony's figures for THD (0.0006-0.003 per cent at 0dB), linearity, separation and stopband suppression are all beyond reproach. Likewise the 3D sweep and dithered 1kHz signal are treated in near-perfect, textbook fashion. A joy.

Sound quality

Do be wary of this player's high output if you're involved in an A/B dem, but listen to this player and you'll discover its seemingly cavernous depth is matched by an exquisite sense of detail.

For our part, Marty Paich's jazz ensemble sounded remarkably fresh and lucid, the sax expressive but reinforced by a realistic 'grunt' from the depths of the reed. The double bass was equally full and resonant without appearing sloppy. A hint of edginess drew our attention to the cymbals but all was otherwise deliciously refined.

A very impressive build up to the Panufnik *Concerto*, remarked our listeners, who also reacted to the precision and poise of the strings, adding a sense of bite that contributed to the drama of the piece.

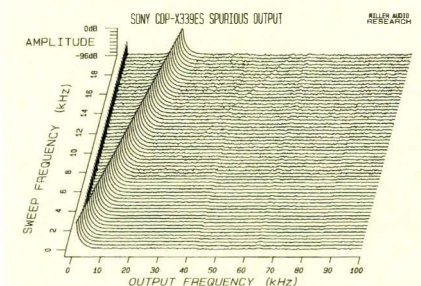
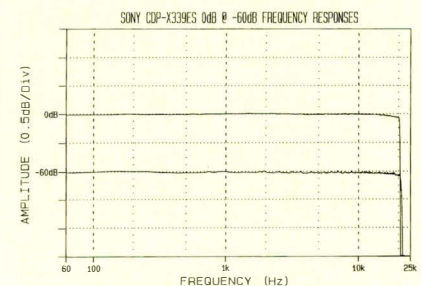
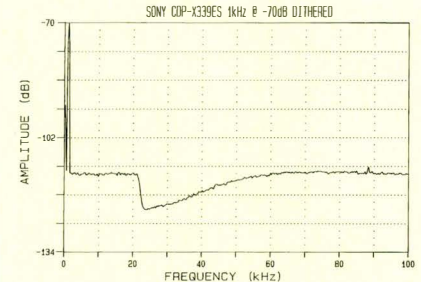
This deep stereo spread was maintained throughout our pop selection, for although Julia Fordham's voice could seem slightly thin at times, her magnetic expression and compelling physical 'presence' was much more than adequate compensation. An excellent result.

Conclusion

Sony's attempt to manipulate lab measurements is quite unnecessary when the eloquent and refined sound of the player speaks volumes in its own defence. Combine this with its massive build, likely reliability and supreme flexibility and Sony achieves a hearty *Choice* Recommendation.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.08dB	0.08dB	0.06dB
Channel Separation	132.9dB	140.6dB	120.8dB
THD vs Level, 0d	-103.8dB	-104.4dB	-90.0dB
-30dB	-92.1dB	-82.8dB	-76.4dB
-60dB	-58.3dB	-53.7dB	-47.2dB
-80dB	-28.1dB	-34.8dB	-26.3dB
Dithered, -90dB	-18.9dB	-23.7dB	-18.3dB
Dithered, -100dB		-20.2dB	
Dithered, -110dB		-7.10dB	
Resolution @ -60dB		0.00dB	-0.03dB
-80dB		-0.03dB	-0.12dB
-90dB		-0.40dB	-0.42dB
-100dB		-0.22dB	+0.33dB
Peak Output Level, L			2.329V
R			2.351V
Relative Output Level			+1.36dB
Output Impedance			202ohm
Radio Frequency Spuria		23mV @ 64MHz	
1Hz Noise Modulation			+17.3dB*
CCIR IMD, 0dB			-98.9dB
Suppression of stop-band IMD			>105dB
De-emphasis Accuracy, 1kHz			-0.09dB
5kHz			-0.09dB
16kHz			-0.12dB
S/N Ratio (A-wtd), w emp, 0LSB			119.0dB
w/o emp, 0LSB			119.5dB
w/o emp, 1LSB			119.2dB*
Digital Output			Optical
Crystal Clock Accuracy			+13.8ppm
Track Access Time (99)			2secs
Typical Retail Price			£450





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22 Merchant Street
Bristol BS1 3EP
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Teac CD-P4500

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Third time lucky? Certainly for Teac whose previous two generations of bitstreamers, well, bit the dust. The *CD-P4500*, by contrast, is a different kettle of chips. Sure, it looks rather like the old *CD-P4000* (issue 95) with its centralised drawer mechanism, orange fluorescent display and very limited range of on-board controls.

But inside Teac has abandoned Technics' MASH/PWM DAC in favour of the genuine article: an SAA7350 PDM DAC from Philips. Great so far, but at this point I'm obliged to cut the merriment short for a quick winge. You see, Teac describes its player as employing second-order noise-shaping, 256 times oversampling and using an 11MHz clock.

In reality the SAA7350 uses third-order Single-Stage Noise-shaping (SSN). And, in practice, Teac has plumped for Sony rather than Philips' decoding ICs which has allowed it to use a 16.9MHz clock and increase the upsampling rate to 384 times. All Teac has to do is re-write its brochure.

Gripe over, Teac should be recognised for its various useful and novel features, not least being the +/-12% pitch adjustment. Then there's the remote handset which offers direct track access, programming, index skip, fast search (with cue lock), time edit and a digital volume control. Something for every occasion.

Lab report

Teac's pitch control actually offers +/-12.5% adjustment, though the built-in clock error already gives you a shift of 10.5Hz at 20kHz. At maximum, this control raises 20kHz to 22.5kHz and the first stop-band product from 24.1kHz to 27.1kHz, holding stop-band rejection at 61dB. Mod noise, incidentally, sky-rockets to +17.5dB even with the pitch setting at 'zero'.

The 2.6V output is excessive, but Teac has otherwise done a fine job. The 3D plot resembles that of the Aiwa *XC-700* (issue

95) and *XC-900* (issue 100) because all three players share the same eight times oversampling filter and SAA7350 DAC. Unlike Marantz' *CD-42*, *CD-52* and *CD-72* (this and issue 100), however, the DAC runs at 16.9MHz and so suffer less ultrasonic noise.

Sound quality

Our listeners described this player as having a certain 'organic warmth' that separated it from the sharper but sterile sound of less involving machines. Two listeners latched onto the drive and incisiveness of its bass which, though not especially dry, underpinned our classical and jazz tracks with unswerving confidence. Then again, another listener felt it over-played its hand in this regard. Big-sounding, sure, but not quite as taut or controlled as possible.

Nevertheless everyone agreed its decidedly warm character encouraged a very fluid, easy-going sort of sound. Prokofiev's *Symphony*, for example, 'moved' logically, giving the listeners a clear picture of each instrument's role in the music. Things were certainly going well for the *4500* at this point, with both Mary Black and Christy Moore communicating in lucid tones. A real 'storytelling atmosphere' they remarked.

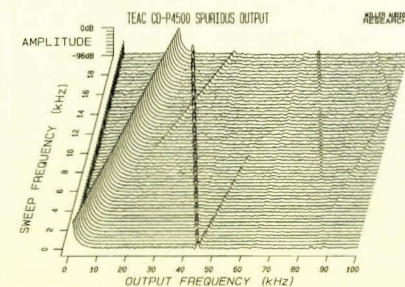
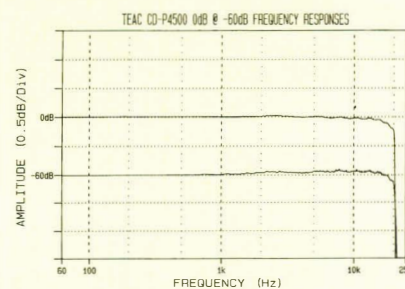
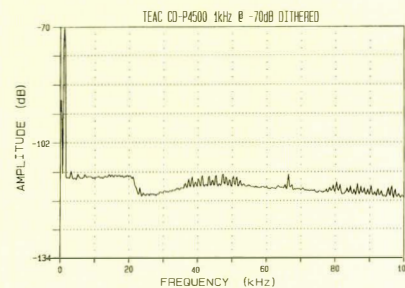
But when Julia Fordham stepped onto our stage her voice was colder and more sibilant than we had anticipated. One track that, for some reason, just did not hang together with this machine.

Conclusion

So for Teac it was well worth persevering with bitstream technology, even if it has switched from PWM to PDM in the process. Teac has had a bumpy ride in the past but the generally warm and well-balanced sound of the *CD-P4500* will stand the company in good stead for the future. Not the last word in explicit detail, then, but a good value all-rounder. Recommended to everyone but the Julia Fordham fan club.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.05dB	0.05dB	0.03dB
Channel Separation	118.0dB	113.1dB	87.8dB
THD vs Level, 0dB	-90.0dB	-98.6dB	-76.7dB
-30dB	-79.9dB	-79.4dB	-77.2dB
-60dB	-50.2dB	-46.0dB	-47.9dB
-80dB	-23.5dB	-28.8dB	-31.1dB
Dithered, -90dB	-15.8dB	-18.8dB	-21.8dB
Dithered, -100dB		-17.5dB	
Dithered, -110dB		-8.55dB	
Resolution @ -60dB		-0.06dB	+0.03dB
-80dB		-0.48dB	+0.64dB
-90dB		-2.42dB	+1.78dB
-100dB		-2.35dB	+4.60dB
Peak Output Level, L			2.588V
R			2.572V
Relative Output Level			+2.21dB
Output Impedance			1.137kohm
Radio Frequency Spurious		3mV @ 29.7MHz	
1Hz Noise Modulation			+2.7dB
CCIR IMD, 0dB			-95.4dB
Suppression of stop-band IMD			61.2dB
De-emphasis Accuracy, 1kHz			+0.01dB
5kHz			0.00dB
16kHz			-0.18dB
S/N Ratio (A-wtd), w emp, 0LSB			102.6dB
w/o emp, 0LSB			102.1dB
w/o emp, 1LSB			102.3dB
Digital Output			optical
Crystal Clock Accuracy			+523.2ppm*
Track Access Time (99)			3secs
Typical Retail Price			£250



Technics SL-PG420A

Panasonic Consumer Electronics, Panasonic House, Willoughby Road, Bracknell, Berks RG12 8FP. Tel: (0344) 862 444



Rather than ditch a successful budget player, Technics will usually execute a token cosmetic revision before relaunching the 'next generation'. So the *SL-PG200A* was really no different from its predecessor, the *SL-P277A*, save for a new peak search facility. Both were cracking players and both, naturally enough, earned themselves a Best Buy.

Fair enough. But now the *SL-PG200A* has been superseded by the *SL-PG420A* which, Technics would have us believe, is pretty much the same machine with the added luxury of a direct access keypad. It certainly looks the part and even has the customary Philips' CDM4 transport mechanism tucked behind its matt bronze fascia. But it's all a ruse. In fact the grandson-of-277 is, how can I put it, a more cost-effective and less impressive design.

OK, so the audio electronics have been diluted but the *SL-PG420A* is hardly underspecified at the price. You've a synchro-edit facility including options for different tape lengths, disc-to-disc linking and time fade while other features like programming, auto-cue, repeat and random play are duplicated on a matching remote. A digital volume control completes the set.

Interestingly, Technics has abandoned any notion of a digital output. Coaxial outputs can be a problem when attempting to comply with international agreements on RFI, it has suggested, while the Toslink optical standard is simply inadequate. Three cheers for that.

Lab report

At the heart of the *SL-PG420A* lies a new, and presumably cheaper, PWM DAC called the MN6475A. Like Technics' earlier MN6474 DAC this also deploys a third-order Multi-StAge Noise-SHaper (MASH) with a total of four PWM switched capacitor networks running at 32 times oversampling. Yet its performance is inferior. The 3D plot

might look similar (see issue 100) but stopband rejection has deteriorated from 83dB to 64dB just as the 'real' S/N ratio has been compressed by 3dB to just 98.4dB: 16-bit resolution by the skin of its teeth.

Passband ripple is also more obvious on both 0dB and -60dB responses which fall some 0.54dB at 20kHz. Nevertheless there are plus points. Distortion, for instance, is actually slightly lower at 20kHz (0.016 per cent) than with either the old *SL-PG200A* or new *SL-PG520A*. And, as demonstrated by the 3D plot, the nature of this distortion is even rather than principally odd in character. The 0.16ppm clock accuracy is a pure fluke.

Sound quality

Shades of the *SL-PG520A* are more than obvious in the sound of this player, yet its presentation lacks the sense of scale, of drama and unfettered power that had previously elicited such an enthusiastic reaction from the *Choice* panel. A 'between-speaker' version of the *SL-PG520*, the listeners proposed, unwittingly linking the two Technics machines.

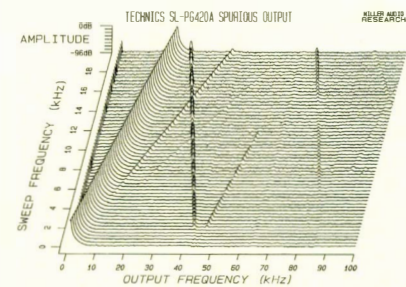
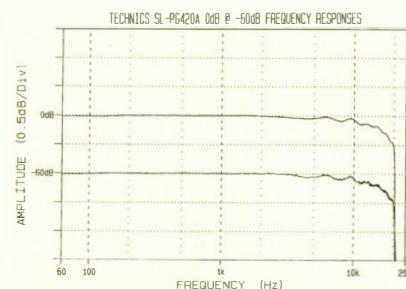
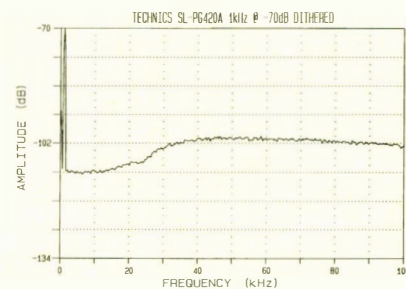
The staccato pattern of Panufnik's *Violin Concerto* was recreated in vivid fashion, with particular emphasis given to the plucked double-bass. Yet the Prokofiev *Symphony* lacked its grandness, the smooth character of the player maintaining a sense of decorum at the expense of sparkle and scale. Simpler tracks, and Mary Black in particular, could sound very open and mellow. Yet there was also something missing, an indefinable presence or spirit that had permeated the *520's* music.

Conclusion

The *SL-PG420A* is good, certainly, but it's no *SL-PG200A* in new clothes. For that you'll have to cough up an extra £40 and opt for the *SL-PG520A*. Leaving the *SL-PG420A* dangerously exposed, as a third successive Best Buy is torn from its grasp.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.10dB	0.11dB	0.26dB
Channel Separation	105.1dB	102.7dB	83.6dB
THD vs Level, 0dB	-90.0d	-97.5dB	-76.1dB
-30dB	-85.2dB	-77.7dB	-62.7dB
-60dB	-48.4dB	-49.2dB	-35.9dB
-80dB	-27.2dB	-32.6dB	-15.7dB
-90dB	-18.3dB	-18.4dB	-8.60dB
Dithered, -100dB		-13.2dB	
Dithered, -110dB		-8.75dB	
Resolution @ -60dB		+0.04dB	+0.03dB
-80dB		-0.12dB	+0.03dB
-90dB		-0.18dB	+0.21dB
-100dB		-0.26dB	-3.40dB
Peak Output Level, L		2.175V	
R		2.153V	
Relative Output Level			+0.69dB
Output Impedance			787ohm
Radio Frequency Spurious		5mV @ 84.5MHz	
1Hz Noise Modulation			+0.79dB
CCIR IMD, 0dB			-96.1dB
Suppression of stop-band IMD			64.4dB
De-emphasis Accuracy, 1kHz			-0.05dB
5kHz			+0.30dB
16kHz			-0.46dB
S/N Ratio (A-wtd), w emp, 0LSB			102.8dB
w/o emp, 0LSB			103.2dB
w/o emp, 1LSB			98.4dB
Digital Output			None
Crystal Clock Accuracy			+0.16ppm
Track Access Time (99)			2.9secs
Typical Retail Price			£178



Technics SL-PG520A

Panasonic Consumer Electronics, Panasonic House, Willoughby Road, Bracknell, Berks RG12 8FP. Tel: (0344) 862 444



If you've just turned from our review of the *SL-PG420A* but want to know the fate of Technics' giant-killing *SL-PG200A* then this, broadly speaking, is it. It being the *SL-PG520A*, nominal successor to the *SL-PG500A*. No, I don't remember it either.

Unlike the *SL-PG420A*, facilities have actually taken a downturn with the new *SL-PG520A*. It looks just like the *500* but features a simpler display, having lost the level meters and optical digital output of its predecessor. Otherwise its combination of edit-guide, synchro-edit, peak search, disc link and time fade options remain unchanged. You've even got Technics' Shuttle Search Dial to facilitate precise, high-speed cueing.

Philips' CDM4 CD transport makes a reappearance, deferring any levy that Technics might be obliged to pay by incorporating a token piece of Europe. It's fortunate for us too, because this single-beam swing-arm laser assembly is rather better than the budget three-beam jobbie Technics would otherwise be using.

But inside is where the action is. Here you'll find everything that made the *SL-P277A* and *SL-PG200A* great. The budget wonder lives on, albeit at a price.

Lab report

Welcome back MN6474, the MASH/PWM DAC that did wonders for the *SL-PG200A*. Just compare the plots back in issue 100 with this little lot. Uncanny isn't it? Second and third harmonic distortion and stop-band pattern is identical on the 3D plot, even the -60dB frequency response has its customary 'glitch' at 11kHz. Things like channel balance, separation, distortion, resolution, noise modulation, output impedance and output level are too similar to be true. Too similar, that is, if you believe the *SL-PG520A* is a new player.

Drawbacks? Well Technics has been caught cheating (again) on the S/N tests though 101dB is still good enough. Then

there's the extended spray of odd-order distortions detected in the CCIR IMD test, something that the cheaper DAC used in the *SL-PG420A* is quite free of. Distortion also increases from 0.004 to 0.047 per cent at 5kHz once the de-emphasis circuit is engaged.

Sound quality

As far as our listeners were concerned every selection of music ended too soon — they felt cheated every time I swapped one disc for another. Yep, they loved it. Their spirited reception was prompted by the open, fresh and melodic character of this player. Less like listening to CD and more like listening to music, they suggested. Dangerous stuff, after all our listeners were not here to enjoy themselves.

Either way they did, relishing the vibrant, lively quality of brass from Marty Paich and astounded by the boldness, strength and purpose of the vibes. Almost as if a new performer had taken to the instrument, huge in scale without blowing things out of proportion.

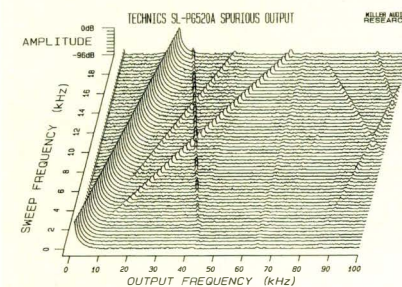
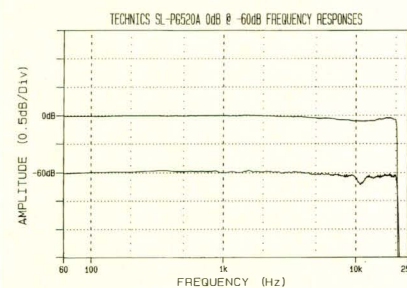
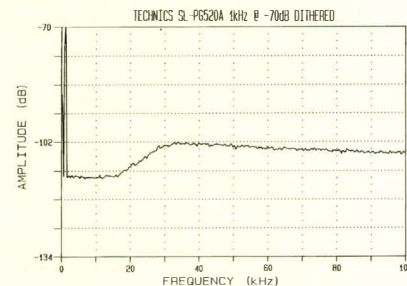
They almost failed to recognise our Panufnik track whose sense of drama had always seemed lacking before. Now all the disparate, staccato elements pulled together, weighty and engaging. This expansive sense of acoustic extended to our pop tracks without compromising any sense of subtle detail. Sweeping movements were handled as gracefully as the tiniest inflection, astonishingly spacious, gloriously musical. A cracker.

Conclusion

The above says it all. Our listeners were utterly bowled over by the sound of this player which had a sense of expression, of drama and scale that put far costlier products in the shade. It has all the hallmarks of a fine audio product: big, powerful, seductive yet never forceful. All the hallmarks of the 'high-end', that is, except the price.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.04dB	0.06dB	0.07dB
Channel Separation	103.5dB	103.8dB	60.7dB
THD vs Level, 0dB	-98.6dB	-98.7dB	-74.7dB
-30dB	-87.5dB	-79.4dB	-66.6dB
-60dB	-59.6dB	-51.9dB	-38.3dB
-80dB	-28.4dB	-31.3dB	-17.9dB
Dithered, -90dB	-17.6dB	-19.6dB	-10.5dB
Dithered, -100dB		-14.6dB	
Dithered, -110dB		-5.65dB	
Resolution @ -60dB		0.00dB	+0.13dB
-80dB		-0.10dB	-0.08dB
-90dB		-0.63dB	-0.62dB
-100dB		-0.17dB	-2.00dB
Peak Output Level, L		2.054V	
R		2.064V	
Relative Output Level			+0.25dB
Output Impedance			797ohm
Radio Frequency Spuria		7.5mV @ 28.5MHz	
1Hz Noise Modulation			+2.3dB
CCIR IMD, 0dB			-95.9dB*
Suppression of stop-band IMD			83.5dB
De-emphasis Accuracy, 1kHz			0.00dB**
5kHz			+0.04dB
16kHz			+0.05dB
S/N Ratio (A-wtd), w emp, 0LSB			111.8dB
w/o emp, 0LSB			107.7dB
w/o emp, 1LSB			101.2dB
Digital Output			None
Crystal Clock Accuracy			+9.5ppm
Track Access Time (99)			2.8secs
Typical Retail Price			£200



Tech Talk

As you've probably noticed, on *Hi-Fi Choice* we employ a variety of independent listeners to audition each and every CD player under blind conditions. Each player is thoroughly warmed-up and level-matched to within a fraction of a dB before being auditioned in isolation.

In this way, each player is auditioned using a fixed series of CDs until every member of the panel has come to appreciate its relative strengths and weaknesses. They then discuss what they have heard among themselves before attempting to relay something of the player's character. I type their impressions directly into the computer, reading back and adjusting the notes until they are satisfied these best reflect their collective opinion.

Then, and only then, the panel are informed of the player's price so that they can make a value judge-

Paul Miller describes the battery of tests used to evaluate CD player performance and explains the results.

ment which, later tempered by build quality and facilities, forms the basis of our Recommendations and Best Buys.

Our ancillary equipment included 100S-series pre and power amplifiers from Deltect together with Audio Note AN-J speakers, the preferred choice of our panel.

Measurement programme

As in issues 95 and 100, specialised CD-R (CD-Recordable) discs were introduced along with conventional test CDs from Sony, Technics, Philips and CBS to provide a wealth of information about each machine. Furthermore, dedicated computer programs were implemented to control a range of digital test equipment via an IEEE interface bus, resulting in the various plots that accompany each review.

Channel balance, separation, output level and the 'real' Signal-to-Noise ratio

Most CD players adhere to a nominal standard of 2V as far as their peak output is concerned, though many manufacturers will hike this up to 2.2V or more to give them a dB's edge in A/B listening tests. Remember, the loudest CD player is not necessarily the best CD player. If you intend using long interconnect leads or a passive volume control then do check the player has a suitably low output impedance, say less than 1kohm.

The S/N is determined both with and without de-emphasis as a ratio of the maximum output (all DAC current sources on = 0dB) against full digital zero (all DAC current sources off), measured in 3rd-octave mode over a 20Hz-20kHz bandwidth and with A-weighting to reduce the contribution of hum.

Unfortunately many new DACs are pre-programmed to switch-off when they detect the digital zero test signal, leading to a wide but unrealistic figure for S/N. The only way to measure the 'real' S/N is to fool the DAC into remaining 'on' using a

special digital zero signal that's offset by 1LSB (see issue 100). So if there's a big jump between the figures for 0LSB and 1LSB, you'll know the manufacturer in question is trying to pull a fast one!

Distortion and resolution versus signal level

In direct contrast with analogue systems like tape decks, phono cartridges and audio amplifiers, distortion in a digital system will increase as the level is decreased. In other words the quieter the sound the more distorted it becomes. This is because the CD format uses a linear quantisation to describe the amplitude of each audio sample and there are some 2^{16} or 65536 equally-spaced quantisation levels spanning the full 16-bit range. Each of these levels is equal to one Least Significant Bit (LSB).

Consequently there are proportionally more levels available to describe the amplitude of a high-level than a lower-level signal. Fewer levels means a relative decrease in the accuracy of the coding (a quantisation error) and that, upon D/A conversion, means both added distortion and a shift away from absolute linearity.

Nevertheless distortion still increases with frequency through cross-modulation within the DAC and the added strain placed upon later analogue stages. Slew-limiting is the principal culprit here, increasing THD from -100dB to -80dB (0.01 per cent) or more. Other effects such as zero-cross distortion and glitches also make their presence felt at higher frequencies though, in the main, these problems are overcome by single-bit DACs, such as the PDM, PWM or PEM devices found in most current CD players.

Figures for harmonic and intermodulation distortion are provided in each table, the former taken at 20Hz, 1kHz and 20kHz and at decreasing levels from 0dB to -90dB (dithered). Accordingly, the linearity of the DAC is also revealed, both at 1kHz and 20kHz and down to a level of -100dB (dithered). Theoretically the DAC should reproduce a -90dB tone at -90dB and a -100dB tone at -100dB for instance. In practice they rarely do, so the error in resolution of the DAC is written as the difference between the level that is expected and the level that is obtained.

Ideally they should be as close to 0dB as possible or, at least, any error that crops up at 1kHz should be matched at 20kHz. If not then you'll witness a change in the player's frequency response at progressively lower levels — changes that can be revealed on the two responses published for each machine. In a perfect world the peak-level response (upper trace) should be maintained at -60dB (lower trace), give or take a little noise.

The 3D Spurious Output

Having already discussed how distortion can arise, the result is portrayed most graphically on the accompanying 3D plots which show a complete audioband sweep over its full dynamic range. Cast an eye over the example plot and we'll examine the different products more closely. First, there are the simple harmonic products (2)-(5) which are multiples of the main 20Hz-20kHz sweep (1). So, just as the

main sweep (1) ends at 20kHz so the 2nd harmonic (2) ends at 40kHz, the 3rd harmonic (3) ends at 60kHz and so on.

Additionally, many plots will also reveal two V-shape tracks either in full or part. These are sampling images or aliasing distortion, reflections of the main sweep (1) either side of the 44.1kHz sampling and oversampling frequencies of 88.2kHz, 132.3kHz, 176.4kHz and so on. Of course, because my horizontal frequency scale only extends to 100kHz you only get to see the first two of these images in full. Sum and difference intermodulation products go to make up each 'V': either 44.1kHz plus (1) or 44.1kHz minus (1). The first option gives (6), the second gives (7) and both of these are called 2nd-order effects.

The same thing occurs either side of 88.2kHz which is the first oversample frequency, producing (8) and (9) respectively. Higher-order images caused by multiples of (1) at higher oversampling frequencies can also occur. The tracks (10)-(13) are the tail-end of just such images which begin at 176.4kHz, the four times oversample frequency. Only the very latest oversampling filters are able to suppress these images below the level of noise (look for the stop-band figure in the tests), the type of filter used in Sony's CDP-X339ES for instance!

The dithered -70dB/1kHz plot and 0.34Hz Noise Modulation

Noise Modulation (see issue 100) is also a reflection of quantisation errors, errors that accumulate as noise covering the entire audio band. It's a type of distortion that's generated by any unevenness in the value of the 65536 quantisation 'steps' or, failing this, by jitter (which is an uncertainty in the timing of the digital transitions).

Using a 0.34Hz (one-third of 1Hz) signal forces the DAC to step up or down just one of the 65536 LSBs per 44.1kHz. Any difference in the magnitude of these LSBs transpires as an increase in background noise, the +dB figure quoted in the tests. Low figures are best though it's quite possible for Noise Modulation to manifest at low and high frequencies only, which is preferable to the same degree of Noise Mod popping up through the crucial midband. So a lone figure tells only part of the story.

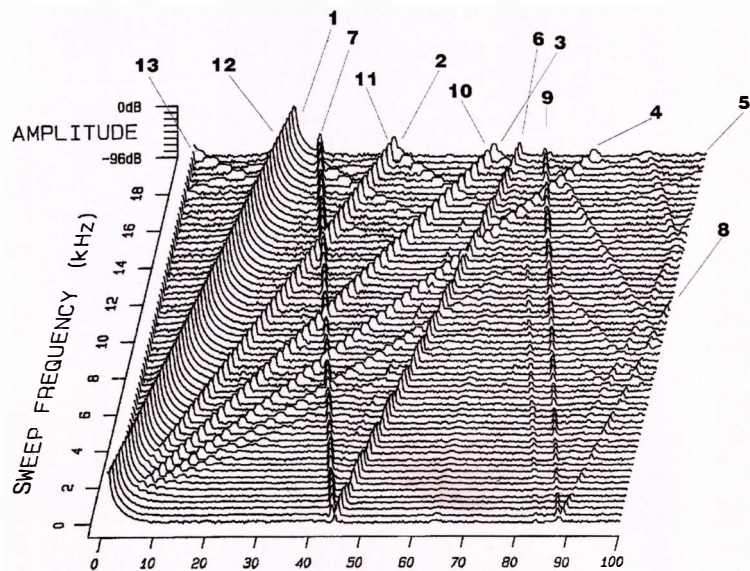
At lower levels other problems come to the surface — hence the plot of 1kHz taken at -70dB. In contrast with issues 95 and 100 (but following-on from issues 101 and 103) this is now a dithered signal. Dither is usually a Gaussian or Triangular noise which has the effect of re-randomising the fixed and predictable quantisation errors that accompany low-level signals. Dither 'smears' the fixed errors associated with an undithered low-level signal so they appear as a slight increase in noise rather than as distortion harmonics. Just compare the undithered trace for Technics' SL-PG200A (issue 100) with the dithered trace for the SL-PG520A in this issue, for example.

Most music discs are dithered these days so the trade-off between noise and distortion is well worth having, especially as it concerns quiet, subtle musical detail that can make or break a performance. Not all the CD players, by any means, prove to be entirely

successful in this regard.

Dithered or undithered, this plot can tell you at a glance whether the player is using a conventional multibit or bitstream DAC simply by looking at the pattern of noise above 20kHz. A bitstream DAC generates an awful lot of quantisation noise as it reduces the 16-bit data into manageable 1-bit chunks, so it uses a technique called noise-shaping to shovel as much of this noise as possible out of the audio band.

Hence the great hump of noise that curves upwards of 20kHz, the terminus of the audio band. Current Philips and Marantz players are especially effected because they're running the noise-shapers at a low 11.3MHz clock frequency. With an ordinary 16



Output Frequency (kHz)

or 18-bit DAC you'll find the noise actually decreases above 20kHz revealing 'spikes' of distortion and sampling images. At higher frequencies still we find contamination from various clumps of radio frequency (RF) noise that 'leak' from the crystal clock and various digital processors that go to make up each and every CD player.

Just how an amplifier responds to the huge differences in the level and type of ultrasonic noise produced by these players could give us some clue to their characteristic differences in sound quality. You might like to re-read the section on RF IMD which was last published in issue 104 and tie-up the unwanted RF produced by these CD players with the sensitivity to such RF demonstrated by many amplifiers.

Still, I feel I must reiterate my warning voiced in the *Tech Talk* for amplifiers. That is, do not use these plots as some sort of guide to the absolute quality of the CD players because this is simply not the case. Instead both the 3D and 1kHz/-70dB plots are very much a 'fingerprint' of the oversampling filters, noise-shapers and DACs that are employed in each player.

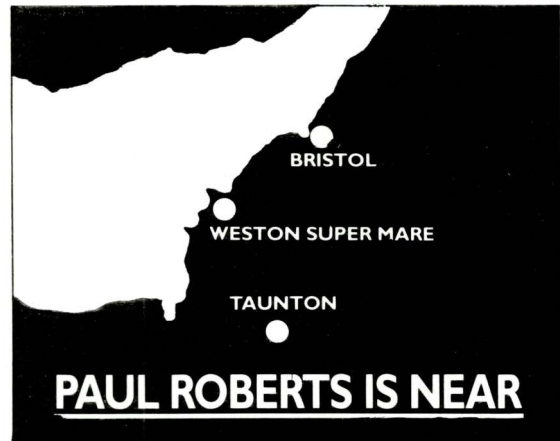


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Conclusions, Best Buys & Recommendations

Instead of giving the game away right from the word go, let's take a look at the near-misses. Costly players like the taut and refined 206B from Meridian, the glorious PD-75 from Pioneer and Creek's CD60, a player that combines a sense of calm neutrality with the occasional vivid flourish!

High quality stuff with plenty of under-the-skin engineering, but all falling just a smidgen short of formal Recommendation.

Those that did make the grade at over the £400 mark include the new *Maxim CD3* from Ariston and the very, very new *CDP-X339ES* from Sony. The two players are poles apart in terms of appearance, features, technology and sound. But, just as the *CD3* demands your attention with its flashing dynamics, so too the '339ES will envelop you in a delicate, fathomless pool of sound.

CD King Paul Miller summarises the results of this month's reviews and highlights the players that outshone the rest.

At the other end of the scale you'll find the Aiwa XC-300 and the Philips CD604, two very affordable players that nevertheless managed to come through our tests with results far above those predicted by their diminutive pricetags. A straight fight for those enthusiasts really strapped for cash, with Aiwa offering the luxury of a remote control handset while the Philips player has the advantage of a richer, fuller and all-round earthy sound.

For the price of a few extra CDs, Technics' *SL-PG420A* and Akai's *CD-57* are within your grasp. The Akai is rather 'dumb', failing to recognise an empty loading tray for ten seconds or so, but the motorised volume control, choice of both optical and coaxial digital outputs, attractive infra-red remote control handset and 'smoochy' sound are all healthy plus points at just £180. On the other hand, Technics' new baby has the edge in performance and price, though it's neither as thrilling or grand-sounding as the older *SL-PG200A*.

Two very different bitstreamers deserved a Recommendation at £200. JVC's *XL-Z441* certainly strove ahead of its PEM partners, perhaps as a result of the new eight times oversampling filter. Either way, you end up with the lightweight but hi-tech style of the *XL-V241* combined with an altogether bolder and yet subtly-textured sound. The curious mixture of FET and bipolar op-amps in the analogue filter of Sony's *CDP-797* probably plays a great role in crafting its dry but searching and expressive sound as the PLM DAC. But who cares? At least Sony is back in the running.

Kenwood jogs along year after year with a series of well-built and generally fine-sounding machines, and its latest offering, the *DP-7040* is no exception. The very smooth, expansive and refined sound maintains the tradition of the older *DP-7030* which impressed us by offering slick engineering at a modest price.

Teac, by contrast, has had less success in the past, so the recommendation of its warm-sounding *CD-P4500* could mark a change of fortune. Well worth a listen, especially since Rotel has decided to vacate the £250 slot . . .

Our last CD players issue saw the Marantz *CD-52* sweep to victory with a decidedly full-blooded performance. Now, following *Special Edition* surgery, the *CD-52* returned with a more mature if no less compelling sound in tow.

So the colour of Marantz' original *CD-52* has been leached from the chassis, leaving its emotive spark all the brighter for the experience and our listeners hanging on every note. Here's a player that digs real deep yet holds its composure, sufficient to justify the £80 premium and ensure that the player will enjoy Best Buy status.

Yet it was Marantz's cheapest offering, the *CD-42*, that had the greatest impact. Technically it's a pared-down version of the *CD-52*, but listen to the *CD-42* and you'll discover a sound that's neither as ruddy or as lavishly coloured. Instead the *CD-42* builds its music on subtlety, drawing on tension and drama within a performance to bind together its quiet but deep and spacious soundstaging. No aural fireworks here, just music plain and simple.

Our listeners responded with similar enthusiasm to the refreshingly open and crisply detailed sound that flooded from Technics' *SL-PG520A*. This could well be Technics' best player to date, one that shoe-horned an astonishingly vast and expressive acoustic into our room. All this was achieved without overlooking minutiae such as the forming and stresses of individual words, intricate detail was immersed in a flowing, melodic whirl of sound that seemed more vivid or believable than just about anything else in our survey.

Once again, our listeners concluded that you needn't spend a fortune on a quality CD player to appreciate a high quality sound. In direct contrast with the old days of analogue, spending rather more on the amp and speakers is a sure-fire route to success.

As a final note, I must offer my sincerest thanks to our 'blind' panel, without whose ears none of this would have been possible. Thanks this month are due to: Alan Ainsley (Technics), John Bamford (Pioneer), Andrew Cartmel (*Hi-Fi Choice*), Tony Mills (Rotel), Terry Murphy (Yamaha), Doug Randall (Marantz) and Guy Sargeant (Audio Innovations). What a team!

Choice Offers

Our Mail Order Section this month features, among the old favourites such as Furakawa interconnects, some great new accessories to help improve the performance of your system. We've been reviewing some new and interesting products and have selected some that we thought you should know about.

Goldring Magic Record Cleaner

This is a kit consisting of a double sided velvet brush and spray on Goldring Magic record rejuvenating fluid. Unlike some other record cleaning potions this one makes old grubby records sound smoother and less gritty, reducing surface noise quite significantly. For best results use with the Mk10 brush.

£11.95 ref: **A13**

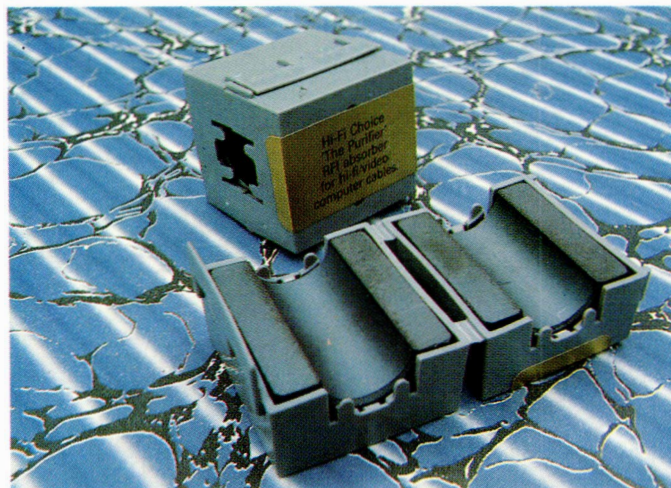
The Purifier

The Purifier is a ferrite cable clamp designed to reduce RF induced noise in audio, video and computer systems. The clamps will accept single or multiple cables of up to half an inch in diameter and can be used on both signal and mains cables. The main benefit is a general cleansing of a system's sound allowing finer resolution of low level detail. They can be particularly beneficial for digital interconnections.

£16.90 per pair ref: **A14**

Nagaoka Anti-Static Record Sleeves no.102

Packs of 50 plastic record sleeves that can be used on their own or inserted into an existing card or paper sleeve. They keep records dust free and eliminate static, but are of course hampered if the record isn't cleaned before it's stored. No great



sound quality claims but in these days of disappearing vinyl it pays to take care of what you've got, after all there may never be a format to beat it!

£6.99 ref: **A15**

Mk 10 Carbon Fibre Brush with Velvet Pad

The carbon fibres efficiently remove dirt from the record grooves, which is then collected by an integral felt pad. This can be easily cleaned with the supplied tool after use.

£9.99 ref: **A8**

Monotrack Support Cones

Supplied in packs of four, these

turned steel support cones are ideal for supporting just about any item of hi-fi, from subwoofers through to amplifiers. The cones provide effective isolation and decoupling at a bargain price.

£8.00 ref: **A12**

System Cleaning Kit 1

Everything needed for maintaining a hi-fi system, all contained in one handsome wallet pack. Stylus cleaner, auto reverse wet tape head cleaner and cleaning fluid, manual CD cleaner and cleaning fluid and a carbon fibre record cleaning brush.

£15.99 ref: **A9**

Milty Work Mat

The Milty Work Mat is a large rubber mat that has been designed to support records, Laser Discs and CDs when they are being cleaned. It is covered in 1mm long tentacles which gently grip the disc so that it can be cleaned without moving about or rotating. The nature of the material ensures that no static is induced and dirt falls between the tentacles. It's a real boon to disc cleaning and makes using cleaning brushes and solutions completely painless.

£7.99 ref: **A16**

Kontak cleaning solution

Kontak is a two stage contact cleaner for all audio and mains connections. All connections are susceptible to oxidation and contamination which impairs electron flow and thus affects sound quality. Here's what Paul Messenger had to say when he tried some on his system; "The effect on the power amps alone was so astonishing I had to carry on and cover the whole system. By the time I was finished the system was utterly transformed. Timing and coherence were back with a vengeance; surface noise and coloration were both much less audible and the soundstage had liberated itself from the boxes".

£19.90 ref: **A17**

Newnes Audio and Hi-fi Engineer's pocket book (second edition)

This useful little book covers a wide range of audio topics with concise explanations to clarify the information.

It covers everything from turntables and cartridges to DCC and DAT with as much technical information as the mere mortal could wish for. If you really want to know what makes your CD player tick and aren't afraid of the odd wiring diagram or equation this is the book for you.

£10.95 ref: **A18**

The Art of Digital Audio - John Watkinson (revised reprint)

This book describes all of the essential theory of digital audio, and a good deal of practice, but it is not a history book. Nor is it a conventional textbook, largely because such things have to choose a target audience and stick to that academic level. The

Improve the sound of your system for a mere £15

Ever wondered why some people get taken seriously in hi-fi shops while others are given the run around? Wonder no more. The answer to all your hi-fi problems is the *Hi-Fi Choice* sweatshirt. Tastefully printed in red and black on grey, as well as being this year's most crucial fashion accessory, it will also readily identify you as a reader of Britain's fastest growing hi-fi magazine. You'll almost certainly be taken more seriously and end up with a better system – and all for a mere £15. We can supply the shirts in two different sizes – Large and Extra Large.



need for understanding in digital audio is too wide and the subject is too interdisciplinary for that. As you can imagine this is a comprehensive tome that covers all aspects of digital technology including disc drives, rotary and stationary head recorders and even interconnects. It is a must for anyone wanting to get fully acquainted with the subject.

£49.50 ref: A19

Technics Auto Compact Disc Cleaner

The Technics *RP-CL300* is a powered wet/dry CD cleaner that can be run off batteries or the mains. It works by rotating the disc and applying the wet cleaner first (cleaning solution is supplied), then reversing the direction of rotation and dry cleaning the disc. The whole process takes just 40 seconds and a set of batteries should clean 80 discs.

