

HI-FI CHOICE

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

DECEMBER 1991 £2.95

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Menu

And the topic for discussion this month? — Politics. Before you all drop off to sleep, that's hi-fi politics as opposed to the Westminster variety.

You might be forgiven for thinking that hi-fi is about as far removed from the world of politics as it is possible to get, after all hi-fi is all about making music sound good. However, there is a lot more to it than that and it is increasingly the case that what the poor old consumer is allowed to listen to comes down more to politics than to any question of fidelity.

Take recordable CD for instance. Elsewhere in this issue you will find a rave review of the format saying that it sounds great, is easy to use and makes a great home recording format. However, because of political rather than technical reasons you can't actually buy it. Why? Because of record company politics. After all, if cheap recordable CDs came onto the market they might lose the cash cow created by what appears to be the massive overpricing of pre-recorded CDs.

Despite the fact that the Home Taping Rights Campaign is currently publicising a *Which?* survey showing that most people only record material they have already paid for, the record companies would like to be able to make them pay even more for the privilege. Not content with mugging you to the tune of £13 for the original CD, they want a further £7 for a tape if you want to play the same material in your car or Walkman. Either that or they want a levy on the blank tape so that their already bulging coffers can be swelled even further, at the expense of the blind, ornithologists and any other group who use cassette tape for any reason other than recording music.

The misologistic approach of the record companies is even further evidenced by their approach to stopping people copying onto DAT. SCMS, the so called Serial Copy Management System has got to be one of the most ridiculous systems ever invented. It doesn't prevent you copying your CDs, it just prevents you copying your copies. It's amazing to think that with nearly 3million unemployed, record company executives are still paid vast amounts of our money to sit around all day wearing gaily coloured plastic spectacles, making decisions that would have Mad Jack McMad (the winner of last year's mad man competition) throwing up his hands in amazement.

So what's the answer? Simple, tell the record companies to take a running jump and launch whatever the consumer demands. After all, what have the record companies ever done to support the hi-fi industry? Here endeth this month's polemic. . .

Andy Benham



Cover photograph of the Sennheiser Orpheus by Chris Richardson.

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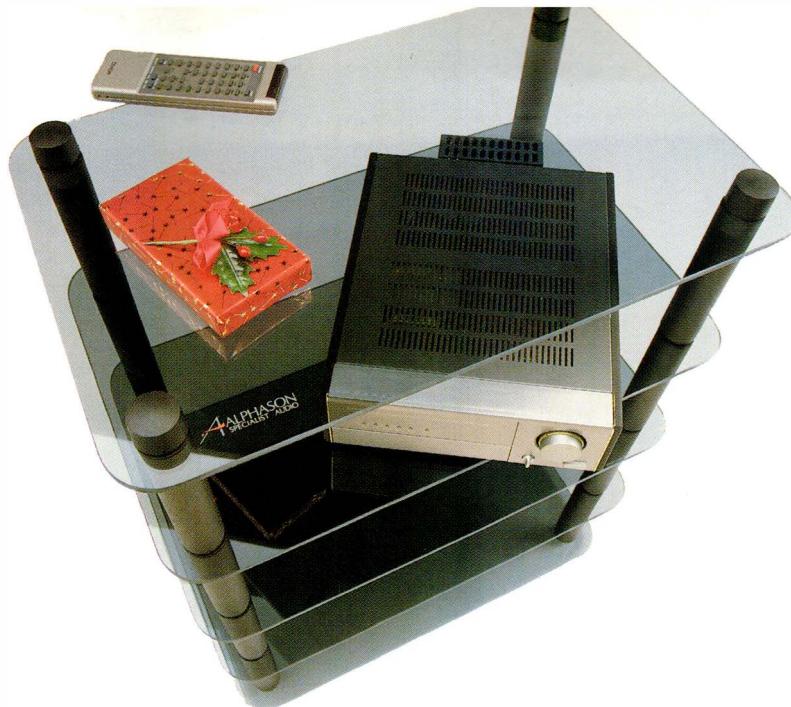
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THE CHOICE DIRECTORY

At a glance information on all the current products that we've tested in *Hi-Fi Choice*. With well over a 1,000 entries, all based on our own full reviews, it even includes concise results from this month's DAC tests.

Beware of cheap imitations, this is the real thing; 30 pages of detailed information including comments on sound quality, compatibility, features and value for money.



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Paul Messenger takes a look at two of the systems which impressed him most at this year's Heathrow Penta Hi-Fi Show.



Top: Look what you could have won! It's a top of the range Alphason equipment support.

Middle: If you can't win the Alphason, then how about this model from AAA?

Bottom: Find out which of these DACs is the best at turning digits into music by reading our comprehensive reviews starting on page 57.



Bass units get it in the neck

KEF is marking its 30th anniversary by announcing two new speaker ranges, the *K* and *Q* series.

The *K* designation is a soemthing of a revival for KEF, the *K1* being KEF's first speaker, launched back in 1961. Three decades on, the new *K* series consists of the *K120*, *K140* and *K160*. The *120* is a compact two way, the *140* a mid-sized two way and the *160* a floor standing three way. Retail prices are a pound shy of £160, £220 and £300. All three models feature baffles moulded in filled polypropylene, with moulded trim rings and invisible grille fixings. This emphasis on presentation is intended to provide you with a speaker that doesn't look undressed when the grille is removed.

The *Q* series is the most recent implementation of what KEF calls 'Uni-Q two-way coincident-source technology'. What this means is that all the sound radiates from a single source, with the tweeter placed at the centre of the bass/midrange



Sunrise industry; KEF's new Q series speaker range.

unit. This is achieved by using a magnesium alloy which enables engineering of a tweeter assembly small enough to be located in the neck of the bass unit's cone. The net result is said to be

improved stereo imaging qualities. The three *Q*'s — *60*, *80* and *90* — are all capable of being bi-wired or bi-amped and are priced at £380, £500 and £650 respectively.

Polk in the eye for Meridian

AGI Electronics Ltd, Meridian's parent company, has announced the sale of Meridian to Polk Audio Inc of Baltimore, Maryland, USA. If negotiations are successfully completed the Huntingdon based hi-fi company will change hands for a price of \$4million and AGI will be left with KEF as its only significant hi-fi holding.

Meridian has a high profile in the UK as a manufacturer of quality audio components, and is perhaps best known for its work in the digital area, with its respected CD players, transports, digital preamp and standalone DACs.

Both Polk and AGI see the acquisition of Meridian as strengthening KEF and further mergers with the American company might well be on the cards.

Death of the Equaliser

The desire to economise on manufacturing costs and declining demand among consumers are combining to kill off phono stages in amplifiers. AV International of Stroud describe this situation as 'sad' but it insists that 'many markets will not now accept preamplifiers with a phono stage'. Be that as it may, the trend continues with AVI's new line only preamp, the S2000MP.

This new preamplifier has six line level inputs switched by reed delays and offering what the manufacturers describe as 'ultra low distortion'.

The output level is set via a motorised Alps potentiometer which can be controlled by means of an infra-red handset, although this is available as an add on rather than being included in the basic price of the unit.

The S2000MP, minus the infra-red handset, retails for just under £600.

Fighting black and boxing clever

Expecting any hi-fi in your Christmas stocking this year? Or perhaps you're planning to surprise your loved one with something audiophilic under the Christmas tree. Picture the scene. It's Christmas morning. The lights on the tree are glowing with every colour the

human eye can recognise. Iridescent shreds of gorgeous recycled designer wrapping paper are settling in the air. Eager fingers tear a box open and the hi-fi component stands revealed as — a black box. Not just black-ish, but dead black. Not just box-like, but as boxy

as you can get. And just about as boring.

Don't despair, however. This year a London hi-fi retailer has decided to do battle against the invasion of the boring black boxes.

Kamla Electronics of Tottenham Court Road is offering customised paint jobs on hi-fi components purchased from their stock. Customers who want something 'a little different' can now emerge from the shop with flying colours. Starting at simple respray jobs for around £50, the service extends upwards to include metallic high sheen finishes or, if you want to lay it on a bit thick, 19 coats of lacquer applied at the Rolls Royce factory. It all depends on the colour of your money.



The green CD debate continues; one of Kamla's painted ladies.

Indoor activities for the affluent

As you might guess from its name, Active Options is a hi-fi manufacturer dedicated to selling you active rather than passive amplification for your domestic audio components. The company's technique involves a complete amplifier circuit dedicated to each speaker drive unit.

Active Options is marketing both two and three way active amplifiers, featuring what AO describes as 'built in dealer configurable active filtering'. In addition to a separate, balanced, line driver unit with lockable gain control, a clipping level indicator and time alignment electronics are also provided.

The unit can be configured to drive most types of speaker and can apparently be adapted if and when you upgrade your speakers. Each amplifier has a nominal output of 75W and the two way system can be upgraded to three way.



You can keep your options active with AO's amplifiers.

The Kent based company is selling the system for prices which 'start at just under

£2,000'. This tidy sum also includes the cost of modifying your existing speakers.

Penta strikes new chord

Pentachord's new column design speakers, the *C* or *Pentacolumn*, present what the company hopes is an unusual 'attractive yet discrete' appearance. The new speakers are designed with the intention of providing the same imaging performance and bass extension as the existing Pentachord satellite-subwoofer system.

The columns are 3'6" high (1.08 metres or gas mark 5!) and contain four drive units. The mid and upper frequency range is handled by a pair of 50mm Bandor units in a separate upper chamber.

The new design adopts the standard Pentachord approach of covering as much of the frequency range as possible with a pair of miniature moving coil drivers operating in tandem.

An active crossover system is used and two stereo power amplifiers are needed. Control of the bass output is handled independently.

The cabinets are built of MDF veneered with real wood. Retail price is £1,795 a pair complete with active crossover, but don't forget you'll need an additional stereo amplifier.



Pentachord offers you the chance to have your own column.

Tape people see red

Behind the boring acronym HTRC lurks the Home Taping Rights Campaign, a group dedicated to protecting your rights — and your wallet. The HTRC was formed in 1986 to oppose the principle of levies on blank tapes. Ever since then it has resisted the encroachment of the record companies on domestic taping and regards the behaviour of these big companies as possibly being motivated more by bumper quantities of greed than any selfless desire to protect the copyright of performers.

The HTRC has welcomed new survey evidence which suggests that record industry claims are exaggerated and that the effect of home taping on music sales is actually rather limited. The Consumers' Association survey, published in *Which?* magazine, states that most home taping is of music already bought and paid for by the individual.

You don't need a brain the size of an avaricious multinational corporation to realise the implications of this. Yet the record industry still insists that it is suffering substantial financial loss, while being less than forthcoming with hard facts, according to the HTRC campaign coordinator, Marianne Yarwood. 'Record industry representatives refuse to disclose their survey evidence to public scrutiny,' says Yarwood.

In like Linn

Linn is releasing a new pre and power amp combination, the *Pretek* and *Powertek*, based on the *Intek*, the company's integrated amplifier.

The *Powertek* has identical gain to the power amplifier stage used in the *Intek* and can be used in multi amplifier or active loudspeaker systems. Linn describes it as being ideal for use in distributed sound systems.

In traditional Linn fashion, the *Powertek* is designed to provide an upgrade route from earlier products and can be connected to an *Intek* with no modification.

The *Powertek* can also be used with Linn's *Kaber* to drive an active system. Prices are £327 for the *Pretek* and £365 for the *Powertek*.

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SAUL B. MARANTZ

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Gramophone, July 1991.



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Show Report

This year's Penta show was a busy event, there were so many exhibitors that in three days conscientious hacking round the corridors, we were hard pressed to get into all the exhibitors' rooms. At a time when life is very tough on the high street, small scale and foreign manufacturers seem to be multiplying at a frightening rate. There was no shortage of new names over doors and a positive deluge of new products, so it's debatable whether we'll ever catch up with them all. But on the following pages we've brought you a selection of some of the more interesting products, especially those that are most likely to become available in your local dealer's dem room.

There was quite a large contingent of foreign manufacturers displaying their wares in the hope that they might attract UK distribution, amongst them was the large French speaker company Cabasse and a Danish valve amp manufacturer called L A Audio whose chrome and brass finished products looked very sexy.

The Brits were there in force however, Wharfedale re-launched the Leak brand name with a very slick multi function digital preamp, CD player and monoblok amplifiers. Details are still a bit scant as the product won't be ready for the market until January 1992 but the full system looks like costing somewhere in the region of £5,000 and is designed to carry on the Leak reputation for well made audiophile products. Wharfedale has also been working on the Cambridge range which has had a pretty thorough overhaul, the CD3 has been replaced with the £695 4100 CD which uses the same 16x16 DAC but is otherwise a

new beast. There's an outboard DAC - 5100D (£499) - incorporating the same chipset and a transport - 5100T (£699) - which is Philips based but uses a Cambridge designed power supply and regulation. The amps have also changed, there are now two, the 2050A and the 2070A in which Cambridge has maintained its emphasis on phono stage quality. Also on show in this overly well packed room were a CD player, the Orbit (£495) and a two box DAC/preamp, the Sigma (£995) from Linx.