£39.95 ref: A20

Audio Technica CD lens cleaner AT-6078

The focussing assembly for the laser head of a CD player is a very delicate affair and yet it requires cleaning from time to time. Rather than fumbling about with cotton buds we would suggest you employ an Audio Technica CD lens cleaner. This is a standard size disc with a set of eight tiny brushes set into it, to use just apply a drop of cleaning fluid on one of the brushes, place the disc in your player and press play. Ten seconds later, hey presto, a clean laser assembly, and cleaner sound from your CDs as a result.

£16.95 ref: A21

Speaker Cables

Furukawa FS-2T14 PCOCC speaker cable

FS-2T14 PCOCC speaker cable is Furukawa's entry level speaker cable consisting of two 1.4mm square drawn PCOCC concentric strands.

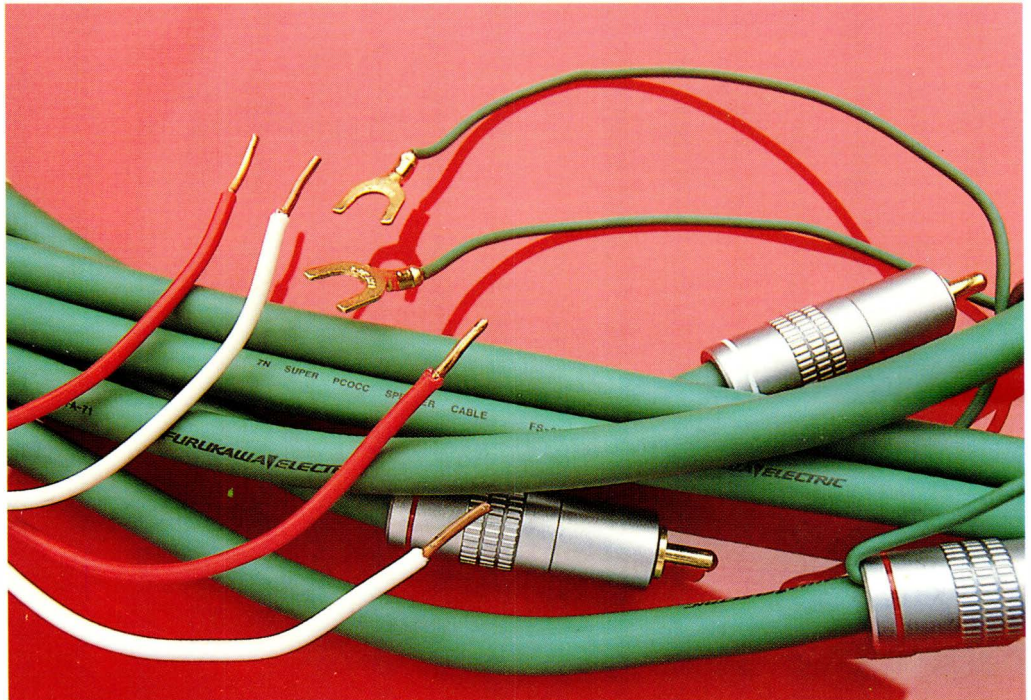
Furukawa FS-2F09 PCOCC speaker cable

Two 0.09mm square drawn PCOCC strands are contained in a neat, flat, flexible PVC insulation.

The *FS-2F09* is highly regarded by audiophiles around the world.

Furukawa FS-2T30F Evencap speaker cable

PCOCC speaker cable consisting of two 3mm square drawn PCOCC rope lay strands. *FS-2T30F* speaker cable, by virtue of its low resistance and



3mm section, increases the audible bandwidth, most particularly in the low frequencies.

FS-2T20P PCOCC speaker cable
PCOCC cable consisting of two twisted 2mm² drawn PCOCC strands laid in a concentric pattern.

The two conductors are insulated in polypropylene and contained in a circular outer sleeve of soft PVC.

Furukawa FS-2T35P PCOCC speaker cable

Produced from six concentric laid conductors in a rope lay this large cable has a low DC resistance and a larger occupation area for the skin effect, therefore bass is larger and treble is even sweeter.

Furukawa FS2T55F Evencap speaker cable

FS-2T55F is a 5.5mm 2 rope lay cable of similar construction to the *FS2T30F*.

Interconnects

We have a variety of interconnects on offer, all sourced from the respected Japanese specialist Furukawa.

The FA21 Series balanced analogue interconnect cables

The *FA21 Series* of analogue interconnects is supplied in matched pairs employing the Furukawa all PCOCC RCA plug with a flying earth or ground lead.

These interconnect cables are recommended for the connection of analogue devices where RCA sockets are provided. They can introduce a wide stereo image with good depth and height.

Furukawa FD-11 Series balanced digital coaxial interconnects

These 75ohm interconnects consist of a PC-OCC central conductor, double insulated with high density and air foamed polyethylene for high mechanical isolation. They are recommended for the interface between CD transports and DACs.

Furukawa FA11S Series balanced analogue interconnect cables

This interconnects is supplied in matched pairs employing the Furukawa hermetically sealed all PCOCC RCA phono plug with a flying earth or ground lead.

The cable's ability to transmit a vast amount of information has the effect of creating an awe inspiring bass, transparent mid range and simply superb unfettered treble.



Audiophile Recordings

We are pleased to be able to offer a selection of records from the world famous Reference label. Guaranteed to get the very best from your system these recordings have been selected for the merits of the performance as well as their outstanding sound quality.

Prof Johnson's Astounding Sound Show: Sampler.

Orchestral Fanfare - Red Norvo Quintet - Cal Arts Ensemble - Richard Morris - Organ - Susan Mc Donald, Harp - Kronos Quartet - David Rosenthal, Tubulong.

A perennial audiophile favourite, this sampler of Prof Johnson's early work shows what Reference can do with a wide variety of musical and sonic experiences.

Includes the only known recording of an unusual tuned mallet instrument, the Tubulong. Guaranteed to give your playback system a royal wringing out!

Copland: *Appalachian Spring Suite, Eight poems by Emily Dickinson.* Keith Clark/Pacific Symphony Orchestra, Marni Nixon, Soprano (in the poems).

Music by America's best loved composer, *The Appalachian Spring Suite* is presented in its original version for 13 instruments. Also included is the world premiere recording of Copland's orchestration of eight of his Emily Dickinson songs.

This recording was a Grammy Award nominee in 1987. The CD version also contains *An Outdoor Overture*.

Walker & Garson: *Reflections. Portrait of a friend - Love - First song - Ethereal - Yearnings - Pied piper - The park - Magic spell - You're one of a kind - Reflections - Reason.*

Jim Walker on flute and Mike Garson on piano from the jazz group 'Free Flight' offer something peaceful and soothing for those quiet moments. Surpassingly natural sound.

Helicon Ensemble: *Vivaldi/Bach Vivaldi: Sinfonia in C-Trio Sonata in G minor - Double Concerto in E-Flat. Bach: Trio Sonata in C - Double Concerto in D minor.* (Compact Disc also contains *Prelude in C*)

Albert Fuller conducts from the harpsichord a varied original instrument ensemble in works featuring two solo violins, including the great *Double Concerto* by Bach and three rare, ingratiating works by Vivaldi.

Featured solo artists are Japp



Schroeder, Stanley Richie and Linda Quan.

Recorded at the John Harnes Centre for the Performing Arts in Englewood, New Jersey. CD also has Bach's *Prelude in C*.

Walton: *Facade Suite.*

Walton: *Facade Suite - Strauss/Hasnohl: Till Eulenspiegel - Scriabin/Elliott: Waltz in A-Flat - Nielsen: Serenata in Vano.* Chicago Pro Musica.

An instrumental from Walton's whimsical *Facade* in the composer's original scoring makes a perfect vehicle for these brilliant musicians. A chamber version of *Till Eulenspiegel* and the seldom heard pieces of Scriabin and Nielsen complete this engaging programme.

Tafel Music: *Popular Masterworks of the Baroque.*

Pachelbel: *Canon & Gigue.*
Handel: *suite from 'Water Music'* **Purcell:** *air from Suite no. 3 in D and Suite from 'The Moor's Revenge'*. **Vivaldi:** *Concerto op. 10-2, 'La Notte'*.

Canada's finest original-instrument Baroque ensemble plays familiar favourites with outstanding scholarship and musical panache. Note the Pachelbel *Canon* with its seldom heard companion piece, both to the composer's instrumentation. Strings, oboes, recorder and harpsichord offer delightful music recorded in a vaulted ceiling stone church.

Stravinsky: *L'Histoire.*

Stravinsky: *L'Histoire du soldat suite* **Blackwood:** *Capriccio Espagnol.* Chicago Pro Musica.

Stravinsky's landmark composition for a mixed ensemble of seven. Grammy winning performances.

Respighi: *Church Windows.* Keith Clark, Pacific Symphony Orchestra.

This grandiose work, scored for full symphony orchestra, pipe organ and tam-tam, has at last been given its due, musically and sonically, in this celebrated recording. *Church Windows* quite literally pushes to the theoretical limit the dynamic range it is possible to reproduce at home.

The CD also contains Respighi's rare mini concerto *Poema Autunnale* with the violinist Ruggiero Ricci.

Marni Nixon: *Marni Nixon sings Gershwin. Summertime - Let's call the whole thing off - Someone to watch over me - I've got a crush on you - But not for me - The real American folk song - Nice work if you can get it - Embraceable you.*

Marni Nixon's impeccable intonation and diction bring a welcome elegance to these songs which are perhaps too often jazzed up. By beautifully singing what Gershwin wrote, stylishly accompanied by Lincoln Mayorga's piano, Miss Nixon brings new insights to these immortal songs.

Eileen Farrell: *Torch Songs. Stormy weather - Round Midnight - The end of a love affair - Black coffee - When your lover has gone - Don't explain - Something Cool* - and more.



The album Farrell fans have been waiting for. America's great blues diva makes these songs of lost love her own.

Smoky night club arrangements set the stage for some unforgettable singing

Dick Hyam: *Dick Hyam Plays Fats Waller. Ain't misbehavin' - Keepin' out of mischief now - African ripples - Honeysuckle rose - Willow tree - Stealin' apples - I've got a feeling I'm falling - Handful of keys - My fate is in your hands - Jitterbug waltz - Squeeze me.*

The world's first direct-to-CD on RR-33DCD. A technological and musical triumph, a true landmark in recording history. RR-33DCD (listed as Ref CD87 on the order form) is available as a deluxe numbered limited edition.

Encoded on the highly sophisticated, computerised Boesendorfer reproducing piano, Hyman's performances were played back for Prof Johnson's microphones, and the digitised signal was transmitted via microwave to the compact disc master as the music was being played.

No recording tape of any kind was used, nor was the digital bitstream corrupted at any stage by copying manipulation or editing.

The digits generated at the recording session are the very digits on the finished Compact Disc. Also on ordinary CD and LP.

Michael Garson: *Serendipity. Lady - Autumn leaves - I should care - Spirit of play - Trio blues -*

My romance

With illustrious sidemen Stanley Clarke (bass), Gary Herbig (sax), Peter Sparague (guitar) and fellow Free Flight members Jim Walker and Jim Laceyfield, Michael Garson has put together a tasty program of exciting mainstream acoustic jazz. Recorded by Prof Johnson in a real concert space, *Serendipity* represents an alternative, non-studio approach to jazz recording. A long standing favourite for audio demo, the CD contains two extra tracks.

Star of Wonder:

Silent night - Nativity carol - We three kings - We'll Dress the house - Come all ye faithful - Deck the hall -

Festive music for the holiday season by an outstanding professional chorus, recorded in San Francisco's St Ignatius Church.

The spine tingling acoustics are ideal for this program and *Star of Wonder* contains the full range of Christmas music: imaginative arrangements of traditional carols, renaissance motets and dramatic 20th century compositions.

The CD contains three extra tracks.

Berlioz: *Fantastique. Symphonie Fantastique.* Varujan Kojian, The Utah Symphony Orchestra.

This is widely considered to be the recording of this magical work. The Utah Symphony Orchestra, playing in Salt Lake City's Symphonic Hall, gives a world class performance, and the excellent recording captures it in its entirety.

The CD contains two versions of the explosive finale, one with standard orchestral bells, and another with digitally recorded church bells.

The 2-disc 45RPM LP set contains two copies of *March To The Scaffold* and *Dreams Of A Witches Sabbath*.

Nojima: *Nojima plays Liszt. Sonata in B minor - Mephisto Waltz - La Campanella - Harmonies du Soir - Feux Follets.*

The recipient of more rave reviews than any piano recording in recent memory, this is truly one for the history books.

Japan's most celebrated concert pianist won the Silver Medal at the Van Cliburn competition. Connoisseurs of great piano playing will treasure this recording, which has also been acclaimed for its outstanding sonic realism.

Chicago Pro Musica: *Weill, Varese, Bowles and Martinu. Threepenny Opera suite - Octandre - Music for a farce - La Revue de Cuisine.*

Chicago Pro Musica gives brilliant performances of four magnificent 20th Century works. Kurt Weill's pungent suite for wind, brass and percussion is the centrepiece.

Featuring the first stereo recording of a rare piece by Paul Bowles, best known as the author of *The Sheltering Sky* but also a distinguished composer for the stage.

Martinu's Parisian ballet from the 1920s contains the steamiest of tangos and a mad Charleston.

Eileen Farrell: *Rogers & Hart. I could write a book - I wish I were in love again - Wait till I see him - I didn't know what time it was - Love me tonight - Nobody's heart - It never entered my mind - Mountain greenery - Sing for your supper - Can't you do a friend a favour - Lover - My heart stood still - Little girl blue - You're nearer.*

A wide ranging survey including many great standards and more than a few rarities. Farrell's affinity for the songs of this era is undisputed.

Beautifully sung as her earlier pop recordings were, these new performances reveal an added dimension to the Farrell art - total involvement with the lyrics. And what lyrics! A must for admirers of Lorenz Hart.

Nojima: *Nojima Plays Ravel. Miroirs: Noctuelles - Oiseaux tristes - Une baroque sur l'océan - Alborada del gracioso - La valse des cloches - Gaspard de la Nuit: Odine - Le gibet - Scarbo.*

Here is the eagerly awaited sequel to Nojima's first American recording, featuring some of his most renowned specialties.

Gaspard de la Nuit is the pianist's Everest, attempted by only a few. *The Miroirs* are a distillation of Ravel's impressionist style, requiring a totally different technique. The Nojima performances are incandescent.

Opus 3 test record 1: Depth of image.

Produced with the idea of analysing hi-fi systems and their ability to reproduce depth of image. This is Opus 3's best selling recording. It contains the work of a broad cross section of the label's recording artists.

Opus 3 test record 2: Timbre.

Timbre or tonal accuracy is a crucial area of performance for audio equipment, this disc is composed of tracks designed to show up the timbral strengths of the components its played through. A good recording of interesting and diverse music.

Opus 3 test record 3: Dynamics.

Another compilation on the Swedish Opus 3 label, with musical extracts carefully chosen

to illustrate what is meant by musical dynamics with comprehensive liner notes to show you what you should be listening for. How good is your hi-fi system?

Opus 3 test record 4: Depth of image, Timbre, Dynamics.

In this fourth recording in the test series Opus has linked together the three concepts as a basis for completely evaluating audio equipment. Test record 4 like the first three contains a selection of illustrated music from our catalogue - mostly from the more recent recordings.

Thelma Houston & Pressure

Cooker: *I've got the music in me. I've got the music in me - To know you is to love you - Don't misunderstand - Got to get you into my life - plus four instrumental tracks.*

One of Sheffield Labs' most famous recordings. The original direct cut has been out of print for many years and is now highly collectable - but the recording sessions were of course taped, and this issue will still blow your socks off!

Eileen Farrell: *Sings Arlen. Let's fall in love - Out of this world - I wonder what became of me - I've got the world on a string - Like a straw in the wind - Down with love - Happiness is a thing called Joe - A woman's prerogative - Come rain or come shine - Little drops of rain - Over the rainbow - When the sun comes out - As long as I live - My shining hour - Last night when we were young.*

Farrell worked often with Harold Arlen, and has long been identified with his music: it was an Arlen tune that gave the title to the first of four albums of pop songs she made in the sixties, *I've got a right to sing the blues*.

This definitive new collection is graced with music notes and personal remembrances by Gene Lees.

Jim Brock: *Tropic affair. Pass a grill - Ladies of the Clabash - Tropic affair - Anya - Quo qui's groove - Side walk - Palm palm girls - O vazio.*

Vibrant, steamy and sensual, this contemporary instrumental jazz contains more than a touch of the tropics.

Renowned percussionist Jim Brock has recorded and toured with such diverse musical talents as Dave Valentin, Janis Ian and Scott Cossu.

Brock's dynamic ten-piece band, production by legendary Don Dixon, and prof. Johnson's magical live to two-track studio sonics result in a soundstage of such three-dimensionality, you can step inside the music. Enjoy

a vacation without leaving home with tropic affair!

Eileen Farrell: *Sings Johnny Mercer. Skylark - I remember you - Early Autumn - Laura - I thought about you - Too marvelous for words - and more.*

Arranged by Manny Albam and Loonis McGlohan, this album includes rarities and favourites from the vast catalogue of America's most poetic and prolific lyricist.

Eileen Farrell: *It's over. I get the blues when it rains - How about me? - Easy to remember - Gone with the wind - I remember April - And more memorable tear jerkers.*

Arranged and conducted by Robert Farnon, this album gives Farrell the opportunity to demonstrate her considerable skills, in touching songs of lost love. These great laments respond eloquently to the lush Farnon treatment.

NEW RELEASES

Robert Farnon conducts the Royal Philharmonic Orchestra: Film music and other works *Suite from Captain Horatio Hornblower - Lake in the woods - Canadian impressions - A la Claire fontaine - and more.*

The Royal Philharmonic Orchestra, conducted by the composer, Robert Farnon at the Town hall, Watford.

The recording session that *Hi-Fi Choice* contributor Richard Black wrote about in the February issue (103), produced by the legendary Prof Keith Johnson using both analogue and digital tape recorders to produce the finest results for LP and CD.

This has the traditional Reference Recordings virtues of wide bandwidth and dynamic range and an unusual degree of clarity, due in no small part to the simplicity of the recording equipment.

Malcolm Arnold: Conducts the London Philharmonic Orchestra. *A Sussex overture - Bechus - Dandi Pratt - The smoke - Anniversary overture - The fair field - Flourish for orchestra - The Commonwealth Christmas overture.*

On this very latest Reference recording the London Philharmonic Orchestra is conducted by the composer, Malcolm Arnold, at the Town hall, Watford.

This Keith Johnson production includes first recordings of Britain's leading living composer's lesser known works.

Record and CD PriceTable

Prof Johnson's Sound Show:

Ref RR-7 (LP only) (£18.50)

Berlioz: *Fantastique*

Ref RR-11 (double) (£24.99)

Ref RR-11CD (£18.50)

Tafel Musik: *Baroque*

Ref RR-13 (£18.50)

Ref RR-13CD (£18.50)

Respighi: *Church Windows*

Ref RR-15 (£18.50)

Ref RR-15CD (£18.50)

Stravinsky: *L'Histoire*

Ref RR-17 (£18.50)

Ref RR-17CD (£18.50)

Copland: *Apalacian Spring*

Ref RR-22 (£18.50)

Ref RR-22CD (£18.50)

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CANTERBURY HI-FI, 50 Burgate, Canterbury, Kent. (0227) 765315 B&W, Denon, Kenwood, Cerwin-Vega, Yamaha, Technica, Rogers, Musical Fidelity, Sony, NAD. No appointments necessary. Free Installation. Service Dept. Access and Visa. Mon-Sat 9-5.30

JOHN MARLEY HI-FI CENTRES, 2 Station Rd, West Canterbury. (0227) 769329. Also at Dover - (0304) 207562. Arcam, B&W, Heybrook, Infinity, JPW, Pro-Ac, Pioneer, Rotel, Tannoy, Technics. Dem and home trial fac. Mon-Sat 9-5.30 closed Thurs. Free install. Credit to £1,000. Access, Visa, Credit charge. Service dept.

KIMBERLEY HI-FI, 193 Broadway, Bexleyheath, Kent. (081) 304 3272. Pioneer, Technics, Kenwood, Denon, NAD, Aiwa, Tannoy, Mission, Wharfedale, Castle. Separate dem room, no appt nec. Free installation. Service Dept. Instant credit facilities. 9.30-5.30. No early closing. PANATEC SOUND & VISION CENTRE, 83b High Str, Gillingham. (0634) 5731141 B&W, Bose, Dual, Kenwood, Marantz, Pioneer, Philips, Sony, Tannoy, Technics. Dem room facilities. 0% credit. Service Dept. Free Installation. Pioneer Reference Point Dealer.

PANATEC SOUND & VISION, 17 Week Str, Maidstone. (0622) 661488. See above for details.

PHOTOCRAFT HI-FI, 40 High St, Ashford (0233) 624441. No.1 in Kent for Linn, Naim, Rega, Roksan, Exposure, Onix, Epos, Royd, Creek. But before you choose equipment choose where to buy it. Dem room, appts necessary. Home trial and free installation. Visa, Access, Bada Chargecard. 9-5.30 Mon-Fri (Wed & Sat 5 only). Service Dept. **BADA**

VOLUME ONE, 41 Upper Wickham Lane, Welling, DA16 3AD. 081 304 4622. Arcam, Creek, Dual, Epos, Exposure, Mordaunt Short, Monitor Audio, Nakamichi, Pink Triangle, Rotel. Large demo room, no appt nec, darts & snooker facilities. Evening dems in shop by appt. Home trial & demo, free delivery & installation. Access & Visa. credit up to £1000. 9.30-5.30 Mon-Sat.

V J HI-FI, 29 Guildhall St, Folkestone. (0303) 56860. Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Quad, Dem and home trial facilities, free install, credit to £1000. Amex, Diners, Visa, Access. Service dept

V J HI-FI, 119 High Street Margate. (0843) 226977. Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Pioneer. Dem and home trial facilities, free installation, credit to £1000. Amex, Diners, Visa, Access. Service dept

LANCASHIRE

NORMANAUDIO, 216 Church Street, Blackpool FY1 3PT. 0253 295661. For details see Preston branch entry (below). Open 9-5.30. Closed Wed. **BADA**

NORMAN AUDIO, 131 Friargate, Preston PR1 2EE. (0772) 53057. Fax 562731. Sony Hi-Fi News Area Winner. Aiwa, B&W Loudspeakers, Denon, Marantz, Mission, Cyrus, Monitor Audio, Nakamichi, Quad, Roksan, Rotel & many others! 2 lux dem. lounge. Home trial by arrangement. Free install. Service dept. Inst. cred. facs. with several companies. Most credit cards accepted. 6 days 9-5.30. **BADA**

LEICESTERSHIRE

MAYS HI-FI, 27/33 Churchgate, Leicester. LE1 3AL. (0533) 625625. Sony, Technics, Denon, Kenwood, Pioneer (Reference Point) Philips, B&W, Tannoy, Mission/Cyrus, Dual, Listening room, free install, service dept. Full range of credit facilities. Open Mon-Sat 9-5.30 Thurs 9-1.30. MJS HI-FI, 80 Stapleton Lane, Barwell, Leicester LE9 8HE. (0455) 846977. The Rock, Audio Innovations, Kelvin Labs, Albary, Ortofon, S D Acoustics, Opus, Finestra, etc. Large range of records stocked, free installation, home trial facilities. Please phone for appts open by appt. THE LEICESTER HI-FI CO, 6 Silver Walk, St. Martins Square, Leicester LE1 5EW. Tel: (0533) 539753. Fax: (0533) 626097. Acoustic Energy, Arcam, Marantz, Micromega, Mission/Cyrus, Musical Fidelity, Nakamichi, Meridian, Rogers, Roksan, "and oodles more". 2 dem rooms, home trial arranged, free install, service dept. Credit facilities. Access, Visa, Diners, Amex. 6 days 9.30-5.30. Bada member

SOUND ADVICE, The Factory, Duke St, Loughborough LE11 1ED. (0509) 218254. Mission Cyrus, Rega, Naim, Linn, Meridian, Yamaha, Rotel, Arcam, Nakamichi, JPW. 3 demonstration areas, no appts necessary, free installation, service department. Lombard credit charge. Access, Visa. Mon-Fri 9.30-6.00, Sat 9.30-5.30

LINCOLNSHIRE

BOSTON HI-FI CENTRE, 65a Wide Bargate, John Adams Way, Boston, Lincs PE21 6SG. (0205) 365477. Quad, Nakamichi, Arcam, Marantz, NAD, Castle, JPW, Rogers, etc. Separate demo studio. Home trial. Free installation. Access, Visa. Tues - Sat 9-5 pm **BADA**

STAMFORD HI-FI CENTRE, 9 Red Lion Square, Stamford, Lincs PE9 2AJ. (0780) 62128. Pioneer, Technics, Cyrus-Mission, Rotel, NAD, Yamaha, Kenwood, Marantz, Quad, plus all major speaker manufacturers. Expert advice, compositor demonstrations, on two floors, part exchange Hi-Fi purchased for cash. No appointments necessary, home trial facilities, free installation, service department. Mastercard, Visa & credit charge, finance available. Mon-Sat 9-5.30pm, closed Thursdays. SUPERFI, 271A High Str, Lincoln LN2 1JG. (0522) 520265. See main entry under Nottinghamshire for full details

LONDON

ANALOG AUDIO, 849 High Road, London N12. (081) 4453267. Cambridge, Denon, Rotel, Yamaha, Marantz, Wharfedale, Teac, Mordaunt-Short, Cerwin Vega, Nad, Free install. Service dept. Instant credit up to £1000, Visa & Access. 9.30-6 6 days.

AUDIO T, 190 West End Lane, West Hampstead, London NW6 1SQ. (071) 794 7848, Fax (071) 431 3570. Greathifi from Linn, Arcam, Denon, Meridian, Mission/Cyrus, Rotel, Proac, Micromega, Yamaha and many more. Tue-Sat 10-6pm. 2 single spkr dem room. Free del. and instal. **BADA**

BILLY VEE SOUND SYSTEMS, 248 Lee High Road, London SE13. (081) 318 5755. Arcam, Linn, Naim, Quad, etc. 2 dem rooms. Int. free credit. Access, Visa. Closed Thurs. **BADA**

CORNFLAKE SHOP, 37 Windmill St (just off Tottenham Court Rd), London W1. (071) 631 0472. Mon-Sat 10-7. Rega, Roksan, Naim, Monitor Audio, Koetsu, Marantz, Yamaha, SME, DNM, Epos. 3 dem rooms. Del and instal. service. Credit facilities, Access, Visa. COVENT GARDEN RECORDS, 84 Charing Cross Road, London WC2 HQJA. (071) 379 7427, Fax (071) 836 1345. London's premier digital audio centre, single speaker dem rooms, appointments suggested, installation service available, service department. All major credit cards accepted. Mon-Sat 10am-7.30pm.

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

DEANS, 283 Edgware Road, London W2 1BB. TEL (071) 402 666, FAX (071) 724 2135. Aiwa, B&W, Quad, Harman Kardon, JBL, JVC, Kenwood, Marantz, Pioneer, Technics. Mail order, fast efficient delivery, all goods dispatched same day. Service department. Guarantees on all products. All major credit cards accepted. Open 6 days to 6pm, Thurs till 8pm.

GALAXY AUDIO VISUAL, 230 Tottenham Court Road, London. (071) 637 2624. Aiwa, Akai, Dual, Hitachi, Philips, Pioneer, Sony, Rotel, Technics, Infinity. Demos available on request. In car audio dept. No appts nec. Service dept. Access, Visa, Amex, Diners, Switch, instant credit subject to status. 9.30-6pm

GRAHAMS HI-FI, Canonbury Yard, 190a New North Rd, London N1 7BS. (071) 226 5500. Winner Sony/HFN Greater London Dealer Award 1986-1989-1990. Linn, Naim, Rega, etc. £400-£3000-£13,000 **BADA**

HI-FI COMPONENTS, 34 Battersea Rise, London, SW11 Tel. 071 2231 110. What Hi-Fi best buys in stock as well as those hard to find accessories and stylus. Established 27 years.

HI-FI EXPERIENCE, 227 Tottenham Court Road, London W1P 9DH. 071 580 3535, Fax 071 436 4733. B+W, Acram, Meridian, Cyrus, Musical Fidelity, Rogers, Quad, Rotel, Linn, Marantz, Listening Rooms, no appts necessary, home trial facilities, free installation, service dept. Visa, Access, Amex, Diners. Mon-Fri 10-7, Sat 9-6.

KJ WEST ONE, 26 New Cavendish St, London W1M 7LH (071) 486 8262/63. Fax (071) 487 3452. Arcam, Audio Alchemy, Audio Lab, Audio Research, Croft, Deltac, Epos, Marantz, Meridian, Mission, Musical Fidelity, Pink Triangle, Roksan. Appts nec. Home trial. Free installation. Service dept. Major credit cards. Mon-Sat 10-6pm. (Late night Thur til 7pm)

THE LISTENING ROOMS, 161 Old Brompton Road, London SW5 0LJ. Tel (071) 244 7750/59. Fax (071) 370 0192. Linn, Epos, Quad, ARCam, Musical Fidelity, Meridian, Rogers, Acoustic Energy, Audiolab, Pink Triangle, etc. -See main advertisement - Two dem rooms, appointments preferred, home trial facilities, free installation, service department. Visa, Access, Amex, Full credit facilities, including interest free. Mon-Sat 10-6

MCQ ENTERTAINMENTS, 218 Walworth Road. London SE17. Telefax: 071 701 3204. Teac, Technics, Ortofon, Shure, Stanton, Cerwin-Vega, Jamo, Koss, Sennheiser, QED, plus a full range of audio & video accessories. Hire facilities, no appts necessary, service dept. Access, Visa. (all major credit cards) Open 9.30-6, 6 days

SOUND ORGANISATION LONDON, 4 Pickfords Wharf, Clink St, London. SE1 9DG. (071) 403 2255. Linn, Rega, Roksan, Micromega, Radford, Rotel, Nakamichi, Onix, Creek, Naim, Exposure, Royd, Heybrook, Epos. Interesting new equipment always under evaluation. Single speaker listening room. Credit facilities. Appts. preferred, free install. Service dept. Open Tues-Sat 10-6. Late dem. by appt

SOUND SENSE, 350 Edgware Road, London W2 1DX. (071) 402 2100. Alphason, B&W, Nakamichi, Celestion, Cambridge Audio, Dual, Denon, Monitor Audio, Marantz, NVA, Sony ES. Appts preferred. Installations available. Access, Visa. Standard credit facilities. Mon-Sat 9.30-6.30

The Choice Dealer Directory

STUDIO 99, 79-81 Fairfax Road, Swiss Cottage, London NW6 (071) 624 8855. Linn, Naim, Meridian, Rega, Quad, Nakamichi, Mission/Cyrus, KEF, Bang & Olufsen, Yamaha, Creek etc. 2 single speaker dem rooms. Appts. nec. Home trials, free install. Service dept. Visa/c, Access/c & finance terms. 10-7 Mon-Fri, 10-6 Sat. **BADA**

SUPERFI, 2-4 Camden High Street, Camden, NW1 0JH (071) 388 1300 See main entry under Notts for full details

UXBRIDGE AUDIO - CHISWICK, 109 Chiswick High Road, Chiswick, W4 2ED (081) 742 3444 Fax (081) 742 3295. 2 Demo Rooms, Installations, 2 Year Guarantee, 7 day exchange. Major credit cards, Tues - Sat 10 - 6, See Middx entry for brands stocked. **BADA**

VOLUME ONE, 41 Upper Wickham Lane, Welling (081) 304 4622. For full details see entry under Kent.

ZEBRA, 18-24 Brighton Road, South Croydon CR2 6AA. 081 688 2093. Mission, Pioneer, NAD, Rotel, Marantz, KEF, Tannoy, Celestion, Sony, Technics, and large range of AV equipment. Single speaker & comparator demo in a more casual environment. Service department. Mon-Sat 9.30-6.00. Access, Visa & instant credit up to £1000 subject to status.

GREATER MANCHESTER

THE AUDIO COUNSEL, 12 Shaw Road, Oldham, Manchester OL1 3LQ. (061) 633 2602. Linn, Naim, Rega, Rotel, Arcam, Micromega, EPOS, Creek, Nakamichi, Denon. 2 dem rooms. Free install. Visa, Access, Licenced credit brokers up to £1000 instant credit. 10.00-5.30 Tues, Weds, Sat; 10.00-7 Thurs & Fri. Closed Mon

CHRIS BROOKS AUDIO, 10-12 Oak Street, Hazel Grove, Stockport SK7 4EJ. (061) 419 9050. Tues-Sat 10-6, 2 dem rooms, credit facilities. All credit cards. Just like the Warrington shop - total absence of bull****

MURRAY HI-FI, 19 Middle Hillgate, Stockport. (061) 429 7666. Linn, Naim, Rega, Arcam, Yamaha, Royd, Epos, Creek, Nakamichi, Rotel. Full demo facilities, free installation & delivery, service dept. Full 2yr guarantee on all products. Access, Visa, Lombard Tricity, licenced credit broker. 10-6 Tue-Sat.

SWIFT HIFIDELITY, 12 Chapel Street, Cheadle. (061) 428 7222. Arcam, Denon, Kenwood, Marantz, Nad, Cyrus, Rotel, Pioneer, Mission, Tannoy Demo room. 9.30-6. Closed Wed. **BADA**

MIDDLESEX

AUDIOT, 159a Chase Side, Enfield, Middx EN2 0PW. (081) 367 3132, Fax (081) 367 1638. Great hi-fi from Linn, Arcam, Denon, Linn, Mission/Cyrus, Philips, Rotel, Yamaha, and many more. Tue-Sat 10-6pm. 2 single spker dem rooms. Free del. and instal. **BADA**

HARROW AUDIO, 27 Springfield Rd, Harrow. (081) 863 0938. Mon-Sat 9.30-5.30. A&R, Audiolab, Cyrus, Denon, Epos, Montor Audio, Musical Fidelity, Nakamichi, Quad, Rotel, Tannoy, Thorens, Yamaha. etc **BADA**

RIVERSIDE EHI-FI LTD, 422 Richmond Road, East Twickenham, Middlesex TW1 2EB. Tel. (081) 892 7613. Fax (081) 892 7749. A.R., Arcam, Audio Innovations, Castle, Dual, Denon, KEF, Luxman, Michell, Musical Fidelity, Micromega, Marantz, Nakamichi, Rotel, Spenhdor, Systemdek, Tannoy, Yamaha. One demo room, in-car demo for car hi-fi systems. Appts not always necessary. Home trial facilities. Free installation, service dept. Lombard Tricity, Access, Visa, Amex, Diners Club. Mon-Sat 9.30-6, Thurs, Fri 9.30-7

SIGHT N SOUND, The Treaty Centre, Hounslow, Middlesex TW3 1ES. 081 572 5418, fax 081 572 5417. Sony, Kenwood, Finlux, Toshiba, Philips, Sanyo, Grundig, Pioneer, Technics, Akai. No appts nec, free intall, service dept. Access & Visa, financing available. 9-6pm Mon-Sat.

UXBRIDGE AUDIO, 278 High St, Uxbridge, Middx UB8 1LZ. (0895) 230 404, Fax (0895) 273 626. Acoustic Energy, Arcam, Ariston, Audiolab, Castle, Creek, Cyrus, Denon, Epos, Exposure, Heybrook, Ion, JPW, Kef, Linn, Marantz, Meridian, Michell, Mission, MA, NAD, Naim, Nakamichi, QED, Quad, Revolver, Revox, Rotel, Rogers, Royd, Ruark, Stax, Tannoy, Thorens, Wharfedale. 2 dem rooms. Installations. 2 yr guarantee. 7 day exchange. Service dept. Access, Amex, Diners, Visa. Mon-Sat 10-6. Closed Wednesday **BADA**

MERSEYSIDE

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

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

P & A AUDIO (BIRKDALE) LTD 31 Liverpool Road, Birkdale, Southport (0704) 68373. Arcam, Cambridge, Creek, Denon, Michell, Mission/Cyrus, Mordaunt-Short, NAD, Pink Triangle, QED, Revolver, Rogers, Rotel, Royd, Tannoy. 3 Single speaker demo rooms and Nicam surround sound dem room. Free delivery, installation (Merseyside) Service dept, Mon- Sat 9 - 5.30 Half day Tues, Access, Visa, Lombard

PETERS HI-FI, 11 St Werburgh Squ., Grange precinct, Berkenhead. (051) 647 5626. 9-5.30 closed Thurs. See Cheshire branch for full details.

PETERS HI-FI, 8 High St, Bromborough, Wirral. (051) 334 1874/2825. 9-5.30 6 days. See Cheshire branch for full details.

WEST MIDLANDS

AMADAEUS SOUND & VISION, 10 Boldmere Road, Sutton Coldfield, West Midlands Tel (021) 354 2311. Arcam, Audio Innovations, B&O, Carver, Castle, QED, Wharfedale, Yamaha, Cambridge Audio, Halfer. Single Speaker demo, appts preferred, service available, installations, B&O link install, home trials. Access, Visa, interest free credit available subject to status. 9.30-6pm 6 days

FRANK HARVEY HI-FI EXCELLENCE, 163 Medieval Spon Street, Coventry (0203) 525200. All major agencies. Free inst. Service dept. Part ex. 3 dem rooms. Mon-Sat 9.30-5.30. Wed til 8pm **BADA**

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

HORNTON ELECTRONICS (1987) LTD, 8-9 Lower Temple St, Birmingham B2 4JD. (021) 643 0972. Aiwa, Acoustic Research, Denon, Marantz, Mordaunt Short, JVC, Mission, Sony, Technics, Wharfedale. Credit to £1000. Access, Visa. 9-5.30 Mon-Sat. Service dept.

MUSICAL APPROACH, 37 High Street, Aldridge, Walsall, W. Mids (0922) 57926. Linn products, Arcam, Creek, NVA, Revolver, Onix, Epos, Marantz, Rotel, Quad & more. Dem facs. Home trial. Service dept. Credit facs available. Access, Visa. 9.30-5.30 Mon-Sat. 9.30-1 on Thurs.

MUSIC MATTERS, 351 Hagley Road, Edgbaston, Birmingham B17 8DL (021) 429 2811. Roksan, Nakamichi, Arcam, Audiolab, Musical Fidelity, Mission/Cyrus, Meridian, KEF, Monitor Audio, Pink Triangle. 2 single speaker luxury demo rooms. Appts nec, home trial facilities, free installation, service dept. Access, Visa, instant credit up to £1000, interest free credit available. Tue-Thur 10.30-6, Fri 10.30-8, Sat 10-5.30.

NAAM HI-FI VISION, 122-123 New Street, Birmingham. (021) 633 4944. Pioneer, Akai, Aiwa, Panasonic, Toshiba, Hitachi, Bose, Wharfedale, Sony. Demo facilities available, appointments preferred. Access, Visa, 10 month interest free credit. Amex, Lombard Tricity Credit charge. Mon-Sat 9-6.00.

NORFOLK

BASICALLY SOUND, The Old School, School Rd, Bracon Ash, Norwich NR1 4HE. (0508) 70829. Arcam, Linn, Naim, Denon, Spondor, Exposure, Audio Technica, Creek, Rega, Epos, etc. 2 comprehensive dem rooms Home trial. Free installation. Visa, Access, HP facilities. Tues-Sat 9.30-1, 2-5.30.

MARTINS HI-FI, 5 High Street, Kings Lynn. (0553) 761683. Est. 1968. **BADA**

MARTINS HI-FI, 85/91 Ber Street, Norwich. (0603) 627010. Est. 1968 **BADA**

NORTHAMPTONSHIRE

AUDIO CRAFT 23-25 Derngate, Northampton, NN1 1TY. Tel: 0604 36291 Bang & Olufsen, Kenwood, Technics, Marantz, Celestion, Mordaunt-Short. No appts nec, Free Install, Service Dept. Open Mon-Sat 9-5:30pm

CLASSIC HI-FI + VIDEO, School Lane, Kettering, Northants. (0536) 515766. Rotel, Musical Fidelity, Wharfedale, Monitor Audio, Yamaha, JBL, Dual, Marantz, Kenwood, Kef, Celestion, and many more. Home trial, free instal., service dept. Access, Visa, credit facs. 9.30-5.30pm

NOTTINGHAMSHIRE

CHANTRY AUDIO, Chantry Walk, 18a Eldon Street, Tuxford, Nr Newark, Notts NG22 0LH. (0777) 870372. Pink Triangle, Deltac, Rotel, SD Acoustics, Ruark, NVA, Michell, Ion Systems, Croft Acoustics, Kelvin Labs, and much more. 2 dem rooms. Home trial, free installation. Access, Visa & credit facilities and mail order. Mon-Fri 9.30-5.30pm Sat 9.30-5.30. Sun & evenings home dem by appt.

DEFINITIVE AUDIO, (0602) 813562. For a carefully considered approach to building a true hi-fidelity audio system with components derived from the following manufacturers: Systemdek, Goldring, Revox, Voyd, Audio Innovations, Snell, Audionote, SME, Helius, Impulse, TEAC, Deltac, Wadia, Ortofon Premier dealer, Pioneer dealer, Huygens loudspeaker stands. Demos by appt. Please phone for further details. Installation free of charge. Mon-Sat 10-7pm, Closed Wed a.m.

NOTTINGHAM HI-FI CENTRE, 120-122 Alfreton Road, Nottingham (0602) 786919. Over 25 years experience, superb demo rooms, extensive range, free parking. Mon-Sat 9-5.30. **BADA**

SUPERFI, 15 Market Str, Nottingham NG1 6HY. (0602) 412137. Kenwood, Technics, Denon, Aiwa, Rotel, Wharfedale, Mission, Marantz, NAD < Celestion, and many more. 2 single speaker dem rooms. Free install on systems, service dept. Access & Visa, Amex. Open 9-5.30, 6 days.

OXFORDSHIRE

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

AUDIOT, 19 Old High St, Headington, Oxford OX3 9HS. (0865) 65961, Fax (0865) 60415. Great hi-fi from Linn, Arcam, Denon, Meridian, Mission/Cyrus, Rotel, Yamaha, B&O and many more. Tue-Fri 10-6pm, Sat 9.30-5.30. 2 single spker demo rooms, A/V dept. free del & instal. **BADA**

OXFORD AUDIO CONSULTANTS LTD, Cantay Hse, Park End Street. Oxford OX1 1JE. (0865) 790879 fax (0865) 791665. NAD, Rotel, Musical Fidelity, Pioneer, Marantz, Rogers, TDL, Thorens, Audio Research. Proceed. 2 Demo rooms. Service Dept. Home trial and free installation. Instant credit, Access, Amex, Visa. 10-6 Mon-Sat

WITNEY AUDIO VISUAL, 28 High St, Witney, Oxford. (0993) 702414. Aiwa, Akai, AR, Bose, B&W, Cambridge, Dual, Mordaunt-Short, NAD, Onkyo, Pioneer, Roberts, Sony & Sony ES, Tannoy, Wharfedale, Yamaha. Reference Point Dealer. Dem facilities. Mon-Sa 10-6 Free installation, credit to £1,000. Access, Visa. Service dept.