But that's enough Wharfedale, what about the Cornflake shop's dem room that was so packed we didn't stand a chance of getting in, or the Mana room that was so metal that we couldn't find the out door, not to mention Russ Andrews' OTT torlite system with its giant leather covered speakers and acres of amplification - £80,000, and it sounded so good that someone bought it!

But back to more realistic products, Inca Tech reappeared (as two words followed by Design Ltd) with a Mosfet integrated amplifier called Oberon (£450). Tom Fletcher of Nottingham Analogue Studio was making some very pleasant noises with a couple of new components, the Mentor and Space arms, a refinement of the old Omega Point, these are unipivots with a counterweight that is slung under the rear end of the arm tube. He is also making an underslung counterweight for the Rega/Moth arm.

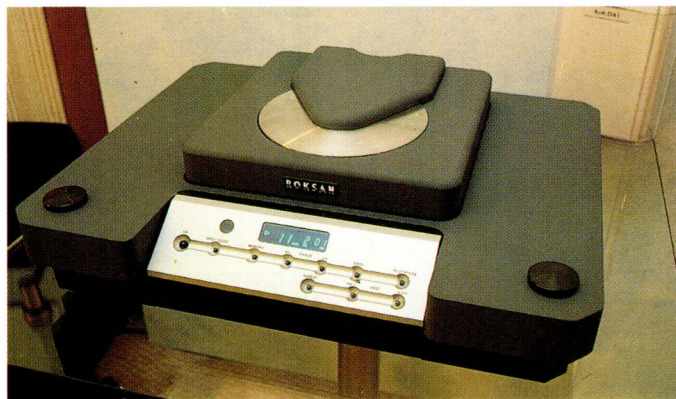
Another vinyl enthusiast Branko Bozic of Audio Freaks was having a good time with the brand new Kuzma Reference, a c£2,000 aluminium and acrylic beauty from Yugoslavia. He was also playing a range of British valve amps called Trilogy, prices range from £495



Nakamichi brought a new degree of sophistication to multi-disc CD players with its £3,000 1000MB transport.



MPI's room was full of high-end goodies including this Primare 201 preamplifier and 204 CD player.



Vinyl diehard Roksan went digital with the launch of its RoK-DS1 CD transport, a matching DAC will follow soon.

for the line preamp to £1,995 for the 100W monoblocks, which were making good sounds with some tasty Hales loudspeakers.

Further along the corridor Zeus Audio was having a good time with a Pierre Lurné turntable and arm and a large pair of Triangle speakers. Both products come from France and seemed to be working nicely with Audio Innovations' amps and some mains transformers called Copenhagen, which they were keen to promote as the best thing

since, er the last really good thing, whatever that was. Audio Philosopher Simon Yorke, of Zarathustra fame, was showing off the latest fruit of his efforts, a gorgeous parallel tracking arm in the Southern mould, a design whereby a beam swings across the disc and a minute arm runs across on precision tracks. He told me not to mention it as it takes so much work to build, so don't order too many!

What else, ah yes, a rather tasty little valve pre/power combo



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response. With this careful attention to detail each model in the range represents the ultimate in contemporary acoustic design.

Each 600 series model has been styled by Pentagram Design to ensure that their looks match their high performance. Prices though are equal to neither, with the DM 600 at £149.95, the DM 610 £199.95 and the floor standing DM 620 £299.95.

Why not visit your local B&W dealer? Because, once you've heard the 600 series, there's really nothing left to say.

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Alphason celebrated its 10th anniversary in style with the launch of its Symphony turntable.



One of the industry's most famous names was back on display courtesy of the BBAR digital to analogue convertor.



Allison Acoustics caused quite a stir with the introduction of its £250 IC5 speaker.



The latest offering from the land of the Iso is this stylish deck, the Michell Micro.



Audio Freaks was showing off its latest products including the British built Trilogy valve amplifier range.



Hard cell - Pink Triangle's battery power supply is certainly speaking the right lingo.

called ESTi from Taiwan was hiding in the PM Components room, its claim to fame being a single ended pentode power amp and an attractive price of around £700 apiece for some very nicely finished amps. There was no shortage of valve amps both old and new about the show, Tube Technology's little beauties were going strong, the Great Little Valve Co (now there's a name) had some unusual but attractive

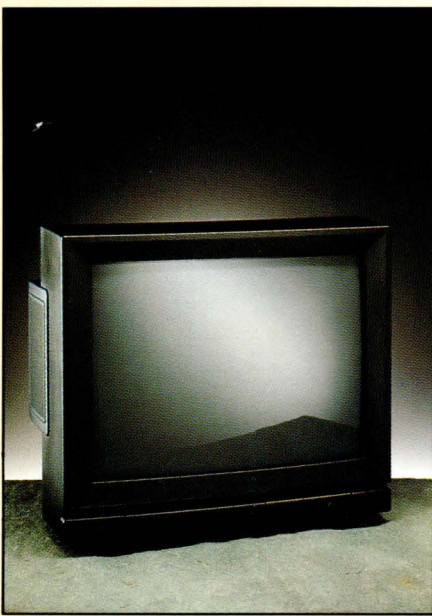
mono blocks in the S1RL room and Acoustic Energy revealed the re-born Dynaco *Stereo 70II*. The latter is a re-incarnation of one of the most successful American valve power amps ever, basically it has been rebuilt using modern components but is said to retain much of the character of the Seventies original, price is £70 over a grand, with around 35W on offer.

Another re-appearance was

made by Cadence valve amplifiers which are to be distributed by Audioplan UK, these attractive little beasts, which were used as a reference in the *Choice* valve amp tests (issue 100), have solid state regulation and star earthing. Mentmore has had a change of ownership and has changed its name to Sound Research, its products are starting to look a bit more attractive as well with stainless steel and polished

aluminium featuring in their construction, prices start at £425 for the CD preamp and work their way up to £1,700 for the biggest power amp. Beard was touting its rather attractive wooden box 12X oversampling DAC the *DAP-1* at £900 and a similarly encased hybrid integrated at an attractive £550.

On the digital front Meridian, Marantz and Denon were demonstrating CD-R machines,



IF YOU HAVE A TV

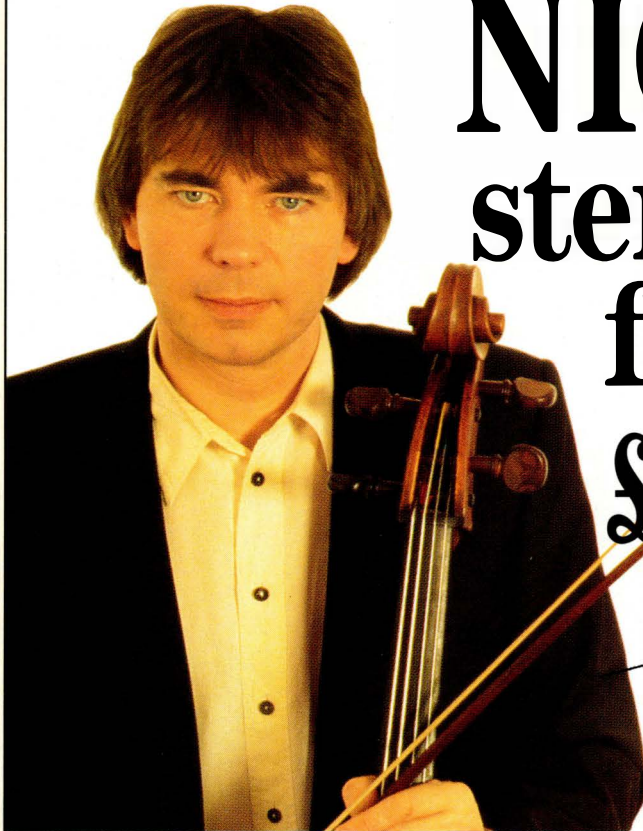


AND A HI-FI,



ALL YOU NEED IS A
CULLAM
INTERPRETER AND...

“You can have NICAM stereo TV for just £289.95”



Julian Lloyd Webber

Whatever you enjoy watching on television, you'd enjoy it far more in full NICAM digital stereo sound.*

But that doesn't mean you have to spend £500 or more on a new NICAM TV set, because now – with the Cullam Interpreter and your existing hi-fi amp and speakers – you can have true hi-fi digital stereo television sound at home for under £290!

Don't confuse the Cullam Interpreter with inferior products. Just look at the features, and compare them for yourself:

- 20 channels including an auxilliary input
- 3 x digital over sampling
- High quality Philips Nicam circuitry
- Dual language capability
- Tamper-proof disabling switch
- Infra-red remote control with volume, treble, bass, balance, mute functions etc.
- Scart Euro-connector and all the plugs and leads you'll need.

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AR's Holographic Imaging range has a new home at Entel UK.



Furukawa's Kozu Suzuki shows off the company's latest 7N PCOCC cable.



Wadia's Power DAC. A convertor with an output of 150W into 8ohms!

the former two being based on a Philips design and costing in the region of three to four grand and the latter being entirely Japanese and commanding a somewhat hefty £9,000 asking price - see the editor's piece on the Marantz (Statements) for our impressions. Distributor and manufacturer Acoustic Energy had a bunch of new digital goodies including the Threshold DAC 1/e digital processor, a 768 times oversampling bitstream DAC that costs a cool £3,150.

In another AE room Music & Sound or MAS was playing its CDT-1 transport (£859), DCC-1 remote control digital preamp (£1,285) and SPA-100 100W power amp (£819). And in another was the full Audio Alchemy range including the ADE analogue decoding engine (£210) for cleaning up the analogue output of a digital component and the DTI digital transmission interface (£330) which acts like JVC's K2, in that it re-clocks digital signals between transports and DACs thus reducing jitter. Not surprisingly there is also an Audio Alchemy transport, called DDS (£800/£900) which comes in two versions depending on whether you need an AT&T type glass rather than plastic fibre optical output. And as if that little lot wasn't enough AE announced that it would be distributing Air Tight Japanese valve products, beautifully made pre and power

amps in the two to four thousand pounds league.

As usual there was no shortage of new speakers. Absolute Sounds was having a good time with the sculpted Sonus Faber *Extremas* (£5,991), these attractive Italian speakers have an unusual adjustable passive bass driver (B139) on the rear which has its own reflector plate. AS also won largest subwoofer at the show award with its Wilson *Pow-Whow II*, a humungous and beautifully veneered Texan scale coffee table with a price to match. £14,000, ouch! Other new goodies around the AS salons included digital product from PS Audio, Theta, Siltech (Sphinx) and Krell whose single box *CD-1bit* at a relatively affordable £3,290 was making good sounds with some new Maggies.

On the interesting new speaker front Industrial Research Ltd was proudly playing its S1RL loudspeaker system, an American style electrostatic panel and subwoofer tower system commanding an American style £14,000 price. Dawn Audio made its debut with a largish GRP (glass reinforced plastic) four way speaker called the *Symphony*, price looks like being £1,750 a pair.

The Professional Monitor Co showed a dinky 21inch high, two way transmission line speaker (£1,190) alongside its somewhat

more substantial pro products.

Entel UK, a new company formed to distribute the International Jensen product range, which includes AR, NHT and Advent loudspeakers, was showing the latest models from these companies. These included AR's *Holographic Imaging* range that's priced between £200 and £900, a re-appearance of the Swiss made Rowen dipoles and the German Einstein amp, an integrated design with a curved aluminium fascia and more capacitors than you can shake a stick at.

Pioneer was bi-amping *A-400s* (with an elastic band connecting the two volume knobs!) into some new pro oriented mini monitors from Primary Acoustics called *LMA*, these use the KEF Uni-Q drive units in an unusual configuration and the more expensive versions (£1,000) have external crossovers.

Roksan had a mock up of its *RoK-DP1* CD transport (£995) which looked both unconventional and appealing, and the *Touraj Moghaddam Signature* turntable, a very slick mega *Xerxes* that costs £3,195 including the requisite *RoK-DS1* power supply.

T&R Industries has been expanding its range of amplifiers to include six preamps, four power amps and a £999 integrated, it's also built a hefty active subwoofer for the same price.

Alphason hasn't been taking it

easy either, it has a new passive preamp called *Argo* - £350, a power amp called *Theseus* - £800, a phono stage called *Arion* - £450 and a DAC called, er *DAC* (must've run out of Classical references!) which will retail for £600.

The company also had a turbo charged turntable called *Symphony* (I've seen that name somewhere else), which is a bit like a cross between a *PT Anniversary* and a *Sonata* as it has two subchassis mounted motors. The price looks like being somewhere around £1,500.

There was some attractive little integrations in the Audiolink room, a company that's under the same wing as Lecson. The Audiolink *Sterling's* claim to fame is that for an extra £50 it's available in chrome, the black version costs £199. Ion also had a new integrated called the *Obelisk 100* priced at £299 or £399 with an MC phono stage.