SHROPSHIRE

AVON HI-FI, 12 Barker Street, Shrewsbury, Shropshire SY1 1QJ. (0743) 55166. NAD, Quad, B&W, Arcam, Kenwood, Aiwa, Bose, Nakamichi, Revolver, Onkyo. Dem room. Home trial. Free install. Service dept. Access, Visa. £1000 instant credit. Mon, Tues, Wed, Fri, Sat 9-5.30. CREATIVE AUDIO, 9 Dogpole, Shrewsbury. (0743) 241924. Linn, Naim, Roksan, Mission, Arcam, Rogers, Denon, Marantz, Rotel, Celestion, etc. Dem room. Home trial and free installation. Credit to £1000. Access, Visa Tues-Sat 9.30-5.30. Service dept

MID-SHROPSHIRE AUDIO, 4 Holland Court, Dawley, Telford TF4 2EX. (0952) 630172. Audio Innovations, Marantz (inc Music Link), Denon, Tannoy, Ortofon, Pink Triangle, Ion Systems, Systemdek, Ruark, Monitor Audio etc. 2 dem rooms. Home trial. service dept. Instant credit up to £1000 Access, Visa, Amex.

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SOMERSET

MIKE MANNING AUDIO, 110 Middle Street, Yeovil, Somerset BA20 1NE (0935) 79361, Fax (0935) 32923, Mobile(0850) 325965. Linn, Naim, Roksan, Pink Triangle, A+R (Arcam), ION, NAD, Pioneer, Rotel, Denon, etc. Dedicated listening lounge, for relaxed and unpressured demonstrations. Appts not usually nec. but best to phone first. Home trial facilities on request, free installation, service department. Instant credit, Access & Visa, etc. 9-5.30 closed Mondays.

STAFFORDSHIRE

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

ACTIVE AUDIO, 95 Stafford Street, Hanley, Stoke-on-Trent. (0782) 214994. Arcam, Ariston, Celestion, Cyrus, Denon, Exposure, Kef, Kef Reference, Marantz, Rogers, Rotel, etc. etc. The only BADA Member in Staffordshire. Full dem & home trial facts. Account and credit cards. Ring for opening times and free Fact Pack.

GRANGE HI-FI LTD, 153 Branston Road, Burton-on-Trent, Staffordshire DE14 3DQ. (0283) 33655. Audio Innovations, Arcam, Castle, Denon, Pink Triangle, Rotel, Rogers, Systemdek, SME, Quad, Voyd. Demonstrations facilities available, appointments necessary on Saturdays. Free installation. Service department. Access, Visa. 9.00-5.30pm. Closed Mon & Wed afternoons, open until 7.00pm Thursdays. Closed for lunch 12.00-12.30

MUSICAL APPROACH, Unit 7, Woodings Yard, Bailey Str., Stafford (0785) 55154. Linn Products, Arcam, Creek, NVA, Revolver, Audiotec, Onix, Epos, Marantz, Rotel and more. Home trial. Free installation. Service dept. Credit facilities available. Access, Visa. 9.30-5.30 Mon-Sat.

SUFFOLK

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

AUDIO IMAGES LTD, 7 All Saints Road, Pake Field, South Lowestoft, Suffolk, NR33 0JL (0502 582853) Arcam, Quad, Triangle, Rotel, Denon, Rothwell, Michell, Finlux, Meridian, JPW. Separate Demo room No appointments, Home trial facilities, free instal, service dept. Open 10:00-6:00 Tues-Sat 10:00-7:00pm Fridays.

AVALON AUDIO VISION, 12 St Margarets Plain, Ipswich, Suffolk, Tel: 0473 281922. Pioneer, Mission/Cyrus, NAD, Rotel, Yamaha, Marantz, KEF, Mordaunt-Short, Mitsubishi, Wharfedale. Single Speaker Demonstration Room. No appts nec, Home trial fac, Free Install, Service Dept. Full HP fac, Interest Free Credit available on most components, Part exchange. Open 9.30-6.00 Mon-Sat.

SURREY

AUDIO SOUTH, 24 (The Woolmead) East Str, Farnham, Surrey GU9 7TT. (0252) 714555 Audio Innovations, Audio Note, Deltrec, Yamaha, Cary, JPW, Marantz, Rotel, Snell, Voyd. Dem room and evening appointments available. Home trial facilities. Free installation. Access, Visa. 10.30-6 Mon-Sat. Closed Tuesday.

COSMIC, 244/256 Station Road, Addlestone, Surrey KT15 2PS. (0932) 854522/851753/843769, Fax: (0932) 841615. Most brands stocked, including: Aiwa, Arcam, Denon, Mission Cyrus, NAD, Nakamichi, Pioneer, Quad, Rotel, Yamaha, etc. Open 7 days 9-6pm. Part exchange, large free car park, service dept, instant credit available Access, Visa, Switch.

DATASOUND, 23 South Street, Dorking, Surrey RH4 2JZ. (0306) 882897. Arcam, Celestion, Denon, Dual, Marantz, Mission, Musical Fidelity, NAD, Rotel, Tannoy. Dedicated listening room. Free instal. Service dept. Up to £1000 instant credit subject to status. 9.30-5.30 6 days

PJ HI-FI- the Hi-Fi Shop, 3 Bridge Street, Guildford, Surrey GU14 9Y. Tel: (0483) 504801. 9-6 Mon-Sat. Linn, Meridian, Creek, Arcam, Quad, Revox, Musical Fidelity, Rotel, NAD, Nakamichi, Marantz

RIVERSIDE HI-FI, 422 Richmond Road, East Twickenham, TW1 2EB. Tel: (081) 892 7613. Fax: (081) 892 7749. See main entry under Middlesex.

ROGERS HI-FI, 13 Bridge Street, Guildford, Surrey. (0483) 61049. Aiwa, Denon, Dual, JPW, Marantz, Monitor Audio, Philips, Pioneer, Systemdek, Tannoy. Demonstration facilities available, no appointment necessary. Free installation. Service department. Access/Visa. Instant credit up to £,000 subject to status. Monday-Saturday 9.30-6pm. later by appointment.

SOUNDS EXCLUSIVE, 1 Kent House, High Str, Cranleigh GU6 8AU (0483) 268185. Michell (amplification & decks), Marantz, Ariston, Ortofon, AME, Sumo, Proac, Jamo, Origin Live, Kiseki. Demo room, appts preferred, home trial facilities, free install, service dept. Access, Visa. Open 9-5.30 Mon-Sat

SPALDINGS HI-FI, 352-4 Lower Addiscombe Rd, Croydon, Surrey. (081) 654 1231/2040. 3 dem rooms and home dem. Free installation, credit Mon-Sat 9-6. Tues to 8. Closed Wed. Servicedept.

SURBITON PARK RADIO, 48 Surbiton Rd, Kingston-Upon-Thames, Surrey. (081) 546 5549. Quad, Castle, Dual, Denon, Kenwood, Rotel, Pioneer, QED, B&W, Tannoy. Demo facilities. Access, Visa. 9.30-5.00 Tues-Sat. Service dept

SURREY HI-FI, 45 High Street, Godstone, Surrey RH9 8LS. (0883) 744755. Parking, easy access - just 2 mins off junction 6, M25. Quad, TDL, Nakamichi, KEF, Thorens, Rotel, Marantz, Michell, Tannoy, JPW, Single speaker demo room. Appts not necessary, Demonstration by appointment, free installation, service dept. Access, Visa, Mastercard. 0% Credit. Open 9-6, closed Wed.

TRU-FI SOUND AND VISION, 2 Central Parade, Redhill, Surrey. (0737) 767404/766128. Aiwa, Audio Technica, B&W, Nakamichi, Mission, Mordaunt-Short, Nakoaka, Sony, Technics. Dem. facilities. Free installation. Service dept. 0% finance. Access, Visa. Mon-Sat 9.30-6

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

UNILET HI-FI, 35 High Street, New Malden, Surrey KT3 4BY. (081) 942 9567. Kef, Mission, Musical Fidelity, NAD, Nakomichi, Quad, Rotel, Tannoy, Demos. Amex, Access, Visa, etc.

ZEBRA 18-24 Brighton Road, South Croydon CR2 6AA. 081 688 2093 See main entry under London

SUSSEX (EAST)

THE POWERPLANT, 66 Upper North Street, Brighton BN1 3FL. (0273) 775978. Roksan, Musical Fidelity, Onix, Marantz, Rotel, Yamaha, Bryston, Tannoy, Monitor Audio, JPW, etc. Comfortable single speaker demonstration rooms. No appts. nec. Home trial facilities, free install. Service dept. Credit facilities available on request. Mon-Sat 10-1.00, 2.00-6pm

SUSSEX (WEST)

AUDIO DESIGNS, 26 High Street, East Grinstead, W. Sussex RH19 3AS. 0342 314569. Linn, Naim, Alphason, Arcam, Rotel, NAD, B&W, Quad, Tannoy, Thorens, TEAC, etc. Very comfortable listening room. No appts nec., Home trial facilities, free installation, service dept. Access/Visa. 9-5.30 Mon-Sat, late Tue till 8pm

BOWERS & WILKINS LTD, 1 Becket Buildings, Little Hampton Rd, Worthing (0903) 64141. B&W, Nakamichi, Castle, Denon, Dual, JVC, Mordaunt Short, Philips, Quad, Sony, Technics. 3 dem rooms. Mon-Sat 9-5.30, Wed 9-1pm. Home trial facilities, free install. Credit to £1000, Access, Visa. Service dept. *

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

TYNE & WEAR

RED RADIO SHOP AND HI-FI CENTRE, 11 Olive Street. (Off Park Lane), Sunderland. Tyne & Wear SR1 3PE (091) 567 2087. Castle, Carver, Denon, JVC, Kenwood, Mordaunt-Short, Michell, Teac, Tannoy, Monitor Audio etc. Dem room, large with comparator facility. No appts nec, Free instal. Service dept. Interest free credit and no deposit 9am-5.30pm daily

NEWCASTLE HI-FI, 153 Kenton Road, Gosforth, Newcastle-Upon-Tyne NE3 4NQ. (091) 285 7179. Linn, Arcam, Creek, Marantz, JPW, NAD, Denon, Ruark, Custom Design, Aiwa, etc. 2 single speaker demonstration rooms. Installation, delivery, 2yr guarantee on all products. Access, Visa 10-5.30 Tue-Sat.

WARWICKSHIRE

NAAM HI-FI VISION, 78 Lower Precinct, Coventry CV1 1DX. (0203) 632086. Technics, Pioneer, Kenwood, AR, Akai, Aiwa, Panasonic, Toshiba, Wharfedale, KEF. Demo facilities. Access, Visa, Amex. Lombard Tricity credit charge. 9.00-6.00 Mon-Sat

WILTSHIRE

AUDIO T, 60 Fleet St, Swindon, Wilts. SN1 1RA, (0793) 538222, Fax (0793) 487260. Great hi-fi from Linn, Denon, Meridian, Mission/Cyrus, Rotel, Sony, Yamaha and many more. Tue-Sat 9.30-5.30. Single speaker dem room, free del. and instal.

WORCESTERSHIRE

WEST MIDLANDS AUDIO, 158 Ombersley Road, Worcester WR3 7HA. (0905) 58046. Linn, Naim, Rega, Absolute Sounds, Meridian, Arcam, Ion Systems, Roksan. 3 dem rooms for budget & high end audio. Appointments necessary. Free installation. Service Dept. Access, Visa, Amex, Diners, Lombard/Hitachi. Mon-Fri 9.30-8.30 by appt Sat 9-5.30.

YORKSHIRE (NORTH)

SCARBOROUGH HI-FI CENTRE, 53 Dean Road, Scarborough, N. Yorks YO12 7SN. (0723) 374547. Aura, B&W, Mission, Quad, NAD, Oxford, Alphason, Rogers, Nakamichi, Ruark, Voyd. Dem room, appointment preferred. Home trial facilities. Free installation. Service dept. Access/Visa/Credit charge/£1,000 instant credit/Amex/Diners. 10-6 Tues to Sat.

HARROGATE HI-FI CENTRE, 15 Commercial Street, Harrogate, N. Yorks

HG1 1UB (0423) 504274. Aura, B&W, Mission, Quad, NAD, Oxford, Alphason, Rogers, Nakamichi, Ruark, Voyd. Dem room, appointment preferred. Home trial facilities. Free installation. Service Department. Access/Visa/Credit charge/£1,000 instant credit/Amex/Diners. 10-6 Tuesday to Saturday

SOUND ORGANISATION YORK, 2b Gillygate, York YO3 7EQ. Tel: (0904) 627108. Linn, Meridian, Micromega, Naim, Rega, Roksan, Arcam, Mission, Denon, Epos, Rotel. 2 single speaker dem rooms. Appts. preferred. Home trial. Free installation. Service dept. Credit facilities on request. Access, Visa. 10am-5.30pm Tues-Sat. Sony dealer. Award nominated '86', '87', '88.

VICKERS HI-FI, 24 Gillygate, York. (0904) 629659. Audioblab, Harman-Kardon, Marantz, Musical Fidelity, Pink Triangle, Quad, Systemdek, Tannoy, Technics, & lots more. 3 demonstration studios (2 by appointment) superb showrooms, 2 year guarantee on all hi-fi products. Appts as above, home trial facilities, free installation, service department. Qualified and experienced staff, over 20 years experience. 12 months interest free credit. 10.30-5.30 Mon-Sat

YORKSHIRE (SOUTH)

BARNSELY HI-FI CENTRE, 40-42 Sheffield Road, Barnsley, S. Yorks. S70 1HP. (0226) 205549 Fax (0742) 467207. Arcam, Quad, Audioblab, Mission Cyrus, Technics, Denon, Tannoy, Nakamichi, Dual, Rotel. Purpose built demo room, no appts necessary, free instal, service dept, Access, Visa, varying finance packages. Open 9.30-5.30, 5 days (closed Thurs).

HI-FI STUDIO, Sunnyfields, Doncaster. (0302) 781387. Heybrook, Monitor audio, Art Audio, TDL, Michell, Sugden, Acoustic Energy, Alphason, Teac, Dual. Listening room demos. Home trial. Free installation. Licensed credit broker, 2yr guarantee on all equipment. Service available. Access, Visa. 10-8pm 6 days. Phone for further info & FREE fact pack

The Choice Dealer Directory

YORKSHIRE (WEST)

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

CLEARSTONE (Formerly Erricks), Rawson Square, Bradford, (Near John St Market), (0274) 309266. A&R, Linn, Quad, Exposure, Nakamichi, Mission, Denon, Kenwood. Private demo rooms, no appt nec, home trial facilities, free installation, service dept. Access, Visa, licenced credit broker. Mon-Sat 9-5.30 (Tue 10-5.30) **BADA**

DOUG BRADY HI-FI, The Forge Cottage, 19 Crossgate, Otley, West Yorkshire LS21 1AA. (0943) 467689. Naim, Arcam, Rotel, Pink Triangle, Meridian, Epos, Castle. Two dem rooms, free install, service. Access/Visa. Open 10-6pm Tues-Sat. **BADA**

ERIC WILEY, 85 Beancroft Rd, Castleford. (0977)553066/556774. Arcam Audio, Cambridge Audio, Celestion, Kenwood, Marantz, NAD, Pioneer Reference Piont, Rotel, Technics, Quad. Car audio specialists. Demo facilities. No appts nec. Access, Visa, Lombard Tricity credit chrgae. Mon-Sat 9-5.30, closed Wed.

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

IMAGE HI-FI, 17 The Springs, Wakefield, WF1 1QE. (0924) 200272. Arcam, Linn, Meridian, Mission, Quad, Rotel, Etc. 2 Listening Rooms Free Parking, DeIL & Instal Mon-Sat 9:30 5:30 pm **BADA**

IMAGE HI-FI, 8-10 St Annes Road, Headingley, Leeds, L56 3NK (0532 789374) Arcam, Linn, Meridian, Mission, Quad, Rotel, Etc. 3 Listening Rooms. Free Dem & Instal. Mon-Sat 9:30 - 6:00pm **BADA**

NORTHERN IRELAND

ARMAGH

LYRIC HI-FI, 84 Bridge Street, Portadown, Armagh, N. Ireland. (0762) 358 059. Linn, Naim, Rega, Arcam, Denon, Rotel, Musical Fidelity, Revox, Mission, Akai, Panasonic, etc. Mon-Sat 10am-6pm **BADA**

BELFAST

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

HI-FI EXPERIENCE, 47-49 Fountain Str, Belfast BT1 5EB. (0232) 249117. Quad, Musical Fidelity, Denon, NAD, Rotel, Pioneer, Kenwood, Mission, Tannoy, B&W. No appts necessary home trial facilities, free install, service dept. Credit facilities available. Open 9-5.30, late night Thurs 9pm

COUNTY DOWN

ASTON AUDIO, Unit 8, Kings Road Shopping Centre, Kings Road, Belfast. Tel: 0232 402220. Akai, Technics, JVC, Mitsubishi, Samsung, Toshiba, Panasonic, and many more. Demos available, Open Mon-Fir 10-8pm Sat 10-5pm.

IRELAND

DUBLIN

LAFAYETTE HI-FI, 50 Wellington Quay, Dublin, Tel: 353177 0443. Technics, Denon, Marantz, Sony, Pioneer, Aiwa, Cyrus, Mission, Cerwin Vega. No appts nec, Free Install. Unique trade in service. Credit Cards welcome. Open 10-6 6 days a week.

LONDONDERRY

ZEUS AUDIO, 23a Kingsgate Str, Colrairie, BT52 4LB. (0265) 56634. Marantz, Mission Cyrus, Aiwa, Akia, Alphason, Sony, Pink Tri, Celestion, Rotel. Open Mon-Sat 10-5.30, Closed Thurs. **BADA**

SCOTLAND

EDINBURGH

BILL HUTCHINSON Ltd, 43 Clarke St, Edinburgh. (031) 667 2877. AR, Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha etc. Dem facilities. Mon-Sat 10-6. Free installation, instant credit Access, Visa. Service dept.

GLASGOW

BILL HUTCHINSON Ltd, 43 Hope Street, Glasgow. (041) 248 2857. A.R., Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha etc. Dem facilities. Mon-Sat 10-6. Free installation, instant credit. Access, Visa. Service dept.

STEREO STEREO, 278 St. Vincent St, Glasgow G2 5RL. (041) 248 4079. Linn, Naim, Rega, Arcam, Creek, Epos, Exposure, Revox, PT, etc. Mon-Sat 10-6. Interest free credit. **BADA**

GRAMPIAN

HOLBURN HI FI Ltd, 441 Holburn St, Aberdeen (0224) 585713. Arcam, Audiolab, B&W, Celestion, Denon, Dual, Epos, Heybrook, ION, Kenwood, Linn, M.A., Marantz, Meridian, Mission Cyrus, M.S., NAD, Nakamichi, Pioneer, QED, Quad, Revox, Rogers, Rotel, Ruark, Tannoy, Technics, Wharfedale, Yamaha. 9.30-5.30 Mon-Sat **BADA**

ROSS-SHIRE

HIGHLAND ANALOGUE, 'Lismore', Avoch, Ross-shire IV9 8RF. (0381) 20655. Acoustat, Basis, Cary, CAT, Cogon-Hall, Diamond-Acoustics, Ensemble, MFA, NRG, SOLEN. 1 demo room, appts nec, home trial facilities, free installations, owner is trained electronics technician. UK's most northerly high-end dealer. Open 7 days

TAYSIDE

J.D. BROWN, 28-36 Castle St, Dundee DD1 9NZ. (0382) 26591. Rotel, Denon, Pioneer, Technics, Aiwa, Mission, Castle, Mordaunt-Short, Celestion, Bose, Infinity. All equipment ready for demonstration. No appt nec, free installation, service dept. Mon-Sat 9-5.30.

W.M. COUPAR, 33 Reform Street, Dundee, Tayside. (0382) 29588. Bang & Olufsen, NAD, Technics, Denon, Kenwood, Dual, Nakamichi, B&W, Acoustic Research, JBL. No appointment necessary, free installation, service department. All demonstration systems wired through a demonstration comparator. Licensed credit broker, Access, Visa. Monday-Saturday 9.00 am-5.30.

WALES

CLWYD

ELECTRO TRADER, 19 Colwyn Crescent, Rhos On Sea, Colwyn Bay, Clwyd (0492) 48932. Ariston, Arcam, B&W, Heco, Infinity, Onkyo, Rotel, Tannoy, TDL, Yamaha etc. Dem room. Appts preferred. Home trial. Free installation. Access, Visa, American Express, Diners. 9.30-1.00, 2.00-5.30 Mon-Sat

SOUTH GLAMORGAN

AUDIO EXCELLENCE, 134 Crwys Road, Cardiff. (0222) 228565. Great Hi Fi carefully selected and demonstrated by friendly, enthusiastic staff. Closed Mon

WEST GLAMORGAN

AUDIO EXCELLENCE, 9 High St, Swansea. (0792) 474608. Great Hi-Fi carefully selected and demonstrated by friendly, enthusiastic staff. Closed Mon. **BADA**

GWYNEDD

I&H GRIFFITHS & SONS, 313 High St, Bangor LL57 1YA. (0248) 370655. Yamaha, Tannoy, Teac, Goodmans, Dual, Sherwood, Wharfedale. Demos available, no appts nec, home trial facilities, free installation, service dept. Access, Visa. Lombard credit charge. Mon-Sat 9-5.30, Wed 9-1.

PETERS HI-FI, Victoria Buildings, Mostyn Ave., Craig-y-don, Llandudno (0492) 876788. 1 single spker dem room. Open 9-5.30, closed Wed. See Cheshire branch for full details

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The Directory

The ultimate buyer's guide with comprehensive information on every currently available product tested by *Hi-Fi Choice*.

Including test summaries covering

Amplifiers

Cables

Cassette decks

CD players

DACs

Equipment supports

Loudspeakers

Personal stereos

Tuners

Turntables

And much, much more

The Directory

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. The products are split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its current retail price is placed in its respective category in alphabetical order. The prices of the products are updated on a regular basis, although it should be noted that our value rating are based on the product's price at the time of review.

The next column contains the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests were not carried out. One important point to remember is that they cannot be used to compare products from different categories — for example, a cassette deck rated 'excellent' in sound quality will not usually offer the same standard of fidelity as a similarly rated turntable or CD player (unless you can get hold of first generation copies of the master tape!).

The Comments column contains a potted summary based on the original review, emphasising the

salient points of a product's character and sonic performance. The space available doesn't allow for great detail but in the 20 or so words we have attempted to put across the essence of the review, in some cases using quotes from the review itself. Obviously, important information on compatibility or auxiliary equipment used in the test cannot be included, and we would advise you to refer to the original review for this, of which more later. Please note that these comments are those of the reviewer and not, as is the case with some magazines, those of the manufacturer.

The next column varies from category to category but is usually either features or specifications, the former being facilities available on a cassette deck or amplifier or the type of drive system on a turntable.

Specifications vary with product type but usually relate to suitability or capability. For instance, in the case of arm matching, figures are given with the cartridges, which tie in with the mass figures for the tonearms themselves, making it easier to avoid compliance/mass mismatches.

Perhaps the most influential letters in the *Directory* are those found in the Value column, the Rs and BBs denoting the Recommended and Best Buy ratings that are appended to products we consider 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. Please note that an expensive Recommended product will nearly always sound better than a cheap Best Buy. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment, system building is unfortunately not quite that simple.

These ratings make a useful guideline for shortlisting components, but only experiencing the actual combination will tell you whether it works for you.

The final column contains a reference to the issue of *Hi-Fi Choice* which featured the complete review. If you wish to get a better idea of a product by reading the complete review it is possible to order a copy (if still in print) through our back issues department. Every *Choice* issue contains a Back Issues page for this purpose.

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SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems to be as strong as ever, and certainly represents the route taken by those who place sound quality first.

The first step in putting together a system is to decide which sources you require. There are now three different prerecorded music media competing for the affection of the hi-fi user, and to go for all three will either cost a lot of money or involve substantial compromises in the sound quality of each. For this reason many separates purchasers may start with just one source, adding others or a tuner when funds permit.

Cassette has never really challenged vinyl's superior quality,

but it's a multiple role format, offering 'go anywhere' flexibility, a useful recording capability, plus a broad catalogue of prerecorded music cassette material. As a hi-fi medium cassette suffers from prerecorded material which has been improving but is still patchy in quality and can usually be bettered by a home recording. There is also the worry that a tape made on a specific machine usually plays best on that machine, which may cause aggravation when upgrading a few years hence.

CD is the relative newcomer but in the last decade it has come to dominate the market. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks. It is probably fairest to say that CD is fine for the majority of listeners, but may not suit everyone. Certainly the lack of background noise and deterioration are major strengths.

The advent of two box audiophile players has certainly

helped to gain better acceptance for the format and unless you are prepared to spend a substantial sum, CD arguably offers the best performance in terms of sound per pound. Players are now exceptionally cheap, having been reduced dramatically since the format was launched, however, the prices of the discs remains extortionate.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Both components and loudspeakers benefit to a surprising degree from proper support in the form of stands that enable them to give their best performance, whether floor-standing or wall mounted.

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a simi-

lar immediate acoustic environment, unencumbered by other furnishings and structure, and a similar distance from listeners, nearby walls, and corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from rigid support

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrates some likely alternatives.

The *Directory* has been compiled as a guide in the sense that you should use the information in it to make a shortlist of equipment and then audition it before taking the plunge. Tastes inevitably differ and it's unwise to buy purely on the basis of our recommendation, as dealers are the most experienced people around when it comes to making systems work as a whole.

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

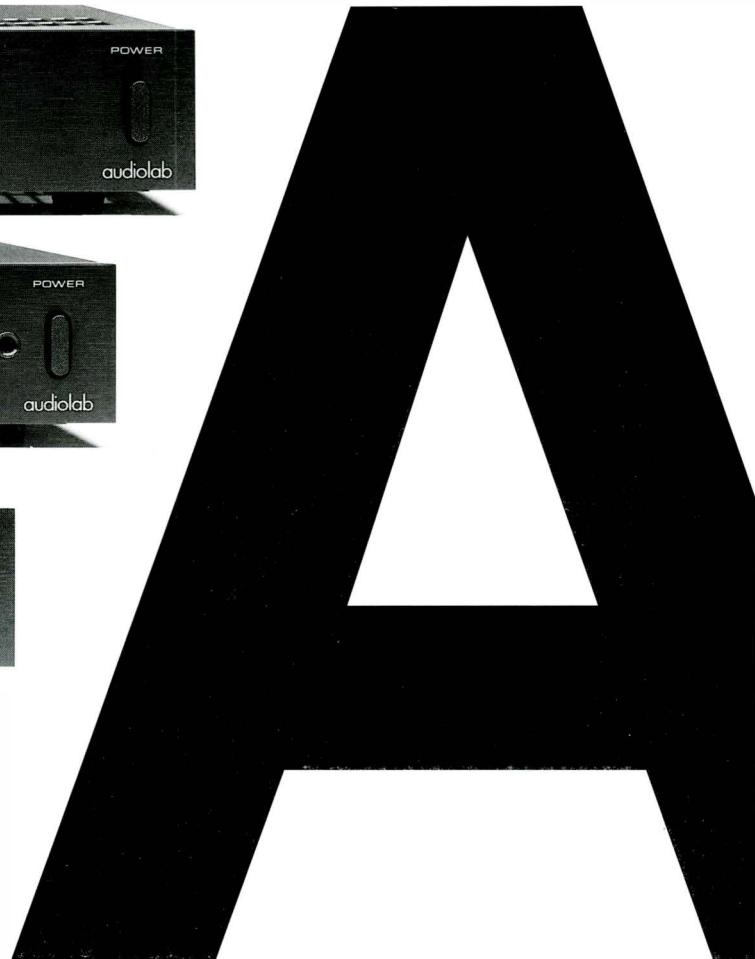
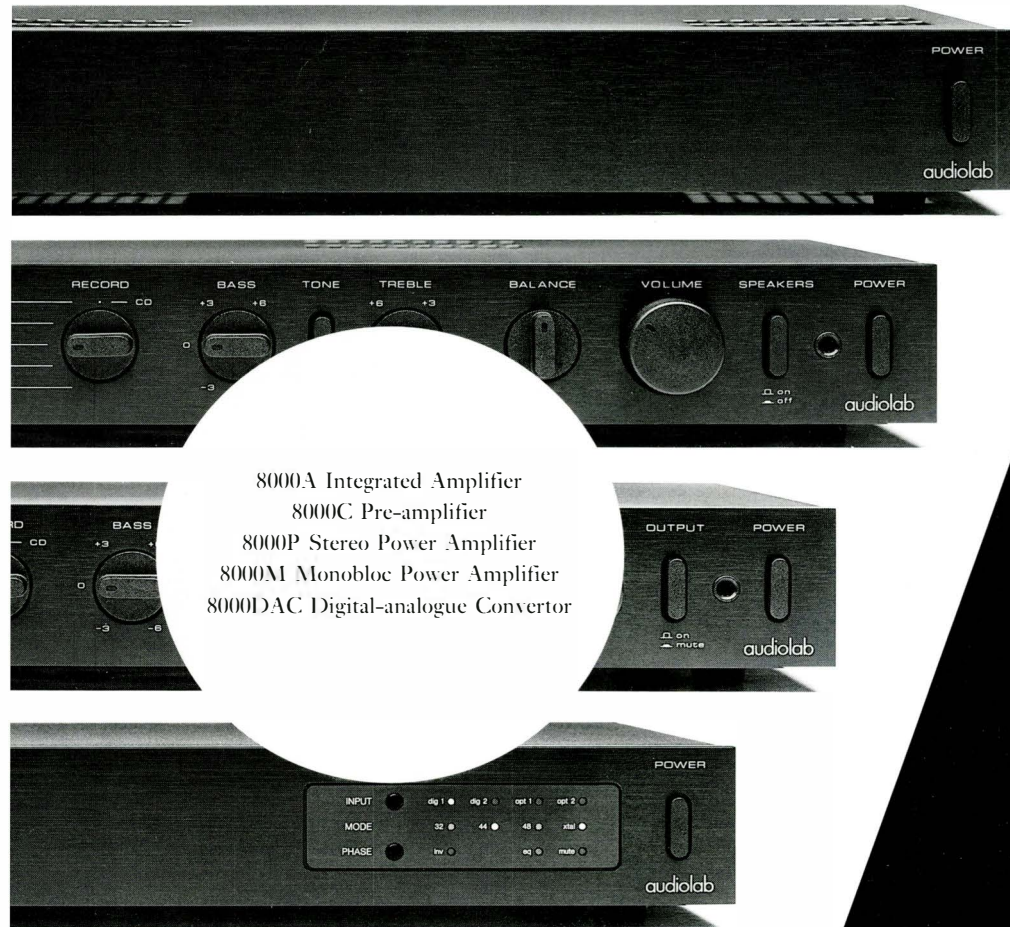
former are bleakly simple, avoiding all unnecessary features to provide the most direct signal path in the interests of best sound quality. The latter range from models with just basic tone controls and tape recorder switching, to those with elaborate facilities such as graphic equalisers, remote control (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.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research A03 £170	Average + Average	New slimmed down version of the A04 with less power and facilities but also a slightly 'fuzzy' sound	38W, MM disc, CD direct and 3 aux inputs		74
Acoustic Research A05 £200	Good + Good +	Capitalises on the strengths of the A-03 and A-07 but escapes the ignominy of their deficiencies. The amp for all AR-based systems	67W, 2 tape, 3 line and both MM/MC inputs. Tone defeat	R	97
Acoustic Research A07 £300	Very Good Average +	Relatively smooth but ineffectual sound quality that lacks some weight and impetus at very low frequencies	75W, 4 line, 2AV and MM/MC inputs		68
Aiwa XA-006 £135	Good Average	Competent enough performer with plenty of facilities. A gutsy sound though one that's rougher via CD than MM.	67W, MM and 5 line i/p's plus independent rec out.		92
Akai AM-47 £200	Very Good Good +	Something of a surprise from Akai: a made-for-Germany amp with plenty of widgets and an unexpectedly sharp, open and detailed sound. Looks hastily but sounds strainfree.	104W, 3 tape, 4 line and MM disc inputs, 4mm speaker outlets.	R	104
Akai AM-52 £230	Average + Average -	Basically equipped, this amplifier offers a comfortable but hardly over-detailed sound	95W, MM/MC disc, 5 line inputs, loudness		74
Akai AM-65B £299	Good Average	On-board 18-Bit DAC's actually give better sound than standard CD inputs! Punchy via MM disc	101W, MM, 6 line, digital inputs		80
Akai AM-93 £550	Average Average -	Unfortunately Akai's on-board D/A convertors were less successful than its conventional analogue CD input.	112W, coax and optical dig inputs. MM/MC		68
Albarré PP1 £400-£500	Average Good +	Available with or without various MM/MC disc options, the 'basic' PP1 has an attractively warm, earthy sound. The budget MM stage needs some further work, however.	48W, 4 inputs with extra gain available for low-level sources	R	104
Alphason Apollo £300	Average- Average+	Our early production sample was beset with a variety of niggling problems. Laid-back though not unmusical sound.	54W, 5 line, tape and MM/MC inputs. Solid wood fascia		92
Amadeus Gold £360	Average - Good	There is some indication of instability but otherwise sounds very rich, warm and musical. High-ish IMD	56W, MM/MC plug-in cards, 3 line inputs	R	74
Amadeus Silver £270	Average - Good	Limited headroom via disc but still offers a sweet, lush sound. Limited current delivery	37W, MM/MC, 3 line inputs	R	80
Aragon 4004 £1795	Good Good	Despite its imposing bulk, the Aragon is something of a softy at heart. It can deliver oodles of power but its musical presentation is more laid-back	231W power amp		72
Arcam Alpha 3 £200	Good Average	After the enthusiastic reception earned by the older Alpha 2 the generally lacklustre and bland sound offered on this occasion met with (unexpected) disapproval.	53W, 3 line, tape and MM disc inputs. Direct option.		104
Arcam Delta 110/120 £720/£520	Good+ Good	Overall performance is limited by the power amp - in isolation the PDM-preamp offers a remarkably open and detailed sound, particularly in 'digital' mode.	112W power amp, MM/MC + four R/- line inputs + coax/opt digital inp	R/-	92
Arcam Delta 60 £300	Good Good +	Very refined and highly detailed sound via MM and CD without any of the hardness noted via the MC stage	59W, 4 line, MM/MC inputs, no tone controls	R	68
Arcam Delta 90.2 £410	Average + Average +	Dark but slightly dead or conservative sounding version of the original Delta 90. Improved disc stage	73W, MM/MC, 4 line inputs, tone bypass, bi-wire	R	74
Art Audio Quintet £725	Average Very Good	Switchable triode/ultralinear output stage. There's 15W and 15W, but in triode mode these are 15 of the sweetest watts around. Surprisingly gutsy	15/25W, variable feedback	R	100
Audio Innovations Series 1000 2nd Audio Amp	Poor Excellent	This valve combination offers awesome dynamic range with superb transparency and power to match. Compatibility with other brands is unpredictable	15W, MM, 6 inputs, monobloks	R	63
Audio Innovations Series 200 £449	Poor Very Good	Like most 'Innovations valve power amps, compatibility with other brands is unpredictable. Hardly a powerhouse, but nicely 'open', transparent and dynamic sound in small(ish) systems	12W	R	77
Audio Innovations Series 300II £500	Poor Good +	Under-powered and over-distorted yet capable of realising an open and captivatingly expressive sound. Sensitive speakers are a must	9W(!) integrated valve amp with tape, 3 line and MM disc inputs	R	97
Audio Innovations Series 400 £669	Poor Very Good	Superior styling and better build quality than the Series 300 make for a very attractive integrated valve amp. Capable of fine results in the right system, but can sound too 'thin'	12W, MM and 4 line inputs	R	77
Audio Note Ongaku £34,000	n/a Excellent	An out and out audiophile product, a single ended, zero negative feedback, triode, line level integrated amp. Probably the best amplifier in the world!	6 line inputs, 27W	R	Coll '90
Audiolab 8000A £410	Very Good Very Good	Recent mods have cured the slightly glassy treble, replacing it with a smoother but richer and more solid style of music making	81W, 3 tape, 4 line and both MM/MC inputs. Tone defeat	R	97
Audiolab 8000C/8000P £375/£545	Very Good Good	Audiolab has revamped its pre/power combo though the very distinctive almost stark neutrality that results will not appeal to all listeners. Good value engineering, nevertheless	157W pow amp + bi-wire outputs. 3 Tape, 4 line + MM/MC on preamp		97
Audion CD-1 £399	Average + Very Good	Nicely presented valve (line-only) preamplifier with fine bandwidth and enjoyable, musical sound. Great if you can justify the cost. Well worth hearing	5 line inputs		77
Aura VA-40 £190	Average Average +	Based on ITL's earlier MA80, this amp sounded slightly withdrawn or 'dead' if inoffensive	55W, MM 4 line inputs, MOSFET output		80
Aura VA-50 £200	Good Very Good	Superficially similar to the cheaper VA-40 but with much more of the old MA-80's magic! Great sound from a slimline package	65W, one tape, 4 line and MM only. New tape monitor switch	BB	97
Beard Audio CA35/P35mkII £695/£895	Average + Very Good	Good build quality and a very smart finish combine with a characteristic valve sound to make a first class amplifier capable of giving hours of musical enjoyment	35W, MM/MC, 4 inputs	R	63
Beard M70 £1995 pair	Good Good +	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W		50
Bryston 0.5B/2B £695/£695	Very Good Good	Very rugged Canadian pre/power combo that sounds cool, confident and punchy. Headamp available to suit MC cartridges	65W, MM and 4 line sources, overload LEDs on power amp	R	74
Bryston 12B/4B £1295/£1395	Good + Good	Bryston's massive 4B power amp stood out as the backbone of this combo, the preamp sounding a trifle unbalanced between MM and MC inputs	272W, bridgeable to 800W, 6 line, 2 disc inputs, subsonic filter		68
Cambridge P25 £180	Good+ Average	Despite clocking-up a solid set of measurements the sound of the P25 proved to be as grey as its appearance.	37W, 4 line and MM/MC inputs + tone defeat.		92
Cambridge P50 £200	Good Average	A pleasant enough sound with full bass yet with a slightly mechanical quality that reduced its sense	56W, 4 line inputs + MM/MC + tone		85

H i - F i t h a t s p e a k s f o r i t s e l f :