Michell has added a line preamp to the giant killing *Iso* phono stage and had a prototype of the forthcoming power amp up and kicking. And finally *Finestra* manufacturer EC Audio were showing a £500 phono stage called *Prisma* and a rather nice 50W power amp called *Lecturne* (£699).

What a massive show! Thank the stars it's only once a year. Hi-fi ain't getting any cheaper but there's still plenty of it!



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Choice Sessions

Super conductor

The new Ortofon MC15 Super cartridge and the nature of 'detail' — Richard Black waxes philosophical.

As its name implies, the £100 MC15 Super comes between the MC10 Super (one of the cheapest MC cartridges around at £70) and the MC20 Super (£200) in Ortofon's range, but Ortofon is quick to claim that the price is deceptive. 'We've pulled out all the stops on this one and we think it's particularly good value', enthused Ortofon's Lawrence Armstrong. 'We hope it will appeal to people who take vinyl fairly seriously.'

A laudable aim, at any rate (I think!). And an examination of the features offered by the MC15 Super certainly seems to confirm the claims for value, what with a high quality Fritz Gyger stylus, tapered boron cantilever and 'Orthophase' symmetric armature, as originally featured in the MC3000. The body is solid aluminium.

I used the MC15 Super in my usual PT TOO/SME 309 setup, with a Moth phono stage and passive preamp, John Shearne power amp, and ATC SCM20 speakers. It took a little bit of fiddling to get it to settle down (tracking at 2.1g, tilted very slightly down at the nose), but once it did I was rewarded with a performance which was marked by quite an unusual blend of virtues.

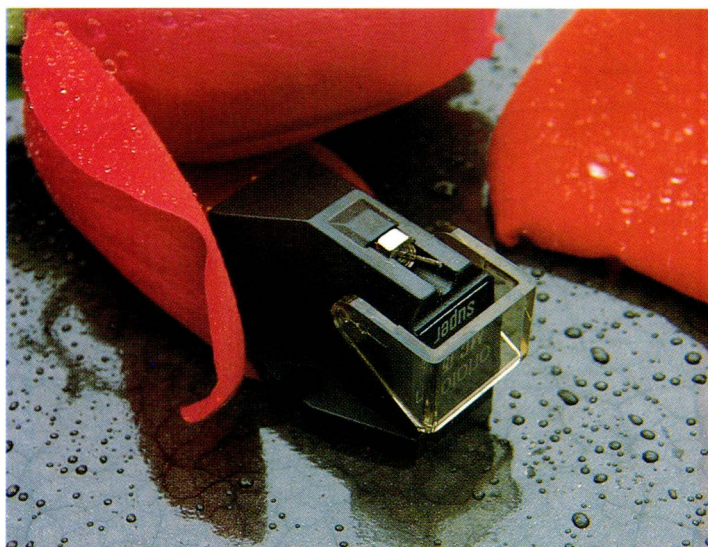
One of the things I always listen for, especially in cartridges, is detail. We all know what detail means, of course — but listening to the MC15 Super crystallised some thoughts on the subject that I had been turning over for a while. There seem to be two sorts of detail, outer and inner. Outer detail is exemplified by things like the sound of massed orchestral string instruments or voices, sounds which are at the front of the

This month Choice scrutinises a British amplifier that takes on the Japanese budget wonders, a Nicam decoder, the latest developments in equipment support and a notable £100 cartridge.

balance. A component with good outer detail will let one hear that there are many individual violins playing rather than just one instrument. Inner detail, on the other hand, is shown up by effects like the ambience of the recording venue and the audibility and clarity of instruments at the back of the mix. By no means do these invariably go together.

I would say that the MC15 Super is particularly good at revealing outer detail. I mentioned massed string instruments above because it made a particularly

Under the rose; the Ortofon MC15 Super cartridge revealed.



good job of some cello and viola passages in the scherzo of George Lloyd's *Fourth Symphony* (a fine recording on Lyrita), clearly recovering the subtle discrepancies between players which make the whole sound greater than the sum of its parts.

With completely different material from a Fifties rock'n'roll band, it was again perfectly clear how many instruments were involved and what they were. And all this was achieved without throwing the performers into the listener's lap, which has a tendency to happen.

George Lloyd knew my father

On the other hand, a £100 cartridge is unlikely to be all things to all mortals, and I couldn't help feeling that I've heard more inner detail. It's no worse than average in that respect, but it isn't outstanding. For example, in the George Lloyd recording there was a bit less acoustic space in evidence than I have heard, and the soundstage seemed to close in slightly. The other slight drawback I found was limited tracking ability, to the extent that some heavily-cut records were able to catch it out on occasion.

Again, no worse than average, but I did feel that an AT-OC5 which I was using for comparison just had the edge there.

Overall, I suspect the MC15 Super may divide opinion between those who value its 'outer detail', its clear and neutral bass and its well-extended (although just marginally bright) treble, and those who feel the need for a little more ambience and peripheral information. What is certain is that if you are of the former persuasion, you won't find a lot better for the price. It's certainly not run of the mill. So try it!



Telly buttons

Want to jump on the Nicam bandwagon but can't afford a new TV set? Cullam's new Nicam Interpreter might well be the answer, as Andy Benham reports.

With all the promotional activities currently being carried out on its behalf, you would have to be an extreme tellyphobe not to have realised that the long promised stereo sound TV service is now up and running, at least in some parts of the country. Although the BBC seems a little shy about employing the acronym it invented, Nicam is now well and truly on the market, and both European and Japanese multinationals are pushing the development extremely hard. Hoardings up and down the high street espouse the benefits of junking your TV and/or video to catch up with this latest technological buzz word.

However, before you part with your hard earned readies and consign your old equipment to an already bulging landfill site, there is another option. Although little understood, both TVs and VCRs are not one component but two. Let me explain. In a TV you have the actual tube itself, which displays the picture, and a tuner, which demodulates the incoming broadcast signal and pulls out whichever channel you require. And in addition to its tape recording mechanism, a video recorder also has a tuner, so that you can

Picture this; the Cullam Nicam Interpreter makes your TV stereo-friendly.

record any channel independently of the TV. So when it comes to changing over to Nicam all you need to do is change the tuner part of the package rather than the tape deck or colour picture tube. So why throw away a perfectly good screen or an excellent recording mechanism when all you actually need to change is the tuner?

This sort of thinking has led to the introduction of a number of standalone Nicam decoders, the most well known of which up till now has probably been Arcam's £369 *Delta 150*, an audiophile unit aimed firmly at the hi-fi buff. Despite various other candidates, Arcam has really had the market to itself for some time, with other manufacturers promising units but being unable to supply in any real quantity. However, this could change with the launch of the slightly more affordable Cullam *Nicam Interpreter*.

SCART issue

Your £289 buys a rather nondescript black box which could easily be mistaken for a Dolby Pro-Logic decoder. A single display window and a mere half dozen or so buttons are the only adornments on an otherwise rather featureless front panel. Round the back you'll find a veritable lunar craterscape of connection sockets, including the standard co-axial sockets, a single SCART and a phono socket for composite video.

The simplest way to use the Cullam unit is to 'daisy chain' it with your TV or TV and video, the aerial lead going first into the Cullam tuner then passing onto the next item in the chain. The Cullam behaves in much the same way as a video recorder in that it does all the tuning and provides the set with a tuned picture. The TV can then be set to channel 36 or whatever and used to monitor the output from the tuner. The audio side of things is taken care of by means of a pair of phono sockets which can be connected to a spare input on your hi-fi amplifier in the same way as any other line level source.

Used in this manner the Philips electronics that form the heart of the Cullam unit (both audio and video) give a very good account of themselves. The picture quality is very good indeed and the Nicam chipset decodes the stereo sound information very efficiently. You control the unit by means of a fairly comprehensive remote handset which adjusts tone and volume as well as station selection. You can't bypass the tone controls but can reset them to the flat position at the press of a switch. It's a long time since I heard the Arcam unit, but if memory serves me well the two components are much of a muchness in terms of sound quality, with the Arcam perhaps a little ahead in terms of openness and transparency, offering a fuller and tighter bass. Pretty much what you would expect given its higher price and straight line approach.

I also checked out the Cullam via the

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SCART socket which carries composite video and also provides left and right audio signals and the switching voltage which should ensure that most VCRs and TVs will tune into the SCART input when the Cullam is turned on. (Both my JVC video and Philips TV acknowledged the Cullam's presence.)

The labelling on the front panel of the *Interpreter* is slightly confusing, although this is probably more the broadcaster's fault than Cullam's. A series of telltales are provided, one marked stereo and the other two enabling you to switch between channels of the Nicam broadcast for markets such as Hong Kong where the left and right channels are used to carry multilingual soundtracks. However, just because the stereo light is on doesn't mean you've got a stereo signal; all it means is that you've got a Nicam signal. This isn't strictly speaking Cullam's fault as there's a data bit in the Nicam transmission which can be set to tell a receiver whether the incoming signal is stereo or dual mono. Unfortunately neither the IBA nor the BBC bother to set it, so dual mono transmissions are thus read as stereo. *Vorsprung durch technik*, as they would have said if the budget hadn't been cut.

The Cullam unit certainly works as advertised and delivers a good quality stereo sound source for those unwilling to junk existing video equipment just because they want this new development. A big advantage is that it provides full remote control of both the programme you are watching and the volume level through the hi-fi, something which is not always available on the cheaper Nicam TVs, and which is never, to the author's knowledge, available from the audio output sockets of a Nicam VCR.

In short, the *Nicam Interpreter* is a well thought out and flexible product at a price which won't break the bank.

Budget box

Latest in a long line of 'budget super amp' contenders, Arcam's Alpha 3 looks certain to put the company back at the forefront of British amplifier design. Andy Benham checks out the evidence.

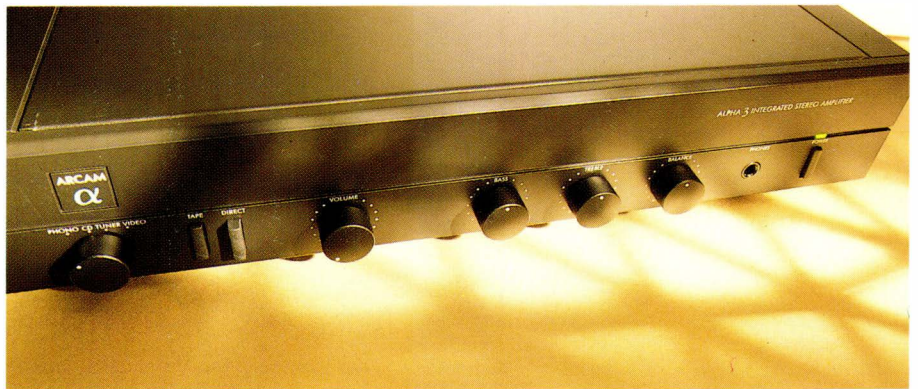
Arcam has long been at the forefront of the 'British sound', manufacturing a variety of no frills products which sell primarily on their sonic merit. For this reason Arcam has been one of the companies most affected by the introduction of the

Japanese so called 'wonder amps' from the likes of Pioneer, Marantz, and more recently Sony.

Arcam's answer to the Japanese invasion has been eagerly awaited and the *Alpha 3* is now in the shops, an updated version of its well respected budget integrated amplifier design. Priced at a very competitive £200 the *Alpha 3* is really the great white (surely black? - *prod ed*) hope of the British amplifier industry.

Testing cosmetics

The most obvious outside change is in the cosmetics: slightly different knobs, a new extrusion and a change of feet distinguishing the *Alpha 3* from its predecessor. The front panel has a new Direct facility bypassing both the tone and balance controls. The other main external difference is around the back where eight chunky binding posts replace the six sockets that were one of the distinguishing features of the *Alpha 2*. Giving both switched and



The British Arcam Alpha 3 looks like it's facing a bright future.

unswitched outputs their own grounds is certainly more convenient, and the change to binding posts (drilled to accept 4mm plugs) makes the whole thing a lot easier to set up.

Inside the case the changes are a little less obvious, but more far reaching when it comes to the performance of the amplifier. The reservoir capacitors have been increased from 6,800uF to 10,000uF: coupled to slight changes in the transformer, the 3 now has at least 40watts on tap compared to the 30watts of its predecessor. Arcam's claimed figures are almost certainly on the conservative side, since the *Alpha 2* measured in the high 30s when we reviewed it back in March 1989.

The other major change is that the MC option is now no longer available, the phono stage in the *Alpha 3* being moving magnet only with no upgrade facility.

A more detailed look at what's gone on inside will have to wait for our next amplifiers issue. But the long and the short of it is that the money saved on the phono stage, plus cost savings brought about by the introduction of CAD techniques in the design of the boards, has resulted in more money being available for the actual power amplification and supply stages themselves.