AUDIOLAB

AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Carver CM-1090 £595	Average Average +	Looks very professional with its meters and handles but suffers from a loose and dirty sound that shies away from busy tracks	141W, 2 tape, 4 line and MM disc. Sonic Holography feature	R	97
Cello Audio Suite £1200	Excellent Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
Chord SPM-900 £1850	Average + Good +	Technically very interesting, this mini-powerhouse uses a switched-mode supply to deliver a crisp and refined sound	236W with protection into lower loads	R	85
Concordant Excelsior £856	Very Good Excellent	Cottage industry styling might not inspire confidence, but sonically this preamp is tremendously vivid and detailed. Real high-end performance. We loved it!	MM plus 3 line inputs. External power supply	R	77
Concordant Exultant £700	Average+ Very Good	Individual appearance of this valve pre contrasts with sonic invisibility. An extremely dynamic performer. Recommendation withheld pending more appropriate p.s. plug	3 line, MM, variable gain	R	100
Conrad-Johnson PV-10 £1100	Excellent Excellent	Pricy, yes, but a fabulous preamplifier which confirms C-J's high reputation in the States. Beautiful imaging, superb detail, plenty of gain on the phono stage - classy build quality too.	MM plus 4 line inputs	R	78
Conrad-Johnson Premier 7A £8995	n/a Excellent	Price has increased since we tested it but at this price who cares? The 'Seven is designed without compromise, and it's clearly one of the finest (valve) preamplifiers money can buy.	MM, 4 line inputs, sep. Rec Out, versatile cartridge matching	R	Coll.'90
Creek CAS 4040s3 £200	Good Good	Now in mk3 guise the '4040 offers a dry but tidy sound via disc and one that's slightly leaner and better focussed on CD.	41W, 3 line and one MM disc i/p. Tone controls.	R	92
Creek CAS 4140s2 £230	Average Good	Disc headroom still poor but the open and detailed, if slightly bright, sound wins through	40W, MM/MC, 3 line inputs, mono R and mute	R	80
Creek CAS-6060 £470	Good Good	An amp that looks like the '5050 but employs the sort of big, confident and meaty-sounding electronics used in the earlier '4040. Dynamic and impressive.	81W, 3 line, 2 tape and MM/MC disc inputs. Bridge-mono facility	R	104
Croft Series 4S £850	Good Good	The original IV is still available now supplemented by the higher price and power (S); both are fine performers	40(60)W channel	R	57
Croft Series 4SA £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
Croft Super Micro A £549	Average + Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs. Now in mk.II form	4 inputs, MM, straight line	R	57
Croft Super Micro A 0T/Series V £689/£555	Average+ Good	Micro is still unashamedly "cottage" but offers good performance. Combo is let down by the very low powered Series V	15W, valve, dual vol. control, 2 line, MM, tape out	R	100
Cyclone Catalyst £1995	Good + Very Good	Exceptionally load tolerant and very refined in delivery. Extra options available in future	74W, external MM or MC stages, 3 R line inputs	R	80
Cyrus I £230	Very Good Very Good	Crisp, meaty and exquisitely detailed, this latest Cyrus amp had us enthralled via CD. MM/MC enjoyed a lesser clarity	34W, 4 line + MM/MC i/p's with dual-conc vol.	R	85
Cyrus II £350	Very Good Very Good	Recently updated this popular favourite captured our attention, once again, with its robust and very convincing sound.	60W, 4 line and both MM/MC disc. No tone controls	R	92
Cyrus PSX £250	Very Good Very Good	The PSX does make the Cyrus Two sound better, and also improves the PCM II CD player giving more wallop and clarity	Auxiliary power supply	R	62
DNM 3A From £1	Good + Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/MC twin vol controls	R	44
Deltec DPA 100S £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
Deltec DSP-50S/DPA-50S £725/£925	Excellent Excellent	Remarkable pre/power combo based around the highly linear DH-OA32 hybrid op-amp. Unmatched detail resolution, control and transparency	63W, external feedback wiring, 3 line, MM/MC no tone controls	R	68
Denon DAP-2500/POA-4400A £550/£600 pr.	Very Good Good	Denon's fully-fledged preamp also incorporates D/A converters that did not improve the sound of our £299 CD player. The power amps are brill!	172W, monoblocks Opt/Coax dig + 2 tape, 4 line and MM/MC inputs	R	68
Denon PMA-250II £130	Good Good +	Spacious yet tactile and gutsy sound via all inputs. Worthwhile upgrade over original PMA-250	53W, MM 3 line inputs, source-direct	R	80
Denon PMA-350 £160	Average+ Good	Bold claims were made at its launch but the sweet and inoffensive sound, though very pleasant, is not mould-breaking at the price.	88W, 5 line and MM disc inputs + source direct.	R	92
Denon POA-6600 £1000 p	Excellent Very Good	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles - now in revised A form	250W monoblok, remote power	R	60
Dual CV600RC £150	Good + Good	The heart of Dual's latest budget range enjoys a very lively, open and vibrant sound. Slightly sanitised via CD perhaps, but still damn good for a features-first integrated amp!	63W, 3 line, 2 tape and MM inputs. Remote control	R	104
E.A.R. 549 £3628 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	R	60
E.A.R. 802/509mkII £1098/£1868	Average Very Good	Extremely well made and combining the sonic strengths of both transistors and valves this EAR combo warrants attention	100W, MM, 6 inputs, monoblocks	R	63
Entire Sound EX50 £500	Average- Average+	A new and fairly costly Mosfet power amp of limited output. Resolution of detail is pretty good but sound is cold-hearted.	40W Power amp. Internal P/S included for ES preamp.	R	92
Exposure VI/VII*/VIII £1580	Good Very Good	An established company like Exposure could do more to improve the 'look' of these amps which, nevertheless, sounded confident, dry and musical. Dual version no longer available	63W, Super mod. 4 line and 2 disc inputs with full rec-out switching	R	68
Exposure VII/VIII £530/£580	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/MC, 3 inputs, straight line	R	62
Exposure XI/XII/VIII Super £1900	Good Very Good	New preamp and improved power amp led to a smooth and refined sound, MM/MC less transparent than CD	61W, MM/MC, 5 line inputs	R	80
Goodmans GSA-600 £140	Good Poor	Designed to form the heart of a Goodmans separates system, the wishy-washy and faceless sound of this amp fails to stack up	76W, tape, 3 line and MM inputs. Remote control	R	97
Grant G60AMS £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 8ohms	R	57
Hafner SE-100/SE-120 £370/£380	Good + Good +	The smallest of Hafner's pre/power range but still imbued with the open, sparkling quality of their bigger models. Preamp sounds significantly better via CD than MM or MC	96W, bridging option. 2 Tape, 3 line + Aux or MM/MC	R	97
Hafner XL-600 £1200	Very Good Very Good	Sounds remarkably open, transparent and inherently 'musical'. XL-600 is tremendously powerful and very compatible	426W in stereo mode, 1.5kW in bridge	R	74
Harman Kardon Citation 25/22 £699/£899	Good Average +	Not as outrageous as previous Citation amplifiers but neither as punchy nor exciting in the sonic stakes. A good all-rounder but lacks sparkle	138W, MM/MC full range of input and recout	R	74
Harman Kardon HK6100 £170	Good Good	Re-packaged version of the popular PM635. Still offers very up-beat and exciting sound	47W, MM, 5 line inputs, tone controls	R	80
Harman Kardon HK6200 £250	Good Good	Supposedly a beefier version of the HK6100 but in practice there's little to distinguish the two amps	50W, 5 line inputs + MM, tone controls	R	97
Harman Kardon HK6300 £330	Good Average +	This amp offers the features of the HK6500 with an internal design culled from the HK6200. Unfortunately its generally bright, grating and mechanical sound is no match for either!	61W, 3 line, 3 tape and MM/MC inputs. Loudness button	R	104
Harman Kardon HK6500 £380	Good+ Good+	The best of HK's current range. A firm sound that enjoys an impressive grip on the most complex music. Great bass!	74W, 3 line, 2 tape and MM/MC Tone controls + loudness	R	92
Harman Kardon HK6600 £500	Good + Average +	This amp comes as a real disappointment after the HK6500. Differences in design yield a flat and uninspiring sound	87W, 2 tape, 4 line and MM/MC inputs. Tone defeat	R	97

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Harman Kardon HK6800 £700	Good + Good	Smoother and more evenly paced than previous H/K superamps, this model sounded both confident and nimble. A fine result	115W, 4 line + 2 tape i/p's + MM/MC	R	85
Heybrook C3/P3 £479/£660	Average + Average	Since we last looked at this combo Heybrook has improved the manufacture of its power amp though flaws in the preamp's disc input remain unchecked	146W, oodles of current, passive line inputs		104
JVC AX-A3TN £140	Very Good Good	A true minimalist amp from the masters of mass-production! Offers a very comfortable, accessible sound yet with some loss of deep bass and extreme treble.	50W, 3 line, 1 tape and MM i/p's. CD DiRT and 'Bass Compensator'	R	92
JVC AX-A441 £210	Good+ Average	A return to the traditional style of mass-market design brought an inconclusive reaction from our panel. Blowing 'hot and cold', our listeners ultimately found its music uninteresting.	93W, 3 line, 3 tape, MM/MC inputs. CD direct facility		104
Jadis JP30/JA30 £4990/£4900	Average 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	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R	60
Jeff Rowland Coherence One/Mod	Very Good Very Good	The technical design of these amps is very elaborate but ensures they achieve an extraordinarily transparent and potent sound. However, the CD i/p is clearly superior to the disc inputs	448W monoblok MM/MC with loading options. Balanced topology	R	72
Kelvin Digital Integrated £550	Good + Very Good	Not so Class A as before but now fitted with a PDM DAC which offers a smooth, detailed and naturally 'musical' sound	34W, digital, line and MM i/p's only	R	85
Kelvin Integrated £449	Good Good	Recent mods have reversed the Integrated's previous good fortune, this unit was just too syrupy.	21W with 10-12W in Class A. Four line + MM/MC.		92
Kelvin Labs Absolute Zero/M30 £395/295/595	Good + Average +	Latest versions of the M30 offers a true 30W Class A and a slightly muddled but very comfortable sound. MC preamp is a very linear design	33W monoblok MC only + 4 line inputs. Separate L/R balance	R	74
Kenwood KA-3020 £140	Good + Good +	An unassuming little amplifier that turns in a remarkably balanced and entertaining sound. Lively, detailed and engaging	66W, 2 tape, 3 line + MM disc. Source direct	BB	97
Kenwood KA-4020 £170	Good + Average +	On paper this is a beefier version of the '3020 yet our listeners thought it sounded weaker, lacking richness and detail	103W, 2 tape, 3 line + MM/MC. Source direct		97
Kenwood KA-4040R £220	Good + Average +	In many respects this sophisticated amp is a 'digitised' version of the KA-4020 with relay-switched inputs and full remote control. Unusual looks but can seem insubstantial via CD.	82W, 3 line, 2 tape, MM/MC inputs. Full remote control		104
Kenwood KA-5020 £220	Very Good Good +	Something of a powerhouse on the cheap this amp can keep pace with the most challenging of dynamics. Its sound is vibrant but some fine detail is lost.	115W, 3 line, 3 tape and MM/MC. Source direct.	R	92
Klyne SK5a £2590	Very Good Very Good	Beautifully made and presented, this American thoroughbred has a good lab performance, but although versatile, is rather expensive for the quality of sound offered	Balanced output, versatile cartridge loading		72
Lescon Quattra £350	Average+ Good	Underpowered but with the flexibility of four independent power amps. Very deep, captivating sound with 3D soundstaging.	19W via all 4 channels. 5 line and MM/MC inputs.	R	92
Lescon Stereo £200	Poor Very Good	Can reflect the full weight and ambience of a tense, classical performance. A genuinely deep, detailed and enthralling sound marred by unreliability of our sample. New stock will be cured.	76W, 4 line, 2 tape, MM/MC inputs.		104
Lectron JH50 £2300	Average Very Good	Sexily presented valve power amplifier from France. Lovely valve sound too, with delicate and airy top end. Not especially powerful and rather expensive but very desirable!	50W		78
Linn Intek £398	Good - Average +	Linn have slashed its price and made various internal revisions, but their no-nonsense Intek still lacks the authority and confidence to support its forward balance.	55W, 3 line, 2 tape, MM/MC inputs, rec-out, mono + mute		104
Linn LK1/LK280 £598/£763	Good Good -	A very modern, logic-controlled amp with distinctive and inoffensive sound quality. Its restrained sound could do with extra insight and zip.	84W, compact amp CMOS sw. for 2 tape, 2 line and MM/MC. xlr sockets		68
Linx Nebula £500	Average + Average +	Ambitious both in style and design this amp was less impressive in the sonic arena — positive but two-dimensional	88W, logic-controlled i/p switching		85
MFA Magus £1147	Good Very Good	Versatile valve preamp from USA, genuine MC compatibility and high class construction make the Magus a bargain	3 line, MC, tape out, variable gain	R	100
Magnum MP150/MF150 £320/£320	Average + Good	This is no technical masterpiece but the strain-free, fluid sound augers well for CD-based systems. Excellent value	89W, 3 line + MM/MC i/p's. No tone cont.	R	85
Marantz PM-30 £130	Good + Good +	The building-block for Marantz's popular budget 'SE' amplifier is no slouch, providing a lively and very expressive sound with plenty of strong bass. A good 'un.	49W, 3 line, 2 tape and MM inputs, source-direct	BB	104
Marantz PM-30SE £150	Very Good Good+	The breathed-on version of Marantz' PM-30 offers an engagingly detailed and spacious sound though one that's warmer via MM disc than CD.	50W, 3 line, 2 tape and MM disc. Source direct	R	92
Marantz PM-40SE £240	Very Good Good +	The improved version of their basic PM-40 model has itself been updated to provide a bigger and more exciting sound. A good 'un	61W, tape, 3 line + MM/MC disc. Source Direct	R	97
Marantz PM-50 £260	Good + Average +	One of Marantz's new breed, the PM-50 has a big and beefy sound yet one that lacks refinement	92W, MM/MC, 4 line inputs, source- direct		80
Marantz PM-75 £500	Good Average	More successful than most amps with on-board DACs but still not as balanced as other Marantz products	136W, opt/coax dig inputs, 6 line + MM/MC		68
Marantz PM-80 £400	Very Good Good +	Technically robust with an equally beefy and tactile sound. Great sense of power and control but spatially a little flat	133W, 3 tape, 4 line + MM/MC. Class A option	R	85
Meridian 201/205 £760/£525each	Very Good Good +	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/MC 6 line inputs remote capable straight line	R/-	62
Musical Fidelity A1 £299	Average + Average +	Just scraping a recommendation, this current A1 sounded lush but sleepy — lacking the bite and sparkle of old	26W with 9W of Class A. 4 line + MM/MC inputs	R	85
Musical Fidelity A100 £499	Good + Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/mc 5 inputs straight line	R	62
Musical Fidelity B1 £200	Average + Good +	The subject of much controversy, this 50W wonder offers a very deep, solid and powerful sound	50W, MM/MC, 5 line inputs, tape monitor	R	80
Musical Fidelity B200 £349	Very Good Good +	Running cooler than other MFs, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/mc 4 line inputs straight line	BB	62
Musical Fidelity MA50 £875 pa	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	62
NAD 3020i £150	Very Good Good +	The most balanced and communicative of NAD's 3020 series. Great at revealing subtle musical clues without aggression	31W with tone controls, 3 line + MM inputs	BB	85
NAD 3225PE £160	Average + Average +	Light and detailed if not as rich or weighty sounding as others. MM input sounds warmer than CD	42W + 70W dyn. headroom; soft-clipping, MM only	R	68
NVA P70MC/A60 £830	Average Average +	NVA's speaker cables are a must, the amp offering well-integrated but not particularly crisp sound	68W, MC, 3 passive line inputs		80
Naim Separates £750 pl	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	40-70W, MM/MC etc	R	60
Onix OA-21s/SOAP £350/£180	Average + Good -	Via MM disc this amp comes alive with a fresh and vibrant sound though its CD input sounds utterly dead by comparison.	60W, 1 tape, 3 line and either MM or MC. Outboard PSU option		97
Orell SA-040 £359	Good Good +	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/MC, 4 line inputs, straight line	R	56
Orell SA-040SE £400	Average Average +	Very natural, relaxing if not overly exciting via CD, the sound closed-in to become 'pinched' or fettered via disc	64W, 5 line + MM/MC i/p's. Tweaky components.		71
Philips DFA-888 £300	Good Average	As above but including a modified disc input and onboard DAC. Sounds tight but also slightly thin	107W, as above + opt and coax digital inputs		74

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Philips FA-880 £200	Good Average	A new and cheaper design from Philips that sounds best via MM disc. Can appear soft and unbalanced via CD	108W, MM/MC source-direct tone		74
Philips FA-890 £230	Good + Good -	Based on their FA880 model but tarted-up with a remote control facility. Inoffensive, civilised but unexciting sound is retained	120W, 6 line + MM/MC logic-controlled input switching		97
Pioneer A-229 £130	Average + Average	An unambitious amplifier that fights shy of tricky speakers with a sound that's equally unadventurous. Slightly soft and comfortably even-handed presentation	60W, 2 line, 2 tape and MM inputs, loudness and direct		104
Pioneer A-300 £160	Very Good Good	The cheapest of Pioneer's dynamic duo gives off its best with CD rather than MM disc which failed to shine quite so brightly.	55W, 3 line, 2 tape and MM. Independent rec out facility.	R	92
Pioneer A-400 £240	Very Good Very Good	Pioneer's design concept snaps into focus with the A-400, an amp that seems to bubble with musical detail. A bench-mark that other manufacturers should strive for.	71W, 3 line, 2 tape, MM/MC. Independent R-out switching.	BB	92
Proton 520 £115	Average Average	Very well equipped budget amp with a slightly flat and undynamic sound - acceptable at the price though	31W, MM/MC with variable MC gain, 4 line inputs	R	74
Proton AP-1000/AA-1150 £250/£395	Good + Average +	Bags of headroom available from this pre/power combo, but can seem bloated or unrefined via MM	67W, MM/MC, adjustable MC gain, 5 line inputs		80
QED A240 CD II £249	Good + Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A270CD/PA £369/£429	Good Good +	Recent updates have bolstered the output of the A270 without adding to its colourations. The PA option is a touch expensive	61W, 2 tape, 3 line + MM or MM/MC from PA board	R/-	97
QED C300/P300 £329/£370	Good Good	A cost-effective combo, limited in its resolution but no less beguiling as a result. Disc stage is sweeter but samey	58W, 2 tape, 3 line, MM/MC + mono/biamp opt.	R	85
Quad 34 £366	Very Good Average	This well-built durable preamp has useful filtering and above average tone controls but was found lacking in sound quality (viz: detail/dynamics)	4 inputs MM/MC tone controls		44
Rational Audio £175	Average- Average+	This wacky newcomer from Czechoslovakia offers a very open and fluid sound via CD but its performance via MM depends very much on the cartridge's load impedance.	129W, caters for line and MM disc sources but has no i/p selector.		92
Ray Lumley Model 75 £1995 p	Average Good +	Monstrous valve monoblocks which represent good value. What they lack in musical subtlety they make up for in sheer muscle. And these are Lumley's small monoblocks!	75W monoblok		78
Revox B150 £1047	Very Good Average +	Beautifully constructed but hampered by Revox's convoluted logic control. Open and smooth sound. Still costly.	117W, CMOS sw. for 3 line, 2 tape and MM		68
Revox B250 £1467	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/MC system/house remote tone controls		56
Rose RV-23 £395	Good Very Good	Beautifully built classy British 'hybrid' preamplifier. You can spend more to get a more transparent sound but it's hard to criticise the Rose given the competitive price	MM plus 3 line inputs	R	77
Rotel RA-930AX £160	Good - Very Good	Based on the original RA-820AX but featuring a new look and a tweaked circuit design, this budget wonder captivated our listeners with its clean, vibrant and thoroughly involving sound	53W, 3 line, tape and MM inputs, tone bypass	BB	104
Rotel RC-960BX/RB-960BX £150/£180	Very Good Good -	With excellent standards of construction, flexibility and plenty of power under the bonnet, this duo represents an ideal choice for the first-time buyer.	80W, bridge-mono facility. 3 line, 2 tape and MM/MC on preamp	R	104
SAE P102/A202 £499/£599	Average + Average +	Microprocessor-controlled pre and power amp that sounds much better at low rather than high volume levels. Pro-oriented aesthetics	151W, MM/MC + 2 liner and 2 tape, tone memory, spk switching		74
Sansui AU-X111 £100	Good Average	Sansui has engineered an amp that's both solid and flexible for the price, but its sound is rather bland compared to competition in the £110 sector	5 line inputs, MM, 52W		92
Sansui AU-X911DG £700	Very Good Good +	At its best when used with the on-board MASH/PWM DAC where it sounds technically neutral but still emotionally charged	112W, 4 dig, 3 line and MM/MC i/p's. Rec-out	R	85
Sony TA-F440E £180	Very Good Good	A new budget amp based on tried-and-tested circuits but free of spurious widgets like tone controls. It has a fresh and up-beat sound with plenty of detail, can sound smeared via CD	109W, 3 line, 2 tape and MM + rec out	R	104
Sony TA-F540E £230	Very Good Good -	An extra £50 buys you an MC input but little else over and above the TA-F440E. This version sounds more consistent from input to input but is still rather superficial or unconvincing	108W, 3 line, 2 tape, MM/MC + rec out		104
Sony TA-F730ES £450	Very Good Good	A very stable and coherent amp but one that lacks a crucial sense of involvement	133W, MM/MC, 3 tape, 2 line, full rec-out		80
Sound Audio VP3a/HBP60a £599/£599	Good Average ++	Hybrid power amp and valve line stage. Big 'n' beely power amp is the stronger partner	4 line, 1tape 60W	R	100
Sugden A21a £395	Average+ Good	The modern-day relative of Sugden's original Class A amp and one that offers a smooth, easy-going sound. Best partnered with sensitive speakers.	25W power amp with a good 16W inPure Class A.		92
TEAC A-X400 £115	Average Average	Sibilance and a lack of crisp vitality hamper the performance of this amp, as does the stringent protection circuitry	59W, 4 line + MM + tone + mic i/p level control		85
TEAC A-X5000 £229	Good Average -	This amplifier is compromised by a grey and muddled sound that taxed the concentration of our listeners. Better via MM disc	107W, 3 tape, 3 line + MM/MC. Source Direct		97
Technics SU-810 £130	Average + Average	Our sample started off sounding fast, taut and well-integrated yet eventually failed on the MM disc input	66W, 2 tape + 3 line + MM. Tone + loudness		85
Technics SU-VX600 £200	Good + Good	What looks like a fairly ordinary mass-market offering is actually the first 'tweaked' amp from Technics, its solid and sharply focussed sound a taste of things to come.	90W, 3 line, 2 tape, MM/MC + power-amp inputs	R	104
Technics SU-VX800 £450	Very Good Average	On the other hand, this is a mass-market amp still hampered by over-enthusiastic protection circuits! It sounds raw and congested when the going gets tough - positive but raucous	148W, 3 line, 3 tape, balanced input + MM/MC		104

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£204 A25B Int Amplifier. A fast tight performance came through with plenty of detail. A surprising achievement at this price. The Sugden A258 is certainly a front runner in the £200ish stakes. I can't think why we haven't heard more of it "Search out a Sugden".

"Eric Briathwaite Hi-Fi World"

£408 A48B INT Amplifier. The A48B managed to surprise me. It has loads of bass and holds a tight grip on the music, while sounding coherent and musical, it has a pleasantly warm natural sound and would suit those who like the valve sound. When compared with the Audio L98 8000A I preferred the Sugden. "Alan Circom Hi-Fi World April 92" **SDA-1 DAC £650.** If you've been waiting for a truly exceptional DAC to come onto the market, you must audition this awesome newcomer that is a state of the art masterpiece, destined to stay at the top of it's class for years to come.

AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Threshold FET 10e system/ £2895	n/a Very Good	Almost valve-like limpidity and excellent soundstaging are star qualities of the Threshold amps. Line input resistive loading is too low	Component FET phono stage, line pre, FET power amp 100w		Coll. '9
Woodside SC26/STA35 Renaiss	Good Good+	Synergistic pairing with a cool, controlled sound, good focus and transparency. More about poise than grunt	35W, valve, 3 line, optional MM or MC, 2 tape outs		100
YBA 1 power amp £2995	Good Excellent	This equally well finished power amp offers front rank stereo staging and transparency, and is capable of driving the most difficult loads	85W	R	62
YBA 1 preamp £2895	Very Good Excellent	A front line French audiophile product. Great stereo and a fine Krell style finish	MM/MC, 3 inputs, straight line	R	62
YBA 2 pre & pwr £1395/£1695	Very Good Very Good	Superbly finished French separates, with very good space and transparency, slightly softened bass. Needs extra transformer (£300) for MC cartridges	70W MM (MC extra) straight line	R	56
YBA Model 3 £995/£9	Good Good	Suited to highish sens. loudspeakers this duo produced see-through, ethereal stereo images that were more convincing towards the centre of the soundstage than at the edges	56W stereo amp MM only with 3 line i/ p's.		72
YBA Model 3 £995/£995	Good Good	Suited to highish sens. loudspeakers this duo produced see-through, ethereal stereo images that were more convincing towards the centre of the soundstage than at the edges	56W stereo amp MM only with 3 line i/ p's.		72
Yamaha AX-330e £100	Average + Average +	An improvement on earlier efforts but still a little bland or lack-lustre. Very compatible though	48W, MM, 3 line inputs, source-direct option		80
Yamaha AX-750 £399	Very Good Average	Big and bulky with remotely-controlled input and volume. Impressive handling, but two samples split the opinion of our listeners, one sounded squashed the other fast and articulate	149W, 3 line, 2 tape, MM/MC inputs + remote control		104

CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation.

The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as any amplifier does, it's really not too surprising that they can influence sound quality.

The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, RF characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The interconnects summarised here were tested in 1m terminated lengths and therefore the results and prices relate

to that length - some cables may well perform differently when used in longer lengths.

What's more, most cables are significantly cheaper if you are prepared to fit the plugs yourself.

The features column contains information on the material makeup of the different cables with the following abbreviations: OFC - oxygen free copper, OFHC - oxygen free high conductivity (Audionote defines HC as high crystal), PC-OCC - pure copper by ohno continuous casting, LC-OFC - linear crystal oxygen free copper.

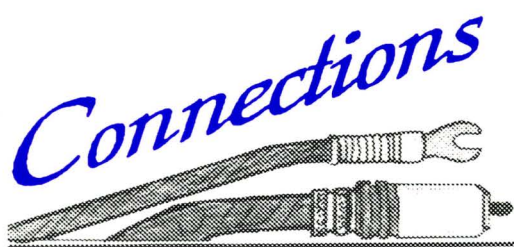
CABLES - INTERCONNECT

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Audio Note Copper ANA £44	Average Good	ANC sounded punchy with a faintly lean but tightly-focused bass character. This crystalline precision waned slightly at higher frequencies	OFHC copper twin-axial	R	59
Audio Note Flexible Silver ANS £99	Average Very Good	ANS scored a hit with its transparent midband and revealing but quite unforced treble quality. Bass transients were slightly softened	Silver signal & Copper screen	R	59
Audio Note Silver ANV £154	Poor Excellent	Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle	21 strand silver Litz		59
Audio-Technica AT-6115 £40	Very Good Average	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional	PC-OCC copper coaxial		59
Audioquest Livewire Ruby £49	Average Good	Smoother sounding than the Topaz, the extended crystal Ruby is less grainy and coarse, better able to resolve complex passages	FCL copper twin axial	R	59
Audioquest Livewire Topaz £35	Good Average	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end	Gold-plated plugs, OFHC copper		59
Chord Mono-t £27/1.2m	Average + Average +	Offers a slightly rolled-off treble but its rich sound is an upgrade from patch-cords	Unsymmetrical 4-conductor cable	R	83 Supp.
Deltec Gortex Black Slink £152	Very Good Excellent	A true reference quality cable providing an exceptionally detailed and transparent sound	Symmetrical, 8-conductors, Gore-tex ins.	R	83 Supp.
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange	4 silver plated OFC strands PTFE dielectric	BB	59
Kimber Kable KC-1 £65.55	Very Good Average	Tonally faintly leaner and brighter than the more open-weave PSB, KC-1's treble detail was just too sharp and grainy	Multi-gauge PTFE dielectric		59
Kimber Kable PSB £41.40	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open	OFC, PTFE dielectric	BB	59
Monster Interlink 300 £30	Average + Average	A big, larger-than-life sound but with some emphasis of midband detail and loss of bass	Screened, symmetrical cable		83 Supp.
Monster Interlink 400 £50	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life	Multi-gauge	R	59
Origin Live Soli-Core Super £60	Good Average	Improves over previous Soli-core samples in stereo depth and bass weight, but a 'loud' treble presentation remains	Solid-core gold-plated AT plugs		59
QED Incon Graphite P1G Gold £19.95	Average Average	A shielded version of Incon P1, it sounded thicker at the frequency extremes, the top end being coarser and more out of focus. Good for long runs though	OFHC Graphite shielding	R	59
QED Incon P1-Gold £16.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight	OFHC, gold plated Deltron plugs	BB	59
Supra EFF-1 £60/0.75m	Average Average	A new, costly and mildly disappointing addition to the range. Edgy, smeared sound plugs	Screeded, symmetrical dir. cable		83 Supp.
van den Hul MC-Gold £230	Average Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances	Silver & gold plated copper		59
van den Hul MC-Silver £750	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models	19 silver plated copper strands		59
van den Hul MCD-102 III £61.50	Good Good	Possessing the same endearing qualities as the D300, it presented open and transparent soundstages and improved timbral resolution	Twin axial silver plated copper	R	59
van den Hul Thunderline £92	Good Average	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'tizzy' 'coarseness', bass is tight and dryscreening	Silver plated 'matched copper'		59

The Directory

CABLES - LOUDSPEAKER

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Absolute Wire Force 4 £4.75 per metre	Good Average +	By current standards there was a loss of fine, sharp detail at the frequency extremes, but it has a big, friendly sound	744 OFC strands, PVC dielectric		64
Audio Innovations OR-200 £16 per metre	Average + Average +	Open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies	200 LC strands, polyurethane and cotton dielectric		64
Audio Note AN-SP £100 per metre	Average - Excellent	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent	15 silver strands, polyethylene dielectric		64
Audio-Technica AT-6120 £10 per metre	Average + Average	Compared to earlier LC-OFC cables, this PC-OCC derivative sounded smoother and less aggressive	PC-OCC, PVC dielectric		64
Audioquest Livewire Black £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green	OFHC, surface only - foam core construction	R	64
Cyrus £2.50 per metre	Average + Good	Because of its impedance characteristic this cable will deliver a smooth and unfatiguing treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	64
Deltec 8S £144 - 5m pair	Good Good +	The unerring transparency and detail resolution of 8S throughout the midband makes it a cleaner and more spacious sounding cable than others at the price	4 silver plated OF copper strands, PTFE	R	64
Deltec Gortex Black 16 £528 - 4.5m pair	Very Good Excellent	Improvements in bass resolution, transparency and treble poise maintains status of this cable	Silver-plated OF copper with Gore-tex ins.	R	83 Supp.
Exposure £2.50 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs	56 OFC strands, webbed PVC dielectric	R	64
Furukawa FS-2F09 £3.50 per metre	Good Average +	Some loss of bass weight but otherwise offers a fresh and open sound. Good value	Multi PC-OCC stranding, PVC dielectric	R	83 Supp.
Furukawa FS-2T15S £50 per metre	Good + Very Good	An advanced solid-core cable with a highly fluid, detailed and inherently musical sound	Single 1.5mm Super PC-OCC	R	83 Supp.
Kimber 4VS £7.15 per metre	Average + Average	Similar construction to 4TC but dissimilar materials infer a slightly tizzy sound	Open-weave, multistrand, PVC ins.		83 Supp.
Kimber Kable 4PR £54 - 5m pair	Average Average +	This directionally marked cable benefited from an open and airy treble quality but seemed notably leaner than 4TC. Bass was well round and satisfyingly taut	4 x 7 copper strands per conductor, PVC diel.		64
Kimber Kable 4TC £17.65 per metre	Good Good +	4TC made a great impression in the listening tests with an open midband, a smooth and unatiguing treble with slightly rich but suitably weighty bass	OF copper, PTFE dielectric	R	64
Linn K20 £2.95 per metre	Good Average	Subjectively, it erred on the forward and bright side of neutral but enjoyed an essentially clear and punchy delivery	56 OFC strands, webbed PVC dielectric		64
Monitor PC Silverline PC4 £5.75 per metre	Good Average	Sonically, it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables	2072 x 0.07mm silver plated copper strands		64
Monster Original £3.49 per metre	Good Average +	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass	Multistrand		64
Monster SCI 16-4 £3 per metre	Average Average	Not as thick-sounding as early Monster cables but still slightly unbalanced. Versatile construction	4 x 16-gauge conductors, OFC strands		83 Supp.
NVA LS1 £6 per metre	Average + Good	A light and breezy sounding cable best suited to short lengths, NVA benefited from a clear and transparent outlook	7 x 0.25mm silver alloy strands, PTFE	R	64
QED 79-Strand £1 per metre	Good Average	For much of the last decade QED 79-Strand has been the first port of call for enthusiasts on the upgrading ladder, a tradition that should still hold true today	79 strand, PVC dielectric	R	64
QED Flat 200 £2.20 per metre	Good Good	I detected a degree of confusion at low frequencies but this did not stifle the acoustic atmosphere which remained open and positive	200 strands, flat webbed PVC dielectric	R	64
QED Incon Graphite £2 per metre	Average + Average +	This graphite version of Incon sounded cruder and generally more heavy handed than the cheaper unshielded type. Overall presentation was mildly restricted and cloaked in a faint aural fog	OFHC, polymeric screen		64
Rotel Supra 10 £8.95 per metre	Good + Good	Supra 10 provided a very free and open sound that was unhindered by any excess at low frequencies. Worth its weight in scrap copper!	2,562 OFC strands, webbed PVC dielectric	R	64
Rotel Supra 4 £3 per metre	Good + Good	Ideal for both long and short runs, it furnishes a big sound that benefits further from a smooth, unatiguing treble	1,036 OFC strands, webbed PVC dielectric	R	64
van den Hul CS-122 £6.50 per metre	Average + Good -	Characterised by a driving and powerful bass, CS-122 is a heavy sounding cable. Mid treble detail was refreshingly clear but there was a slightly muted air about the extreme treble	19 x 0.45mm silver plated strands, rubberised dielectric	R	64
van den Hul D-352 £12 per metre	Good Average +	Subjectively it sounded like CS-122 only more so, the deep rumbling bass tending to overwhelm subtle musical details. It also appeared a trifle peaky in the treble	7 x 0.76mm + 168 x 0.125mm silver plated strands, rubberised diel.		64
van den Hul SCS-12 £10 per linear metre	Good + Good +	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different guages, PTFE dielectric	R	64
van den Hul SCS-2 £99.95 per linear metre	Good + Good +	Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair	665 silver plated matched crystal copper strands, PTFE dielectric	R	64



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The Directory

CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs to be taken in choosing the best tapes for a

specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.)

Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price.

All modern hi-fi decks have Dolby B and the majority have Dolby C besides; the very worthwhile HX Pro system is becoming steadily

more widespread. Remote control remains rare, though sometimes it is available as a system option

Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research RD-06 £300	Average Average	Acceptable middle market player with very simple facilities and cramped control section, but unusually good looks	Dolby B/C/HX Pro, fine bias, counter memory, repeat		69
Aiwa AD-F410 £100	Average Average	Comparable to AD-F500 but cheaper: Good all round performance, well adjusted, useful basic and not so basic features	2 head, Dolby B/C/HX Pro, bias adjust	BB	99
Aiwa AD-F500 £160	Average Good	Noise levels are a little higher than usual, but sound quality is otherwise very good - open, explicit and very neutral tonally.	Dolby B/C/HX Pro, cue/review, fine bias, record sensitivity adjus	R	93
Aiwa AD-F810 £200	Good Good	First class budget 3-head machine with a dual capstan transport that really works at reducing the 'fudge' factor	Dolby B, C, HX Pro, bias adjust, track search, variable hdph	BB	99
Aiwa AD-WX616 £160	Poor Poor	Sonically sub-standard twin transport deck which has sensible range of well implemented features, yet which sounds compressed and uneven.	Twin full logic, 1 records, Dolby B/C track search	R	93
Aiwa AD-WX777 £190	Very Good Very Good	Excellent, middle price dual deck with quick side change and a living, breathing sound though prerecorded tapes sound bright	Twin auto-reverse, one records. Dolby B/C, fine bias	BB	75
Aiwa AD-WX888 £260	Good Good	Inaccurate set-up spoils metal tape operation, but with other tapes the deck works well. This deck offers fine engineering, facilities and sound	Dual auto-reverse twin deck, Dolby B, C and HX Pro	R	75
Aiwa XK-S9000 £700	Good + Excellent	Genuine state of the art in battleship pale gold/wood gloss clothes. Fabulous build, clunky transport and sharp, refined sound quality with Dolby S or B and metal tapes	Dolby B/C/S/HX Pro, built in DAC, tape alignment	R	105
Akai DX-57 £200	Good Good	Confident sounding deck which eschews fancy gadgets for a good transport and decent electronics. Sound quality is firm and tidy under most conditions of use; avoid Dolby C.	3 heads, dual capstans, Dolby B/C/HX Pro, variable bias		105
Akai GX-32 £170	Average Poor	Constrained and smeared sum up this deck well. It has poor bass and treble definition alike, though it proved well aligned for prerecorded cassettes	Dolby B/C, variable bias, headphone out, track search		69
Akai GX-52 £250	Very Good Very Good	Well finished and a pleasure to use, this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track locate features	BB	57
Akai GX-65 £300	Average Average	Fine un gimmicky middle ranking deck with simple, purposeful controls, works best with metal tapes. Performance standards fair to good	3-head, dual capstan, Dolby C/HX Pro		87
Akai GX-95II £400	Good Very Good	Sharp, clear and articulate sounding deck, with superb performance extending to frequency extremes	3 heads, dual capstans, tape calibration, Dolby B/C/HX Pro	R	99
Akai GX-R35 £200	Average Average	Middling sound quality at best with Dolby B; deteriorates with Dolby C and unsatisfactory anyway with testing material due to loss of low level information	Auto-reverse (optically triggered), Dolby B/C/HX Pro, bias adjust		99
Denon DR-750A £250	Average Average	Workmanlike and simply equipped dual deck which is more appealing on audio grounds than most of its type	Dual transport, Dolby B, C & HX Pro	R	99
Denon DRM-510 £140	Good Average+	An amnesic Dolby switch and lack of timer standby detract from an otherwise strikingly successful deck with a consistently good performance	2 heads, Dolby B/C/HX Pro heads, record return	R	99
Denon DRM-710 £230	Average Average	Although this is a fair performing model, the design has lost some of the competitive edge of its predecessor, the DRM-700. Memo: must try harder - and where's the timer standby?	Dolby B/C/HX Pro, fine bias adjust, record return		105
Denon DRS-810 £300	Poor Average	Basically good deck with non-stressful material let down by an inability to deal with high energy tapes properly. The horizontal loading mechanism is a success.	CD style loading drawer, real time remaining display, Dolby B/C/		105
Denon DRW-650 £200	Average Average	This simply equipped model is a little fiddly to operate at time, partly because of the way the single set of transport keys is assigned. But sound quality is generally workmanlike - good value	Twin transport, Dolby B/C/HX Pro	R	93
Dual CC800RS £150	Average - Average -	Low(ish) cost auto-reverse deck has mic input but lacks some niceties. Delivers a punchy but ultimately rather crude impersonation of source material, and a thin, lightweight bass.	Auto reverse, Dolby B, C, HX Pro, microphone input.		105
JVC TD-R431 £170	Poor Poor	Modestly specified auto-reverse cassette deck which suffers the usual problems of the breed, to wit unstable, homogenised sound quality	2-head, Dolby B/C/HX Pro, auto reverse		99
JVC TD-R441 £170	Average - Poor	This deck would make a good choice for those who need the unattended recording time to deal with absentee recording off air, but is a less than wholly convincing musical advocate.	Auto reverse transport, Dolby B/C/HX Pro, CD direct input		105
JVC TD-V531 £260	Average Average	A simple but potentially Good deck with an excellent transport, let down by poor setting up. With all tapes, sound quality was thin and lacking in both substance and colour	3 heads, dual capstans, Dolby B/C/HX Pro, var bias		99
JVC TD-V541 £280	Very Good Very Good	Crisp, lively sounding deck with excellent timing and occasionally slightly thin tonal quality. Best with metals and Dolby B	Dolby B/C/HX Pro, 3 heads, fine bias, display off	BB	105
Kenwood KX-5030 £200	Good Average	confusing mishmash of listening impressions caused by poor set-up afflicting metal tapes and Dolby C in particular. Promising otherwise	2 head, Dolby B/C/HX Pro, auto-bias, track search		99
Kenwood KX-5530 £190	Average - Average -	Neat looking and well equipped deck, adequately engineered but somewhat lacking musically. Worth considering if auto-reverse is the key to your happiness.	Dolby B/C/HX Pro, auto reverse, auto biasing, auto fader		105
Kenwood KX-7030 £260	Good Good	Fine, articulate middle price cassette deck whose only (mild) failing with some programme material is a just perceptibly synthetic glaze	3 heads, dual capstans, Dolby B/C/HX Pro, auto bias	R	99
Marantz CP230 £330	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz CP430 £400	Average Average	Uniquely flexible and compact package for outside work which at a pinch can double as a domestic cassette deck. dbx is useful for location work; results with Dolby B are acceptable	Portable 3 head, dbx, fine bias, charger/adaptor	R	87
Marantz SD315 £180	Average Average	Sound quality is promising, but somewhat offset by 'shut in' top end. Pitch integrity suspect. Dolby C sound quality and dubbing performance poor	Dolby B/C/HX Pro, twin transports, one rec/play, one play only. Mic i		93
Marantz SD40 £150	Average Very poor	Obstructive aesthetics are offset by apparently good build and sensible features, but sound quality is uneven or worse.	Dolby B/C/HX Pro, fine bias	R	93
Marantz SD50 £230	Good Very Good	Fine, exacting all-rounder offering good stereo, precision and focus. Good with prerecorded tapes too.	Dolby B/C/HX Pro, track & intro search, variable bias etc	R	81
Marantz SD515 £350	Poor Poor +	Good electronic design is let down by mediocre alignment and poor transport stability. Disappointing at the price.	Twin auto-reverse, both transports record, HX Pro, parallel recording		93
Marantz SD60 £350	Good Very Good	A first rate, highly capable deck offering energetic yet refined sound largely due to good electronic design	3-head, Dolby B/C/HX Pro, variable bias & sensitivity	R	81

The Directory

CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Memorex SCT-5 £150	Poor Poor	Poor example of a twin cassette deck where everything has been sacrificed on the altar of flexibility	1 rec/play, 1 play only transport, Dolby B/C		87
Nakamichi Cassette Deck One £700	Good Good	New modernised Nakamichi is still curiously old fashioned in many ways, but offers unusually articulate sound of great insight	Dolby B/C, 3 heads, dual capstans, var azimuth	R	99
Nakamichi Cassette Deck 1.5 £500	Good Very Good	High grade 3 head deck with minimal features but fine engineering and sweet, open though slightly coloured sound quality.	Dolby B/C 3 heads, bias adjust	R	105
Nakamichi Cassette Deck Two £350	Very Good Very Good	Not completely neutral, this deck is assured, dynamic and quick, with abundant detail and some coarseness. Stable transport but rudimentary features accompany fine under the skin engineering	Dolby B/C, manual tape type selection, bias adjust	R	93
Nakamichi RX-202E £600	Good Very Good	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control	Auto reverse, Dolby B, C, 2 head	R	63
Philips FC870 £250	Average Average	Disappointing at the price, this is a well equipped deck with off-tape monitoring, but a somewhat listless, smeared musical style	Dolby B/C/HX Pro, 3-heads, track/intro search etc		81
Pioneer CT-339 £150	Average + Average	Auto BLE tape alignment is the most interesting feature. Sound quality is a little flaky, but reasonable, though pitch problems were encountered with cheap tape stock.	Auto tape align, Dolby B/C/HX Pro, mic inputs	R	105
Pioneer CT-676 £250	Average Poor	Dull, compressed and hard sounding deck, which is hamstrung by high measured transport flutter. Good points include sophisticated (and accurate) tape alignment	Dolby B/C/HX Pro, auto tape alignment, 3 heads		99
Pioneer CT-900S £500	Good Average	High spec and well built derivative of CT-93, but disappointingly lacklustre sound	Dolby B/C/S/HX Pro, dual capstans, 3 heads, auto alignment		99
Pioneer CT-93 £800	Excellent Excellent	State of the art deck, built like something out of NASA's shuttle, with superb all round performance. Dolby S can muddle ambient information, but increases effective dynamic range	Dolby B/C/S/HX Pro, auto tape align, 3 heads, dual capstans	R	99
Pioneer CT-W650R £200	Average Average	There were some intermittent problems with the tape alignment system on the test sample, but the deck was otherwise good, despite a coloured bass and inability to exploit Type IV tape	Twin deck, both reverse, one records, auto align, B/C/HX Pro	R	105
Revox B215 £1727	Very Good Very Good	Fine, consistent and solid sound quality, with excellent under the skin engineering and many useful features — but you're also paying for the same	Dolby C/HX Pro, 3 heads, dual capstans, auto tape align	R	87
Revox B215-S £1826	Very Good Very Good	This is a superbly engineered deck with a classically fine performance that almost transcends the stereotypes. Ergonomics are flawed but the user interface is both powerful and flexible	3-head, dual capstan, Dolby B/C/HX Pro, auto calibration	R	75
Revox H1 £1,145	Very good Very good	Bare bones version of B215 is still a sophisticated piece of kit, and lacks for none of the 215's engineering prowess	3 heads, Dolby B/C, auto tape align, semi-auto record level set.		99
Revox H11 £938	Average + Average +	Costly and well engineered deck which boasts the bare minimum of facilities and which is primarily designed for the Revox multi-room H-Line system. Moderate performance.	3 head, Dolby B/C/HX Pro, manual tape alignment		105
Sansui D-X111E £120	Poor Poor-	Very high levels of flutter, and a shabby, hollow sound with metallic colorations and a severe loss of detail - is it necessary to go on?	Dolby B/C/HX Pro, fine bias adjust		105
Sansui D-X211HXR £170	Good Good+	Clean, stable and open sounding recording quality distinguishes this player, - and auto-reverse too. A great improvement on earlier mid price Sansui models, and excellent value.	Auto reverse, Dolby B/C/HX Pro, bias adjust	BB	93
Sansui D-X311WR £250	Poor Poor+	Not wholly successful auto-reverse deck which suffers because it has tried to be all things to all people. Lack of clarity is the main limitation	Twin optically triggered auto-reverse, Dolby B, C & HX Pro		99
Sony K870ES £350	Average+ Average+	Good but not outstanding deck which proved slightly disappointing on audition. This model is no standard setter	3 heads, dual capstan transport, Dolby B/C/HX Pro, tape calibration		99
Sony TC-K520 £170	Average Good	Fine, assured and detailed performer with a very well designed and straightforward user interface	Dolby C/HX Pro, variable bias, BB display on/off	BB	87
Sony TC-K570 £200	Good Average+	Good if slightly untransparent sounding recorder, comfortable with all noise reduction circuits and all tape groups	3 heads, Dolby B/C/HX Pro, bias adjust	R	99
Teac V-5000 £300	Average+ Good-	Fine middle ranking heavyweight with blemish free overall performance, beaten only on subtleties by the best at the price	3 heads, dual capstans, bias/sensitivity adjust, Dolby B/C/HX Pro		99
Teac V-7000 £400	Good Good	Intrinsically sharp, clear and solid sound spoiled by exaggerated detail with prerecorded material and losses imposed by Dolby circuits	3 heads, quartz locked dual capstans, tape align, Dolby B/C/HX		99
Teac R-9000 £450	Good + Good	Much better than average auto-reverse deck, well worth considering, though short of the special qualities required for formal endorsement at this price. Nicely engineered too.	Auto-reverse, 3-head, tape calibration, Dolby B, C, HX Pro		105
Teac V-8000S £700	Good + Excellent	Superb stability and real subtlety from a cassette deck, this must be the best Teac yet. The only disappointment was the Dolby C circuit which was coloured and lacking in transparency.	3 heads, dual capstans, Dolby B/C/S/HX Pro, tape calibration	R	105
Technics RS-B965 £380	Very Good Very Good	Messy control layout, but ultra capable deck with clear electronics and excellent headroom, low noise, an ultra-stable transport - and first rate sound quality.	3 head, dual capstan, Dolby B/C/HX Pro, dbx, assisted tape alignment	R	93
Technics RS-BX606 £180	Average + Average +	Good middle ranker with accomplished metal tape handling but some HF roughness. Good with both noise reduction systems and with prerecorded material.	Dolby B/C/HX Pro, 3 heads, variable bias	R	105
Technics RS-BX707 £220	Average Average -	Uneven but ultimately messy sounding deck with a number of oddities, including a tape calibration system lacking in accuracy and poor Dolby alignment	3 heads, Dolby B/C/HX Pro, bias & level calibration		105
Yamaha KX-250 £150	Good Good	Excellent if somewhat fiddly deck with all mod cons. Play trim helps recalibrate tapes back into line. Refined, expressive sound quality and stable transport	Dolby B/C/HX Pro, Intro Scan, Play Trim	BB	93
Yamaha KX-330 £180	Average Good	Cramped control panel but a strong, dynamic and comparatively stable performance distinguish this strong middle-price deck	Dolby C/HX Pro, optional remote control	R	87
Yamaha KX-530 £230	Good Good	Excellent all-rounder that does most things at least competently and many things well. One of the best middle price decks	Dolby C/HX Pro, 3 motors, optional remote control	BB	87
Yamaha KX-650 £300	Average+ Good	Fine audio manners, especially in the midband and treble, mark this high class deck out from the crowd	3 heads, dual capstans, Dolby B/C/HX Pro, play trim, bias adjust	R	99
Yamaha KX-930 £400	Good Average	Worthy but ultimately slightly disappointing mixture of fussy ergonomics and tidy but cluttered sonics	3 heads, dual capstans, Dolby C/HX Pro, remote control		87

CD PLAYERS

Now nearly a decade old, this all digital music source is well established despite high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise, ease of use, and more robust software. Remote control is just about standard on all new players.

However, many vinyl enthusiasts find CDs

sound less involving than top quality vinyl.

Prices average out at a little over £200, although entry level models are now available for little more than £100. Even the most basic models can sound very good indeed and employ state of the art decoding chips and the most useful play features. Extra money can buy remote volume control, audio 'tweaks', plus improved build and component quality control.

Digital outputs facilitate an easy upgrade path

Machines can be split into bitstream and multi-bit with each school having its adherents. Bitstream is the newer technology and will probably win in the end, although the development time spent on multi-bit systems means that excellent results can still be obtained.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research CD-06SE £450	Average- Average-	Basic Philips machine with beefed-up chassis and a revised analogue board. Distortion is higher than normal while the sound lacks both immediacy and clarity.	Remote control, programming but no direct track access, 16bit 4x		95

The Directory

CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research CD-07 £300	Good Good	AR's first Bit Stream CD player relies heavily on Rotel know-how to produce a smooth, detailed but undemanding sound	Few features on player, remote, dig o/p. SAA7321 PDM DAC	R	100
Aiwa XC-300 £130	Average + Average +	Cheap, cheerful and gratifyingly free of digital 'nasties', this new bitstreamer is well-equipped but safe rather than thrilling on the sonic front.	Remote control, optical output, Toshiba bitstream DAC.	R	107
Aiwa XC-700 £180	Good+ Very Good	Generously equipped player that harbours a top Philips' Bit Stream DAC. Offers a characteristically smooth and effortless 'bitstream sound'. Exceptional value	Remote control plus index skip, midship transport and 7350 PDM DAC	BB	95
Aiwa XC-900 £210	Good + Good -	The loss of transparency and general awkwardness of this player comes as a surprise after the XC-700. Extra features have taken their toll	Remote control with variable o/p, midship transport, 7350 PDM DAC	R	100
Akai CD-52 £249	Good Good	A nice surprise from Akai, genuinely good sound from this mid-priced model. Better linearity will help further	Remote, digital output, headphone socket	BB	64
Akai CD-55 £230	Good Average -	Budget model which fails to compare with the CD52	Remote, hdph, Good programming		83
Akai CD-57 £180	Average + Average +	A very flexible machine with a slightly lumpy but fullsome bass, no model of clarity but very entertaining!	Remote control, motorised volume, hybrid PWM DAC	R	107
Akai CD-62 £330	Average Very Good	Looks, build quality and the technical specification are right up to date. As it stands it sounds ve good but if the indifferent lab performance is improved, it would probably sound even better	Remote, programme, hdph, comprehensive display etc	BB	70
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
Akai CD-93 £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	Track entry remote, menu display etc.		58
Arcam Alpha £420	Very Good Very Good	Arcam's new star, its best CD player yet and great value	Remote, etc, coax dig. out	BB	83
Arcam Delta 70.3 £650	Good Good+	Latest in a line of Delta 70 CD players and one that offers a distinctly rugged, beefy sound. Plenty of power behind individual instruments but lacks a feeling of involvement	Remote control, display dimmer, variable and dig outputs. 7350 PDM		95
Ariston CD1 £400	Good Good	Easy on the ear compact disc for those who like their music Radio 2 flavoured. And it looks good	digital output, remote control	R	87
Ariston Maxim CD2 £550	Good+ Good+	Yet another re-worked Philips player with chunky alloy casework and sophisticated analogue stage. Narrowly escaped a recommendation with its dynamic and purposeful sound. Still a hint	Remote control, coax digital output. 16bit 4x chipset		95
Ariston Maxim CD3 £430	Good Good	CD1 electronics given room to breathe in the heavyweight CD2 chassis. The result? A fine all-rounder with a positive, dynamic sound that's better than either parent.	Remote control, display-off facility, Philips 16-bit chipset.	R	107
CEC 880CD £230	Poor Average	The dynamic and spritely sound of this machine is gratifying in the light of its primitive design but is otherwise poor value	Remote control, direct track access, dig o/p, hybrid PWM DAC		100
Cambridge Audio CD3 £649	Poor Good +	Unique internal configuration gives the CD3 a fluid and detailed sound falling off at the frequency extremes. The controls and displays are primitive	Optical/electrical digital out, remote control		87
Carver TL-3220 £495	Good Average	A lightweight player with primitive display. We thought it sounded rather sparse and dry, and though Carver's DTL feature certainly 'fleshed-out the bass it also softened the stereo focus	Remote control with volume keys, 'Digital Time Lens', 18bit 8x		95
Carver TL-3300 £595	Good + Poor	Carver needs to listen critically to CD sounds; in our opinion. DTL does not improve the recipe	DTL, remote, programming, digital output		83
Cary Audio Design CAD-955 £899	Average Average +	Rotel's latest 16-bit wonder with an add-on valve processor to filter-out any residual RF garbage. Nice idea but the player sounds very dry and taut, lacking warmth and body.	Remote control, triode-output stage, Philips 16-bit chipset.		107
Creek CD60 £500	Good + Good	A big and confident sound from a player that's stuck with a green display, green lettering and green-fronted drawer. So it looks ghastly even if the internal design is very thoughtful.	Remote, spring-loaded buttons, coaxial digital output, 16-bit.		107
Denon DCD-1290 £319	Good Good -	This player certainly looks the business but its sound is a real five-minute wonder. Its compelling fizz lasts about as long as your average firework.	Remote, pitch control, index skip, variable output, 18-bit		107
Denon DCD-1460 £400	Good+ Average+	Here's a player that benefits from solid casework and decent features yet the overly complex electronics knock the stuffing from its sound	Remote control, volume, index search. 18+2-bit DACs		100
Denon DCD-2560 £550	Very Good Good	Beautifully built and, once again, generously equipped yet with a sound that's decidedly sluggish or reserved, particularly through the bass. Vocals are more forward but can sound a little glassy	Remote, pitch, tape edit features, opt/coax digital output, 20bit 16		95
Denon DCD-860 £250	Average+ Good+	This is a well designed and generously equipped budget player that offers a very spacious and appealing sound. There's a hint of treble emphasis but it still sounds great at high volumes!	Remote, pitch and full tape edit facilities. 18bit 8x.	R	95
Denon DCD-960 £300	Good + Average	A fine feature package with sood lab results, but unfortunately an unexceptional sound quality	Remote inc vol, hdph, keypad, well featured		88
Dual CD1080RC £200	Very Good Average -	A rather strange-sounding player with a top-heavy treble that does little to redress its lack of vibrancy and emotion. The back-lit LC display and clean digital output are plus points.	Remote, coaxial digital output, digital volume, MASH/PWM DAC.		107

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Ferguson CD007 £130	Good Average	The cheapest recommendation in the test group; don't expect the earth but the value is good	Manual, digital output, headphone socket	R	64
Ferguson CD008 £150	Average Average	Not as strong as its relatives, sample fault perhaps? Though performance is fair enough overall	Remote, midi digital output, 2x O/s, timeshare 16 bit		64
Goodmans GCD-435 £140	Poor Average -	Goodmans has the power to source with more care than this, music centre quality!	multibit, remote, basic facilities		88
Harman Kardon HD7400 £230	Poor Average +	This player looks little different to other HKs but its performance is dominated by a budget decoder/oversampling IC. Good bass nonetheless but pop tracks can sound fizzy and tiring.	Remote control, display-off, timed-shared mono 18-bit DAC		107
Harman Kardon HD7450 £300	Good Average	A very stylish machine but one that is let down by its aggressive and 'dirty' treble quality which pierces through most types of music. Weak bass resolution undermines the 'roots' of the player	Remote control but no headphone socket. MASH/PWM bitstream		95
Harman Kardon HD7500II £350	Good+ Good+	An update of the original HD7500 but featuring superior analogue electronics to the HD7450. Tonal integration is much improved, packed with detail that's expressed with enthusiasm.	Remote, variable, digital and headphone outputs. MASH/PWM	R	95
Harman Kardon HD7600II £429	Good+ Average+	Based on the HD7500II but with a motorised volume control and extra-heavy casework. Either way it lacks the transparency and sparkle of the cheaper machine	Remote, variable and digital outputs. MASH/PWM DAC		100
Harman Kardon HK7300 £200	Average Average -	Budget low bit technology, does not deliver enough for a recommendation	No remote, no digital out; basic control features		83
JVC XL-V231 £149	Excellent Average -	Text book lab result but below par sound, nice and boring. Must be some potential here	Remote, hdph (fixed), JVC 1-bit PFM		88
JVC XL-V241 £160	Good Average	Even with its mkII PEM DAC this new machine sounds pleasant but not especially interesting. Stereo imaging is a trifle suspect	Remote control, slim centralised drawer, PEM bitstream DAC		100
JVC XL-Z1011 £520	Very Good Good+	JVC's current flagship combines olc K2 technology with PEM bitstream to deliver a full, beefy and engagingly dynamic sound	Remote control, variable and digital outputs, PEM bitstream	R	100
JVC XL-Z431 £200	Very Good Average-	This is a player that started life off the back of the successful XL-V231 but whose performance fails to come up to scratch. The sound is weak and uninspiring - poor use of JVC's PEM DAC.	Remote operation, motorised volume + tape edit. PEM bitstream		95
JVC XL-Z441 £200	Very Good Good	The smoothest-sounding of JVC's budget machines - clear and bold but also very even-handed. Could well be their best sub-£500 player to date and strongly recommended.	Remote control, tape edit, index skip, PEM bitstream DAC	R	107
Kenwood DP-4030 £180	Good+ Good+	Kenwood's first and cheapest bitstream player enjoys a deceptively detailed and refined sound but one that is mildly veiled right across the spectrum. Excellent value nonetheless	Remote, variable and opt digital outputs. NPC bitstream DAC	R	95
Kenwood DP-5030 £200	Good+ Good+	This looks like the DP-4030 but has more in common with the DP-7030 inside. Either way its neutral, uncluttered and intimately detailed sound is better than both	Remote control, motorised volume, R disc file. Sony PLM DAC.	R	100
Kenwood DP-5040 £200	Very Good Average	Better built and technically superior to the older DP-5030 but its untidy, detached treble quality proved a real disappointment in our listening tests.	Remote, display control, tape edit, peak search, Sony PLM DAC.		107
Kenwood DP-7030 £300	Good+ Good+	By adapting established Sony bitstream technology Kenwood has moulded its own exceptionally smooth and polite sound. Very nicely built machine with midship transport mechanism.	Remote, index scan, variable and optical outputs. Sony PLM bitstream	R	95
Kenwood DP-7040 £300	Very Good Good	A classy, polished sound from a decidedly refined piece of engineering. Close to the older DP-7030 in terms of performance but better value in construction and technology.	Remote control, Disc File memory, R display control, Sony PLM DAC.	R	107
Kenwood L-1000D £830	Very Good Good	A beautifully constructed and very stylish player that really only gives off its best when teamed-up in balanced-mode with Kenwood's matching pre/power combination	Remote control, balanced XLR's, 16-bit integrating DACs		100
Luxman D105u £699	Average Average	Visible valves are essentially for show in this rather ordinary player - both sound and lab	"valves", remote inc vol, hdph, well equipped		88
Marantz CD-42 £170	Average + Good +	Not as warm or rugged-sounding as the CD-52 but still wonderfully spacious and intimately detailed. Currently the best player under £200, plus it's got a decent coaxial digital output.	Remote control with direct track access, SAA7350 Bit Stream DAC	BB	107
Marantz CD-52 £200	Average+ Good+	Hardly the most neutral player on the planet but its rich, full and very generous sound cannot fail but warm the coldest of hearts	Remote control, FTS and dig outputs, SAA7350 PDM DAC	BB	100
Marantz CD-52SE £280	Average + Very Good	A similarly dramatic yet far more neutral sound than the basic CD-52. Either way, its engaging and believable performance was a real hit with our listeners.	Remote, FTS memory, switchable digital output, Bit Stream DAC	BB	107
Marantz CD-62 £300	Good Good-	Basically this is a Philips CD850II with Signetics op-amps all plonked into an old CD-50 chassis. Something of a range-filler	Remote control, index, 8-step volume and FTS. SAA7350 PDM DAC	R	100
Marantz CD-72 £400	Good - Good +	A heavily-constructed player based on the same digital electronics as the CD-42 and CD-52. This implementation sounds astonishingly solid and immediate but also rather too 'clean'.	Remote, variable and digital outputs, FTS, Bit Stream		107
Marantz CD-80 £560	Very Good Good	A dynamic and bold sound from a machine that is equally bold in appearance. It betrays no fear of the most thundering crescendos yet can sound a little hard or glassy with pop CD's.	Remote, motorised volume + FTS programming, 16bit 4x.		95
Memorex CD1650 £200	Poor Poor	An overpriced music entre player. Surely the giant Tandy corp. can get a better standard than this?	remote, keypad, multi bit, midi		88
Meridian 206B £995	Excellent Excellent	What a stunner! Audiophile quality from the reference one box CD player, and at a most realistic price	Differential bitstream, keypad remote, prgming	R	88
Meridian 206B (DAC7) £995	Good + Very Good	Plenty of tight, strong bass but a little mechanical or even sparse at times. Its technical presentation of music is spot-on, only the sense of drama or anticipation needs working on.	Remote control, novel direct-loading transport, DAC7		107
Meridian 208 £1,550	Excellent Excellent	State of the art CD sound combined with a decent preamp and full remote control	Hdph + remote level. Programming, R phase invert, various outputs	R	83
Micro Seiki CD-M100 £5541	Very Good Good	One of the hernia inducing bricks of hi-fi, the Micro is extravagantly styled, finished and built. The good lab performance led to an 'only good' sonic display when the price demanded excellent	Balanced output, remote, display blanking		72
Micromega Logic £500	Good- Good	A rather expensive version of Philips CD624 with new op-amps and CD tray. Still, it does sound rather meatier, better integrated and more purposeful	Remote control, no FTS but switchable digital output, SAA7321 DAC		100
Mission DAD5 £300	Good Average +	Similar-sounding to Philips' 600-series players: lively, plenty of space and full of 'bounce' but a little too eager to impress in the short term.	Stylised remote, no 'stop' key on player, digital out, Bit Stream		107
Musical Fidelity CD1 £400	Average + Good -	Put together in Taiwan to MF's specifications, the main PCB and digital electronics are also used by Rotel's RCD-965BX! This version lacks the creamy, engaging quality of the latter.	Simple remote, index and track skip, digital out, SAA7323 DAC		107
NAD 5425 £200	Very Good Very Good	Not much in the way of facilities on offer but a sound that is both wonderfully open, detailed and appealing. This is a very communicative player that sounds positive without being brash	Worthless remote control, track skip/scan. MASH/PWM bitstream DAC	BB	95
NAD 5440 £300	Very Good Good+	The 'no compromise' version of NAD's 5425 but still rather lacking in facilities. Its sound is smoother and richer than the 5425, preferring to seduce with subtlety rather than have	Remote with direct track access, variable output, MASH/PWM	R	95
Nakamichi CD Player 2 £625	Average+ Average+	This may look like a CD Player 4 but features a special transport able to store 7 CD's with one in play. Nevertheless its digital electronics are flawed and its sound powerful but blunt	Music bank, remote, volume control, digital o/p, 18 bit DACs		100
Nakamichi CD Player 4 £300	Average+ Good-	Attractively styled but suffers high-ish distortion for a modern CD player. Best suited to up-beat pop rather than complex classical works which seem to lack focus and secure soundstaging	Remote with track access, coax dig. output. 18bit 8x		95
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, I		51

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Nakamichi OMS-7EII £2000	Good + Good	The only serious criticism here is of the price. And in our opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry programming, hdph		51
Philips CD604 £120	Poor Average +	To all intents and purposes this slightly ponderous but weighty-sounding player is the older CD610mkII minus remote control. Good sound at a daft price.	No remote, tape edit, peak search, digital out. 16-bit	R	107
Philips CD618 £170	Good Good	Cheapest of Philips bitstreamers and quite possibly the best with its excellent definition, punch and sparkle	Remote control, shuffle play, variable headphone, SAA7321 PDM	R	100
Philips CD624 £200	Good Good-	Philips' cheapest Bit Stream machine is still equipped with a vast array of features. Sounds pretty civilised too but lacks the crispness and freedom necessary to set it apart.	Remote, FTS programming, digital output. SAA7321 Bit Stream DAC		95
Philips CD634 £250	Good Good-	The all-singing all-dancing version of Philips' budget Bit Stream player and one that seems better able to cope with the pizzaz and dynamics of a decent recording. Nevertheless it	Remote, FTS + Title + personal programming. SAA7321 Bit Stream		95
Philips CD850mkII £400	Very Good Good	This looks just like the original but sounds completely different, trading a little transparency and pizzaz for an altogether smoother but slightly less memorable performance	Remote control, 2 FTS, personal presets. SAA7350 Bit Stream DAC	R	100
Philips CDV185 £350	Average + Average	Hard to value with the video singles facility but it all works well enough for a recommendation	Video singles + CD scart + digital out etc	R	76
Pioneer PD-75 £800	Very Good Very Good	A confident yet beautifully poised and relaxing sound from an equally luxurious package. Oodles of refinement plus Pioneer's hi-tech Stable Platter transport, but still expensive.	Remote, index and track skip, display off, PDM Bit Stream DACs		107
Pioneer PD-7700 £250	Good+ Good+	A busy-looking player with an upside-down transport yet one that offers a very tight, confident and dynamic sound. Bubbly and entertaining but still very refined	Remote control, turntable drive mechanism. 1-bit PDM DAC	R	100
Pioneer PD-8700 £300	Good+ Very Good	A pair of PDM DACs builds upon the sound of the '7700, crafting a generous soundstage populated with big-hearted and thoroughly captivating musical images	As 7700 plus index skip, display off and motorised volume. 1-bit	BB	100
Pioneer PD-91 £900	Excellent Excellent	Close to state of the art in nearly all areas - soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player	Track entry remote, calendar display	R	64
Pioneer PD-93 £1430	Very Good Good+	The extremely civil, understated feel of its music contrasts markedly with the over-engineered construction of this unit. It will not offend anyone but then neither will it spark much excitement	Remote with fader and index facilities. Two dig o/p's. 20bit 8x		95
Proton AC-120 £180	Average Average -	Fine styling, low price but barely average performance	15 track memory, simple design, remote, hdph		76
Revox B126 £649	Very Good Good	Made in Switzerland so the build quality and technical performance is high, but then so is the price and the sound quality is only good	Programming, Revox system compatible		70
Revox B226S £840	Good Average	Top quality build and finish for the Revox system enthusiast. For high value sound look elsewhere	Remote vol, hdph, 19 track memory, digital op		76
Rotel RCD-955AX £260	Good + Average	Touted as a repackaged version of the evergreen RCD-855. In practice, however, our sample disappointed on several visits lacking the clean, cohesive quality of the original.	Remote control, digital output, repeat, scan, Philips 16-bit		107
Rotel RCD-965BX £300	Average+ Excellent	Two years on and the 865's replacement turns out to be an exceptionally refined bitstreamer: transparent, exquisitely detailed and powerfully emotive. A landmark player	Remote control, index skip, digital out. SAA7323 PDM DAC	BB	100
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	Remote (inc volume), skip, scan etc.		58
Sansui CD-X311mkII £250	Good+ Good	Sansui's mid-ranked player uses Technics' technology but provides a warm and cuddly sound that's atypical of the breed	Remote control, variable and digital out, MASH/PWM DAC	R	100
Sansui CD-X317 £270	Good + Average	Not in the same class as Sansui's older CD-X311mkII. Same technology and a similar appearance but the sound is neither as responsive or engaging.	Remote, fixed, variable and digital outputs, MASH/PWM DAC		107
Sansui CD-X711 £600	Excellent Very Good	Luxury features, finish and sound from this classy Sansui; no excuses required here	Hdph + vol, remote full programming	R	83
Sharp DX150 £129	Average Average	This is one oversampled player which is rather outclassed for technical and sonic merit by the vast majority of the competition. Pretty enough but would you want to put discs in it?	Programmable, skip, search, repeat		70
Sharp DX750 £179	Average Average	It has a remote control but it's too like the 150 which is rather outclassed for technical and sonic merit by the vast majority of the competition	Remote, programmable, skip, search, repeat		70
Sony CDP-591 £160	Good+ Average+	Tons of features at a highly affordable price but let down by its lacklustre if inoffensive sound quality. The sound of these new Sony players lacks the grip and purpose of the last generation	Remote control, variable and optical digital out. PLM bitstream		100
Sony CDP-797 £200	Good + Good -	Another day, another DAC. This new budget player succeeds with its taut imaging, clean and impressive soundstaging. Can seem a little too lean or dry, however.	Remote, motorised volume, edit and scan facilities, PLM DAC	R	107
Sony CDP-991 £230	Good+ Average+	Another well-equipped and well-specified machine and one that can sound very up-beat and detailed with simple material. Tends to loose its way with complex stuff, however	Remote control, Custom File programming, variable out. PLM DAC		100
Sony CDP-X333ES £400	Very Good Good-	This beautifully built player has a very tidy and well-ordered style of music-making, but in the long run it lacks the ability both to excite and involve	Remote control, Custom File programming, Complementary PLM DAC		100
Sony CDP-X339ES £450	Excellent Very Good	Superbly constructed, this tour-de-force of features and technology offers a tightly detailed almost cavernous sense of acoustic. The mid and treble can sound positively magnetic.	Comp remote, Custom/Edit Navigation System, new PLM DAC	R	107
Sony CDP-X77ES £1000	Excellent Good+	Rather like Pioneer's PD-93 this flagship player is beautifully put together but simply lacks the thrill or conviction of cheaper and perhaps more ragged-sounding machines. Still,	Remote, everything but Custom File titling, Complementary PLM		95
Stax Quattro £2995	Very Good Very Good	Now in mkII guise this substantial player recreated exceptionally strong and convincing bass lines together with a beguilingly musical midband	18-bit DACs, 20-track memory, full IR remote, variable o/p	R	72
TEAC CD-P4500 £250	Good + Good	TEAC's first genuine 1-bit player uses Philips BS DAC to great effect, its sound described as having a certain 'organic warmth', very composed and easy-going.	Remote, pitch control, variable out, SAA7350 Bistream	R	107
Technics SL-PG200A £160	Good+ Good+	This season's version of last season's favourite (the SL-P277A) offers extra features and a similarly punchy, dynamic and up-beat sound. All this plus an uncommon poise - Best Buy	Remote control, random play, variable out, MASH/PWM bitstream	BB	100
Technics SL-PG420A £178	Good + Good +	No repackaged version of the SL-PG200A but a new player in familiar clothes. Still offers an open, transparent and uncommonly fresh sound but a little of the 'magic' is missing.	Remote, digital volume, synchro edit, auto cue, MASH/PWM DAC	R	107
Technics SL-PG520A £223	Good + Very Good	A cracking player that builds upon the astonishing out-of-the-box sound of earlier budget players. Superb clarity and dynamics, thrilling but musically involving too	Remote, shuttle search dial, edit mode, peak search, MASH/PWM DAC	BB	107
Technics SL-PS900 £350	Very Good Good-	Just about the quietest transport in existence and a sound that is equally unobtrusive, polite and refined. There's plenty of detail too but the overall result won't set your pulse racing	Huge remote control, function manager MASH/PWM DAC		100
Wadia WT-2000/Digimaster 2000 £	n/a Very Good	Very high grade player which provides state of the art in believable music making from CD, and promises a degree of upgradeability	Transport/multi bit DAC - 32, 44.1, 48kHz o/s		Coll. '9
Woodside WS2 £1095	Good Good+	Prompted a mixed reaction on audition, responding well to our jazz and classical selection but sounding bright and grainy with the pop CD's. RF emission is very high	Remote control, display defeat, variable and digital outputs, 16bit		95
Yamaha CDX-450 £170	Average+ Good	A contentious player this and one that prompted a range of reactions from enthusiasm to disinterest among our listeners. It could prove too safe-sounding but worth a try at the price.	Remote control, track access, variable out. 18-bit hybrid DAC	R	100
Yamaha CDX-750 £250	Good Average+	A sleek machine that can sound rich and vibrant with simple material but seems to lack expressiveness and subtlety when dealing with more complex passages	Remote control, variable and digital out, LC display. PDM DAC		100

CD TRANSPORTS AND DACS

A CD player can be split into two basic components, the mechanism which reads the information from the disc, known as the transport, and the device which turns the digital numbers contained on the disc into the music that comes out of your speakers, this device being referred to as a digital to analogue convertor or DAC. Although at the lower end of the market both of these are contained in a single box, at the top end of the market two box machines consisting of a CD transport and a separate DAC become more common.

Although many of these units will be purchased as two box machines, which are generally considered to sound better than a one box equivalent, a DAC can also be used to upgrade an existing CD player. A good example is where an early machine with a satisfactory drive unit but a rather dated DAC can be brought up to the latest spec by the addition of a new DAC.

When upgrading an existing player best results are usually obtained using the electrical digital output rather than optical, and obviously

to be upgradeable your CD player must have a digital output in the first place.

The choice of interconnect is crucial in linking drives and DACs and conventional interconnects used for analogue signals should be avoided, a dedicated 75ohm digital cable will give far better results.

Mixing and matching transports and DACs from different manufacturers can be a bit of a lottery and readers are referred to the full reviews where this subject is discussed in more detail.

CD TRANSPORTS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Arcam Delta 170.2 £620	Very Good Good	An upgraded Delta transport, it sounds different but not really better. More research is required here	Transport only, display off, usual programming		88
Kenwood DP-X9010 £500	Average Average +	Compromised by jitter, RF noise and poor clock selection this transport generally encourages a dynamic but bright and edgy sound with most DACs	CD transport, optical + coax outputs, Class 2		96
Marantz CD-95DR £1500	Very Good Good	At its best with Philips-based DACs, this transport sounds confident if not totally pure, sparkling or fresh	CD transport, optical + coax digital, Class 1		96
Meridian 200 £895	Very Good Very Good	Broadly compatible with most DACs and offering a light, fresh and very bubbly sound that is both natural, engaging and unfatiguing	CD transport, optical + coax outputs, Class 1	R	96
Meridian 602 £1,750	Very Good Good	This dedicated CD transport teams-up most successfully with the 606 DAC. Otherwise it lacks the life and pizzaz of the 200	CD transport, optical + coax outputs, Class 1		96
Philips CDD882 £500	Good Good	A butchered CD880 CD player-cum-CD transport that pairs up well with most Philips-based DACs. Dynamic and lively but can also sound a little mechanical	CD transport, optical + coax outputs, Class 1		96
TEAC P-10 £1499	Good Very Good	A chunkier and altogether more successful transport than the P-500 with an especially beefy and compelling sound. TEAC's best	CD transport, coax + optical outputs, Class 1	R	96
TEAC P-2 £2849	Very Good Good	TEAC's flagship CD transport is beautifully styled and constructed but its sound is bleached and generally less inspiring than that of the P-10	CD transport, coax + optical outputs, Class 1		96
TEAC P-500 £649	Good Good +	Provides a smooth and very sympathetic sound with most DACs yet is also rather vague, lacking the crispness and resolution of its peers	CD transport, coaxial and optical outputs, Class 2	R	96
Technics SL-PA10 £470	Good + Good	Built to partner the SU-MA10 upmarket integrated amp/DAC, this transport has the unusual limitation of only optical output. Reassuringly solid and more immune to vibration than most	CD transport, optical output only, remote		88
Wadia WT2000 £5614	Very Good Good +	Based on TEAC's P-2 with outboard mains transformers, active digital output and solid alloy casework. Dynamic and crisp sound best realised with Wadia DACs, otherwise less impressive	CD transport, AT&T opt + direct -coupled coax outputs, Class 1		96
Wadia WT3200 £1800	Excellent Very Good	Based on Marantz's CD-95DR with new casework, active digital output and revised grounding. Very clean, clear and authoritative sound with Wadia and Philips-based DACs	CD transport, AT&T opt + direct -coupled coax outputs, Class 1	R	96

DIGITAL TO ANALOGUE CONVERTORS (DACs)

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Arcam Black Box 2 £260	Very Good Very Good	An upgraded version of the old BB1 with more inputs and improved sound quality	Optical and wired inputs	BB	76
Arcam Black Box 3 £360	Good + Very Good	Top of a series of three decoders it can offer a high sonic standard with top class transports	Bitsream, auto input switching,	R	88
Audio Alchemy Digital Decoding Engine V1.0 £376	Good Very Good	A very sweet and seductive sounding unit that gives good results with a wide range of CD players/transports	Coaxial and optical inputs, phase invert, Bit Stream DAC	BB	101
Audio Research DAC1-20 £3898	Very Good Good	This expensive DAC works surprisingly well with Meridian's cheaper 200 transport, an impressively weighty and engaging combo that proved entertaining on audition.	BNC, Toslink and AT&T optical inputs, phase invert, 20-bit DACs		103
Audiolab 8000DAC £695	Very Good Good	Needs to be used with a genuine Class 1 digital drive. At its best with the Wadia WT3200 where it sounds vivid and alive. Otherwise can sound a little antiseptic.	Coax and opt inputs, phase invert, crystal lock, Bit Stream		103
Deltec Bigger Bit £650 + £98	Good Very Good	Partnered with either TEAC P-10 or Meridian 200 transports, the Bigger Bit delivers a very taut and dynamic sound, bathed in an open acoustic. Deltec's RF mains filter is a must.	Coax and opt. inputs, Deltran sync facility, DAC7 Bit Stream	R	103
Deltec Little Bit (Optical) £400	Very Good Good	Our sample suffered from radiated RF interference but new LB's are now cured. Works especially well with Meridian's 200 transport but does require the services of Deltec's 'Power' mains filter.	Coaxial and optical inputs, SAA7350 Bit Stream DAC		101
Deltec PDM1 £500	Average Very Good	A no frills audiophile bitstream converter at an affordable price	Coax-in, special cable and mains filter options	R	83
Deltec PDM1 Series 3 £1195 + £196	Very Good Good +	Hailed as a budget version of the PDM2, it bears technical comparison with both the PDM2 and Bigger Bit but - in terms of sound quality - is no great advance on its cheaper relative.	Coax and opt inputs, two-box construction, DAC7 Bit Stream		103
Deltec PDM2 £2000	Excellent Excellent	State-of-the-art technical performance with a pristine sound to match. Repertoire includes a solid, invert, two-box DAC7	Coaxial and optical inputs, phase invert, DAC7 chipset	R	101
Forte Audio Model 50 £950	Good Very Good	The first American DAC7 design and one that offers a typically big and full-blooded sound, infiltrated by a slightly euphonic quality but never hard or gritty	2 Coax and 2 optical inputs, DAC7 Bit Stream technology	R	103
Kelvin PDM DAC £200	Average + Average +	Don't disregard this DAC-in-a-matchbox for though it can sound a little unconvincing it is capable of developing a surprisingly lyrical and natural sound with the right transport.	Single coaxial input, low analogue outputs, SAA7320	R	103
Meridian 203 DAC7 £510	Good Very Good	This is another broadly compatible DAC that's free of fatiguing nasties yet remains bubbly and exciting. If you find the 606 too sober then the 203 will undoubtedly suit	Coaxial and optical inputs, single-box DAC7 Bit Stream	R	101
Meridian 606 DAC7 £1220	Very Good Good	Extra cash buys you a better standard of construction and finish over the 203 yet by refining its sound further Meridian have also tempered its vibrancy and 'life'. Fickle with other transports	Two coaxial and optical inputs, phase invert, DAC7 chipset		101
Micromega Duo BSII £500	Average Good	This DAC has a tendency to sound light, airy and 'fast' but it can also become a little hard or - fatiguing with some digital outputs. At its best with Meridian's 200	Coaxial and optical inputs, phase invert, SAA7321 Bit Stream		101
PS Audio Superlink £1498	Average Good -	Another transport-fussy DAC that, once again, does the business with Meridian's 200 but can sound bloated, smeared and even vaguely electronic with standard 75ohm digital outputs.	Touch-sensitive coax and optical inputs, phase invert, 18-bit		103
Proceed PDP2 £1595	Average Good -	The PDP2 has a wobbly input impedance that's suited to specific drives, ie Meridian 200, or Proceed's own. At its best expressive and enticing, otherwise it can seem gutless and smeared.	Coax and XLR inputs, balanced outputs, 18-bit DACs		103
Stax DAC-Talent £1400	Excellent Good +	Natural, refined and never over-zealous, the DAC Talent is also capable of sounding very spicy and dynamic. Capable of wielding a maturing influence over a light or bright-sounding system	Coaxial and optical inputs, phase invert, mute, 20-bit DACs		101
TEAC D-500 £399	Good + Good +	An unusual combination of NPC oversampling filter and no less than two Philips' DACs. Its reliable 75ohm input infers broad compatibility. A dynamic and 'interesting' sound	Coax and optical inputs, complementary 16-bit DACs.	R	103

DIGITAL TO ANALOGUE CONVERTORS (DACs)

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Threshold DAC 1/e £3150	Very Good Very Good	The DAC 1/e can sound beautifully detailed with a marvellous sense of scale and sharp, solid images. Its unpredictable behaviour with unknown transports precludes recommendation.	Coax and opt inputs, balanced outputs, phase invert, MASH/PWM DA		103
Wadia DigiMaster X-32 £2000	Average - Good -	Wadia's freaky input circuit gives unpredictable results with non-Wadia transports. Otherwise it can sound bold, dynamic and crisp but lacks the warmth to bind its music together	BNC and optical (TosLink and HP) inputs, 18-bit 32x		101
Wadia DigiMaster X-64.4 £5000	Average Good*	The X-64.4 positively buzzed with vibrant, sharply-etched detail. An exciting sound	BNC + Toslink/AT&T optical inputs, phase invert, 18-bit 64x		101
Woodside DAC 1 £895	Good Good	Fine but slightly dated and costly package in performance terms - but flexible, musical and well built	2 electrical + optical i/p. tape ou		87
Woodside DAC2 £510	Good Good +	Based on Woodside's earlier 16-bit CD player and offering a similarly sharp and dynamic sound, all the more captivating for its lack of graininess and 'tizz'. Should be a reliable upgrade	BNC coaxial input (no optical), 16-bit 4x	R	101

DIGITAL AUDIO TAPE

DAT, or digital audio tape, has been on the market for quite some time now but has never really 'made it' as a consumer medium, probably due to the fact that very little prerecorded software has been made available.

In the last year or so it has begun to carve itself a niche at the top end of the market replacing reel to reel tape recorders as the audiophile's tape based medium.

The DAT standard specifies a 48kHz sampling rate, which is higher than CD, so direct copying in the digital domain is only possible on those machines with dual sampling frequencies, ie 48kHz and 44.1kHz. Some machines also record at 32kHz to give a longer recording time for a given length of tape.

To try and get around the copying problem many machines incorporate SCMS, the Serial

Copy Management System, a device which enables you to record from a CD but not to 'clone' one digital tape from another.

Portable machines are now entering the market but make sure the price you are quoted includes an analogue to digital convertor, with some portables these have to be purchased separately and increase the price considerably

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa HD-S100 £450	Average - Average -	Largely bulletproof in non-critical and semi-critical applications. Despite the usual limitations of DAT as a hi-fi medium, the HD-S100 is a practical and well built tool.	Portable, ADC, mic in, phone/line sockets (3.5mm), 70 min battery	R	105
Aiwa XD-S1100 £550	Poor Average -	A muddled fascia detracts from the appeal of this inexpensive deck, but the real no no is a significant loss of the finer virtues: detail, imagery etc	SCMS, analogue, coaxial & optical in/outputs, full subcode editing		99
Aiwa XD-S260 £500	Poor Poor	Unlovely sounding deck lacks weight, clarity and presence. Low pricing and mini dimensions excuse many sins however	SCMS, optical/coaxial and analogue in, optical/analogue out		99
Denon DTR-2000 £800	Good Very Good	Not cheap, but first rate DAT recorder, good to excellent fidelity in all modes, with a slightly cool detached quality when differences are detectable.	Digital LP/digital & analogue SP rec/play, LP analogue play only	R	93
JVC XD-Z505 £620	Good Good	Competent middle market DAT with uncomplicated (but still flawed) user interface, but good basic sound quality. A fine CD dubbing machine.	DAT SP/LP en/decode, low bit conversion, remote control	R	105
Kenwood DX-7 £500/Sony	n/a Average	Sound quality is pretty fair, but a little rougher than the best of the breed. Controls are good, the display however is poor - and most users will require the accessory pack	Mains recorder, LP mode. Optional accessory packs adds battery/ADC		94 Supp.
Kenwood DX-7030 £700	Average Average-	Bland sounding deck that lacks low level clarity and imaging. No analogue LP mode. Build quality is good however and ease of use ranks highly	Remote control, stand-alone DAC facility, optical/coaxial in/out		99
Pioneer D-500 £600	Good - Average	Looks extremely good. Fascia design is complex yet accomplished, and offers very slick tape handling. Musically however it is on the messy side compared to others in this price area.	SP/LP en/decode 1-bit converters, many search/display aids		105
Sony DTC-750 £450	Good Good	Superb value for money: the lowest price full size DAT on the market, fine features, build, measurements and sound approaching the best DAT has to offer at any price.	SP/LP record, real time/date recording	BB	105
Sony DTC-77ES £1000	Excellent Average	Superb engineering, many well implemented features (including off tape monitoring) and technical near perfection (!) don't offset perceptibly slowed, thickened sound	4-head, tape monitor, many search/display options, SP/LP		105
Sony DTC-M100 £799	Very Good Very Good	Only available from professional outlets. Clean clear sounding second generation model with most of the features and sound of the DTC-1000ES	Midi-width, alpha-numeric display, remote, optical interfaces	R	63
Sony TCD-D3 £500	n/a Very Good	At the time of writing, this model represents the state of the art, and beats all comers.	DAT recorder, detachable rechargeable power pack, LP/SP	BB	94 Supp.

EQUIPMENT SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two broad schools of design. The most common

is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be.