Chucking the *Alpha 3* onto the business end of a Meridian 200/203 combination quickly showed up another difference between the models. Because the CD input is no longer padded down to reduce its volume level to the same as that produced from other line level sources such as tuners and cassette decks, the *Alpha 3* sounds a lot louder.

A quick blast of that Chris Isaak CD (yeah, I know, but it happened to be in the drive at the time) was all it took to realise that Arcam has risen to the challenge most effectively. In fact the *Alpha 3* shows

just how much change there has been in the budget amplifier market in the last year. By now I suppose I should be used to relatively small units making this sort of sound, but it's still quite hard to believe that replacing a pre/power amp combination costing ten times the price with a baby integrated model can result in such a small overall decrease in quality. Perhaps this is just me showing my age but my first thought was that something this cheap hasn't got any right to sound this good.

Watts per quid

This is great news for anyone putting together a budget system, because nowadays £200 buys you an awful lot of amplifier. In fact, it can buy you an awful lot of CD player as well and the results you can get from just £400 worth of electronics are

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SENNHEISER

quite incredible. Still, that's something to think about some other time; for now the topic under consideration is the *Alpha 3*.

Describing the sound of an amplifier is extremely difficult if it's doing a proper job. Hence it's difficult to say very much about the Arcam other than that it increases the power of the inputs and passes the signals down to the speakers.

If I had to ascribe sonic characteristics to it then I suppose 'mellow' is as good a word as any other.

It hasn't quite the sonic incisiveness of the Pioneer *A-400*, but in many ways this is no bad thing. The *Alpha 3* will probably sound better than the *A-400* when used with budget ancillaries, for the simple reason that it doesn't pull systems apart in quite the same unforgiving way.

Not that there is any lack of detail here. The *Alpha 3* is a very polished performer and retains its detail well. In this respect it's presentation is probably closer to the Marantz *PM40SE* than the *A400*.

Interestingly, the phono stage is rather better than I had expected and makes this amp an obvious first choice for anyone putting together a budget vinyl system. Perhaps this is a reflection on Arcam's and Pioneer's relative attitudes to vinyl, or perhaps it's just coincidence; either way the amp doesn't appear to have suffered because of the better quality phono stage and it should definitely appear on any £200 auditioning shortlist.

Staunch supporter

Treble A is a company offering a new approach to equipment support. Jason Kennedy tables a decision.

Treble A is a relatively new equipment support company from Wales. It builds a range of tables based on a theme of tubular uprights and thick medite shelves. The tables are better presented than most, the use of brass and the picture frame chamfering on the edges of the platforms make them stand out from the steel framed competition. Brass is used at the top and bottom of each leg, on the top shelf there's a dimpled puck which locates the spiked foot of the separate glass or medite platform that sits there.

At the bottom of each leg is a large, tapered brass nut that is tapped to accept one of the stainless steel spikes that are supplied, and on each shelf there's a brass bush around each leg. The steel uprights and medite shelves are finished in that



Exhibiting polished table manners; the Treble A equipment support unit.

old hi-fi favourite: black.

The separate platform mentioned above is an optional extra available in medite or glass with a brass spike mount at each corner. These are designed to give extra isolation to a key component such as a CD player or turntable. There are therefore three different price brackets for Treble A tables. Standard models without a separate platform cost £123 for two shelves, £144 for three shelves and £166 for four shelves. For an extra £64 you can have a spiked glass platform with any of these. Or for an extra £39 you can have a medite one. If you buy a top platform separately however, it'll cost an extra £10.

Room at the top

With the separate platform atop it the Treble A table measures two feet high (610mm), and each shelf measures 18x550x395mm (hwxwd) but the actual usable width is limited, to an extent, by the space between the uprights (465mm). Compared to a Target table the Treble A is wider, deeper and probably heavier. The four tier version I took home to try out was very heavy indeed. Setting it up was straight forward, although the spikes are pretty sharp and with that much weight on them you can make significant holes in soft floorboards. The glass platform is quite fussy about precise adjustment but not in Mana territory. Just remember to tighten up the nuts properly.

It was the Mana that I used to compare the Treble A with, in its basic form it costs £200 which isn't that far from the £187 charged for a two shelf Treble A with the glass top. In most instances the Mana resolved greater depth and naturalness

not to mention more precise acoustic boundaries than the glass topped Treble A. However the difference wasn't that great considering that the Mana is the best table I've used. It really depends on how good your source component is at rejecting vibration; some record players are far more sensitive than others and if you want to get the best out of a Linn, Roksan or Rega for instance, then the Mana has a lot going for it. However if you've got a reasonably solid CD player or a turntable of the Voyd, Rock or Pink Triangle ilk then the Treble A option begins to look quite appealing. It's more user friendly and, depending on taste, aesthetically less obtrusive. And the fact that it manages to come anywhere near the standard offered by the Mana is quite an achievement.

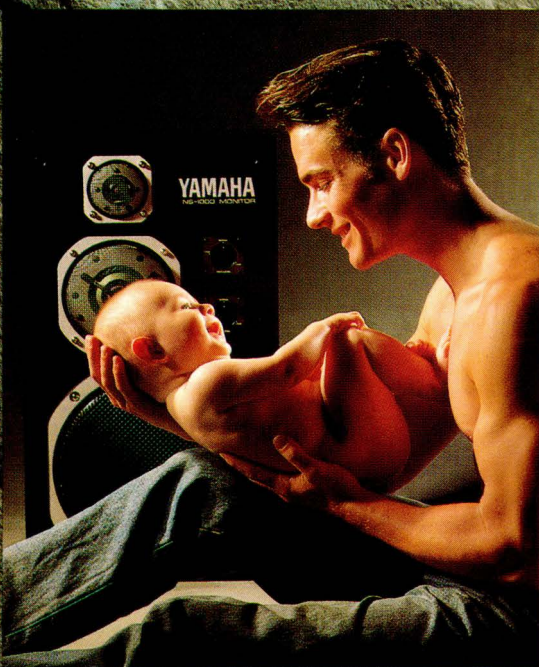
Taken on its own the glass platform offered better low frequency definition than the medite, which didn't allow the CD player to extract as much ambient detail. The glass gave music more depth and detail and is worth the extra £25 in mid to high resolution systems.

On the shelf

One option for devoted audio nutters is to use both the medite and glass platforms, one on top of the other (glass uppermost), giving a Mana Reference type arrangement. This brings in some Mana style boogie factor and offers another step on the upgrading path for the dedicated.

The Treble A tables are good looking, well made, capable of letting your equipment give of close to its best, and are a colourful entrant to the large grey field that makes up the supports market.

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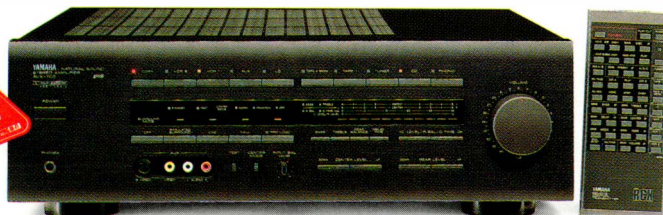
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**HIGH FIDELITY
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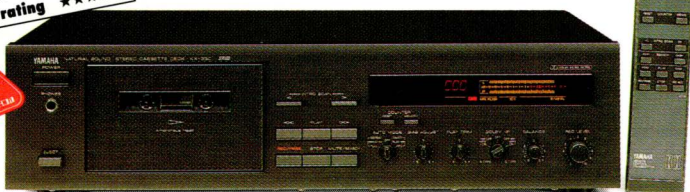
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**WHAT HI FI
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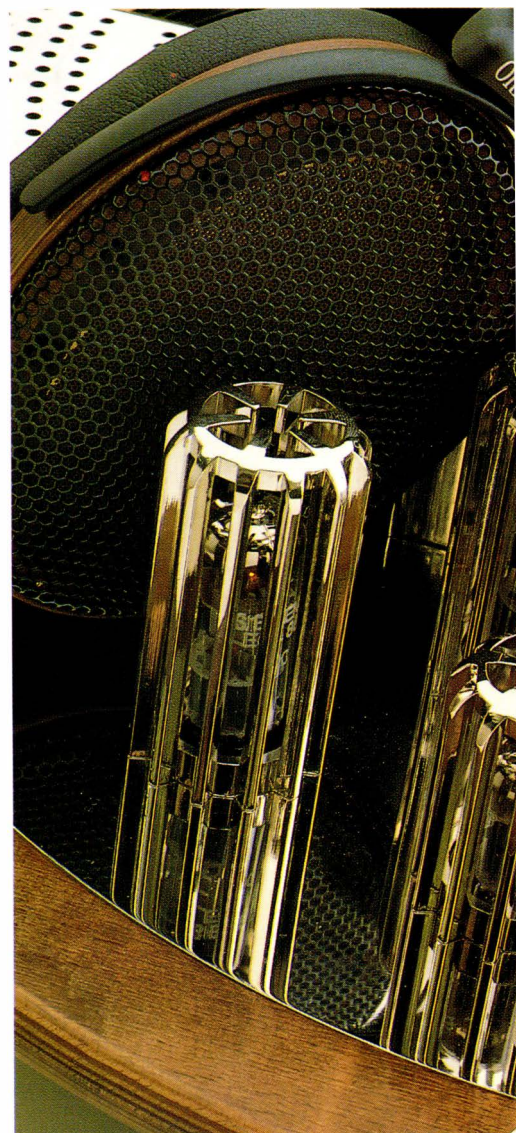
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The jolly-nearly £10,000 Sennheiser headphone system, Rotel's elite new Michi brand, and recordable CDs that sound better than the originals.

Statements



Sennheiser is a pretty big fish in the European headphone pond. Its cans were being used by just about everyone at the Berlin Funkaustellung, even the in-car people having them hooked up to their head units. But the company has always had very strong competition from the Japanese, mainly in the form of Sony, a company which not so long ago launched a statement on the art of headphone design, the *MDR-10 King*, a £2,500 closed-back dynamic.

Possibly in response to that, but more likely as a means of establishing itself as a high-end contender, Sennheiser has launched its own statement—the *Orpheus* electrostatic headphone. At £9,652 including a dedicated valve amplifier/energiser/DAC this is the most expensive headphone system currently available. It makes heavyweight Stax models seem like a bargain. But none of those are this good looking, and for that matter none have onboard digital to analogue converters.

As one would expect of a cost no object, limited production creation, the construction of the *Orpheus* is pretty special. Each elliptically shaped earphone chassis is made out of laminated beech, which was chosen for strength and acoustic neutrality. The diaphragm is a 1µm gold coated polymer foil and the electrodes are made of honeycomb perforated glass sheets, which are gold plated on one side.

These delicate layers are protected by a honeycomb perforated stainless steel mesh on either side, but you can still see through the earphones if you

hold them up to the light.

The circumaural earpads are furnished in an imitation leather which has a finish that's a cross between suede and velvet—very comfortable and not too sweaty. Power and signal are supplied via a flat OFC cable that connects to both earpieces and is made of teflon insulated OFC with a rubber outer dielectric.

The *Orpheus HEV 90* valve amplifier which drives the phones is nothing short of a work of art, the attention to detail and the standard of construction second to none. It combines stainless and chrome steel with a laminate edge trim and cast alloy to create a sculptural piece of audio equipment. You shouldn't need to ask why Sennheiser didn't make it a particularly stackable component.

The chrome amphitheatre

Its unusual design, resembling nothing so much as a chrome amphitheatre, conceals a power supply in the right hand wing, amplifier electronics in the middle and preamplification including D to A conversion in the left wing. There are no output transformers and the four output valves operate in class A at all times. In an effort to extend tube life Sennheiser has incorporated an automatic delay into the start up of the heaters, so when you switch the *HEV 90* on the red LED flashes for about 30 seconds while the valves are gently brought to life. Each tube is protected by a rather tasty alloy housing which has to be removed from below, so valve replacement is a job for the qualified service agent.