The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses spikes at the base but Blu-

tack or the like for coupling with the cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

EQUIPMENT SUPPORTS - COMPONENTS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (H x W x D)	VALUE	ISSUE
Alphason R444 £120	Rack Good	A heavyweight structure with stressed MDF shelves, ideally suited to the Sonata turntable	82 x 60 x 39.5cm	R	83
Audioquest Sorbothane Feet £40 for four	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS6 £60	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		83 Supp.
Foundation Stable Table £100 (with Supe	Table Good	Similar to Stand Design's table though less well finished and certainly less stable	64 x 46.5 x 36cm		58
Origin Live Skyline Super £100	Table Good	An asymmetric table that helps provide a quick, lucid and solid sound with most decks	41 x 50 x 40cm	R	83
Roksan Equipment Table £169	Rack Good	An upgradable/expandable system suited to Roksan's Xerxes if not other competing turntables	65 x 52 x 38cm		58

EQUIPMENT SUPPORTS - COMPONENTS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (H x W x D)	VALUE	ISSUE
Sound Organisation Table £55	Table Very Good	A deceptively simple structure that just happens to be engineered in a thoughtful, and ultimately successful manner.	37 x 45 x 35cm	BB	57
Sound Organisation Wall Stand £40	Shelf Very Good	The first of its ilk and still amongst the best, this simple framework represents a vast improvement over standard furniture shelves.	27.5 x 43 x 35cm	BB	57
Sound Organisation 2022 £97	Table Excellent	A small but costly table made from thin steel tubing. Suited to the LP12 but not other decks	49 x 45.5 x 36cm		58
Stand Design Duplex £75	Table Very Good	Well made and nicely finished, this table is broadly compatible with most heavy turntables	63.5 x 46.5 x 36cm	R	83
Target TT2 £64	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'. Design was updated in 1990	52 x 46.5 x 35.5cm	BB	57

EQUIPMENT SUPPORTS - LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (H x W x D)	VALUE	ISSUE
Appolo A10 £52.50	4 leg Average	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old.	19 x 19cm 44cm	R	58
Appolo A820 £44	4 leg Average	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Foundation Fred £70	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Maggi £159 to order	Plinth Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £269 to order	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/5	R	58
Foundation Sir Fred £80	2 leg Good	Upgraded 'Fred' with special in-fills. Sweet sound but one that also lacks bite and edge	19 x 19 x46.5cm		83 Supp.
Goldingr Black Satin £65	1 leg Very Good	Screw together stand tastefully hewn from medite. Some loss of bass but still pleasantly rhythmic	18 x 20 46cm	R	83 Supp.
Heybrook HBS1 £109	4 leg Very Good	With its new aluminium base frame the HBS1 fared very well in the listening tests. It allowed much of the speakers own 'sound' to remain intact.	23 x 21cm 47cm	R	58
Heybrook P5S £69	3 leg Very Good	An unusual triangulated open frame stand that can help certain speakers sound more transparent and fluent - a good value stand	23 x 21.5cm 47cm	BB	58
Linn Kan II £101	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers.	19 x 16cm 59cm		58
Linn Sara £112	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Origin Live Three Leg £89	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R	58
QED TS22 Tristand £60	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband.	19 x 17cm 45/50/58cm	BB	58
Standesign Z20 £75	1 leg Excellent	Well built and finished with optional sand in-fill. Ideally suited to Wharfedale 505.2's	16.5 x 19 50cm	R	83 Supp
Target HJ15/3 £107	3 leg Very Good	Sound quality was basically very good though without the sand infil some loudspeakers may sound a little unbalanced as both bass and treble regions are subjectively exaggerated.	28 x 28cm 40cm	R	58
Target HS20 £64	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the speakers sound accordingly	19 x 16.5cm 53cm		58
Target T-40 £51	2 leg Very Good	Not very stable, tends to infer a slightly forward, ragged sound with diluted pitch	19 x 19 40cm		83 Supp

HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jecklin and Stax models.

The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit

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, as well as irritating the hell out of 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.

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.

MODEL PRICE	FIT SOUND	COMMENTS	TYPE	VALUE	ISSUE
Aiwa HP-X30 £31	Good Good -	A flashy personal stereo phone which alternatively could be used at home. A slight LF tonal preference slightly colours the response, but it ain't a bad can	Supra-aural, closed-back, dynamic		75
AKG K1000 £500	Very Good Excellent	One of the best moving coil headphones on the market, hooks directly to speaker outputs and makes much of the competition sound lame. Looks a tad weird	Extra-aural, open-back, dynamic	R	99
AKG K135 £33	Poor Average	Despite a very appealing design the K135s don't live up to the usual AKG standards, though they do have the ability to reproduce rhythm well	Supra-aural, semi-open, dynamic		63
AKG K145/S £60	Good + Good +	Electrostatic tweeters combine with a dynamic mid/bass unit to create very confident sounds in a comfortable headphone. Balance is on the bright side	Supra-aural, semi-open, electrostatic/ dynamic	R	75
AKG K240 Monitor £60	Very Good Good	Something of a classic, these AKGs are very user friendly in all respects; sonically on the warm side of neutral	Circumaural, semi-open, dynamic	R	63
AKG K280 Parabolic £90	Good Very Good	A very revealing and unusual twin driver design that uses the same principle as a satellite dish to beam sound into the ear	Circumaural, open-backed, dynamic	R	63
AKG K340 £140	Good Excellent	Heavyweight cans in most respects, the K340 with its electrostatic tweeter is a very revealing headphone. Gives the total electrostatics a good run for their money	Circumaural, closed-back, electrostatic/dynamic	R	75
AKG K44 £40	Good+ Average	Good quality personal oriented phone, could have a better sense of space but is musically quite communicative	Supra-aural, open-back, dynamic		99
Audio-Technica ATH-609 £31	Average Average-	Warm feeling and sounding with impressive physical substance for the price, could be more relaxed and open	Circumaural, open-back, dynamic	R	99

HEADPHONES

MODEL PRICE	FIT SOUND	COMMENTS	TYPE	VALUE	ISSUE
Audio-Technica ATH-611 £51	Average Good	Same basic design as 609 but bigger thinner diaphragm makes this a more relaxed and informative headphone	Circumaural, open-back, dynamic		99
Audio-Technica ATH-909 £60	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at highish levels	Circumaural, semi-open, dynamic		55
Audio-Technica ATH-910 £70	Average Good	The closed-back 910s are an improvement on the 909s with a nice rhythmic quality rarely found with headphones	Circumaural, closed-back, dynamic	R	55
Audio-Technica ATH-911 £80	Very Good Very Good	Nicely finished dynamic headphones with all the trimmings, plus a very clean and subtle sound	Circumaural, open-backed, dynamic	R	63
Beyer DT 325 £32	Very Good Average	Lightweight in more ways than one, the 325s may be a little bright for some systems and tastes but will suit duller sources	Supra-aural, open-back, dynamic	R	63
Beyer DT330 Mk II £50	Good Poor	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
Beyer DT550 £61	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange; not suitable for headbangers!	Circumaural, semi-open, dynamic		55
Beyer DT880 £80	Good Good	Well made cans with a warmish sound but fairly solid midrange, though they're not that informative for the price	Circumaural, semi-open, dynamic		63
Beyer DT990 £102	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones; they have a smooth and yet revealing neutral sound that is hard to criticise	Circumaural, open-back, dynamic	R	55
Beyer IRS690 £203	Good + Very Good	High quality infra-red headphones with soft comfy earpads and mellow but informative sound quality which is hard to dislike	Circumaural, open-back, dynamic	R	75
Jecklin Float Electrostatic £399	Good Excellent	One version of the state-of-the-art, these electrostatics have an openness of sound rarely found in the breed, with good dynamic range to boot	Circumaural-ish, open-back, electrostatic	R	55
Jecklin Float Model One £79	Good Very Good	Whilst very unusual in appearance, the Floats give remarkable sound quality and openness at a reasonable price	Circumaural-ish, open-back, dynamic	BB	55
Jecklin Float Model Two £99	Good Very Good	Helmet shaped and pretty unflattering but open sounding and comfortable in the long term. Note lack of adjustment means you should try before you buy	Circumaural-ish, open-backed, dynamic	R	63
JVC HA-D990 £65	Good + Good +	Good looking well made cans that offer good sound quality for the money. Sonic nature is of the easy-going, laid-back variety	Supra-aural, closed-back, dynamic	R	75
Koss K/6X Plus £30	Average Poor	'Sixties-style' phones from the good ole US of A, their sonic style is unique and can make a system sound quite different	Supra-aural, closed-backed, dynamic		63
Koss TD/60 £20	Good Average	Although they're devoid of channel identification and have a decidedly Stateside approach to sound, these are very listenable phones for the price	Supra-aural, closed-back, dynamic		75
Pioneer SE-72 £30	Good + Average -	Neat, very nicely made personal stereo phones along the lines of Sony V3s. Sound is on the veiled side, good for aggressive sources	Supra-aural, closed-back dynamic		75
Quart Phone 30 X £40	Good Average	Slightly dark character makes these more suitable for some sources/material than others, specifically music that needs bass weight	Supra-aural, open-back, dynamic		99
Quart Phone 70 £70	Good Good	Competent performers that were hard to criticise but lacked the life and sparkle of which some of the competition are capable	Circumaural, closed-back, dynamic		63
Quart Phone 95 X £100	Good+ Good+	Can sound even handed, relaxed and open with a good drive system but may be a bit too transparent for lesser headphone outputs	Circumaural, open back, dynamic	R	99
Ross RE2530 CD £20	Average Average	Rather an 'average' £20 phone that some found uncomfortable due to high pressure on the ears. Sonic balance is on the bright side	Supra-aural, closed-back, dynamic		75
Ross RE2560 CD £25	Good Average +	If you're not too fussy about quality of finish and don't have an elfin head then these British phones warrant attention. Sound could be smoother	Supra-aural, semi-open, dynamic		75
Sennheiser HD40 £20	Very Good Good -	Very light and comfortable headphones with an even sonic balance that will suit most sources, but jack is 6.3mm and not suited to personals	Supra-aural, semi-open, dynamic	BB	75
Sennheiser HD450II £40	Good+ Good-	A neat looking supra that makes quite acceptable noises with a variety of outputs, could sound more spacious but is pleasantly relaxed	Supra-aural, open-back, dynamic		99
Sennheiser HD480 Classic II £60	Good+ Good	The same basic design as the 450 but improved sound quality as a result of aluminium coil and extra damping, natural with good bass	Supra-aural, open-back, dynamic	R	99
Sennheiser HD520 £65	Good + Good +	A very comfortable and musically capable headphone. If you've got this sort of bread to blow on cans, give 'em a blast	Circumaural, semi-open, dynamic	R	75
Sennheiser HD530 £75	Very Good Good +	One of the better dynamics in its group, the 530s create a sense of space that eludes most sub £100 cans, and they're dead comfy to boot	Circumaural, semi-open, dynamic	R	75
Sennheiser HD540 Ref Gold £160	Good Very Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sennheiser HD560 Ovation II £120	Very Good Good+	A comfortable and nicely styled headphone that could be more natural sounding at HF, but is detailed and open with good power	Circumaural, open-back, dynamic		99
Sony A21EX £20	Good - Good -	Forward facing in-ear drivers on a folding plastic band provide exceptional clarity for such an inexpensive phone. However, no bass, and fit isn't to everyone's taste	Intra-aural, semi-open, dynamic	BB	75
Sony MDR-CD3000 £300	Very Good Very Good	Better than most of the headphone outputs around so hard to make the most of, potentially up there with the electrostatics	Circumaural, closed-back, dynamic	R	99
Sony MDR-CD350 £32	Good+ Good	Very impressive for the price the 350 is possibly the most open sounding cheap closed back can around, lightweight in balance but transparent	Circumaural, closed-back, dynamic	BB	99
Sony MDR-CD550 £50	Good+ Good+	A very competent headphone for the price, creates a remarkable sense of space for a closed back design and sounds natural to boot	Circumaural, closed-back, dynamic	BB	99
Sony MDR-R10 £2500	Excellent Excellent	Costly state of the art sealed moving coil design built to the highest standards using the finest materials. Sound quality reflects this care, being big, clear, sweet and refined	Circumaural, closed-back, dynamic	R	72
Stax Gamma pro/SRD-X pro £296/£230	Very Good Excellent	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
Stax Lambda Signature/SRM-T1 £470/£895	Very Good Excellent	The Signature when combined with the SRM-T1 valve driver must be the most transparent headphone available	Circumaural, open-backed, electrostatic	R	72
Stax SR Gamma £299 (inc. SRD-6 Adaptorat £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price	Circumaural, open back, electrostatic	R	55
Stax SR Lambda Pro/SRD-7SB Mk 2 Adaptor £360/£185	Very Good Very Good	A bit of an industry reference, the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro/SRM-1 Energisers £360/£635	Very Good Excellent	This combination extracts layers of information that other headphones only hint at. The SRM-1 has more edge than the SRM-T1, but it's good	Circumaural, open-back, electrostatic	R	75
Stax SR34 £140	Average Very Good	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR84 £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	63
Yamaha YHL-006 £30	Average Average	Unusual personal stereo oriented phones that curl up when not in use. Earphones are like golf balls and balance is well suited to Walkmans	Supra-aural, open-back, dynamic		75

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 rigid stands. The listener should be about the same distance from and listening angle to each loudspeaker. The ideal placement depends on the way a particular model has been balanced (not to mention a number of other factors), and our recommendation is given in the entries.

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
ATC SCM20 £1320	Very Good Good +	Massively built to no-compromise Pro monitoring standards, the SCM20 is invariably informative but the rather forward presentation can be uncomfortable	44 x 24 x 31cm stands close to rear wall	82dB/w 28Hz (in room)		86
Acoustic Energy AE1 £767	Good Good	Amongst the best miniatures around, this metal driver pioneer shows exceptional mid focus and coherence, but is pricey and could be faster and more agile.	29.5x18x25cm stands clear of wall	84dB 48Hz (in room)		102
Acoustic Energy AE2 £916	Good Very Good	Dynamic, solid and lively, a great allrounder if a bit small considering the price. AE proves that metal cone/dome drivers really work	39 x 23.5 x 29.5cm heavy stands, free	88.5dB 45Hz	R	66
Acoustic Energy AE3 £1650	Very Good Very Good	Solid, authoritative and impressively accurate – if a shade ponderous and slow – AE's latest 'big one' is a much better bet than the earlier '4, combining	63 x 26.5 x 37cm low stands in free space	85dB/w 23Hz (in room)	R	86
Acoustic Research AR-112 £125	Average Average -	Nicely presented and engineered, but sounds a bit small and boxy without true coherence	36 x 19 x 18.5cm stands near rear wal	87dB/w 75Hz		66
Acoustic Research AR-122 £150	Average Average	Despite a promising enough list of ingredients, the 122 failed to excite real enthusiasm amongst the listening panel	38.5 x 19 x 22cm stands near rear wal	87dB/w 68Hz		68
Acoustic Research AR-132 £200	Average + Average -	Good presentation and detail engineering was not sufficient to counter bass heavy balance problems on auditioning	44.5 x 23 x 25.5cm stands 1ft from rear	87dB/w 50Hz		66
Acoustic Research AR-152 £373	Good Good-	Large bookshelf size model with luxury finish has a slightly thin overall balance, but fine coherence and agility makes it well worth considering	44 x 23.5 x 28cm stand 1-2ft wall	87dB 25Hz in room		98
Acoustic Research Red Box £100	Average Average	Lively and balanced if a bit crude and uneven, this econobox succeeds partly because of its simplicity, and works well with some rear wall assistance	32 x 19.5 x 17cm close to rear wall	87dB/w 85Hz	R	74
Alexander SE11 £299 (s)	Good Good	Clearly better than its cheaper stablemates, the metal jacket delivers a different – and in some respects superior – sound than the wood-based	52 x 14 x 17.5cm stands close to wall	86dB/w 25Hz (in room)	R	82
Alexander SE5 £199	Average Average	Particularly well suited to surround sound A/V applications, the SE5 can give any miniature a run for its money on bass performance; hardness and coloration	40.5 x 12 x 15cm ALS stands near wall	82dB/w 50Hz (in room)		78
Allison AL100 £120	Average- Average	Loud and lively budget wall-mount is bigger and beefier than most of the competition, if lacking some subtlety and refinement	33.5 x 24 x 21.5cm stands against wall	87dB/W 30Hz (in room)	BB	94
Allison AL105 £150	Average Average -	Pretty enough in appearance, sonically the AL105 doesn't really make the grade at the £150 asking price	37 x 24 x 21cm high stands against wall	87dB/w 45Hz (in room)		78
Allison AL110 £220	Good+ Good-	Compact bookshelf model is a little dry and mid forward, but bass is extended and solid. Free space balance is good, though build quality could be improved.	40x24.5x22.5cm stands 1-2ft from wa	86dB 28Hz (in room)	R	102
Allison AL120 £429	Good Average	Cleverly engineered compact floorstander is pretty well balanced if slightly mid forward, but sound quality is a little disappointing for the price	63 x 28 x 27cm floor, clear of walls	88dB 30Hz (in room)		98
Allison CD6 £290	Average Good -	An unusual cube-shaped model designed for wall mounting gives exceptional bass extension from a small box, though it's also a bit heavy, coloured and slow	28.5 x 28.5 x 28.5cm stands against rear	88dB/w 45Hz	R	71
Allison MS 200 £220	Average- Average-	Built as small and solid as a brick, this micro-miniature has limited bass and bright balance, but sounds agile and communicative	25.5 x 14.5 x 15cm 50Hz (in room)	85dB close to wall		106
Alphason Amphion £680	Good Good	This fine-sounding, nicely finished compact wall-mount is just a little too expensive for formal Recommendation, but is a good performer for all that	44 x 23 x 27.5cm high stands against wall	88dB/w 47Hz (in room)		78
Alphason Artemis £299	Average Average+	Pretty little miniature sounds nicely unboxy but is also a bit short of punch and balanced rather too bright.	27 x 17.5 x 22cm stands 1ft from wall	86dB/W 50Hz (in room)		94
Alphason Orpheus £1000	Good Good +	Large hi-tech two-way features unusual, sweet-sounding isodynamic tweeter; well engineered and balanced if a shade odd in appearance	65.5 x 28 x 34cm stands near rear wal	87dB/w 43Hz	R	71
Apogee Caliper Signature £3998	Good + Very Good	Pretty but power hungry full range panels have remarkable transparency and delicacy, though loudness and bass 'grunt' are both a bit lacking	122 x 59-70 x 6.5-28cm floor, free space	81dB/w 30Hz (in room)	R	81
Arcam Alpha £200	Good Good	It has its own colorations to be sure, but delivers a fine room balance with unusually good dynamics, timing and 'life', and is fine material value	46 x 26.5 x 26cm stands close to wall	89dB/w 30Hz (in room)	BB	82
Arcam Delta Two £340	Average+ Good	Pretty luxury compact sounds a shade forward and coloured but has dynamic and lively bass for its size	37.5 x 22.5 x 27.5cm stands 1-2ft from wa	87dB/W 40Hz (in room)	R	94
Ariston Image £180	Average - Average -	Despite a sweet treble character, the Image fails to impress with a 'lumpy' over-rich balance that has room integration problems	42 x 22 x 27.5cm stands in free space	89dB/w 28Hz (in room)		82
Ariston Q £395	Average + Average	The prettily shaped Q delivers a good impression of scale from a small box, but a rather laid back, ponderous and over-rich overall sound	35 x 16.5-25 x 20-27cm high stands in free	85dB/w 30Hz (in room)		86
Audio Electronics TC10 II £599	Good - Good +	Oddball appearance is rescued by a respectable technical performance, interesting and impressive engineering and fine sound quality	70 x 33.5 x 33.5cm low stands in free space	87.5dB 40Hz	R	68
Audio Note AN-E £1300	Very Good Very Good	Lovely coherence, great midband dynamics and transparency, extended bass and high sensitivity — pity it's so darn ugly!	80 x 36 x 28cm low stands, free space	90-91d 20Hz (in room)	R	106
Audioplan Kontrapunkt £799	Good Good +	Cute little German miniature sounds as sweet as it looks, dressed expensively in real wood with matching stands. Not for bass or loudness freaks	31 x 24 x 13cm free space, matching stan	83dB/w 48Hz (in room)	R	86
B&W 610 £200	Good Average	Fine presentation and good perceived value, with good in-room bass extension and impressive loudness credentials too, but rather indifferent integration and coherence	49x23.5x30cm stands clear o	89dB/W 25Hz (in room)		102
B&W 620 £299	Good Good	Good value floorstander has well balanced, laid back and slightly lazy sound that is pleasantly easy on the ears; could do with its own spikes	74 x 23.5 x 30cm floor, free space	89dB/W 25Hz (in room)	BB	94
B&W CM1 £400	Good Average	Cleverly thought out luxury design package is also fundamentally well engineered, if a shade pricey on 'sound for pound' basis	24.5 x 16 x 22cm close to rear wall	84dB/w 90Hz		74
B&W DM550 £149	Good + Average -	Beautifully presented, well engineered near-miniature with precise sound but a distinct lack of 'wellie'. Ideal for considerate flat dwellers	35 x 20.5 x 22.5cm stands in free space	86dB/w 70Hz		71
B&W DM560 £199	Average + Average -	Fine cosmetic presentation and good engineering for the price; overload protection may be handy but listening panel was underwhelmed	49 x 23.5 x 30cm stands in free space	88dB/w 55Hz		66
B&W DM600 £150	Good+ Average+	Attractive hi-tech appearance and clever engineering makes for an impressively smooth overall balance, but sound is a touch bland with it	35 x 20.5 x 25cm stands 1-2ft from wa	85dB 30Hz (in room)	R	98
B&W Matrix 801 £3295	Good + Good +	Lacks the transparency of the best panels, and the drama of the best dynamics, but is something of an acoustic tour de force, with low coloration and fine imaging	77/99 x 56 x 43cm floor or stands, tre	86dB/w <20Hz (in room)	R	81

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
B&W Matrix 805 £915	Very Good Good	A genuine compact monitor, stylish, with remarkable imaging properties, good balance and low coloration, though less successful at communicating musical	42(max) x 26 x 22.5cm Slate stands in free	87dB 30Hz (in room)		98
B&W Vision DS1 £120	Average Average -	Although significantly hampered by upper bass cabinet coloration, the DS1 cleverly combines high sensitivity with a rich and generous soundstage	36 x 21 x 19cm stands quite close to wall	91dB/w 40Hz (in room)	R	82
B&W Vision DS2 £180	Average Average -	Although the box is generous for the price, the DS2 is a rather uneven performer, both on the measurement and listening.	50 x 24 x 25cm stands in free space	89dB/w 43Hz (in room)		86
Bose 305 £350	Average Good -	A bit of an oddball, fine dynamic liveliness and a good room match more than make up for the strange stereo imaging and treble	28 x 45 x 23cm high stands near wall	88dB/w 40Hz (in room)	R	78
Bose 901 MK6 £1600	Good Average	Still controversial after all these years, the pre-equalised multi-driver 901 is cleverly engineered to deliver exceptional loudness.	33 x 54 x 32cm rigid stands in free space	(92dB/ midband) 28Hz (in room)		86
Bose Interaudio 3000XL £150	Average Average -	Lots of perceived value and well enough balanced, but low cost cabinet and driver engineering results in a crude and unobtrusive sound	46.5 x 29 x 23cm stands in free space	89dB/w 45Hz		71
Boston A120 £349	Average + Good -	Ugly but cleverly engineered, the 120 combines a tiny main driver with much larger ABR to give a generous, bighearted and lively sound despite little bass	62.5 x 31.5 x 25cm stands in free space	89dB/w 48Hz	R	86
Boston A40II £120	Average Average -	Competent performance for size and price but below average relative to the UK competition	34 X 21 x 20cm on stands near wall	88.5dB 63Hz		41
Boston Acoustics T830 £399	Good Good	A lot of speaker for the money, the T830 is a smooth and accomplished performer with a big and easy - or alternatively a lazy and laid back - sound	82.5 x 25.5 x 24cm floor, away from wal	87dB/w 30Hz (in room)	R	82
Brinkmann Endymion £395	Average- Average+	Omnidirectional design with rococo styled urn-shaped ceramic enclosure. Distinctly bass light, but sounds impressively coherent and solid	48 x 29 (diam)cm stands in free space	85-87dB 50/150Hz (in room)		106
C-J Synthesis LM210 £895	Good Good+	Elegant compact US floorstander is eminently relaxing and listenable, with open and coherent midband, if a bit short on welly and drive	90 x 26 x 27cm clear of walls	86dB 28Hz (in room)	R	106
Cambridge SoundWorks Ambianc	Average Poor	Attractively styled sub-miniature sacrifices sensitivity in the interests of bass extension, but manages to lose dynamics along the way too	28 x 18 x 14cm close to wall	83dB/W 45Hz (in room)		94
Canon S-50 £349	Average Average+	Though only a small cone miniature at heart, the fascinating styling and extended stereo listening area feature make it utterly original and unique.	30x24(diam)cm stands in free space	84dB 48Hz (in room)	R	102
Castle Chester £599	Good Very Good	A brilliant throwback, using horn-type approach to provide startling midrange dynamics and coherence.	94 x 23 x 27cm floor, experiment	87dB 45Hz	BB	98
Castle Durham £259	Average + Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/w 67Hz	R	46
Castle Pembroke £379	Good Average +	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/w 46Hz	R	31
Castle SG Trent £129	Average Average	The grey paint finish looks much more modern than black vinyl woodprint, and this miniature wall-mount sounds lively and engaging, if a bit rough at the top.	33.5x18x20cm stands close to wall	88dB 50Hz (in room)	R	102
Castle Warwick £229	Good Average -	Excellent presentation and fine engineering with overload protection, but a sonic disappointment in bass and dynamic qualities	46.5 x 25 x 23cm stands 1ft from rear	88dB/w 50Hz		66
Castle Winchester £1400	Very Good Very Good	This unconventional and beautifully crafted model is physically large for its bass extension but is engagingly agile and sounds attractively open and airy	114 x 24 x 47cm in free space	87dB/w 25Hz	R	90
Celef CF2 Nimbus £230	Good - Good -	Nicely balanced overall but a little uneven with it, this lively and dynamic largebookshelf model came close recommendation	46 x 25.5 x 24cm stands in free space	88dB/w 55Hz		71
Celef Cirrus £180	Average Good	It's nice to see Celef back in the UK, with this decent sounding small reflex box that seems unusually tolerant of siting	39 x 20.5 x 23cm stands in free space	84dB/w 60Hz	R	66
Celestion 3 £109	Average + Average	This attractive little wall-mount gives good balance and stereo imagery, with a character which leans more towards inoffensiveness than excitement	31 x 18.5 x 21cm high stands against wall	86dB/w 55Hz (in room)	R	78
Celestion 5 £149	Good Average	Cunningly conceived and balanced, the 5 may be a little slow for some tastes, but is well suited to CD-oriented budget systems	35 x 20.5 x 26cm heavy stands close to wall	89dB/w 30Hz		90
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system - with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB	R	60
Celestion 7 £200	Average Average+	Good value, good looking large bookshelf size wall-mount has lively up front presentation. Can sound a bit coarse and stand selection is critical.	45 x 24.5 x 32cm heavy stands close to wall	87dB 30Hz (in room)	R	98
Celestion 9 £249	Good Average	Nicely presented and fair material value, with impressively flat bass-to-mid balance, the 9 doesn't really make a convincing case for the return of the three-way.	49.5x20.5x24cm stands clear of wall	89dB 30Hz (in room)		102
Celestion DL6 Series II £179	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/w 65Hz		59
Celestion DL8 Series II £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB 60Hz	R	59
Celestion SL12Si £599	Average Average	Careful setting up does reveal elements of fine sound quality, but this 'grown up' SL6 variation has a lumpy response alongside its improved power handling	53 x 20 x 27cm matching stands clea	85dB/w 50Hz		66
Celestion SL600Si £799	Good + Good	This Aerolam high tech miniature has certain remarkable qualities that some will find irresistible, but needs careful system and room matching	27 x 20 x 23cm free air on tall stands	82dB/w 52Hz		68
Celestion SL6Si £399	Average+ Average+	This stereotype luxury compact can sound a bit dull and congested, but really opens up on Slate Audio stands; favours CD	37.5 x 20 x 25cm stands 1-2ft from wa	88dB/W 30Hz (in room)		94
Creek CLS20 £200	Good Average -	Looks good material value, but sound is distinctly over-rich and thick in the mid-bass region; maybe the box is a little too large.	49 x 24.5 x 24cm open frame stands, free	88dB/W 30Hz		90
DCM Timeframe TF250 £350	Average + Average	Neat and unusual floorstanding presentation, marred by indifferent build and cuddly but rather coloured sound, especially on spoken word	86 x 32 x 16cm close to rear wall	88dB/w 45Hz		90
Dali 700 £600	Very Good Average	Good material value and fine bass extension for size and price, but overall sound is disappointing, perhaps due to complexity of driver array	110 x 28 x 35cm clear of walls	88dB/w 20Hz		90
Diamond Acoustics Ref III £895	Average Good+	Lovely freestander suffers from indifferent bass alignment, but is fast, coherent, solid and very informative indeed.	87 x 27.5 x 28cm well clear of walls	90dB 30Hz (in room)	R	106
Duntech PCL1000 Crown Prince £8478	n/a Excellent	Immensely 'listenable', refined sounding speaker capable of creating lifesize musical images. Not overly transparent to source, but very civilised	180 x 30.5 x 43.5 free standing away from	90dB/w 42Hz	R	72
Duntech PCL500 Marquis £5250	n/a Very Good	Better value for money than the Crown Prince - and arguably more dynamic, with real bass 'slam' but a little less refined in the higher registers	147.5 x 27 x 40cm free standing away from	92dB/w 48Hz	R	65
Eltax Linear Response 8 £399	Average- Average+	Good material value Danish floorstander suffers from 'loudness contour' balance due to twin main drivers, but nevertheless has pleasing coherence	97 x 21 x 33cm floor, free space	88dB 22Hz		98
Epos ES11 £300	Good Good+	Pretty luxury compact uses integral baffle/driver to give a remarkable combination of low coloration, transparency and speed; bass is a bit shy	37.5 x 20 x 25cm stands 1ft from wall	86dB/W 45Hz (in room)	BB	94
Epos ES14 £449	Good Very Good	Substantial stand mount model delivers delightful midrange focus and delicacy with good bass control. Tends to be system sensitive	49 x 22.5 x 29cm own stands 1-2ft from wa	85dB 25Hz (in room)	R	98
Equation 0 £1290	Average + Very Good	Expensive but most attractive floorstanding miniature. Bass is limited and mid tends to shout but sound is fast and lively with fine dynamics and timing	85 x 20 x 35.5cm floor, c1ft from wal	85dB/w 45Hz	R	90
Faraday FS5 £589	Good Good	Pricey and ugly, but with its own sonic charm nonetheless, thanks to the substantial (largely positive) influence of the concrete enclosure has upon the sound	46x27x26cm stands in free space	90dB 28Hz (in room)		102

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Faraday Siren £330 (d)	Average- Average-	Interesting if ugly high mass concrete cabinet is let down by imbalance of ageing driver combination	46 x 27 x 27cm stands, free space	87dB/W 48Hz (in room)		94
Goodmans HIM 440 £350	Good Average -	Amazing perceived value, sensitivity and good bass extension, marred by serious cabinet coloration, a nasty tweeter and a difficult amplifier load	87 x 38 x 40cm low stands clear of wall	94dB/w 24Hz		90
Goodmans M100 £80	Average + Average -	Effectively a Maxim on the cheap, the M100 measures more smoothly but sounds somehow less involving than its more famous stablemate.	20 x 17 x 26cm close to rear wall	85dB/w 50Hz (in room)	R	86
Goodmans M300 £100	Average Average -	Conveying much of the charm and life which has made the Maxim 2 so popular, the M300 is sensitive, but hampered by upper bass cabinet coloration	38.5 x 21.5 x 17cm stands close to rear	89dB/W 50Hz (in room)	R	82
Goodmans M500 £130	Average Average-	Large 'bookshelf' size means plenty of speaker for the money plus good sensitivity, let down by unruly mid/bass performance and indifferent build	47 x 24.5 x 21.5cm stands, free space	89dB/W 50Hz (in room)		94
Goodmans Maxim 3 £110	Good Average	Smooth and accomplished wall-mount miniature makes a worthy replacement for the bestselling Maxim 2	26 x 17 x 21cm stands against wall	85dB 50Hz (in room)	R	106
Harbeth HL Compact From £5	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	87.5dB 65Hz		59
Harbeth LS3/5A £343	Good Average	Still a classic miniature, though not to every taste, and none the better for the recent update under our listening conditions. Limited dynamic range	30.5 x 19 x 16cm stands in free space	81dB/w 60Hz		66
Heco Interior 120 £169	Good Average	Drab appearance belies a lively enough character, though the balance is altogether a bit bright for UK tastes	32 x 23 x 23cm high stands against wall	88dB/w 50Hz (in room)		78
Heco Interior 430 £429	Good Good -	This tall floorstanding enclosure delivers an impressively even sound balance with good bass extension, if not the lively dynamics to satisfy enthusiasts	85 x 24 x 27.5cm free space	88dB/w 43Hz	R	71
Heco Interior 90 £159	Good Average -	Neatly finished and engineered miniature, but the disappointingly 'lifeless' sound left the listening panel decidedly underwhelmed	27 x 18 x 16cm on high stands	87.5dB 90Hz		74
Heco Interior Plus 404 £400	Average+ Average+	Odd shape and size; twin main driver arrangement creates a slight 'boom n' tizz' effect, but mid focuses well and bass extension is impressive	58 x 26 x 31cm low stands free space	88dB/W 25Hz (in room)		94
Heco Presto Superior 750 £600	Good+ Average	Tall slim and attractive floorstander delivers a fine, even in-room balance but lacks transparency, coherence and dynamic drive	95 x 24 x 27cm clear of walls	87dB 22Hz (in room)		106
Heco Reflex 10 £160	Average+ Average	This nicely balanced and well mannered small bookshelf wall-mount is a competent rather than exceptional package for the price, thanks to indifferent build.	32x21x23cm stands up to 1ft fro	90dB 30Hz (in room)		102
Heco Superior 740 £599	Good Good -	A similar sonic package to the cheaper Interior 530, these Superior clothes are very pretty indeed, though spikes are still awaited	84.5 x 22 x 25cm on floor in free space	88dB/w 30Hz (in room)		78
Heco Superior 940 £999	Good Good	This large and beautifully finished floorstander has an impressively smooth and transparent midband. Bass is well extended but follows rather than drives the music	110 x 26 x 31.5cm free space	88dB/w 20Hz		86
Heybrook HB1 S3 £250	Average+ Good	Latest version of long established favourite delivers good liveliness and fine coherence for the price, even though the shape looks a bit dated	47 x 29 x 24cm HBS1 stands close(ish) to	88dB 30Hz (in room)	BB	98
Heybrook HB100 £279	Average + Good	Well matched for wall siting, the HB100 is a lively and informative performer in the tradition of the popular HB1	47 x 26 x 28cm stands near rear wall	86dB/w 50Hz	BB	66
Heybrook HB150 £369	Average Good	Convincingly communicative but a bit coloured and congested, this lively compact wall-mount is nicely finished but a little costly for the content	40.5 x 23 x 22cm stands close to rear	89dB/w 42Hz (in room)		82
Heybrook HB200 £429	Average Average	This luxury successor to the HB2 is lively and informative, but sounded insufficiently balanced to convince our listening panel	46 x 23 x 26cm stands against rear wall	87dB/w 55Hz		66
Heybrook Point 5 S2 £179	Good Good	Lively, revealing and enjoyable wall-mount can sound unruly with multi-strand but comes dramatically into focus with solid core cable.	37.5 x 23 x 24.5cm HBS1s against wall	85dB/W 28Hz (in room)	BB	94
Heybrook Point 7 £185	Average Average	Physically an attractive package, but not entirely convincing in lab or listening panel test; interesting for all that	40.5 x 23 x 23cm stands against rear	85dB/w 60Hz		68
Heybrook Sextet £949 (i)	Good Very Good	Elegant floorstanding three-way wall-mount is engagingly coherent and a highly analytical, partly due to distinct and not always comfortable upper-mid forwardness.	96x27x20cm close to wall	85dB 25Hz (in room)	R	102
Heybrook Solo £159	Average + Average +	Discreetly styled wallmount sounds a little untidy in both bass and treble but handles complex rhythmic material much better than most	36 x 23 x 22cm HBS1 stands close to wall	87dB/w 28Hz	R	90
Infinity Kappa 6 £795	Good Good	Interestingly styled US loudspeaker has unusual high tech drivers and good neutrality, but the sound seriously lacks excitement	63 x 38 x 24cm stands, free space	85dB/w 35Hz		66
Infinity Kappa 8 £1850	n/a Very Good	Very nicely made and unobtrusive but large four-way speakers which have a tendency to sound bass heavy unless used with solid core cables	118 x 51.5 x 17.5cm floor standing, open	89dB/w 33Hz		72
Infinity Modulus £695	Good Average +	Luxury high-tech miniature, carefully conceived and beautifully built. Undeniably attractive in the mid and treble, it failed to handle the bass as successfully	30 x 18 x 26cm high stands 1ft from wall	84dB/w 45Hz (in room)		86
Infinity RS2001 £180	Average Average +	A little coloured and unruly in the treble, the 2001 nevertheless retains the lively dynamic bounce of its predecessor; pity the price has gone up	36.5 x 22.5 x 20cm lightweight stands	87dB/w 50Hz (in room)	R	78
Infinity Reference 10 £149	Average Average	Follows the Infinity tradition in providing an engaging and lively sound from a prettily finished and substantial small bookshelf size model	36 x 23 x 23cm stands in free space	87dB 50Hz (in room)	R	98
Infinity Reference 20 £220	Good Average	Large bookshelf size model is well presented and balanced with good bass control, but somehow lacks convincing cohesion and agility; build was slightly suspect too.	46x27x24cm stands 1-2ft from wa	88dB 27Hz (in room)		102
Infinity Reference 30 £330	Good Good	Drivers from Ref 20 in box from Ref 50 creates a well balanced and extended floorstander at a very competitive price	85 x 26.5 x 25cm clear of walls	87-88dB 25Hz (in room)	R	106
Infinity Reference 50 £499	Average Average-	Despite hi-tech drivers, attractive presentation, good bass extension and sensitivity, this three-way floorstander suffers from a forward, coloured sound	86 x 26.5 x 25cm floor in free space	89dB 25Hz (in room)		98
JBL Control 1 Plus £229	Average Average	Sub-miniature with forward midrange and no real bass; highish price partly justified by cute, near-indestructible Pro styling and build	23 x 15.5 x 14cm close to rear wall	89dB/w 50Hz		90
JBL L20T3 £249	Average- Average-	Compact bookshelf model delivers bouncy miniature-type sound when free space mounted; pleasant enough but uneven and undistinguished	39 x 23 x 20.5cm stands free space	87dB/W 48Hz (in room)		94
JBL LX33 £259	Average + Good	A bit of a cheat, but a lot of speaker for the money, which manages a better room balance than many 'large bookshelf' rivals, and delivers a fine acoustic	80 x 25 x 21cm floor, 1ft from wall	89dB/w 48Hz	R	82
JBL LX44 £339	Good - Average	This generously built model offers good power handling, bass extension and dynamic range, but suffers from the 'three-way syndrome', with middle muddle	58.5 x 30 x 29cm stands in free space	89dB/w 40Hz		71
JBL LX55 £350	Good Average	This big bluff three-way provides lots of speaker, bandwidth and loudness for the asking price, but is ultimately a bit of a dinosaur	66x34.5x29cm stands clear of wall	91dB below 20Hz (in room)		102
JBL XE2 £149	Average- Average-	Budget Danish-built 'bookshelf' model has anomalous 'laid back' balance and lacks the genuine JBL spirit	38 x 23 x 23cm stands in free space	88dB 48Hz (in room)		98
JBL XPL 90 £699	Good Average +	Though undoubtedly pretty and very expensively engineered, this elaborate near-miniature didn't really convince our listeners.	39.5 x 24 x 24cm stands in free space	85dB/w 45Hz (in room)		86
JPW AP2 £180	Good Average	Good size bookshelf model offers real wood veneer at a bargain price; performance is cleaner but broadly comparable to P1 Vinyl overall	43.5 x 25.5 x 26cm stands in free space	86dB 45Hz (in room)	R	106
JPW AP3 £225	Good Average +	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/w 57Hz	R	46
JPW Minim £85	Average + Average -	Very civilised but dynamically limited, the Minim is well suited to the smaller room and where limited loudness is acceptable	27.5 x 18 x 19.5cm stands against wall	85dB/w 28Hz (in room)	R	82

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
JPW P1 £145	Good Average +	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/w 60Hz	R	59
JPW P1 Vinyl £135	Good Average	Not particularly pretty, this is still a lot of highly competent loudspeaker for the price, with a safe and middle-of-the-road sound that's unlikely to disappoint.	43.5x25.5x26cm stands 1-2ft from wa	87dB 32Hz (in room)	BB	102
JPW Sonata £115	Good Average +	Well balanced and integrated, this near-miniature offers fine sound if limited bass and dynamic range, plus real tree wood at a nearly silly price	32 x 23 x 20cm stands near rear wall	86dB/w 55Hz	BB	71
JPW Sonata Plus £135	Average Average -	This luxury variation on the redoubtable Sonata theme features a metal dome tweeter, and is not the better for it	32 x 23 x 21cm about 1ft from wall	87dB/w 30Hz		90
JRT AD1 £500 (s)	Average + Good +	A most auspicious Choice debut for relative newcomers JRT. A fair share of cosmetic deficiencies do little to spoil the impressive coherence and timing	59.5 x 28 x 36cm own stands close to rear	86dB/w 28Hz (in room)	R	86
JRT AD1 Micro £389	Average Good	Beautiful bijou miniature has delightful life and coherence and gives surprising impression of scale; some aggressive tendencies but very open to system tuning	28 x 17 x 21cm stands against wall	87dB/W 50Hz (in room)	R	94
Jamo Concert II £250	Good Average -	A thoroughly respectable 'bookshelf' performer that needs free space sitting but includes attractive cabinetwork and a neat grille	41 x 24 x 25cm stands in free space	85dB/w 48Hz		66
Jamo Concert V £500	Average Average	Compact, solid, nicely finished floorstander delivers unusually extended bass at the expense of lowish sensitivity; midband is smooth but laid back.	86x24x28cm well clear of walls	85dB below 20Hz (in room)		102
Jamo Concert VII £650	Average+ Average	Beautifully built large floorstander uses unusual double reflex bass system, unsuccessfully as far as low frequency resolution is concerned	96 x 28 x 31.5cm floor, free standing	87dB/W 25Hz (in room)		94
Jamo Cornet 40 £100	Average- Average	Pretty little Danish-built miniature with respectable rather than exceptional sound quality for the price	32 x 20 x 22cm stands 1-2ft from wall	86dB 48Hz (in room)		98
Jordan JH400 £504	Average- Average+	Beautiful piano finish hexagon has single full range driver and controversial sound, with uneven balance but delightful mid coherence	33 x 24 x 30.5cm 1-2ft from wall	83dB 50Hz (in room)	R	106
KEF 104/2 £1,295	Very Good Very Good	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound level	90 x 28 x 41.5cm floor standing in free spa	92dB/w 50Hz	R	60
KEF K120 £159	Good Average	Physically pretty and sonically competent but undistinguished medium bookshelf size model has good sensitivity but limited extension	34 x 20.5 x 26cm 1ft from wall	87dB 45Hz (in room)		106
KEF Q60 £349	Good Good	Uni-Q co-axial driver provides fine imaging and mid coherence, while magnet decoupling reduces cabinet coloration. Goes loud, bass not entirely convincing.	48x25x27cm stands close to wall	90dB 25Hz (in room)	R	102
KEF Q80 £499	Good Average+	Uni-Q floorstander has good stereo and fine midband coherence, but bass lacks extension, drive and resolution	85 x 24.5 x 26.5cm free space	87dB 45Hz (in room)		106
Kammerzelt Reference Mini Monitor	Average+ Good	Lovely miniature has a beguilingly sweet sound with good pace and drive, but scale is restricted and presence a little dulled considering the high price	stands 1-2ft from wall 85dB/W	50Hz (		94
Kenwood LS-770E £260	Good Good	Impressively communicative made-in-Japan large bookshelf size model has fine vigour, scale and dynamics, if not the smoothest sound around	48 x 27 x 25cm stands in free space	89dB 25Hz (in room)	R	106
Lindley New Age £1100	Average - Average +	Attractively different presentation with classy finish, this tall cylindrical floorstander has fine bass extension but a rather uneven overall balance	105 x 23 x 23cm clear of walls	86dB/w 25Hz		90
Linn Helix II £357 (s)	Good Good+	Ku-Stone supported, this is one of the best 'large bookshelf' size models around. Dry, controlled bass and very open, if slightly aggressive balance.	57x24x30cm KuStones 1-2ft from	88dB 33Hz (in room)	R	102
Linn Index II/KuStone £235/£1	Good Good	Combination of stand and speaker looks and sounds very good for the price, with good bass extension and control, fine dynamic range. Clean, clear if a shade slow	44 x 21 x 23.5cm (box only) close to rear	86dB/w 28Hz	BB	90
Linn Kaber LS500 £1098	Average Good +	Discreet wall-mount package trades sensitivity for fine bass extension and midbass performance; can be a little relentless but has prodigious dynamic capabilities	93 x 19 x 28cm floor against rear wall	86dB/w 45Hz (in room)	R	82
Linn Kan II £439	Average + Average +	A niche product for those prepared to tolerate its strong character for the sake of its fine bass performance and near invisibility	30.5 x 18.5 x 16.5cm Kan stands against	82dB/w 35Hz (in room)		78
Linn Nexus LS250 £458	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall	89dB/w 60Hz		59
Magneplanar MG1.4 £1090	Good + Good +	Replaces the stalwart MGc with a revised panel layout. Offers a very crisp and articulate sound, particularly revealing of upper mid vocal details	155 x 8 x 57cm open space	88dB/w 40Hz	R	72
Magneplanar SMGa £688	Average - Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/w 56Hz		46
Marantz LD-50DMS £230	Very Good Good	Well behaved larger two-way has fine balance, stereo and integration with good bass extension, albeit with mild boxy, chesty and fizzy effects	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)	R	71
Martin Logen CLS II £3998	n/a Very Good	Much improved high resolution design, fussy about system set-up and demanding of ancillaries and software alike. It rewards the efforts though	60 x 28 x 7.5cm open space	86dB/w 45Hz	R	72
Meridian Argent 1 £1,200	Good+ Good+	Beautifully built, finished and shaped but pricey compact has fine bass extension and virtual absence of 'boxiness'; needs a big amplifier	33 x 27(max) x 27(max)cm Slate stan	83dB 28Hz (in room)		98
Meridian Argent 2 £995	Good+ Good	This beautiful but pricey high-tech 'large compact' delivers an extended, smooth and neutral sound with fair speed. Slate Audio stands are almost essential	48.5 x 21 x 29.5cm stands free space	85dB/W 23Hz (in room)		94
Meridian M30 £895	Average + Average	Pricey but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 760 £100	Good Average +	Smart presentation and an engaging sound, this sensitive budget miniature sounds notably more lively and less boxy than most of its peers	29 x 18 x 20cm stands close to wall	88dB/w 50Hz	BB	90
Mission 761i £150	Good Average	Variation on 760 theme adds an extra main driver for easier amp loading and power handling. Sound was judged slightly inferior to its simpler, cheaper stablemate.	38x19x24cm stands close to wall	88dB 48Hz (in room)		102
Mission 762 £200	Average Average -	Mission's 'bookshelf middleweight' offers high sensitivity and loudness capability, but at the expense of a somewhat untidy and rather 'heavy' sound	50 x 25 x 27cm stand, experiment advised	91dB/w 55Hz		66
Mission 763 £300	Average + Average +	A very artful combination of generous volume and good bass extension at a modest price. Works well in the listening room despite a few rough edges	77 x 25 x 32cm near rear wall	86dB/w 40Hz	BB	68
Mission 764i £480	Good Average	Despite improvements, this large floorstander still lacks low frequency authority, which is probably a function of its comparatively modest price	1ft from wall, freestanding 87dB/W	below		94
Mission 767 £2500	Very Good Very Good	Magnificent and massive part-active monoliths have fine acoustic subtlety and impressive loudness capability, ultimately limited by partnering (Cyrus) electronics	138 x 29 x 43cm floor, flexible	91dB/w <20Hz (in room)	R	81
Mission Cyrus 780 £180	Good Average +	Pricey but very pretty miniature based on Mission 760 but with beefed up box and crossover network to enhance sound quality still further	29 x 18 x 26cm light stands close to wall	88dB/w 50Hz	R	90
Mission Cyrus 781 £250	Average + Good	Properly run in, the pretty little 781 delivers a fast, dynamic and informative sound which more than justifies its price.	43 x 22.5 x 28cm matching stands 1ft	88dB/w 28Hz (in room)	R	86
Mission Cyrus 782 £350 (s)	Good - Good -	Lively, articulate and beautifully finished, this compact wall-mount model with twin main drivers has good integration but a rather rich, 'Loudness' balance	50 x 25 x 32.5cm Cyrus stands near wall	90dB/w 50Hz		71
Monitor Audio MA1200 £900	Average Average +	This smooth and civilised slimline floorstanding loudspeaker is well built and nicely presented. But it is also expensive	94 x 20 x 26cm in free space	85dB/w 48Hz		68
Monitor Audio MA1800 £1400	Good Average +	Attractive and beautifully finished, even when ballasted with lead shot the 1800 inclines towards upper bass richness and lacks genuine extension	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)		81
Monitor Audio Monitor 11 £330	Average Good	This tall and slim and attractive free space compact has an extra driver to help out in the bass, giving extra urge at some price in delicacy	52 x 20 x 24cm stands free space	87dB/W 48Hz (in room)	R	94

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■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
Monitor Audio Monitor 14 £400	Average Average	Floorstanding version of M11 suffers from excess upper bass, giving a thick, chesty coloration beneath a quite lively and well focused mid and treble	78 x 20 x 24cm floor well clear of walls	86dB 30Hz (in room)		98
Monitor Audio Monitor 7 £180	Average - Average	This lively and punchy near-miniature looks pretty enough and is good value but is let down by an unruly and indifferently integrated tweeter	34 x 16.5 x 17cm stands 1ft from wall	84dB/w 70Hz		74
Monitor Audio Monitor 9 £220	Good Average	Despite a much better treble balance than the 7, the Monitor 9 is less engaging and lively at low frequencies than its smaller sibling	37 x 20 x 21cm high stands near wall	85dB/w 30Hz		78
Monitor Audio Monitor One £180 (rosewood)	Average+ Average+	Pricey but very cute little micro-miniature just about gets away with it sonically, though performance envelope is inevitably limited	24 x 15 x 16cm stands against wall	85dB 55Hz (in room)	R	106
Monitor Audio Studio 10 £1200	Average Average +	Expensive, luxury build/finish and all-metal driver diaphragms provide engagingly transparent midrange and treble, spoilt by over-strong mid-bass.	40 x 20 x 25cm heavy stands clear of wall	87dB/w 45Hz		90
Monitor Audio Studio 15 £1,600	Average+ Good	A little slow and lazy but better balanced than the smaller Studio models, the midband coherence and focus is superb, but it ain't cheap	51x20x26cm free space	87dB 45Hz (in room)	R	102
Monitor Audio Studio 5 £500	Average+ Average+	All metal diaphragm luxury miniature has splendid presence coherence but sound can be aggressive and lacks welly.	32 x 18 x 20cm stands close to wall	83dB 28Hz (in room)		98
Mordaunt-Short 5-30 £200	Average+ Average-	Good hi-tech material value for money, but a disappointingly dull and rather bland sound. Safe but uninspiring	42.5 x 25 x 28cm stands clear of walls	86dB 28Hz (in room)		106
Mordaunt-Short Classic 20 £395	Average+ Average+	Luxuriously finished compact delivers beguiling mid transparency but bass is altogether less convincing — one for the carpet slippers generation perhaps	37x22x27cm stands in free space	86dB 45Hz (in room)		102
Mordaunt-Short MS3.10 £110	Average Average+	Probably the liveliest and most communicative miniature around, this beautifully presented design is probably better suited to budget 'real hi-fi'	28.5x17.5x20cm stands in free space	88.5dB 48Hz (in room)		78
Mordaunt-Short MS3.20 £140	Average Average+	All the charm of its BB rated £99 baby 3.10 brother, plus a smidgeon more bass for those in a suggestable frame of mind	35.5x18x20cm stands against wall	85dB 50Hz (in room)	R	82
Mordaunt-Short MS3.30 £200	Average Average+	A little too mid-forward for neutrality or formal recommendation this attractive, good sized model nevertheless has more than enough appealing qualities	46x23.5x27cm stands 1-2ft from wal	87dB 38Hz (in room)		78
Mordaunt-Short MS3.40 £260	Average+ Average	It looks pretty and sound civilised but the 3.40 failed to ignite any degree of enthusiasm amongst our listeners. LF room matching is critical	57x23.5x27.5cm stands in free space	87dB 30Hz (in room)		86
NAD 8100 £300	Average+ Average+	Floorstanding variation on attractive 8225 miniature adds some half convincing extra bass thump and saves the price of stands - very cost effective	75 x 20 x 25cm floor clear of walls	88dB 25Hz (in room)	R	98
NAD 8225 £150	Good Average +	Notwithstanding lacklustre styling and an unprepossessing appearance, this NAD miniature has a smooth and even midband plus an appealing overall jauntiness.	34 x 20 x 18cm stands close to wall	87dB/w 45Hz (in room)	R	86
NVA Cube 1 £600 (s)	Good - Good +	Attractive, cube-shaped semi-omni is very sturdily built, and gives an idiosyncratic but unusually open, spacious and informative sound	33 x 32 x 32cm own stands c0.5m from wa	85dB/w 52Hz	R	71
NVA Cube 2 £380	Average Good	A rude but exciting miniature, with unusually accomplished bass capabilities for its size	28.5 x 27 x 28.5cm NVA stands against wall	85dB/w 48Hz (in room)	R	82
NVA Cubix £1100	Average Good	Too idiosyncratic for formal recommendation, the Cubix possesses remarkable bass extension for its size, but is tricky to optimise	60 x 32.5 x 32.5cm	84dB/w 28Hz (in room)		78
Naim NA IBL £798	Average+ Good	This tiny and elaborately engineered floorstanding wall mount delivers outstanding dynamics, speed and detail, marred by pronounced upper mid forwardness	wall, freestanding 84dB/W	30Hz (		94
Naim SBL £1,527	Good Very Good	Impressive scale and full bandwidth coherence from an attractively discrete floor standing wall-mount — coloured midband but very well balanced and agile with it.	88x26.5x17-27cm close to wall	86dB 25Hz (in room)	R	102
Neat Petite £525	Average Good+	Pricey and far from perfect, this near miniature is nevertheless one of the most entertaining and enjoyable speakers around, colorations notwithstanding.	30.5x20x18cm stands close to wall	86dB 33Hz (in room)	R	102
Opus 3 Capella £599	Good Good	The sound of this Scandinavian curiosity certainly benefits from the crushed marble enclosure, though presentation is strictly DIY	32 x 40.5 x 26(ave)cm amongst books in	86.5dB 45Hz		66
Opus 3 Credo £399	Average Average	Credo's odd-shaped silicate-based cabinet confers good box and bass performance, but the sound could be more neutral for the price	32 x 28 x 32cm stands in free space	88dB/w 65Hz		74
Origin Live OL1 £499	Very Good Good	Luxury miniature has very good overall balance, sacrificing sensitivity to achieve remarkable bass extension for the box size	30.5 x 19 x 21cm stands close to wall	82dB 25Hz (in room)		106
Pearl & Oakley Victoria 200 £1099	Average - Average -	Extraordinary — and to many very attractive — 'ginger jar' presentation in Staffordshire ceramics, but let down by need for further acoustic development	93 x 33 x 33cm on floor in free space	87dB/w 30Hz (in room)		78
Philips FB815 £250	Average Average	An impressively — indeed imposing — physical package for the price, clever engineering gives a very competent if slightly hard and brittle sound quality	63 x 27 x 27cm low stands in free space	85dB/w 30Hz		86
Philips FB820 £450	Good Average	Big-but-less-than-beautiful three-way is well enough balanced but lacks communication skills in the time domain	86 x 27 x 35cm floor clear of walls	87dB 28Hz (in room)		98
Philips FB825 £650	Good Good	Generous sounding and impressively uncongested for the type, loudness and bass extension don't quite match the large and rather plasticky box	110 x 29 x 41cm on cones clear of walls	88dB/w 25Hz	R	90
QLN Model One £700	Good Average	Similar to Signature at two thirds the price, Model One exaggerates the latter's rich and heavy midbass and lacks its velvet smoothness	35 x (16-25) x (21-27)cm pillar	85dB/w 28Hz (in room)		82
QLN Signature £1100	Good Good	Beautiful but expensive luxury compact has a rather laid back and 'heavy' sound, but coloration is low and stereo imaging very good	37 x 18 x 36cm heavy stands in free space	83dB/w 30Hz (in room)		78
Quad ESL-63 £2072	Good + Very Good	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without	92 x 66 x 27cm open stand well clear of	84dB/w 34Hz	R	60
RAM Hermes £425	Average- Average+	Slim small floorstander is a bit tall for its footprint. Good sensitivity is combined with an attractively lively sound, but it's uneven and not truly coherent	70 x 21.5 x 23cm floor, freestanding	91dB/W 45Hz (in room)		94
RCF Mytho 3 £1,395	Average Average+	Undoubtedly very attractive and well built, incorporating a number of unusual and interesting ideas, the highish price isn't really justified by the performance.	100x21.5x30cm away from walls	88dB 25Hz (in room)		102
Richard Allan CD5 £184	Average - Average -	This neatly presented small reflex design can sound engagingly communicative, but is flawed sonically and technically and quite expensive too	38 x 19 x 23cm on rigid stands	88dB/w 80Hz		68
Rogers LS2a/2 £209	Good+ Good	Balance is a bit warm and rich but 2a/2 has delightful mid-to-treble coherence and transparency, and more welly than Mk1	35.5 x 23 x 22cm stands clear of walls	84-85d 30Hz (in room)	BB	106
Rogers LS8a £425	Average + Average +	This modestly priced floorstander is a mixed bag, with plenty of scale and welly but lacking the subtlety, clarity and agility delivered by some rivals	89x25.5x25cm clear of walls	91dB 48Hz (in room)		102
Rogers Studio 1a £599	Very Good Good -	The classic BBC monitor style sound sensitively updated — transparent and natural with fine stereo, but a touch 'heavy' in balance	63.5 x 30.5 x 30.5cm stands in free space	87dB/w 36Hz	R	66
Roksan Darius £1569 (	Good Very Good	Now totally realigned, the current Darius provides an exceptionally impressive combination of transparency and delicacy with fine information retrieval and speed	47 x 27 x 40cm own stands angled in spa	82dB/w 20Hz	R	86
Royd A14 II £199	Average Good	Not the smoothest or prettiest around, this is still an informative if sometimes aggressive large bookshelf model, with plenty of welly for the price	40 x 26 x 23cm stands 1ft from wall	87dB/W 30Hz (in room)	R	94
Royd A7 Series 11 £115	Average + Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near	86dB/w 75Hz	R	53
Royd Apex £485	Average + Good	Not the smoothest sound around, it more than compensates with an impressively communicative and informative musical presentation	85.5 x 20 x 30cm on floor close to wall	87dB/w 33Hz (in room)	R	78
Royd Eden £235	Average Average +	Delightful mid/treble speed and transparency but determinedly bass light, this oddball miniature threatens cult status but could use a sweeter tweeter	31 x 20.5 x 18.5cm stands close to wall	87dB/w 85Hz	R	66

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Royd Sapphire £200	Average+ Good-	Neat little miniature sounds a touch cold and thin but unusual main driver delivers remarkable speed and coherence for such a reasonably priced model	30.5 x 20.5 x 21cm frame stands 1ft fro	88dB 28Hz (in room)	R	98
Royd Sintra £330	Average + Good	Balance is bass light and a little bright, but superb dynamics, speed and timing make this luxury miniature musically very informative and satisfying	30.5 x 20.5 x 19cm stands close to wall	88dB/w 50Hz	R	90
Ruark Swordsman £219	Good Average	Very attractively styled and finished, the Swordsman is a well built 'small bookshelf' model that delivered better test than listening results	38.5 x 20 x 27.5cm stands 0.5m from wal	84dB/w 50Hz		71
Ruark Swordsman Plus £269	Good Average	This real wood variation on the established Swordsman theme looks and measures rather better than it sounds, probably due to rather prosaic drivers	38 x 20 x 28cm stands 1-2ft from wall	84dB 27Hz (in room)		98
Ruark Talisman £629	Average Good	Clever and beautifully finished compact floorstander has some coloration but is impressively informative and communicative, with fine pace and timing	83.5 x 21.5 x 31 (max) cm close to rear wal	86dB/w 30Hz	R	90
SD Acoustics DBS £845	Average Good	Recent changes have added some refinement to a seductive midrange, good timing and fine sensitivity, though bass extension is limited and coloration obvious	102 x 35 x 25cm floor, angled, away from	92dB/w 30Hz (in room)	R	82
SD Acoustics Ribbon £2150	Average Good +	Entertaining but a little underdeveloped and rather amplifier sensitive, the Ribbon is a lively and loud hybrid marred by some colorations; some like it, others don't	152 x 30 x (15-30)cm floor, angled, away	91dB/w 30Hz (in room)		81
SD Acoustics SD1 £1350	Average Very Good	A large scale, airy and unusually detailed system with excellent dynamics. Current model has more civilised top-end and warmer balance than original model	123.5 x 38.2 x 31.9cm free space	90dB/w 50Hz	R	60
SD Acoustics SD3 £379	Average Good	Neither cheap nor perfect, this near miniature sounds unusually lively and dynamic within inevitable physical constraints. Both engaging and entertaining!	38 x 19 x 29cm stands 10cm from wall	83dB/w	R	86
SD Acoustics SD3 £399	Good Good	Port firmly blocked, the new SD3 has the agility and charm of a quality miniature, with good bass extension but low sensitivity	38 x 19.5 x 29cm stands 1ft from wal	83dB 25Hz (in room)	R I	106
Seventh Veil System IV £1290 (	Average Good +	Lacks welly and loudness but delivers astonishing results with female vocals in particular. Antithesis of the 'good allrounder'	72 x 44 x 21 x 29cm own-stands close to	84dB/w 28Hz (in room)	R	86
Shan Shimna £315	Average+ Good-	Pretty little miniature with resin-based enclosure has a bright, thin but sweet and communicative sound; loudness and welly are both limited	31 x 21 x 17cm own stands 1ft from wall	84dB 48Hz (in room)	R	98
Sony APM-101ES £100	Good Average	Big hearted sound from small bookshelf successor to BB '10ES, sounds a little untidy at frequency extremes, so suits CD better than vinyl	39.5 x 22.5 x 23.5cm stands, free space	86dB/w 52Hz	R	71
Sony APM-121ES £150	Average Average -	Good perceived high tech value, but the balance has an artificial 'loudness' character, too rich in the bass and too strong in the treble	43 x 25 x 28cm stands, free space	86dB/w 25Hz (in room)		86
Sony APM-141ES £200	Average Average	A great deal of loudspeaker for the money, the rich sounding '141 needs a big room and still shows significant 'loudness' (boom'n'tizz) tendencies	61.5 x 26 x 32cm stands in plenty of	88dB/w 30Hz (in room)	R	78
Sony APM-181ES £300	Very Good Average	Big and beefy but equally fat and bass heavy, this well engineered 3-way has notable strengths but lacks transparency and sounds better at lower levels	57.5 x 29 x 36cm low stands, free space	87dB/w 40Hz		71
Spendor S20 £510	Very Good Good	This solid and elegant luxury compact maintains Spendor's tradition for peerless mid-to-treble coherence and perspectives. Bass is rather unconvincing.	38x22x26cm stands 1-2ft from wa	83dB 25Hz (in room)	R	102
Spica Angelus £1295	Good Average	A little bass shy and soft in the bass and lower mid, the free standing Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm away from walls	86.5dB 50Hz		60
Spica TC50 £599	Good - Good	This triangular-profile 'grown up' miniature is a shade boxy and laid back but has good rhythmic and musical integrity	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Spica TC50SE £799	Good - Good	A heavily UK-modified TC50, the SE sounds less boxy and more spacious, but lacks some of the urgency of the standard model	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Studio Power DMS100 £249	Average + Average +	Close to a BB rating, and in many respects remarkable value for money. Delivers an impressively smooth and large sound, but sheer ugliness will limit its appeal	51 x 26 x 32cm open stands 1ft from wall	86dB/w 25Hz (in room)	R	82
TDL Monitor £1799	Very Good Very Good	Fine solidity and good accuracy, with enough bass extension to satisfy even organ freaks. Needs a big room and can sound a bit lazy and a shade tinkly	118.5 x 30 x 47cm 0.5m from walls	85dB/w 28Hz	R	66
TDL Studio 0.5 £399	Average Good	This tiny floorstanding transmission line has good agility but doesn't provide the coherence or even balance of the slightly bigger Studio 1	55 x 20 x 30cm own stand, free space	85dB/W 40Hz (in room)		94
TDL Studio 1 £599	Average + Good	Delivering genuinely extended bass from a compact floorstanding enclosure, the Studio is very detailed but a shade clinical and detached in presentation	76 x 23 x 33cm	84dB/w 25Hz (in room)	R	78
Tannoy 603 £120	Average+ Average+	Pretty hexagonal cabinet miniature is optimised for free space siting and delivers fine imaging with little boxiness, but little in the way of welly and power either.	33.5x22(max)x16cm high stands in free	85dB 45Hz (in room)	R	102
Tannoy 605 £150	Good Average+	Largish bookshelf size hexagon is potentially fine performer, though unusual stand sensitivity makes optimisation difficult	40 x 27.5 x 18cm stands 1-2ft from wall	85dB 25Hz (in room)	R	106
Tannoy 609 £250	Good Good	Distinctive hexagonal cabinet reduces box colorations, and new dual concentric driver is sweeter than its predecessors, making this one very superior speaker	50x32(max)x22cm stands clear of wall	90dB 25Hz (in room)	BB	102
Tannoy Westminster £3600	n/a Good +	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from	96dB/w	R	Coll '87
Technics SB-EX2 £180	Average- Average	Nicely presented, well built and decent size enclosure sounds solid but somewhat dull, thanks presumably to rather ordinary, low cost drivers	48 x 23.5 x 27cm stands clear of wall	86dB 20Hz (in room)		98
Technics SB-RX50 £650	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
Townshend Glastonbury IIS* £1700	n/a Very Good	What? No bass? Actually, like the KEF 107, Glastonbury II goes down so low you might not notice how good it is. A truly remarkable performer. Superb	91.5 x 28 x 4.6 free standing in room	88dB 27Hz	R	65
Townshend Glastonbury Tor £1495	Average - Very Good	Prodigious bass extension, stunning stereo focus and low cabinet coloration, but limited loudness from low sensitivity and power handling	99 x 26.5 x 33cm well clear of walls	82dB/w below 20Hz	R	90
Vandersteen Model One £1000	Average + Average +	This compact American floorstander's elegant staggered baffle arrangement contributes to a refreshing freedom from boxiness, but the price is quite high	100 x 30.7 x 25.6cm floor clear of walls	87dB/w 23Hz (in room)		86
Vecteur Premiere £695	Average Good	Expensive for its material content, this pretty French compact nevertheless has a beguiling sound quality that indicates painstaking development	34 x 19.5 x 25cm light stands clear of wall	88dB 48Hz (in room)		98
Wharfedale 410 £130	Good Average-	One step up from the Diamond, this attractive and sensitive small bookshelf model sounds smoother but is also rather bland and uninvolved	34.5 x 22 x 22.5cm stand against wall	89dB/W 45Hz (in room)		94
Wharfedale 505.2M £260	Average+ Good-	Luxury red mahogany finish version of 505.2, confirms that this well balanced design remains fully competitive nearly three years after the original	44 x 25.5 x 25.5cm stands in free space	87dB 45Hz (in room)	R	98
Wharfedale 505/2 £190	Average Good	This lively Wharfedale provides plenty of speaker with unusual refinement for the money, and should be fairly tolerant of room siting	44 x 25.5 x 24cm stands 1ft from wall	86dB/w 55Hz	BB	66
Wharfedale 515 £260	Good Good	Effectively a technical update on the continuing 505 theme, this is still more evenhanded, with better bass extension and smoother treble	40 x 25.5 x 30cm stands clear of walls	85dB 28Hz (in room)	R	106
Wharfedale Coleridge C £600	Good Good	Very prettily dressed and sounds pretty good as well, though whether enough to justify the £600 pricetag is open to debate. Well balanced, smooth and a little dull.	48x25.5x25.5cm stands clear of wall	86dB 30Hz (in room)		102
Wharfedale Delta 30.2 £100	Average- Average	This hundred pounder has a bigger main driver than many of its rivals, and so packs a bit more welly and loudness. Coloration is rather obvious, but timing is good	38 x 22 x 17cm stands close to wall	88dB 48Hz (in room)	BB	98
Wharfedale Diamond IV £109	Good Average +	Thanks to a new metal dome tweeter, the new Diamond is much more civilised than its predecessors, with an attractive lively sound but some boxiness	27 x 18 x 18.5cm stands close to wall	86dB/w 48Hz	R	90
Yamaha NS 1000M £900	Good Good +	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stan	90dB/w 40Hz	R	46

LOUDSPEAKERS - SATELLITE AND SUBWOOFER SYSTEMS

Satellite and subwoofer systems, sometimes referred to as three way systems, consist of a small pair of speakers (the satellites) and an extra box (or two) to handle the low frequencies.

Most systems use a single sub-woofer to supply low bass output, although stereo sub-woofer systems are available. By freeing the main speakers of the necessity of generating deep bass they can be made much smaller than a standard design and as a result satellite

and subwoofer systems are usually visually unobtrusive.

Positioning of the sub-woofer is usually not as critical as the positioning of a conventional speaker and as a result the largest part of the system can be hidden away entirely, although please refer to the placement notes below as this does not apply to every system.

In general the sonic performance of these systems will fall below the performance of a good, comparably priced, conventional speaker.

The value ratings given below are judged in the context of sat and sub woofer systems only and are not judged by the same criteria as the main loudspeakers, thus a Recommended sat and sub system probably won't sound as good as a Recommended traditional speaker.

If you are prepared to compromise slightly in terms of sound quality then a satellite and sub-woofer system might represent a good solution for those situations where the loudspeaker should be heard but not seen.

LOUDSPEAKERS - SATELLITE AND SUBWOOFER SYSTEMS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (cm) PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Allison MS 205 £420	Average Good -	Tasty high quality satellites give this quite pricey 3-box system a touch of class. Subwoofer is very compact and only slightly boomy.	25.5x14.5x15 + 29x 29x36 stands close to wall	86dB 30Hz	R	104
Bose Acoustimass AM3 £289	Average Average	Ultra compact 3-box is well balanced though limited in loudness and bass. Tiny satellites are a bit fierce, and grilles unhelpful	9x11x11 + 20x37x19 close to wall	85dB 48Hz		104
Bose Acoustimass AM5 £569	Average + Average +	Pricey but cleverly engineered 3-box system is well balanced and uses tiny twin-driver satellites to good effect	16x7.7x12 + 36x19x48 sats at wall, sub 2ft from wall	85dB 40Hz	R	104
Heco Libero £375	Average Average	Attractive 3-box package uses neat metal satellites with versatile mounting accessories, but subwoofer is boomy in the midbass	18x11x12 + 21x55x 31.5 uncritical	85dB 45Hz		104
Jamo SW/SAT300 £300	Average Average	Attractively finished 3-box package has 'tunable' subwoofer that allows boom to be minimised and a good balance achieved	21x15x8 + 21x48x34.5 uncritical	85dB 40Hz	R	104
RSS Solid/Bass Station £550	Average Average	Multi-driver macho subwoofer adds mucho muscle to Solid satellites, but it's much more midbass than serious extension	24x12x12 + 47x 48, x 20 sub at wall, sats in free space	91dB 45Hz		104
Wharfedale 2130 £300	Average Average +	3-box system marred by indifferent boomy subwoofer but rescued by novel wide-dispersion satellites that give an open sound	14x24x11 + 19x32x 50 sub away from wall	86dB 48Hz	R	104

PERSONAL STEREOS

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than all manner of domestic systems and as such demand some attention.

Now that personal CD players have joined the ubiquitous Walkman in the market, the variety and standard of sound quality is huge, with obscurely named cassette players practically falling out of your cornflakes packet and the top Discmen going for £300 or more.

Despite their diminutive size personals attempt to incorporate as many gimmicks and features as possible, cassette players often incorporating tuners, Dolby noise reduction or

even graphic equalisers.

CD players are don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Rechargeable batteries are extremely useful and increasingly popular, some can now be recharged within the unit and charge capacities are also being increased. Most models come with a mains adaptor, which in some cases doubles as a battery charger and some include a wired remote control. A few are now appearing with infra-red remote control.

Sound quality on the cassette front seems to have a proportional relationship to price and

integrity of construction – wow and flutter being quite obvious on the cheaper models.

CD players become less noisy as they get dearer and also reduce in size; one drawback of the latter seems to be that immunity to shock suffers as a consequence, although newer models are starting to buck this trend. Cassette players do, on the whole, seem better suited to the outdoor life than their digital counterparts, as does the software. Bear in mind that the sound and lab ratings given below cannot realistically be compared to those in other categories or between cassette and CD personals

PERSONAL CASSETTES

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa HS P505MKII £70	Good	Very good clutch of features and accessories plus good sound at a reasonable price. Could be more user friendly	Remote control, rechargeable battery and charger	BB	102
Aiwa HS-PL707 £135	Very Good-	Has a precise, attractive sound, if a little clinical and cold. This player might be ideal for the user who will listen to mostly classical music. Somewhat fiddly to use	Remote control, BBE sound enhancer, charger & battery	R	102
Aiwa HS-JX705 £220	Good	Rather expensive radio-equipped player. Sound quality on tape playback didn't match up to the Aiwa HS-PL707	FM/AM tuner, recording mic remote control, charger		102
Panasonic RQS15 £85	Good	Considerable power and immediacy to the music though with some raggedness. Good features and accessories. Well designed and easy to use	Remote control, rechargeable battery and charger	R	102
Panasonic RQV520 £100	Good	Features an onboard radio without sacrificing sound quality on tape playback. You lose out on accessories, though (no battery charger)	Radio, remote control, bass enhancer		102
Panasonic RQS65 £130	Good+	Solid, warm sound plus a good selection of features and accessories all combined in a stylish and very user friendly package. Comes with one of the better remote controls	Remote control, rechargeable battery and charger	R	102
Sanyo MGR401D £40	Average-	Easy to use budget model with a radio and some useful features (including a simplified remote control). Sound quality on tape isn't great but is helped by the bass enhancer	Radio, remote control, bass enhancer with graphic equaliser		102
Sanyo MGR580 £50	Poor	A more sophisticated radio than on Sanyo's 401D but the feature count is low and the tape playback unexceptional	Radio 'digital tuner', auto reverse		102
Sanyo SPT1000 £40	Average	Despite outlandish colourful trim and features completely unrelated to audio enjoyment (a 'Pedometer' for monitoring jogging) this has a better basic sound than the other Sanyos	Bass enhancer		102
Sharp JC-510 £30	Average	Serviceable sound quality and some decent features at a low price	Radio, bass enhancer, auto reverse		102
Sharp JC-K99 £160	Good-	Sharp's 'extremely lightweight' model. Well made, elegant and it certainly doesn't weigh a lot. Pleasant sound, marred on the test sample by some distortion	Remote, rechargeable battery and charger, bass enhancer		102
Sony WM DD33 £90	Good-	Well built and resistant to vibration on the move but comes with very limited features and accessories for the price	Bass enhancer		102
Sony WM EX80 £150	Good	User friendly Sony with a good remote control and high quality, accurate sound. Comes with all the extras	Remote control, rechargeable battery and charger	R	102
Sony WM DD99 £240	Good-	Mixed bag of accessories (nice headphone storage system, but no remote control) with variable sound quality at a steep price. But it does have Dolby B&C, good build quality and ergonomics	Dolby B&C, rechargeable battery and charger, auto reverse		102
Sony Walkman Pro £249	Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56

The Directory

PERSONAL CDS

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa XP-6 £150	Good	Punchy sound both via headphones and when used in a system but transport lets the side down a bit - not one to take out jogging	Digital output, mains adaptor, remote, headphones	R	106
Denon DCP-100 £250	Good	Solidly constructed and nicely finished in the slightly impractical Velvex, almost walkable, competent if uninspiring sound quality	Remote, mains adaptor, no earphones, rechargeable batts		94 Supp
Denon DCP-50 £180	Average +	Not very walkable, but lightweight and nicely finished in a nextel like grey. Sound through a system is a tad unexciting but not too bad	No headphones, remote, mains adaptor		94 Supp
Goodmans GCD-10 £120	Average -	Cheap, flashy and not short on accessories, the GCD-10 is a rather noisy player that left a lot to be desired on the sound quality front	Mains adaptor, headphones		66
Kenwood DPC-41 £130	Average -	Lightweight, not very walkable but nice control layout. Sound through the phones is on the thin side, through the line output it's pretty average for a portable	Mains adaptor, rechargeable batts headphones		94 Supp.
Kenwood DPC-81 £200	Good +	Chunky metal cased player that makes pretty confident sounds through a system but sounds dry via earphones and ain't exactly walkable	Remote control, mains charger and batts, digital output		94 Supp
Philips AZ6897 £200	Good +	Unusually designed and equipped with a radio the Philips is almost joggable, it sounds remarkably good via a system and a little cautious through the phones	Mains adaptor with built in plug, wired remote, clock, headphones	BB	94 Supp.
Philips AZ6819 £300	Excellent	Unusual looking machine with interesting radio headphones. Excellent sound quality but not one to walk with, superb styling	Radio headphones, rechargeables, plinth, infra-red remote	BB	106
Samsung MY-CD2 £110	Poor	Cheap and not particularly cheerful, minimum of facilities and naff sound quality, could suit those on a very tight budget	Headphones, mains adaptor		106
Sanyo CP-12 £260	Good +	Sonically amongst the more enjoyable CD players and capable of revealing the musical aspects of a disc in an interesting and entertaining fashion	Wired remote, headphones main adaptor	R	66
Sony D-11 £135	Average -	Chunky player with old fashioned styling, a rather lightweight sound and limited dynamic range.	Headphones, AC adaptor bass boost		106
Sony D-202 £160	Average +	Good sound quality twinned with relatively good portability accounts for the recommendation, can also sound OK in a main system. Nice entry level machine	Headphones, AC adaptor rechargeables, remote, digital out	R	106
Sony D-303 £280	Excellent	Tidy design with adequate features but not as cluttered as the D-350. Excellent sound quality and will even serve as a CD transport	Headphones, AC adaptor rechargeables, remote, digital out	BB	106
Sony D-350 £300	Good	More buttons and widgets than any of the others but not the sound quality or walkability to go with it	Mains adaptor, clock, rechargeable batteries		94 Supp.
Sony D-66 £180	Average +	One of the few walkable CD players on the market, sound quality is a little muddled but not offensive	Mains adaptor, rechargeable battery pack	R	94 Supp.
Technics SL-XP1 £140	Good +	Remarkably competent and enjoyable player that you can actually use on the move and sounds enthusiastic through a domestic system	Rechargeable batts, mains adaptor/charger, headphones	BB	94 Supp
Technics SL-XP505 £180	Average -	Excellent transport makes this one of the most stable players on the market and the infra-red remote control is a nice bonus. Sound quality leaves a little to be desired	Headphones, AC adaptor rechargeables, infra-red remote		106
Technics SL-XPS900 £280	Excellent	Great sound quality both via phones and in the home backed up with an impressive array of accessories. Transport is not up to use on the move	Headphones, AC adaptor rechargeables, infra-red remote	R	106

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier

cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually)

across the bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories. (The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

TUNERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa XT-003 £105	Average	Economically designed and built in the UK, but trade-offs have a marked influence on FM and AM sound quality.	FM/AM digital, 30 presets, no signal strength meters.		93 Supp
Akai AT-52L £150	Very Good	Holds its own on FM against many much more expensive tuners, but AM is very poor	All bands	BB	65
Akai AT-93L £250	Good +	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	65
Arcam Alpha 2 £185	Good	Re-styled to blend in with the Alpha system, Arcam's cheapest tuner makes up for its lack of features with a sensitive front-end and mellow sound.	FM/AM analogue, no presets, manual tuning + AFC	R	93 Supp.
Arcam Delta 80 £340	Average+	Hi-fi sound on FM, good on AM, a dependable British all-rounder	6AM, 6FM presets. FM/MW/ LW display, manual tune	BB	55
Creek T40s3 £220	Very Good	Creek's FM-only analogue tuner is now in series 3 form, though the aesthetics remain unchanged. Ours was hampered by an obvious bass 'hump' though production units are said to be cured.	FM-only analogue, no presets, manual tuning + AFC		93 Supp.
Denon TU-260L £100	Average	Creek's FM-only analogue tuner is now in series 3 form, though the aesthetics remain unchanged. Ours was hampered by an obvious bass 'hump' though production units are said to be cured.	FM/AM digital, 20 presets, manual and auto tuning.	BB	93 Supp.
Harman Kardon Citation 23 £600	Very Good	A new cheapie from Denon with the bare minimum of features. Careful designwork promises a surprisingly open and vivacious sound, so don't overlook it!	FM/AM seek/manual adjustment muting 16 presets remote control	R	60
Harman Kardon TU9400 £250	Good	Fine performance, interesting features and ease of use are this tuner's forté, and the sound quality is top notch	FM/AM digital, 24 presets, auto-tuning, signal strength meter	R	93 Supp.
Linx Theta £475	Very Good	Striking in appearance and with a sound to match, this new digital tuner comfortably exceeded our expectations. On stereo FM it's HK's best yet.	Manual analogue tuning, no presets, signal strength meter	R	72
Magnum Dynalab FT101 £599	Good	A Magnum Dynalab on the cheap with the hallmark styling of this small British newcomer. Some of the best midrange from any tuner	Analogue manual tuning, no presets, signal strength meter	R	72
Marantz ST-40L £140	Very Good	Although expensive for its fairly minimum set of facilities, its excellent sound makes up for what it lacks elsewhere	FM/AM digital, 30 presets, manual/auto tuning	R	93 Supp.
Meridian 204 £660	Average +	A little slow to tune but once accomplished it provides a meaty and dynamic sound on FM. AM too has a little extra bite to its performance	FM only, auto scan, digital, remote, timer		55

TUNERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Naim NAT 01 £1377	Very Good Excellent	There may be better sounding tuners in the world, but we have yet to hear one	No presets. Two box, flywheel tuning, FM only, Analogue	R	50
Nakamichi ST-7E £750	Good + Good +	Exceptionally good for weak-signal areas, and good all round	16 AM/FM presets, auto time digital		55
Pioneer F91 £360	Excellent Good +	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/AM 24 presets	R	60
Proton AT-300 £199	Good Good	The AT-300 is pretty on the outside, orthodox on the inside and rather dear. AM - poor	FM/MW only	R	65
Quad FM4 £399	Very Good Good +	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets. Digital	R	50
Revox B260 £1120	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM - virtually everything	R	60
SAE T-102 £449	Good + Good +	Expensive for all the radio you get, but sounds interesting. AM - poor	FM/MW only	R	65
Sony ST-S530ES £200	Good+ Good	The cheaper version of Sony's revered '730 certainly looks and feels the part but its sound is, well, less startling. Civilised, yes, but lacks much enthusiasm.	FM/AM digital, 30 presets, hi-blend + Cal tone + manual/auto		93 Supp.
Technics ST-G70L £200	Good+ Good+	Another very polite and refined-sounding tuner but one that does retain just enough sparkle to keep your interest. Plenty of widgets to play with too...	FM/AM digital, 39 presets, selectable RF/IF + fine tuning, signal. str. mtr.	R	93 Supp.

TURNTABLES - CARTRIDGES

Very much the 'slave' of turntable and tonearm and to some extent undermined by the supply of free 'starter' cartridges on many turntable systems, the cartridge is still worth taking seriously. The quality of both the stylus itself and the cartridge's tracking performance are important in preserving that most important part of the hi-fi system – the record collection – and the cartridge also plays a significant role in determining the overall balance of a system.

Cartridges fall into two groups: high output models, capable of working directly into any amplifier, and more expensive low output models.

Stereotypically, low output cartridges use the moving coil principle of operation, have better mechanical integrity and tighter tolerances, and give better performance but at much higher cost. Most under-£150 amplifiers and many valve designs need either an extra head amp or

transformer to cope with the low output.

Cartridge/amplifier interfacing can be very subtle, but even basic high output moving magnet designs benefit in overall balance from optimised amplifier capacitance loading. Still more important, the mechanical cartridge characteristic of cantilever compliance ('springiness') needs to be considered in the light of the effective mass of the tonearm which will be used.