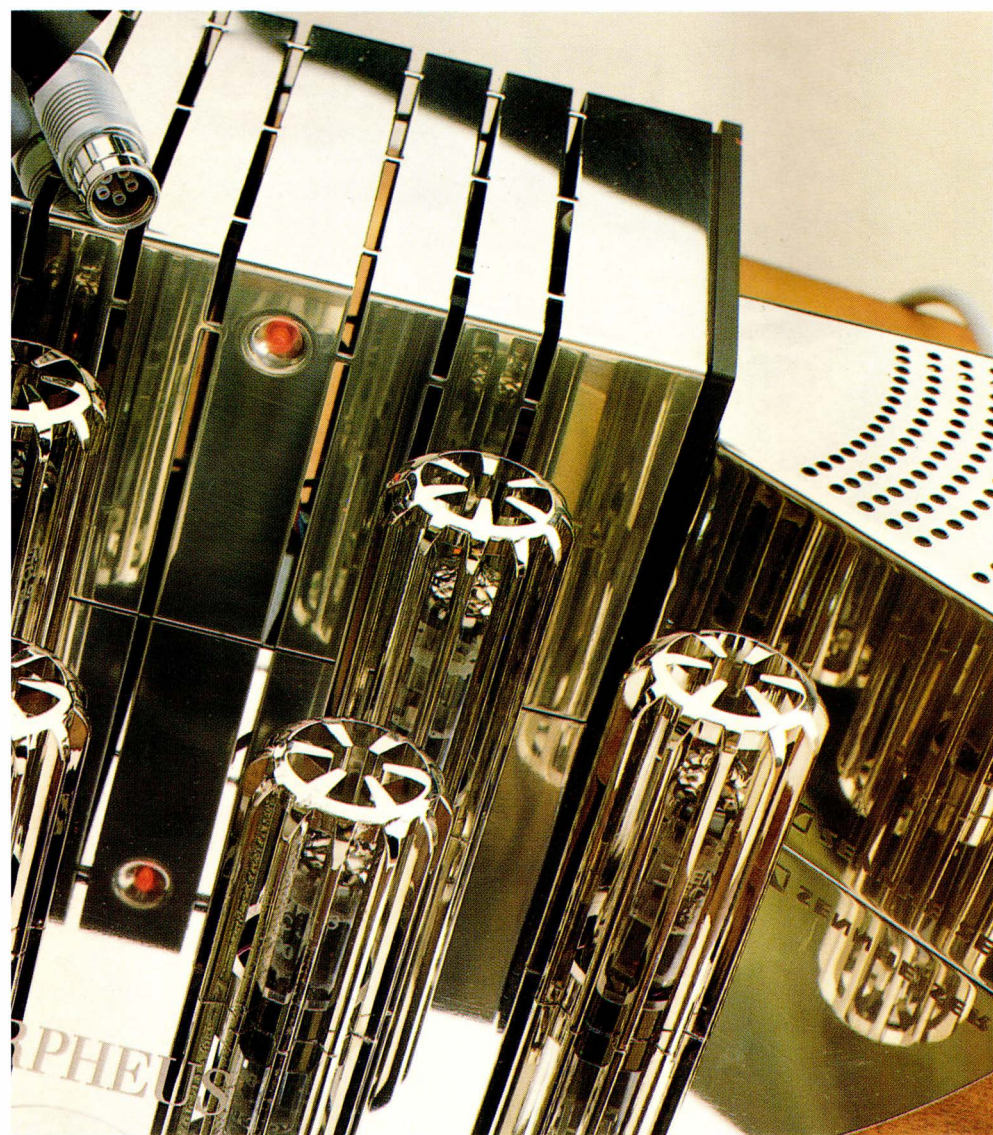
The amp has both optical and coaxial

digital connections for its BitStream (SAA 7323) DAC and a single line input, switching between the two is available next to the sockets and volume is controlled by the chrome knob on top of the amp's front leg. Pretty subtle, huh? About the only other feature apart from the ignition key on/off switch is a second output socket for another pair of *Orpheus* cans, which are available separately, at a price.

Operationally, all was groovy except for the volume levels encountered when using the only marginally higher than average analogue output (around 2.5Volts) of a JVC *XL-Z1011* CD player. I had to turn the volume down to the point where one channel was on the verge of disappearing for levels to be low enough to be endurable. The same problem occurred with the digital output.

I know that some people listen at higher levels than me but this situation is unacceptable in a product at this price. Sennheiser claims to be looking into it as I write and presumably future *Orphii* will have some form of padding on the inputs to allow lower listening levels for those of us who aren't hard of hearing.

I managed to audition the set-up using the variable output of the JVC and the



The Sennheiser Orpheus. State of the art sound and looks - and a price that might send you into the Underworld.

main output of my phono preamp (itself a be-tubed beauty) and spent some very enjoyable hours in the process. With most headphones one has a tendency to listen to specific reference tracks and then take them off with a not inconsiderable feeling of relief. With the *Orpheus* I ended up listening to whole album sides without even thinking about their sound quality, just enjoying the music.

Information freak's dream

All this made it rather difficult to assess the *Orpheus'* sonic character, especially in a critical fashion. Had Stax's finest been to hand it might have been possible to find some weakness, but to be honest I very much doubt it.

The *Orpheus* is amazingly clean and distortion free, which can be quite hard to get used to after the relatively raw sound of moving coil drivers. You lose a lot of aggression, which takes the edge off electric guitar, for instance, but gain incredible fluidity which allows acoustic instruments to sound phenomenally natu-

ral. Sense of spaciousness is superb, the ambient information being so rich in some cases that you get a precise impression of the acoustic space in which a recording was made. Detail resolution is excellent, an information freak's dream, and it's presented in such a relaxed fashion that it doesn't wear you out. There is a degree of relief when you take the headphones off, but that's a result of the earpads and the unhealthily high levels one is prone to listen at because of the lack of distortion. Real long term comfort can only be achieved with designs like the Jecklin Float which don't actually touch the ear.

I had the AKG *K1000*, a £500 dynamic and another away-from-the-ear design, on hand for comparison. It didn't fare too well, sounding distinctly crude and flat for the most part. Bass performance approached the *Orpheus* in terms of dynamics and perceived extension but lacked its cleanliness.

In a nutshell, the Sennheiser *Orpheus* is a state of the art electrostatic headphone with build quality to match its high price. If you want the best cans in town and a future collectors item to boot (only 300 are being made), look no further.

Jason Kennedy

Barely content with its impact on mainstream hi-fi, Rotel has marshalled its forces upmarket with three new components including a substantial 200W power amp, a passive line controller and an active phono equalisation stage, all flying the *Michi* banner to distinguish them from Rotel's established electronics. (That's if the piano-lacquered wooden sidecheeks and heavyweight alloy fascias are not distinction enough.)

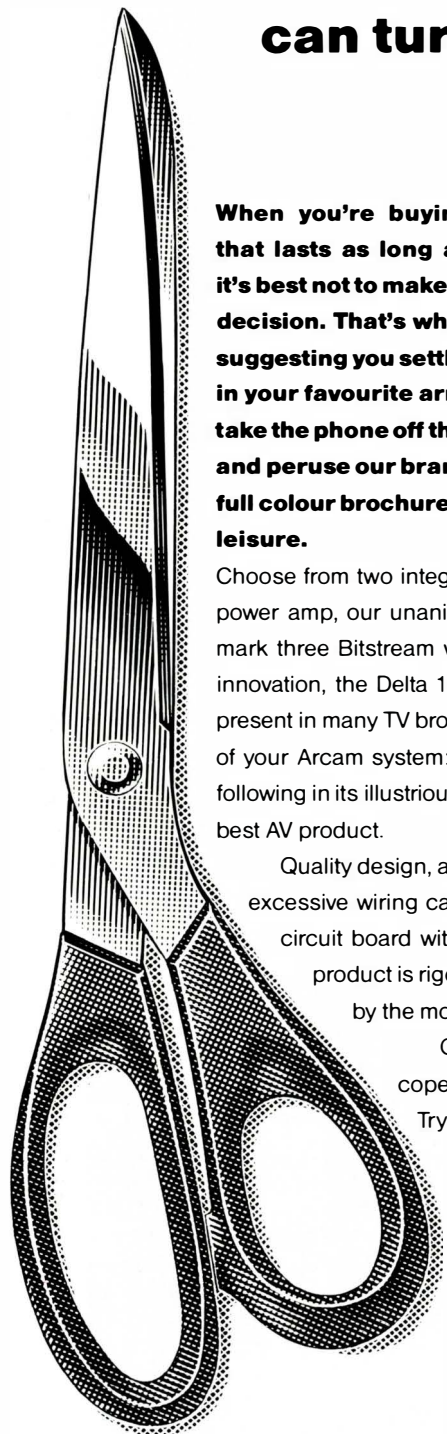
Still, despite appearances the *Michi's* are not really a complete break with tradition but more an evolution of the ideas and technology utilised in Rotel's ever-green budget amplifiers. But where limited resources put restrictions on the likes of the *RA-930AX* or *RA-940BX*, nothing but the very best has been lavished on this high-end trio.

Amassing power

The massive *RHB-10* power amp is very much the heart of the system with its twin-mono construction, robust complementary output stage and vast power supply that feeds from two (yes two) 1000VA mains transformers! Extra-thick plated fibreglass PCBs, precision components and 6N copper cabling are just the icing on the cake. Simplicity is the key to this huge amplifier, and indeed the accompanying control equipment. With the *RHB-10* you get no superfluous features, no speaker switching and, if so desired, no output protection. Look around the back and all you'll find are two gold-plated phono sockets and a pair of insulated lock-down 4mm speaker terminals. In view of this and its prodigious output (300W or more into 4ohms) the £1,300 asking price seems positively reasonable.

Which brings me to the *RHC-10* passive controller and *RHQ-10* phono equaliser. The former costs a whopping £600 for which you get separate five-way input and record out selectors and a four-gang conductive plastic potentiometer, all encased in a rather posh non-magnetic alloy chassis. Still, however you care to dress it up, the *RHC-10* is just a very expensive passive pot that'll attenuate the output from a CD player before passing it on to the power amp. Spend just £195 more and the *RHQ-10* offers an all-active MM/MC phono equalisation network of exceptional quality, including

these simple tools can turn this ad into a full colour hi-fi brochure



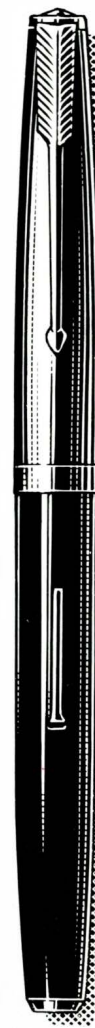
When you're buying hi-fi that lasts as long as ours it's best not to make a hasty decision. That's why we're suggesting you settle down in your favourite armchair, take the phone off the hook, and peruse our brand-new, full colour brochure at your leisure.

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Quality design, allied to simplicity of construction, is the key to our success. For example, excessive wiring can cause all sorts of problems, so our boffins prefer a single fibreglass circuit board with military specification soldering. And, just to make sure, every single product is rigorously tested and repeatedly checked. By the fussiest of computers and by the most finely tuned pairs of ears.

Our 'simple is best' philosophy extends to the controls, too. If you can cope with a pen and scissors, any Arcam component will be a piece of cake. Try it and we'll send you a brochure to feast your eyes on.

Alas, to give your ears a similar treat, you'll have to visit your nearest Arcam dealer.



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the same conductive plastic volume control and exquisite casework.

The burning question

But what of performance? Well, Rotel's literature suggests that all components be left to 'burn-in' for at least 100 hours, a recommendation that bears fruit in practice. Even when cold the calibre of this amp is obvious enough, courtesy of its deliciously smooth and sure-footed presentation. But after a time this smoothness becomes positively silky, the knitting of one note to another giving rise to a remarkably fluid sound, a warm and beguiling whirl of music that can build to astonishing levels without ever becoming oppressive.

This liquid smoothness suits the sound of pipes to a T, drawing out the richness of detail and heartfelt emotion of Davy Spillane's *Equinox* like never before. This track is haunting enough at the best of times but with the *Michi's* in its path seemed all the more lush and inviting. The powerful sound of the pipes can often overwhelm the accompanying instruments, but on this occasion their characteristic drone created a highly charged rather than highly confused ambience, an atmosphere that was the perfect complement to the etched string-tone of both acoustic guitar and mandolin.

This same sense of balance, integration and proportion graced Beverley Craven's *Promise Me*, the positive and disarmingly tangible sound of her voice joined by the delicate impact of keyboards as the entire performance seemed to flow effortlessly into the room. It's just so easy to sit back and relish the sound conjured by this amplifier, its sense of grace and poise never stifling the natural exuberance of its music. This is one amplifier that oozes refinement without sending you to sleep.

The down side

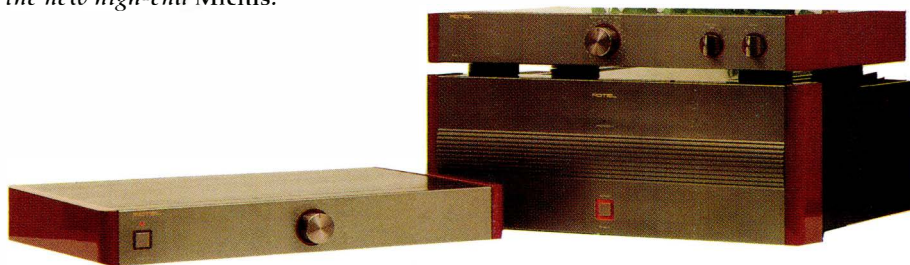
But not all is positively rosy. Listen basswards and though there's no loss of grip or control nor any lack of fullness, the bass simply lacks the freedom, transparency and bite that ensures the rest of its performance is so utterly compelling. Telemann's *Suite for Trumpet and Organ* (a stunning recording on the Water Lily label) demonstrates the *Michi's* ability to convey the natural rawness of a brass fanfare without it appearing remotely hard or wearing. Silky smooth yet still

intricately detailed. Nevertheless, allied to the crisp sound of brass the presence of the organ was somehow less definite - big and impressive certainly but also just a little vague.