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Arcam C77 £22	Average + Average +	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
Arcam C77Mg £30	Average - Average	Punchy sound quality with plenty of extra energy to liven things up. The solid body seems well worth the extra £10	4-8g Normal, MM	BB	67
Arcam E77Mg £50	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8gN Normal, MM	R	48
Arcam P77Mg £60	Average + Average +	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
Arcam PMX10 £100	Good + Very Good	Not the very clearest in complex high-frequency sounds, but lively and exciting, good transients	5-11g Low, MC	R	85
Audio Note I02VDH £1295	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity', needs a transformer	8-18g Very low, MC	R	43
Audio-Technica ART1 £800	Good + Very Good	This is a delicate and very fluid-sounding MC that tracks well, offers very low distortion and exceptionally good stereo separation	9-18g Low, MC	R	72
Audio-Technica AT-420E £35	Average Average	Better suited to pop recordings, this MM bears some of the sonic hallmarks of the Linn K5	7-14g (damp) Normal, MM	R	67
Audio-Technica AT-95E £19	Average - Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio-Technica OC-10 £307	Good + Good +	Good treble and good detail too, but some congestion and coloration reduces its informativeness.	4-12g Low/MC	R	103
Audio-Technica OC-5 £123	Good + Good	For the price, it's unusually effortless and detailed, but it tends to become rather relentless and tiring after a while.	5-14g Low/MC	R	103
Audioquest AQ 404i-L £400	Very Good Good +	Slight harshness detracted from the performance of this otherwise clear-sounding and detailed cartridge	8-16g Low, MC		84
Audioquest AQ 7000 £1200	Good Good +	Stunning stereo imaging and good detail at low levels are spoiled by less-than-perfect tracking and high sensitivity to arms.	6-20g Low, MC		91
Audioquest MC5 £220	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Cello Chorale £750	Average + Good	Now available through a new distributor at a saving of some £300, the Chorale is still blessed with a delicate but highly detailed treble. Arm matching is a problem	3-9g Low, MC		72
Denon DL103 £99	Good Average +	An oldie but in many ways a goodie, the 103's good performance in bass and general 'life' is seriously let down by its spherical stylus which kills subtle details.	9-22g Low/MC		103
Denon DL110 £69	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £89	Average + Good	Although listeners just preferred the 110, its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Normal, MC		43
Denon DL304 £200	Very Good Excellent	Uncoloured, detailed, neutral, superb tracking; top notch altogether, and a top notch bargain too.	4-12g Low/MC	R	103
Dynavector 17D2 £280	Very Good Very Good	Clear, detailed, neutral and generally very informative - excellent	6-18g Low, MC	R	91
Dynavector DV-50X £99	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC	R	48

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Dynavector DV10X IV £125	Average Average +	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g (damping) Normal, MC	R	48
Dynavector DV23RS £230	Average + Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector XX-1 £680	Very Good Good +	Good, but not immensely competitive at the price, and not helped by comparison with the low output version	7-15g Normal, MC		84
Dynavector XX-1L £680	Very Good Very Good	Very clear, very detailed, no troubles with tracking; response lift around 20kHz seems to do no harm	7-13g Low, MC	R	84
Empire Benz Micro MC-Gold £130	Good + Good	Nothing is obviously wrong, but nothing is stunningly right either and tracking isn't perfect. Safe, but perhaps a little too safe	7-17g Low/MC		103
Empire Benz Micro MC-Silver £130	Good Good	High output MC that though ultimately not the peer of the MCGold is more appropriate to the sort of equipment it's likely to be partnered with	8-18g Normal/MC	R	103
Empire Benz-Micro MC-2 £699	Average Good +	Similar to both the Empire MC1000 and vdH MC2 in design, the Benz offers a warmer and very transparent account of the music. Its tracking prowess is slightly limited	5-12g Low, MC	R	72
Glanz GMC-10EH £50	Good Good	The rising HF trend of this high o/p MC may cause problems in certain systems but with a favourable wind its seductive qualities will win out	8-14g Normal, MC	R	67
Glanz GMC-10LX £80	Average + Average +	Bearing some of the hallmarks of the 10EH, the 10LX is still less competitive in the sonic stakes	7-15g Low, MC		67
Glanz GMC-20E £129	Good + Good +	Very good tracking, smooth sound and good detail. Very slight surface noise enhancement	5-10g Low, MC	R	91
Glanz MFG-110EX £25	Average Average	A little bright but giving detailed bass and clear treble, this was competitive at the price	6-16g Normal, MM	R	43
Glanz MFG-310LX £50	Good + Very Good	Detail and treble outstanding for sub-£100 cartridge. Slight coloration may be due to body resonance	6-10g Normal, MF	BB	85
Glanz MFG-610LX £90	Good + Good +	Similar to cheaper 310 but slightly clearer transients and bass. Benefits from lowish impedance loading	3-10g Normal, MF	R	85
Goldmund Clearaudio £1500	Average + Very Good	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring 1012 £50	Good + Good	Slightly harsh sound but plenty of life and quite good detail. Some very high frequency coloration apparent	6-12g Normal, MM	R	85
Goldring 1022 £70	Good + Good	As with 1012, a touch harsh; detail and transient purity improved, though, and it goes well with electric guitar	5-11g Normal, MM	R	85
Goldring 1042 £90	Good + Good	Not terribly subtle, and not such good value alongside 1012 and 1022. Quite lively, though	7-12g Normal, MM		91
Goldring Elan £20	Average + Average	A lightweight and frisky-sounding MM that appears to be based upon the same body as the Nagaoka mm4	7-15g Normal, MM	R	67
Goldring Elite £200	Good + Good	The basics are right, and the Elite will cheerfully tackle any source material, but its sound possesses a certain dirtiness which can irritate.	8-18g Low/MC		103
Goldring Epic II £32	Average Average +	An excellent budget choice though the limitations of the stylus are rather obvious at higher frequencies	5-12g Normal, MM	R	67
Goldring Eroica H £105	Good Good -	More confused and coloured than its low-output sibling - high output less of an issue in these days of cheap MC-compatible amplifiers	8-15g Normal, MC		84
Goldring Eroica LX £120	Good + Good	Not the most subtle cartridge in the world; can sound edgy at times, but lively and informative	8-14g Low, MC	R	84
Goldring Excel £549	Average + Good	Goldring's most expensive cartridge to date errs on the warm and heavy side of neutral. Strong bass lines are its forte though its ability to resolve subtle treble details is weaker	6-13g Low, MC		72
Goldring Excel GS £600	Very Good Good +	The Excel has some true high end quality in its lack of annoying colorations, but tracking seems indifferent and high levels tend to sound rough and edgy.	9-20g Low/MC		103
Grado ZF3E + * £47.50	Average - Average	Downtilting balance disguises the brightness of this cartridge; bit of a mixed bag at this price	9-20g (damping) Normal, MM		54
Grado ZTE +1 £26.50	Average - Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal, MM	R	54
Kiseki Blackheart £1795	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Blue Goldspot £450	Very Good Good +	Good bass and imaging, but hints of spit and coloration let the side down slightly	8-15g Low, MC		84
Kiseki Lapis Lazuli £4000	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluidity of the Clearaudios	4-12g Low, MC		60
Kiseki Purpleheart Sapphire £799	Good + Good +	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		48
Koetsu Black S £612	Average Good +	The S is an OEM design built to Koetsu's blueprint. It features a sturdier fixing plate and offers a brighter, faster and more tactile sound than the earlier K	8-15g Low, MC	R	72
Linn Asaka £373	Good + Good +	Disciples of Linn who are trying to realise their true "Karma" may find that saving money is not a short cut to heaven	9-18g Low, MC	R	Coll. '86
Linn K5 £39	Average Average +	Not as crisply focused as the costlier Linn magnetics, the K5 offers a smoother presentation	7-16g Normal, MM	R	67
Linn K9 £89	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal, MM	BB	Coll. '86
Linn Karma £564	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems; results may be less predictable in more general application	9-18g Low, MC	R	Coll. '86
Linn Troika £798	Very Good Good +	Good all-rounder, but still some hint of unhappiness at very high levels. Good imaging and bass.	6-18g Low, MC		91
London Maroon £149	Average Average +	Now manufactured under the London brandname this Decca cartridge is as iconoclastic as ever	9-20g (damping) Normal, MM		67
London Super Gold £300	Poor Average -	Immediate and (in the midrange at least) detailed, but very coloured, very nonlinear and questionable effect on records. Devotees swear by it	9-15g (damping) Normal, fixed stylus MM		84
Milltek Aurora £249	Good + Good +	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	Coll. '86
Milltek Olympia £349	Average + Good +	Warm and detailed sound - packs the punch of the best MCs with high output as a bonus	12-20g (damping) Normal, MC	R	54
Nagaoka MM4 £9	Average - Average -	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £18	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Nagaoka MP11 Boron £40	Average Average +	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP11 Gold £47	Average - Average +	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Ortofon 510 £30	Good Good +	For the price, a good blend of virtues - weight, clarity and neutrality.	3-11g Normal, MM	BB	85
Ortofon 520 £50	Average Average +	Very sensitive to load capacitance this new Ortofon maintains the company tradition for a lively, effervescent SQ	7-16g Normal, MM	R	67
Ortofon 530 £80	Good + Good +	Very clean and assured sound; transients not quite perfectly pure but plenty of detail.	4-11g Normal, MM	R	85
Ortofon 540 £100	Average - Average	Graced with an advanced FGII stylus our sample possessed too high a compliance for broad arm matching. It could also sound a little unforgiving	3-8g Normal, MM		67
Ortofon MC10 Super £70	Average Good	"What a delightfully sweet-sounding cartridge this is . . ." we said	5-15g Low, MC	BB	48
Ortofon MC15 Super £100	Good + Very Good	A good all-rounder, with outstanding performance in detail retrieval, even if it can be very slightly bright and close-up at times.	10-24g Low/MC	BB	103
Ortofon MC20 Super £200	Average + Good +	An "inviting" sound quality; polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low, MC	R	Coll. '86
Ortofon MC3 Turbo £100	Average + Good	Not terribly subtle, but it obviously doesn't aim at that. The 3 Turbo is bright, cheerful and bouncy - take it as it comes!	10-24g Normal/MC	R	103
Ortofon MC30 Super £270	Very Good Good +	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coll. '87
Ortofon MC3000 MkII £850	Very Good Excellent	Low levels of body resonance are a real ear-opener. Nothing to criticise elsewhere; one of the very best	9-16g Low, MC	R	84
Ortofon MC5000 £1500	Good + Good	Review sample could not be fully run-in, which might explain limited tracking ability and bright and forward sound, though imaging is excellent. Fussy about s.	12-20g Low, MC		91
Ortofon Quartz £120	Good + Good	Lively, quite detailed, and a touch bright, the Quartz has many qualities of the much dearer Quasar	3-12g Low, MC	R	91
Ortofon Quasar £300	Very Good Very Good	Many of the qualities of the MC3000, although a touch bright. Good detail and delicacy	8-15g Low, MC	R	84
Ortofon Quattro £200	Good + Good +	Undoubtedly a competent performer, the Quattro however seems a less obvious choice than the other Qs. Generally neutral, but can be edgy and bright in loud passages.	6-18g Low/MC		103
RATA RP20 £22	Average - Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average +	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average +	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
Rega Bias £34	Average Average +	Difficult to mount in some arms due to its shallow build, the bias offers a gentile, refined SQ that certainly makes it worthy of audition	4-10g Normal, MM		67
Rega Elys £74	Good Good	Clearly superior to the Bias, despite their common heritage, the Elys is both more detailed, accurate and musically convincing	8-15g Normal, MM	R	67
Revolver £20	Average + Average	This modified AT-95E enjoys a very lively mid and treble even if the bass is somewhat 'slower' in comparison. A firm budget buy	8-16g Normal, MM	BB	67
Roksan Corus Black £110	Good + Good	Recognisably related to Corus Blue, but distinctly more civilised and smoother.	7-12g Normal, MM	R	91
Roksan Corus Blue £65	Good + Good	Roksan-specified modified Goldring 1012; slight harshness detracts from otherwise good sound.	7-11g Normal, MM		91
Shure M104E £36	Average - Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure M105E £49	Average Average -	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 Summ
Shure M110HE £60	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 Summ
Shure M111HE £72	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal, MM		38 Summ
Shure M92E £17	Average - Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £29	Average - Average -	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 Summ
Shure ME75ED £26.50	Average Average -	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure ME97HE £49	Average Average +	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48
Shure ML120HE £95	Average + Average +	Quite decent sound quality and a generally fine balanced performance	6-18g Normal, MM		48
Shure ML140HE £120	Average + Good	Qualitatively the treble of this well-balanced moving magnet model was a match for many moving coil cartridges	6-16g Normal, MM		43
Shure Ultra 500 £499	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Shure V15 VMR £215	Good Average +	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure VST V £173	Very Good Very Good	Quite exceptional assurance with difficult material; very stable and clear sound. One of the best. Dynamic Stabilizer actually works!	4-11g Normal, MM	R	85
van den Hul MC One £699	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale - worth it for the extra money	6-12g Low, MC	R	60
van den Hul MC Two £899	Good Very Good	Connected directly to any standard MM input the vdH MC Two rewards with a highly detailed yet fluid and musically convincing portrayal	6-13g Normal, MC	R	72
van den Hul MC1 Super £799	Very Good Very Good	Slight softening effect on transients was the only real flaw, but it didn't quite seem to have that special touch one expects for the money	8-15g Low, MC		84
van den Hul MC10 £599	Good Good +	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60
van den Hul MM1 £200	Good + Very Good	If its wooden-sounding midrange coloration could be tamed, the excellent imaging and admirable all-round security of the MM1 would make it an excellent performer.	7-15g Low/MC	R	103

TURNTABLES

The schizophrenic split between consumer electronics and 'real hi-fi' is most obvious amongst turntables. The former are supplied simply as a means of playing vinyl in a system context. Cheaply manufactured in the Far East, these are complete players with a variety of automatic facilities, sometimes tied into system remote control. But engineering compromises severely limit sound quality, cartridge choice may be P-mount restricted, and such machines are rarely stocked by specialist hi-fi dealers these days.

Specialist turntables offer big sound quality improvements, but lack so-called convenience features (that practised users often find irksome). Such turntables at the cheaper end of the market (sub-£350) tend to be supplied with matching tonearm, and often include a 'starter' cartridge. Still better quality is found at higher prices amongst the separate motor units and tonearms. Careful partnering and set-up is essential for these individual components, but 'naturally sympathetic' combinations do exist, and the good dealer can help.

Listed separately as integrated players and as turntable motor units and tonearms, our sound quality rating is based on results achieved using a high quality system – but in point of fact the turntable is usually the limiting factor soundwise in any system. Lab performance summarises the speed stability, vibration generation and environmental isolation of turntables, along with the friction, alignment and adjustment of tonearms. The tonearm's physical characteristics also define a range of compatible cartridges.

TURNTABLES - INTEGRATED

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	ISSUE
Acoustic Research EB-101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Sonata/HR-100S MCS/Atlas £835/£550/£400	Very Good Very Good	Good sound in all areas - bass, clarity and neutrality all in the top class and bettered by very few decks. Atlas PSU expensive but worthwhile	Belt drive, suspended, optional PSU, 13g	R	79
Ariston Pro £160	Good Good	Remarkably clear and detailed for the price, very neutral. Benefits from cartridge upgrade	Manual, belt drive, 12g, cart.	BB	91
Ariston Pro Maxim/RB250 £210	Average Fair	Warm, full sound with a deep bass and solidity is partly offset by lack of fine detail in mid and top. On a suitable surface, with a crisp sounding cartridge, it easily qualifies for shortlisting	Solid plinth, belt drive, manual, 11.5g		103
Ariston Q-Deck £180	Good Average +	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid, inc. cart	BB	67
Dual CS-505-4 £170	Average Average	Easy to set up and to use, this is a consistent sounding and well isolated turntable with a long pedigree. It is slightly lacking in balls, but compensates with a consistently unmuddled presentation and good stereo focus perspectives.	Auto-armlift, interlocked cueing, 2 speed, pitch control	R	103
Dual CS-750 £300	Average- Average-	Attractive but lazy performance from a deck with many good ideas and which is a pleasure to use. Cartridge is past it's sell by date. Has 78rpm facility	Solid plinth, belt drive, cart. 3-speed, quartz referenced, auto lift		103
Dual CS430 £100	Average Average -	Ragged, sometimes unpleasant cartridge mixes with a modest pleasing player in a very sharply priced package	Belt drive, with cartridge, auto return, 5g	R	67
Dual CS5000 £230	Average Average +	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Dual CS-503-2 £145	Good - Average	Not wholly inspiring; generally coarse and woolly sound is at least not offensive, but easily bettered by the CS505-4. Good value in material terms	Semi auto, belt drive, 10g	R	91
Goldmund ST4 £4589	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard performance at £2,000 less, in a neatly integrated though bulky package	Solid subchassis, direct drive, parallel arm, detachable h/shell	R	60
Goldring Excelda 1 £160	Poor Poor	Untidy, resonant sound, narrow effective dynamic range and lack of tracking security. The cartridge (the only authentic Goldring part) is quite nice	Manual integrated arm, synchronous motor, auto-start/stop		103
Heybrook TT2 turntable & arm £469/£269	Average Good +	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, R belt drive, 14g		67
JVC AL-FQ555 £170	Average - Poor	Clear midband sound but woolly bass and crude treble. Ease of use however ranks highly, and there's little to go out of adjustment	Auto, direct drive, 5.5g		67
Kuzma Stabi/Stogi Reference £995/£899	Very Good Very Good	Beautifully made in a solid oak plinth, the Stabi also sounds very clear, detailed and extended. Stogi Reference is also most capable.	Manual, belt drive, subchassis, 12g	R	91
Linn Axis/Akito £443	Good - Average +	A neat, attractive and well-made package which delivers a rather harsh sound with a 'one-note' effect in the bass, but it's well suited to mid market systems	Belt drive, semi-suspended, electronic PSU, 10g		79
Linn Basik £250	Good Average+	Strong midband analysis and imagery, clean if sharp treble is matched to a good if occasionally wooden bass. Good at the price, and requires no complex setting up or fine tuning in service	Solid plinth, inc cartridge, manual speed change	R	103
Linn LP12 Basik/Akito £599/£137	Very Good Good	Familiar Linn virtues and vices - plenty of the former though and few of the latter. Trails the full LP12 significantly, but pace, rhythm, timing etc. still in top class, and bass tauter than of old	Suspended subchassis, belt drive, R single speed, 45rpm adaptor		103
Linn LP12-Lingo/Ekos/Troika £1168/£1097/£798	Good + Good +	The classic reference is improved (at a price) by the Lingo but character remains the same - not as detailed or neutral as the best. Ekos arm, though pricey, is well made and suited to many decks	Manual, subchassis, belt drive, 9g	R	91
Manticore Mantra/Musician £340/£170	Good + Good +	Well engineered deck with satisfying sound. The arm is particularly fine and very good value	Belt drive, suspended, 15g	R	79
Marantz TT400 £160	Average - Poor	Everything one hopes a budget deck won't be; coarse, confused, muddled and woolly. Construction isn't wonderful, either	Manual, belt drive 16g		91
NAD 5120 £90	Average Average	A number of running improvements have given this player a range and tautness denied its lazier sounding antecedents.	Semi-auto belt drive, detachable arm tube/weight, 9g	BB	67
Opus 3 Continuo/Decca London International (Revise) £599/£99	Poor Good	Heavyweight motor unit with many fine properties, but which needs further development. The idiosyncratic arm is a suitable (though not ideal) platform for the Decca cartridge. For all its faults though, the whole transcends the sum of the parts	Belt-drive manual, damped unipivot arm, 12g		67
Rational Audio Aura 01 £189	Poor Good	Poor lab results reflect bad rumble, but midrange and treble are very pure and clean; idiosyncratic sound and styling should be tried!	Manual, belt drive, linear tracking arm 10g	R	91
Rega Planar 2 £185	Average + Good	A remarkable product at the price, surprisingly articulate and confident	Manual, 11.5g	BB	48
Rega Planar 3 £250	Good Good	A long time leader in its price category, the '3 (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Manual, 11.5g	BB	48
Revolver Rebel £185	Average Good -	Quite lively and detailed but not the strongest on subtlety, with slightly lumpy bass. Motor breakthrough audible, and watch for bent motor shaft on delivery!	Manual, belt drive, semi-suspended 12g	R	91
Revox B291* £892	Average - Average -	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, cart		55
Roksan Radius/Tabriz zi £635	Good Good	Truly modern turntable in appearance. The design is subtle, refined and easy on the eye. Musically it offers exceptional performance with a minimum of setting up and operational fuss	Semi-suspended, belt drive, mains plug PSU.	R	103
Roksan Xerxes 33/Tabriz zi £550/£255	Good Good	Good but not exceptional sound quality from expensive package. At its optimum with a relatively inexpensive arm/cartridge unless upgrade to full Xerxes is contemplated. XPSII PSU adds 45rpm and much to sound quality	Semi-suspended, belt drive, 33rpm only, mains plug PSU, one piece arm tube, 'intelligent' counterweight		103
Roksan Xerxes/Artemiz /Artaxerxes £785/£655/£559	Excellent Excellent	Superb though costly record playing hardware, highly integrated and synergistic in nature, but suitable for use with any good MC cartridge. Will not suit all tastes, however	Semi-suspended, belt drive, quartz locked 2 speed PSU	R	103

TURNTABLES - INTEGRATED

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	ISSUE
Rotel RP-855 £200	Good Good	Great sound for the money - detailed and clear with good bass and no irritating nasties	Belt drive, solid, speed adjust, 9g	BB	79
Systemdek 1/900 £188	Poor Average-	The motor unit is derivative of the Rega Planar 2, but sounds inferior by virtue of insufficient structural integrity. Pitch stability is also far from acceptable	Solid plinth, manual speed change, no cartridge		103
Technics SL-DD33 £120	Average Average	As with the QD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
Technics SL-L20 £120	Poor Average -	A rather lightweight parallel tracker achieving a poor overall rating, with little to recommend it unless you dig facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £150	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Technics SLBD-22 £100	Average - Average -	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi automatic, solid plinth, electronic, 6g P-mount	R	48
Thorens TD 166 Mk V £240	Good Good	Classic suspended-subchassis deck with clear, stable sound of no particular character. Unlikely to make enemies	Belt drive, suspended, 12g	BB	79
Thorens TD 280 Mk II £190	Good - Good -	Legendary Thorens build quality on the cheap - slightly unsubtle sound but eminently liveable-with and very good value	Belt drive, solid, electronic PSU, 12g	BB	79
Thorens TD 316 Mk II £250	Good Good -	Very solid deck with neat split-chassis construction. Sound is a bit insecure in the bass, but it could suit classical music lovers well	Belt drive, suspended, electronic PSU, 12g	R	79
Thorens TD-3001/TP90SF £850	Very Good Good	Excellent middle ranking esoterica, with strong all round abilities rather than excellence in particular areas. Engineering content is particularly high	Suspended subchassis, belt drive, available w/o arm	R	103
Thorens TD166 VI/UK/RB250 £270	Good Average-	Refined and articulate sound with well focused imagery, suitable for use with good MM and budget MC cartridges. The Rega arm is the best at its price, a good purist deck	Manual, belt drive, suspended, 11.5g	BB	103
Thorens TD2001 £650	Good Good -	Similar to TD320 but much dearer - why? Sound is comfortable but not very detailed	Semi-auto, belt drive, subchassis 15g		91
Thorens TD280 II/UK £189	Average Average	Excellent value for money from a built to last player which is also easy to use. Will benefit from a cartridge upgrade in due course, but has an energetic and detailed sound	Solid plinth 2-speed player, inc cartridge	BB	103
Thorens TD320 Mk II £400	Good Good	Good, consistent sounding deck with much improved (but not ideal) arm. A little expensive for performance offered	Semi-auto two speed belt drive, 14g		67
Townshend Rock Reference/Excalibur £2295/£745	Excellent Excellent	Overall the closest reproduction to master tape we've yet heard, with stunning real bass and excellent neutrality. Front end damping through improves LF detail significantly	Belt drive, suspended, electronic PSU, front-end damping, 12g	R	79
Voyd Reference/Helios Cyalene £5414/£1350	n/a Excellent	Voyd's flagship is equipped with three of the biggest motors in the business, a Lexan platter and a real brute of a power supply (it dwarfs most power amps!). A strong contender for best turntable in the known universe	Belt drive, 3 motors, subchassis, outboard PSU, 12/14g	R	Coll. '90
Well Tempered WTAT £1690	Average Very Good	Intriguing and challenging design. Musically it is not ideal, but it has a limpid quality and a lack of artificiality that sets standards as well as turning the ear, though it's not completely uncoloured. A charmer yet mainstream enough in its virtues to be viable	Manual 2-speed, damped, suspended arm, 7.5g	R	67
Zarathustra S4/Pluto 5A Prestige/PSU £1500/£2500/£500	n/a Excellent	The very well made and finished heavy platter S4 with the superb Pluto arm make a devastating combination ranking up there with the very best	Subchassis, manual, available without PSU	R	72

MOTOR UNITS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
CEC ST930 £599	Good Very Good	A rarity - a serious hi-fi product that loses nothing to budget rivals in finish or convenience. Good clean sound, very stable and assured	Belt drive, external PSU, 78 speed inc.	R	79
CS Audio Resan kit for Rega £90	Good Good	After-market kit to convert Rega 2 or 3 to semi-suspended subchassis style. Looks good and sounds tidier than original. Feedback is much reduced	Conversion kit, all work reversible	R	79
Michell Gyrodec £595	Good Good	Sweet and natural sounding player, well exploited by the Rega RB300 arm. Aesthetics, and the acres of acrylic, are unique	Manual, belt drive, suspended motor unit		55
Michell Syncro £265	Good Good	A happy blend of qualities endows the Synchro with a blend of subtlety and force - the mailed fist in the velvet glove. Easy on the ear in the best sense	Manual, belt drive, suspended motor unit	R	67
NVA Senior £450	Good - Average	Very high sensitivity to low-frequency vibration, especially on NVA stand, gives strange subjective bass response and confused sound. Looks are unusual but pleasing	Belt drive, electronic PSU, two-part plinth		79
Oracle Paris £695	Good - Average	Looks good but sounds coarse, confused and uneven, with bass liable to thump	Belt drive, semi-suspended, electronic		91
Origin Live Oasis A £495	Good - Average	Rather coarse sound with lack of detail resolution - but lively presentation may appeal. Appearance is industrial	Belt drive, external mains filter, 33rpm only, suspended		79
Origin Live Oasis B £199	Average Average +	Aesthetics are not its strong point, but its lively and articulate - if idiosyncratic - sound will please some tastes. Highly resonant construction is very sensitive to feedback	Belt drive, 33Gy1/3Gyrpm only, solid plinth/subchassis		79
Oxford Acoustics Crystal Reference £2495	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery. Recently updated to mk.II form	Manual, belt drive, subchassis, stand	R	60
Pink Triangle Anniversary £1175	Excellent Excellent	Possibly the most detailed, clear, neutral and therefore accurate deck around. Likeness to master tape is almost uncanny	Suspended, belt drive, electronic, motor on subchassis	R	91
Pink Triangle Export £676	Very Good Excellent	Basically a PT TOO with built-in power supply. Retains features of great transparency and neutrality. Review sample had highish motor noise - presumed untypical	Suspended, belt drive, electronic	R	91
Pink Triangle Little Pink Thing £392	Good + Very Good	Leads the field for clarity and neutrality at this price or a good bit more. It also looks very smart! Excellent value. Arm cut-out suits Rega or Linn style	Belt drive, semi-suspended, electronic PSU	R	79
Revolver £150	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Systemdek IIX/900 £200	Good Good	The Systemdek IIX is a high performance, low cost turntable which is particularly strong in the areas of fine detail resolution and imagery. Tested with Rega RB250	Suspended subchassis, metal armband, glass platter, 2 speed	BB	103
Systemdek IIXE/900AP £358	Good Good+	A development of the IIXE/900, with a comparably detailed sound reinforced by better frequency extremes, timing etc. Needs careful setting up.	Suspended subchassis, metal armband, acrylic platter, PSU	R	103
Systemdek IV £495	Good Very Good	The level of wow is a theoretical concern at least, but elsewhere this player shines, combining euphony, information and imaging in a polished, untemperamental package	Two-speed manual belt drive	R	67
Voyd 0.5 £3062	n/a Excellent	Based on the standard 3-motor Voyd but with upgrade options (better bearing, platter, etc) which take it half way to a Voyd Reference. Superb build and finish; colourful, dramatic performance.	Belt drive, 3 motors, subchassis, outboard PSU	R	72
Voyd Valdi £868	Good - Very Good	Recent power supply upgrade has resulted in around improvements. This Perspex plattered, two motor deck is remarkably competent, revealing and neutral	Belt drive, suspended subchassis, electronic PSU		79
VPI HW-19Mk3 £1600	Very Good Very Good	Built to accommodate parallel tracking arms, this large but elegant deck produced clean, smooth sound when fitted with an SME arm. Good bass	Belt drive, suspended subchassis	R	79

The Directory

TO NEARMS

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFF, MAS	VALUE	ISSUE
Airtangent 1B £1990	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	60
Alphason Delta £230	Good Average +	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason HR100S £490	Very Good Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	Coll. '86
Alphason Xenon £286	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
Audio-Technica AT-1130 £186	Good Good	Well suited to most cartridges including high compliance ones, the AT is smooth and tonally neutral, if slightly lacking in 'balls'	8.5g	R	67
Decca London International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48 Summ
Eminent Technology £1000	Good + Very Good	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	Coll. '86
Goldmund T3F arm £4400	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll. '87
Kuzma Stogi Reference £899	Very Good Very Good	A large, solid and well-made arm that holds the cartridge firmly, giving exceptionally clear sound with just a hint of brightness	12g	R	79
Linn Ekos £1097	Very Good Very Good	Superb, state of the art design which builds significantly on Ittok's strengths	9g	R	67
Moth Arm £95	Good Good +	The ultimate budget arm? Refined, detailed, sweet and natural - performance improves in line with the rest of the system	12g	BB	60
Naim Aro £752	Good Good -	Designed for use on the Linn LP12 turntable and Troika cartridge, the Aro is a little bright and congested.	10.5g		91
Rega RB300 £139	Very Good Very Good	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
Roksan Artemiz £655	Average Good	Interesting design which works a treat on the Xerxes deck. Fits Rega cut-out.	8g		67
Roksan Tabriz £165	Good Good +	Though obviously targeted at Roksan's own Xerxes, it is also a good alternative to the Rega arms in many applications. A trifle bright.	9g	R	91
SME 3009 Series III £253	Good Average +	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009 Series IIIS £182	Good Average +	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009R £335	Average + Average +	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME 309 £568	Very Good Very Good	Beautifully made, finished and presented, this arm is fully and easily adjustable and a highly neutral performer	10g	R	79
SME Series IV £828	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1232	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60

VIDEO RECORDERS

For some time there's been a move to improve both the video and the audio quality of video recorders and TV sets alike as a necessary prelude to a proper integration between the two. Hi-fi video is obviously an important element in the story, and so is Dolby Stereo, the ambient 'surround sound' system.

The weak link of course is on the broadcast side. Although TV sound is well up to normal hi-fi standards, it has always been in mono and unjustly or otherwise has rarely attracted much audiophile interest. But TV sound is – or shortly will be – freed of the shackles of mono by the introduction of NICAM stereo. NICAM – an

acronym for Near Instantaneous Companding and Modulating – is the missing link that will help facilitate the much feted integration of video with audio. And then we have S-VHS, a system which does for picture quality what the other developments promise to do for the sound

VIDEO RECORDERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Akai VS-75EK £550	Average Good	Excellent performance and a slick set of controls make this recorder a pleasure to use. Good price is a bonus	Hi-fi, NICAM, programmable remote	BB	71
Akai VS-967EK £500	Average Good	Many well implemented facilities, but unsuitable for dedicated audio use due to lack of LP mode, manual record levels or audio input	Hi-fi, NICAM, on-screen programming	R	86 Supp.
Grundig VS680 £1250	Very Good Average	State of the art technology gives top notch sound with tremendous flexibility but somewhat disappointing picture quality. It's also very hard to drive	Hi-fi, NICAM, LP/SP, teletext programming, on-screen graphics		86 Supp.
Nordmende V4405K £549	Good Good	Fine basic sound and picture quality, but the RF converter introduced significant losses. An excellent model, but configured for German home market. The recorder lacks NICAM	Hi-fi, transmitter handset, digital FX	BB	71
Panasonic NV-F65 £500	Good Average	Uninspired but competent and well made deck. Plenty of features, decent sound and reasonable video ensure recommendation	Hi-fi, NICAM, LP audio only, bar code programming	R	86 Supp.
Sanyo VHR-D4890E £1000	Poor Excellent	High grade S-VHS recorder with digital effects which gives first rate screen-based results but relatively poor sound recording	Hi-fi, NICAM, S-VHS, PIP etc		86 Supp.
Sharp VC-S1000H £1000	Good Poor	Clean, accurate and stable off air and from tape, and LP modes are satisfactory — but on-screen S-VHS results are well below par	Hi-fi, NICAM, LP, S-VHS, titling		86 Supp.

**TO ORDER BACK ISSUES PLEASE
TURN TO PAGE 39**

Personal Messages

It's nearly a year since I reviewed the Naim CDS (issue 98), the first CD player that really gave me some hope for a format that has been foisted on us by the collective greed and deafness of the music industry. Its big strength is superb timing and coherence, but even so my approval was decidedly guarded, as it fell well short of vinyl in terms of transparency and top end delicacy.

With hindsight, however, I did sell the player a little short, as several subsequent events have shown, highlighting all too clearly the unexpected pitfalls that can trap even a fairly wary and circumspect reviewer.

Never one to use a Naim in vain, PM decided to have another listen to the CDS and was very impressed this time around.

I may well have turned off the Linn Lingo turntable power supply during the period I was reviewing the CDS; frankly I can't remember. Certainly it never occurred to me to disconnect the Lingo physically from the mains, though as I found and mentioned briefly last month, doing so significantly improves the sound from the CD player.

I doubt I'd have stumbled across such a surprising observation and unexpected interaction without a tip off, but I'm not just being susceptible to suggestion. Three months back I spent an unforgettably enjoyable Compact Disc evening driving Tannoy Westminster Royals with a pair of Audio Innovations' giant Third Audio (prototype) power amps, fed via a passive potentiometer. The Naim CDS had never sounded better — and the Lingo mains lead had been temporarily transplanted to a Voyd power supply at the time.

In a similar vein, I ended the last set of loudspeaker listening tests mildly perplexed that the CD-sourced material had sounded distinctly sweeter and more transparent than usual. The fact that I used a Voyd for the duration, again borrowing the Lingo power lead to feed its supply adds another piece to the jigsaw.

More recently still, the CDS revealed yet another vicious snare waiting to entrap the unsuspecting reviewer. Since the early production sample I have been using, Naim has instituted a couple of power supply tweaks to improve performance. (Early purchasers are offered a factory retro-fit for £162.) Keen to keep up to date, I arranged to borrow a new sample, which Doug brought over a week ago.

It was plugged in to warm up and stabilise for at least two hours before making any attempt to play discs. A few favourite tracks were played on the original machine, then the new player was properly sited, plugged in and fired up. Feeling charitable, I acknowledged I could detect some improvement in the low frequency resolution, but the timing was shot to hell, and high frequencies were quite definitely out to lunch. We persevered for a while but soon reverted to vinyl.

By the end of the afternoon I could certainly detect an improvement, but was still far from happy with the sound the new player was making. Doug promised things would continue improving over the next few days, but the information from my ears made me insist that I hang onto the original player as a reference for a couple of weeks.

The next few days were preoccupied wrestling with the complexities of the Marantz Audio Computer, but the occasional spin did suggest things were still getting steadily better. A weekend away gave three more days of burn-in, and I returned to the fray well refreshed on the Monday morning.

Though I'd kept the old machine plugged in and warmed up throughout, there was no need whatsoever to refer back to it. The new version is now clearly superior in every respect. The original's superb low frequency agility is now enhanced by additional poise and less fluster, leading to much improved analysis. The treble too is altogether more convincing, not perhaps with the delicate transparency of the best vinyl replay, but certainly, clean and informative.

Best of all is the way the total coherence is altogether better focused and more secure. I found myself much less conscious of the mechanical/logical basis of the music reproduction, which in turn facilitates the suspension of disbelief and lowers the barriers to enjoying the music itself. Re-exploring my rather sporadic collection of CDs proved a both rewarding and pleasurable experience, during which I confess to finding myself humming along and tapping my feet on several occasions!

At the end of a whole week, the CDS is finally coming into its own, and for all I know it might go on getting better for some time yet. Pity the poor reviewer, attempting to get an accurate fix on such a relentlessly moving target!

I can't say whether the CDS is better than some of its obvious commercial rivals, simply because most of my efforts to try out the alternatives have so far come to naught, perhaps as much through my known preference for matters analogue as the inertia of the brands concerned. But at least I've now found a CD player that makes a convincing job of recreating what musical messages manage to survive the iniquities of modern recording studio technology.



The Naim CDS gets a second innings this month.

It's a Peach

The new Naim CDI

Getting things right the first time is a tradition at Naim Audio.

Which is why our first CD player, the CDS, has received such world-wide acclaim.

We are now delighted to introduce a second model, the Naim CDI (shown here).

The Naim CDI incorporates all of the technological innovation and expertise gained from the development of the CDS. Designed to be the best in its class and devoid of gimmicks, here is an affordable player capable of providing true musical enjoyment.

Our efforts are bearing fruit.



Naim Audio, Southampton Road,
Salisbury SP1 2LN, England.
Telephone: (0722) 332266

Now you know what's in a Naim.

 naim audio

The Critic's Choice

AMPLIFIERS

Rotel RA-930AX

Gamepath, 25 Heathfield, Stacey Bushes, Milton Keynes
MK12 6HR. Tel: (0908) 317 707



If you had an award-winning budget amp on your books and the time came to update the range, would you junk a successful design? Of course not and neither has Rotel. So when the popular RA-820AX had run its course it simply re-arranged the fascia and tinkered with the circuit layout before re-launching it as the RA-930AX!

The style of this amp compliments Rotel's other 900 Series separates with its centralised volume control and new, luxurious finish. Yet like the RA-820AX it caters for MM disc, CD, tuner, aux and tape inputs with both switchable tone controls and a second set of speaker outlets. Nothing ostentatious, then, but perfectly adequate for the keen listener.

Inside there is the same series-feedback RIAA stage with its Signetics op-amp and traditional Sanyo-based power amp. However the layout of the PCB is now wholly symmetrical, a change known to improve upon the breadth and depth of stereo soundstaging, while star-earthing and Rhoderstein signal-path resistors complete the evolution. All this with an increase of just £10 since we reviewed the RA-820AX in issue 80. Not bad, huh?

Lab report

By way of recompense the power output has edged up from 47W to 53W (8ohm) and 69W to 77W (4ohm) though the headroom and peak current are quite unchanged. Stereo separation, channel balance and the low 0.006ohm output impedance have all taken a turn for the better while the DC offset is still too high!

Rotel has obviously changed the feedback operating about the power amp, for the overall sensitivity is reduced while distortion has increased from 0.0013 to 0.007 per cent at two-thirds output - just compare the 3D plot with that in issue 80. The disc response is identical, by the way.

Sound quality

This was one of just two or three amps that gave us the distinct impression of playing louder than usual, despite the outputs of all contenders being matched at precisely the same level. Both vinyl and CD inputs were similarly influenced, pulling up low-level detail from a deathly silent background - detail that was often masked elsewhere.

This prompted a slight split in opinion. Some were mildly aggravated by the immediacy and 'loudness' of its presentation yet were bound to acknowledge its biting clarity and insight. Larger than life, the panel suggested - a truly surrealistic performance! Ordinarily, of course, they would have reduced the volume a notch or two.

Meanwhile the remainder of the panel were captivated by the clean, even-handed and thoroughly involving sound. The sort of sound that enhanced the femininity of Julia Fordham's voice while exposing percussive and string detail from both pop and classical discs with exquisite clarity. Notes grew and faded with realistic presence, a trait, along with the sheer vibrancy and tension of the music, that prompted one listener to correctly identify this as a Rotel amp. Not once, I might add, but in two consecutive blind listening sessions.

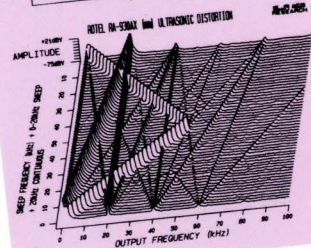
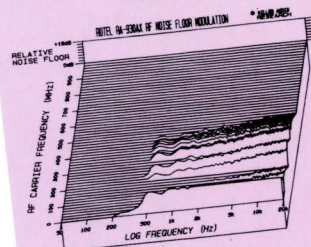
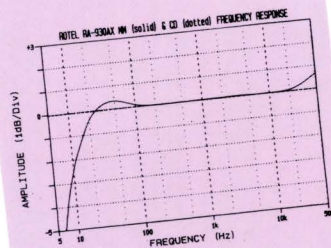
Conclusion

'A real scorcher' was the overwhelming response of the Choice listening panel. But so it should have been. After all these were the same people that voted its predecessor - the RA-820AX - a Best Buy exactly two years ago! In common with this classic, the RA-930AX bundles across a wealth of busy, intriguing musical detail with bags of enthusiasm.

Indeed, it was voted second only to the Lecson for its ability to invoke powerful, emotive music. This, plus its technical competence and reliability, maintains the family tradition for Best Buys.

TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output:			
8ohms	47.5W	52.5W	50.4W
4ohms	66.6W	76.7W	74.9W
Dynamic Headroom (IHF) -1.36dB (72.0W)			
Peak Current (5msec, 1% THD) -12.5A			
Output Impedance 0.0058ohm			
Damping Factor 1391.3			
	CD/Aux	MM	
Stereo Separation (1kHz)	81.8dB	80.5dB	
(20kHz)	56.8dB	54.5dB	
Channel Balance (1kHz, -20dBV) (-60dBV)	0.21dB	0.27dB	
	0.31dB	0.42dB	
Total Harmonic Dist. (0dBV) (2/3 power)	-82.3dB	-85.7dB	
	-83.3dB	-83.4dB	
CCIR Intermod. Dist. (0dBV) (2/3 power)	-87.8dB	-76.7dB	
	-90.7dB	-77.5dB	
A-wtd Noise (0dBV) (2/3 power)	-86.3dB	-79.8dB	
	-98.1dB	-80.7dB	
Residual noise (unwtd)	-72.0dBV		
Input Sensitivity (for full output)	27.6mV	450µV	
	201.6mV	3.29mV	
Disc Overload (1kHz)		181.1mV	
(20kHz)		1660mV	
(50kHz)		3175mV	
Tape Output/Impedance	11.2V (disc) / 2.0kohm		
Input loading	30kohm/125pF	47kohm/180pF	
DC offset, left/right	+75.5mV	+78.5mV	
Retail Price			£160



Phone or fax
Rotel UK for
brochures and
a nationwide
dealer list.

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Ask someone who knows...