You needn't choose something with such an obvious contrast to pick-out this slight loss of focus, but it helps. Select almost any track from Yello's latest CD, *Baby*, and, likely as not, you'll be struck by the openness, ambience and sheer immediacy of its sound. In this instance the bass goes way down, real subterranean stuff that you feel as much as hear. The *Michis* are still there, beaver away into the low Hertz yet the sharpness, the zip and intimacy you hear with vocals, strings and percussion is lacking.

This effect is directly linked to the *RHC-10* whose unbuffered volume control introduces a variable amount of noise into the system depending on its position. Set midway, for instance, and you'll hear an audible buzz from the speakers - a faint rasp that's still sufficiently bold to breakthrough during the quietest interludes. Just how damning the effect will be depends very much on the sensitivity of your speakers because breakthrough is much reduced in both low and high vol-

A Rotel by any other name; the new high-end Michis.



ume settings where the preamp's output impedance is lowest. The preamp's high output impedance also exacerbates the problems of dielectric absorption within the interconnect cable just as it forms a gentle low-pass filter in conjunction with the cable's parallel capacitance. Consequently the *RHC-10* is extremely sensitive to the nature (dielectric, etc) and length of the pre/power interconnect.

With or without the *RHC-10*, however, the *Michi* power amp still enjoys a naturally smooth and effortless sound, qualities immediately revealed when I traded the passive pot for Deltec's (active) *DSP-100S* preamp. The overall sound was just

as open and transparent but the bass now snapped resolutely into focus. The same Yello CD now had a real sense of authority and weight about it, each blow like a bone-slicing retort from the speakers. So, if nothing else it served to demonstrate the untapped potential of Rotel's *Michi* power amp which, with hindsight, reminded me very much of Rowland's superb *Model One*. Except the *RHB-10* has the edge on power and pricing.

So, whatever way you look at it, the *RHB-10* is a beautifully engineered amplifier with an equally attractive sound, if one that's not served to its ultimate advantage by the *RHC-10* volume control.

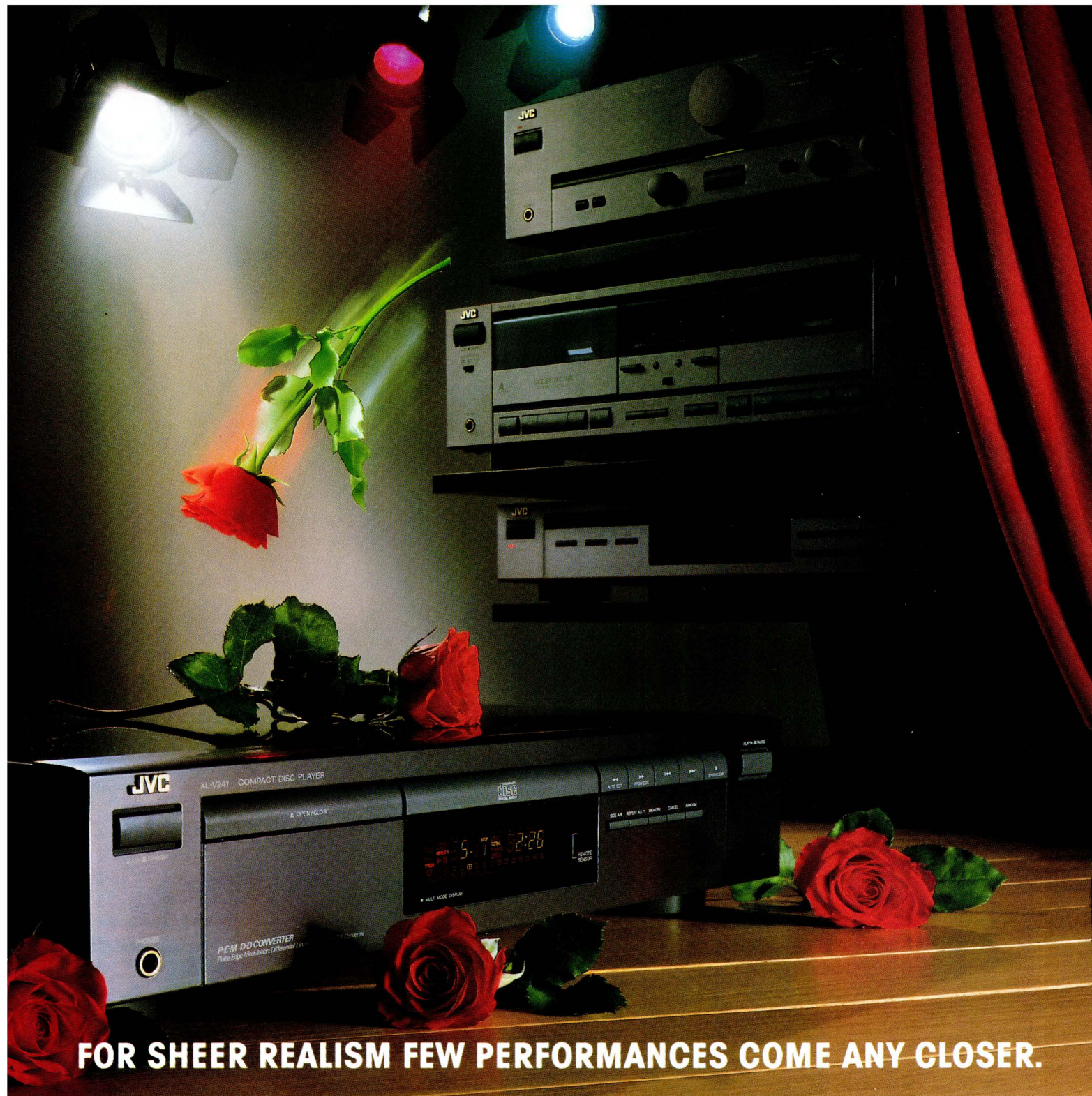
Paul Miller

Copy. There's something vaguely derogatory about the word. People automatically expect a copy to be inferior to the original, and nowhere more so than in the world of audio. After all if you copy something it is obvious that you must lose something in the duplication process and therefore end up

with an inferior result. It only stands to reason doesn't it? Well it ain't necessarily so. When we borrowed Marantz' first CD-R player for a long weekend in wet and windy Bolton, we ended up making copies of CDs that sounded distinctly better than the original discs.

Before Outraged of Orpington puts pen to paper with demands for the editor's immediate incarceration in a suitably secure establishment, let me offer a few words in defence of that outrageous statement.

First it wasn't just my opinion that these copies sounded better than the originals. During the course of the show more



FOR SHEER REALISM FEW PERFORMANCES COME ANY CLOSER.

It's hardly surprising that JVC's latest hi-fi separates have picked up so much applause from the hi-fi press.

Each component has been designed to recreate music, purely and simply, establishing new standards of accuracy in the reproduction of digital sound wherever they perform.

The XL-V241 Compact Disc player, for instance, features the highly acclaimed 1-bit Pulse Edge Modulation (PEM) DA converter, an exclusive JVC creation. It dramatically reduces zero-crossing distortion, non-linearity and glitches, offering twice the resolution of conventional 1-bit DA converters.

The PEM converter allows 4th order noise shaping which virtually eliminates re-quantization noise and together with an advanced oversampling system

provides a very high signal-to-noise ratio, close to the theoretical upper-limit.

All of this means you can sit back and enjoy the subtle caress of the most delicate nuances, or suddenly be shaken by the most stirring musical crescendo, with a total sense of realism.

Recommended as an ideal partner for this player is an amplifier such as the JVC AX-A341. Providing up to 85 watts per channel, there's also a 'CD Direct' switch to make sure your ears receive the ultimate in sound purity.

Completing the line-up is a range of matching tuners, cassette decks, and other hi-fi separates. Each component, a polished performer in its own right. Together with the right partner, definitely a class act.

JVC

than 250 people came and heard the demonstration. Secondly, I talked to representatives of both Marantz and Meridian, the two companies who had CD-R on display at the Penta hi-fi show, and both companies agreed with our findings.

Basically we found that the copies had a more relaxed sense of timing, more low level detail, better depth of image and were generally nicer to listen to. In fact our resident vinyl junkie JK even went so far as to describe the sound as being closer to that produced by a decent turntable, and to showed the first faint signs of interest in the digital medium.

Why now?

Recordable CD is nothing new. It's been available on the professional market for at least a couple of years. What is new is the Philips mechanism which will shortly see the light of day inside CD-R machines from the likes of Marantz, Mission, Meridian and Micromega. This is the first time a CD-R mechanism has been produced in any quantity, and will enable machines to be produced for less than £4,000; indeed a price tag closer to £3,000 has been rumoured for the Marantz recorder.

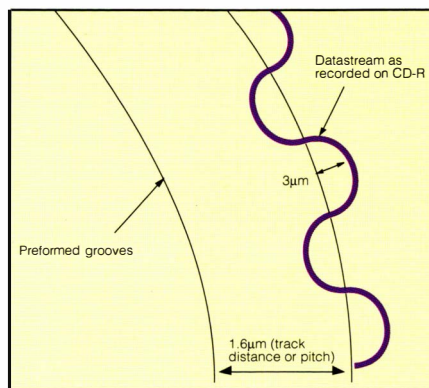
The discs recorded by a CD-R machine are claimed to replay on any domestic CD player, and certainly the samples we made presented no problem to the 602 drive that those nice people at Meridian lent us for the show.

What happens during the recording process is that a laser is fired at a four layer disc, the top layer being a protective coating, the second layer reflecting the laser light back when the disc is read, the third layer doing the actual recording and the base layer being the plastic substrate of the disc itself. According to Marantz' literature the laser heats the selected parts of the recording layer to around 250°C, at which temperature it shrinks, leaving a pit structure that can be read by a conventional CD player.

One clue why the CD-R discs might sound better may lie in the recording process itself. When you put a standard CD into a player, the machine sets the rotational speed of the disc by looking at the data it's reading. This enables the player to maintain the constant linear velocity required at the laser head, and makes all the necessary adjustments to the discs' angular velocity as the laser tracks across the disc. The problem with recording a blank CD is that there is no data present

with which to set the speed. This is overcome by pre-grooving the disc so that the machine knows where to record the pits, and then by recording the pits themselves in a sinusoidal wave pattern oscillating about the groove centre at a frequency of 22.05kHz. Thus if this waveform is read at a frequency of higher than 22.05kHz the disc is slowed down and vice versa. Further information is fed to the recorder through a frequency modulation of +/- 1kHz of the excursion frequency. In this way the recorder receives information about 'absolute time'.

How, you may ask, can this effect the sound quality of the recorded discs? The answer to this is two fold. First, as the



Feeling groovy; the CD-R disc surface in microscopic detail.

original disc is being played any necessary data correction is applied before the datastream is passed over to the CD-R machine, assuming of course that you are recording in the digital domain.

This means that when the CD-R is played back, the CD player doesn't have to correct the data, as it has already have been sorted out by the error correction of the first CD player. This could, possibly, have an effect on the sound quality of the copy, by covering up any errors due to the mass production of the original disc.

The jitter bug

Although hard and fast information is hard to come by at this early stage of the medium's development, the block error rate given in the CD-R standard is some ten times lower than that given in the CD standard and this could well have some bearing on the events mentioned above.

The second factor in the sound quality equation is the question of jitter. Because the CD-R machine is constantly monitor-

ing its speed and making adjustments to keep it spot on, the data is effectively being relocked as it is recorded onto the CD-R. In effect you are remastering the disc as it is recorded.

It may well turn out that the copies we made at Bolton have a cleaner digital signal on them when compared to the mass produced originals, the pits having been more accurately placed by the recording laser than the master stamper at the pressing plant. At the time of writing we are waiting to get a machine down to Paul Miller's lab in order to investigate this further.

Whatever the technological explanation - and it could even be something as simple as the fact that the CD-Rs are gold/green as opposed to the usual silver - there was no doubt that the copies sounded distinctly better than the originals, which in turn implies that CD-R has great potential as a hi-fi medium. Whether the man in the street will ever be able to buy one - and if so at what price - must remain to be seen. The machine we used was an early prototype and intended for professional use where the lack of SCMS copy management facilities will be a positive selling point rather than the potential political disaster and flagrant breach of the Athens agreement that it would be on the domestic market.

No doubt the form in which CD-R machinery will be launched onto the consumer market will be a subject of much discussion between Philips and its licensees, but the sound quality available from this early prototype is certainly good enough to suggest that all the fuss over a compressed digital medium may be a bit of a red herring, and that the true future for digital recording may well remain with the five inch discs that started the whole revolution rolling in the first place.

Whether CD-R will actually be launched onto the consumer market comes back to that thorny old question of copyright. At the moment the medium is being kept out of the hands of the consumer by keeping prices extremely high. There is, however, no real reason why the entry cost could not fall dramatically in the not too distant future. A Philips spokesman told *Hi-Fi Choice* that CD-R is currently under discussion with the recording industry, but until the results of these discussions become known all the Dutch multi-national would say was a resounding 'No Comment'.

Andy Benham

WHO SAID



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SILENCE IS GOLDEN?

Dawn chorus

It's about the same size as a hard back novel and comes with flat speakers that hang on the wall. Yamaha's tabletop CD system is certainly more than a little unusual, as Andy Benham found out.

Yamaha's YST-99 is actually rather difficult to describe. Priced at a penny short of £380 it is either the most expensive clock radio I have ever come across or one of the cheapest CD systems on the market.

It certainly looks like and is about the same size as a clock radio, with a large LCD display on the front of the unit. In fact the unit is slightly smaller than the Sony *Dream Machine* it replaced on my bedside table.

However there aren't many clock radios that come with a pair of wall mount AST speakers, and even fewer that include a CD player and a full infra-red remote control unit the same size as a credit card.

Whatever you decide to call it, and Yamaha has decided on 'Tabletop Active Servo Stereo System', the YST is a positive triumph of design. It looks absolutely superb and once you've set it all up its one of the most unobtrusive systems on the market.

A system to go

The Yamaha made an excellent impression from the word go. Instead of an unwieldy cardboard box it comes in a natty little cardboard carrier complete with its own pop up carrying strap, which makes carting the unit about, on holiday for instance, distinctly feasible. Open up the box and Yamaha amasses even more of those all important brownie points: alongside the speakers and the control unit you'll find all the necessary connections including very generous length speaker cables and a much better than average loop aerial.

Setting the unit up is no problem at all. Simply plug it into the wall, attach the speaker cables and the YST-99 is ready to roll. The speakers themselves are only about an inch and a half thick and are intended for wall mounting, although a

metal spike is provided which enables them to be set up on any handy flat surface.

Wall mounting the units is comparatively easy, a pair of keyhole shaped sockets on the back panel of the speakers engaging with the heads of a pair of screws inserted into the wall in the desired position. A template to help mark the screw positions would have been handy, but it's easy to make your own and fixing the speakers onto a wall should be within the scope of even the most incompetent DIYer. Just one word of warning: don't try and skimp on the job and hang the speakers from a single screw as the sound quality is markedly worse if they are fixed in this manner. Make sure also that the speakers are securely clamped against the wall; the tighter these are held in place the better the system performs.

Although the cables can just be left hanging down below the speakers, the neater but rather more permanent solution is to chase a couple of channels in the wall. Once this is done, the speakers are the very model of unobtrusiveness, and guaranteed to restore complete domestic harmony to even the most anti-hi-fi household.

That'll do nicely

The key to getting the thing up and running is that tiny little credit card handset. Although most of the controls are duplicated on the top panel of the main unit, remote control is really the only way to drive this beast.

Already filled to overflowing, Yamaha's brownie point account was further enhanced when I discovered that the unit even has a slot to house the handset, which helps stop it getting lost down the side of the bed. As an inveterate loser of remote controls this proved to be a positive boon and even after three months solid use the remote control remained

stubbornly available.

Using the *YST* proved extremely easy. Setting the alarm for a morning wake up call is easily accomplished by means of the remote control. Setting this from the comfort of one's own bed rather than having to reach out and actually touch the unit is a luxury I could very easily get used to. You have a choice of radio, alarm tone, or CD to wake you up, and you can pick from any one of the radio presets depending on your preference of Brian Redhead, Chris Tarrant, or Simon Mayo.

My first slight niggle is that despite the choice of wake-up programme, the Yamaha has only got one alarm setting. Quite a few clock radios have two, or even more, and this is something I would have liked to have seen included here.

The radio reception was on the good side of OK, and a proper coaxial socket sensibly provided on the back of the unit,

And, finally, onto the most important question of all - what does it sound like? In a word, astonishing. It's the first time I've had an *AST* system at home, and I must admit to a little initial scepticism, despite there having been very good reviews of the technology in previous is-

Ultimate volume levels are perhaps a little limited, but then I've been reliably informed that the volume levels I usually indulge in are somewhat above those normally appreciated by the general public. Anyway, headbanging is certainly game on, but just don't push it too far; it's a



Up against the wall. Yamaha's YST-99 is rather more than a clock radio.

enables you to use your roof aerial which will obviously gives far better results than the antenna provided with the unit.

The larger view

Moving beyond the *YST-99's* role as sophisticated clock radio and looking at it more in the context of a hi-fi system, what you have here is a CD player and tuner in the same casing, with a row of 3.5mm stereo jacks on one end allowing you to add up to three more sources including a tape deck. Switching for these sources is included on the remote control unit. Everything works just as advertised and that dinky little handset takes care of all the CD and radio functions, including the aforementioned presets, as well as looking after the volume.

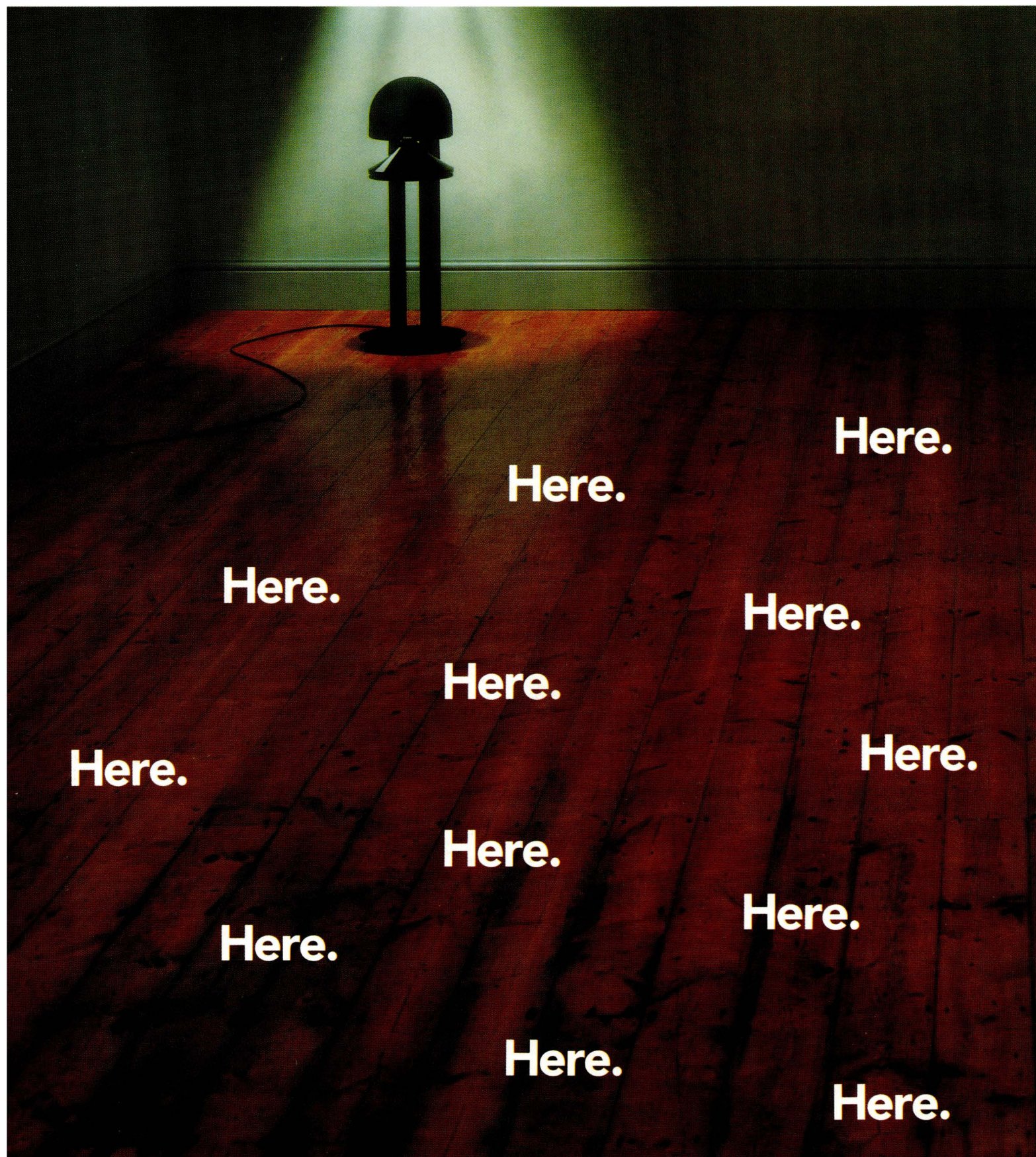
sues of *Hi-Fi Choice*. However, the unit's residency chez Benham has turned me into a convert. Considering its tiny size the *YST* has definitely got big system pretensions. It's capable of delivering a sound that makes the price look like an incredible bargain and clears the hi-fi hurdle with a considerable amount of ease, in fact for a mere £380 it gives a quite amazing level of fidelity.

The *AST* system gives a remarkable degree of bass welly but unusually you also get very good control as well. Treble is relaxed rather than harsh, which is the best way to go if you have to veer from neutral, and the midband has got a real clout that makes rock recordings in particular sound very pleasant indeed.

case of going up to ten rather than 11 methinks.

To conclude, the Yamaha is an astonishing looking piece of kit with a sound quality to match, and could fairly be classed as an excellent value hi-fi system which just happens to look like a clock radio. It makes a superb second system for the bedroom, with the added advantage of portability so that you can take it away with you on holiday. There's even a 12V input so you could run it off the car, boat or caravan battery if you so desire. However, the sound quality is such that it could also make an ideal first system for those on a tight budget, and has to be the ultimate in cool accessories for the average student bedsit.

Where can you hear from a pair of Can



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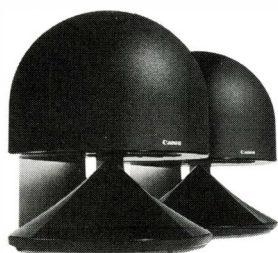
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SONY
Why compromise?



Chi Hung Tso has refined and adapted his system in a quest for minimalist perfection. Dan Houston visits him and asks whether less is really more.

The bare essentials

High-end hi-fi is often seriously minimalist in design. Components are made to retain as much audio signal purity as possible, and often only the barest of expensive essentials are incorporated. It's rare to find LEDs on high-end kit, likewise tone controls on amplifiers, or automatic returns on record players which can cost as much as a new sports car. Audiophiles who use such equipment know that any extra circuitry within the system detracts from the signal purity, and is therefore better avoided. Recreating the recording situation in their listening room is the aim - tailoring the sound with something like a graphic equaliser is akin to heresy.

Our host this month doesn't own the most expensive system we've encoun-

tered, but it is more minimalist than most. His one-bedroom west London flat is centred on a sparsely furnished listening room where he spends evenings, either making music on a rented upright piano, or recreating it via a very esoteric gramophone. An armchair on axis to the speakers, and a sofa for less stereo-critical guests, are the only furniture apart from a coffee table. Sheaves of records and piles of classical music and hi-fi magazines are stashed along one wall.

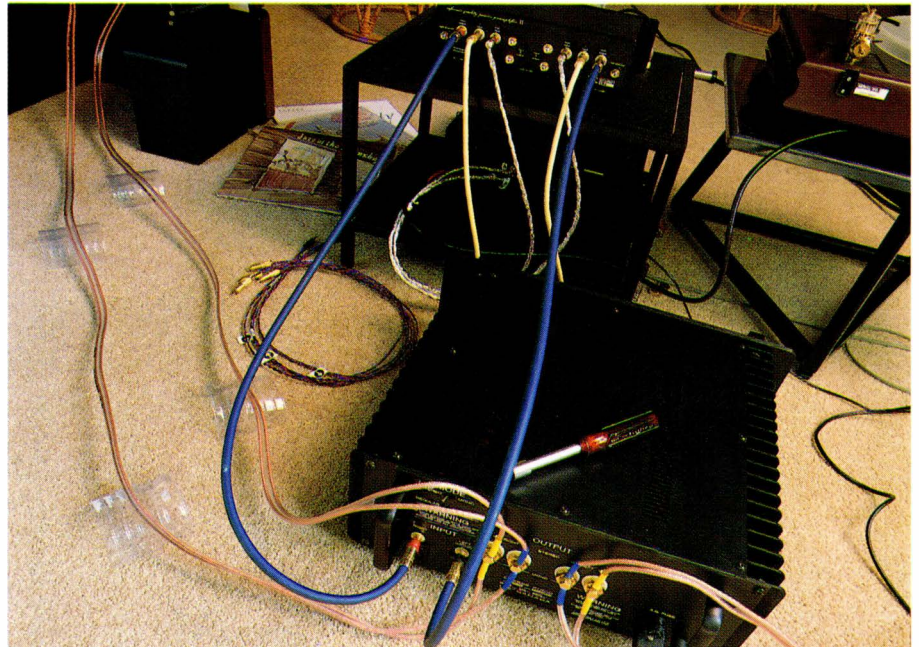
Chi Hung Tso is a 24 year old computer programmer who arrived in Britain from Hong Kong seven years ago, to study A-levels before reading computer science at Imperial College. His scientific nature belies an early musical influence; he began playing the piano at the age of six and

also learned the violin and organ. Asked the chicken and egg question about which came first, hi-fi or music, he unequivocally states music, citing piano geniuses Chopin and Liszt as favourite composers. "I play Chopin, but I can't play Liszt," he reveals modestly.

Chinese boxes

Chi's interest in hi-fi began at the age of 14 when he became an avid reader of Chinese hi-fi magazines (that's the Hong Kong rather than the rarer Beijing variety). "But I couldn't afford a hi-fi system then, and there wasn't room at home for another system apart from my father's," he says. However, being born into the age of cramped city life allowed him to take advantage of the technological answer to

Initially shaped by limitations on space and less than lavish student grants, Chi's system has come a long way from its origins as a personal stereo.



Audiophile spaghetti and tagliatelli: Chi Hung Tso's serious cabling and his ribbon design Apogee Stage speakers (left).

that situation; he bought a Sony Walkman Pro and a Discman.

"When I arrived in England I partnered these with a Mission Cyrus amplifier and 700 LE loudspeakers, but then I bought a Rega III turntable from the Cornflake Shop," he relates. Chi explained that the sound of this first system had never appealed to him as much as the setup he had known at home. He felt, unsurprisingly, that the speakers sounded too 'brilliant' compared to his father's vintage Wharfedales with their 15-inch bass drivers. However, his student grant prohibited upgrading until after he graduated in 1989. His first acquisition then was a new pre and power amp combo from PS Audio (the 4.6) and Counterpoint (the SA12 valve hybrid) respectively.

The turntable was also upgraded - to a Voyd Valdi, the £860 two-motor baby of the Voyd stable. Chi's Rega RB300 arm and an Audio Technica OC9 moving coil cartridge were partnered with the deck, so the vinyl replay part of the system now

verged on the high-end.

The next stage was to replace the Mission 700LEs. These diminutive £140 loudspeakers must have been doing pretty well to keep up with the system by this time; Chi's only criticism of them was that they were just too bright for his tastes.

Taking to the Stage

It took eight months to find the right replacement loudspeakers, during which time ProAc Super Towers and Kef 105s were tried at home. But Chi eventually opted for the Apogee Stages, preferring their soundstaging qualities and transparency with many of his orchestral recordings and piano pieces. "I like loudspeakers which can disappear," he says. "I found with box speakers that I can always hear *them*, but with the Stages you forget the speaker is there."

The Stage is the smallest of the Apogee range, and can be bought with dedicated stands - which are used here, and which our host regards as necessary for sound quality. Being an open ribbon design they move as much air to the rear as to the front and so are particularly finicky about placement in a room, and room size itself. The sand-filled stands allow you to adjust



the vertical angle of the ribbons, canting the speaker back and forth to adjust it to your ear height. Chi's dealer, Les Wong of KJ Leisuresound, set them up originally, but Chi, a critical perfectionist, has since experimented with both the position and angle, and claims they need months rather than hours to get right.

Still unsatisfied with the bright nature of the system, Chi bought himself a Classe DR15 solid state power amplifier on a return visit to Hong Kong. Not distributed in the UK at the time, Absolute Sounds has just taken on this Canadian electronics range.

He also decided to upgrade the preamplifier, opting for the First Sound Reference II, an American-made dual mono passive preamp with only line level inputs. The latter was bought from KJ but Chi had read promising reports in the Hong Kong Chinese audio press about the preamp. And partnered with an Equinox phono stage, borrowed from the shop, he had a system which finally agreed with his hearing.

However, Equinox stopped manufacturing before he could buy the unit, so he ended up with the £400 Michell Iso, the first electronics product from the partnership between John Michell and Finestra's Tom Evans. "I think the Iso is actually better than the Equinox because it sounds more neutral. The Equinox was a bit thick and sugary sounding at times," Chi says.



Upright citizen: when Chi isn't listening to music he is creating it on his piano.

The other sources in the system are a Marantz CD 65II, bought in 1989, and the trusty Walkman Pro, used as a capable cassette deck in this system.

Tweak minded

As an avid reader of hi-fi journals, Chi has also experimented with a wide variety of tweaks. Everything is isolated by stands or cones and he has paid much attention to the cabling between mains, components and speakers. The Voyd sits upon an Origin Live Skyline platform, with Chi's

own slab of black marble cut to fit in place of OL's mediate board. The isolation had resulted in better bass control and a tighter performance overall. A recommended Voyd tweak - the removal of the base-board from underneath the deck - has further improved things he says. The CD player sits on AudioSelection cones while the Voyd's separate power supply uses Michell cones.

Between the Voyd *Valdi* and *Iso*, dedicated Deltec *Sturm* cable is terminated in gorgeously finished Clearaudio phono plugs with their wooden bodies and gold plated sprung connectors. The Kimber PSB cable between the *Iso* and First Sound preamplifier uses silver wire for optimum conductivity. Chi has wrapped this around with aluminium foil to improve the screening performance. "A colleague brought me a foil wrapped sandwich one day and said 'here's your radiation shielded lunch'. I thought it would be interesting to see what effect aluminium made in shielding cable. It's a small difference but after I did it I found the top end sounded smoother and less bitty," he says, vouching for the benefits of this otherwise strange behaviour.

Pre to power amp signal travels through Audioquest *Lapis* interconnect, another type auditioned especially for its purpose. The power amplifier uses esoteric Masterlink cable to optimise current from the mains. The loudspeakers are driven via Symo cable, which is recommended by Apogee and is similar if not identical to the cable used internally in the speakers. These cables are also held off the floor with the 'cable cradle' or 'floaters' method, using plastic water bottles in half sections.

Are we in nutty-as-a-fruitcake territory? "I must admit the difference is pretty subtle," Chi concedes, "but there does seem to be better detail and a less muddled sound."

In common with many audiophiles Chi finds the CD player largely redundant. "But I think the system is probably too revealing for it; it sounds tiring," he says, adding that a more modern player may perform better in the system. "I do need a CD player because so many titles are now only available on CD."

Bolt from the blue

Chi listens mostly to vinyl discs, using his latest upgrade to the Voyd, which consists of a Morch tonearm and Clearaudio *Goldmund* cartridge, a combination which is as unusual as it is expensive. The soft-





ware collection has been built up over the last half decade with a bias towards orchestral and instrumental classical music. Apart from his piano heroes, Chi's favourite composers are Elgar, Mahler and Richard Strauss for symphonies and tone poems, and Rachmaninov for concertos.

His favourite conductor is Adrian Boult, and he's collecting the EMI series of recordings made by Boult during the Seventies. Some of the records have been bought second hand from shops in London, but a great many are from the specialist vinyl pressing companies like Mobile Fidelity (which recently stopped pressing LPs), Chesky, Cardas and Reference. In fact the collection looks a little like the contents of the *Hi-Fi Choice* Audiophile Recordings page!

These discs aren't cheap, and Chi admitted that many had been bought purely to show off the system. Another reason was that he now finds some of his less well recorded LPs virtually unplayable on the system: "The sound quality is so good that it does demand good recordings," he explained. "Some of my records sound terrible now which is a shame. On one hand you want the best and most revealing system, but on the other you find you can't listen to stuff anymore."

While there are several older analogue recordings from labels such as RCA Vitrola, and Boult's EMIs, Chi's two fa-

A Void in my heart — along with a Morch tonearm.

avourite records are digital: The Philips 1985 Classics Series Tchaikovsky and Sibelius *Violin Concertos* played by Viktoria Mullova with the Boston Symphony Orchestra conducted by Seiji Ozawa, and the 1984 BIS Direct Metal Master recording of Vivaldi's *Four Seasons* with Nils Erik Sparf and the Drottingen Baroque Ensemble. Musicality aside, these don't let the system down, which is as much a reflection on the recording technique as the use of the digital methods per se.

Carmen on strong

However the specialist analogue recordings show off the system admirably, and we sat down to listen to a selection which brought the artists almost into the room. One of these was last year's Cardas release of Kip Dobler's *Reaching Out From The Inside* where the Apogees' soundstaging capabilities really brought the artists' positions into focus. This gramophone is just as coherently capable with the more complex staging of a full orchestra. But I was slightly disappointed with Bizet's *Carmen* performed by Kiri Te Kanawa and Placido Domingo under Georg Solti with the London Philharmonic Orchestra in 1975. Chi owns the beautifully packaged Mobile Fidelity boxed set,

which unfortunately loses the true sparkle and ambience of original Decca.

On the face of it Chi seems to have gone a lot further than providing himself with just the bare essentials when it comes to hi-fi, and the system tweaks smack more of the audio zealot than the music buff.

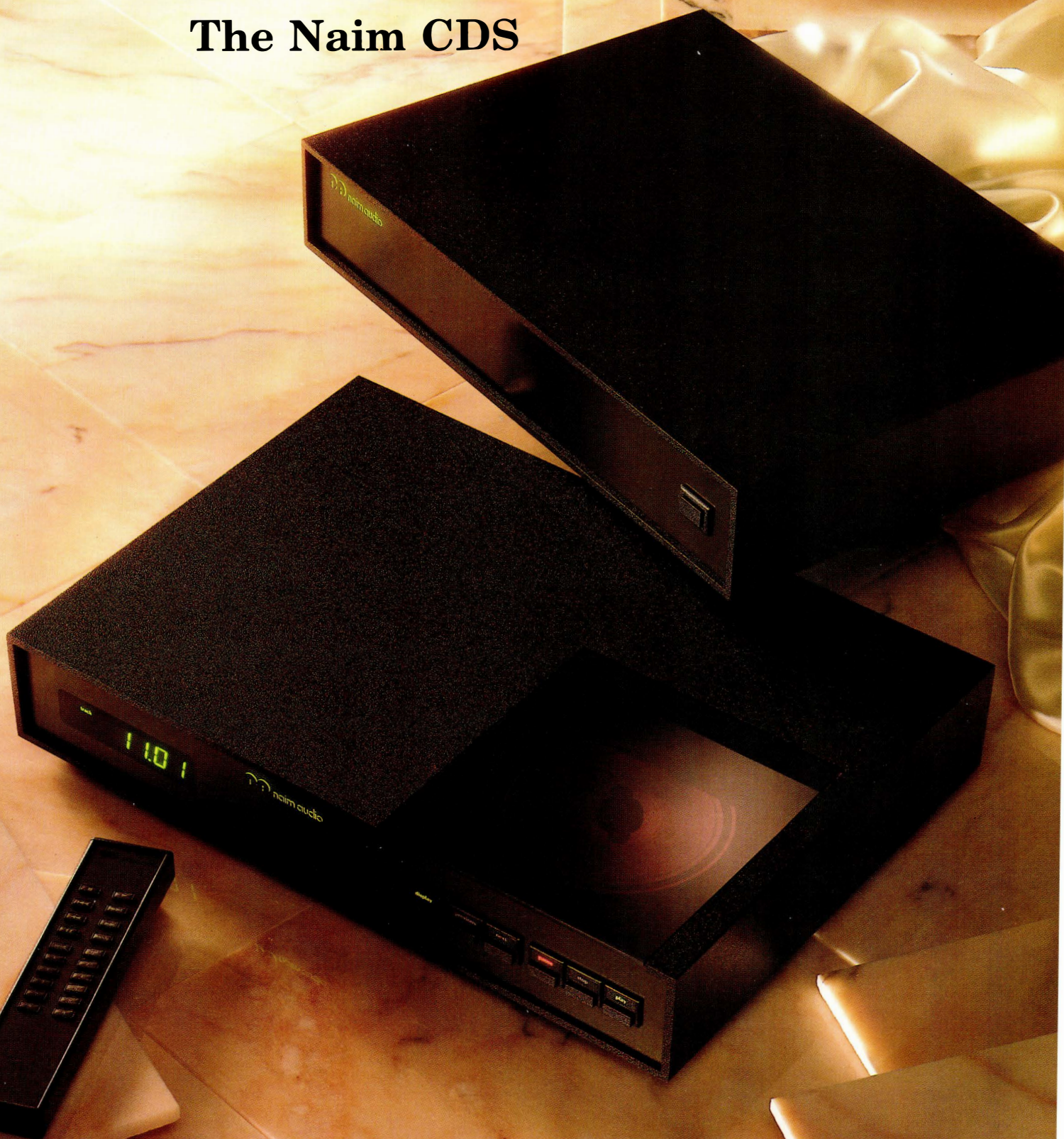
But it has really been a case of isolating each function and then choosing the optimum components for the task; there are no more ingredients here than in any other system - they just happen to come from different manufacturers. It's not so much an aural suit as a carefully tailored set of mixed and matched separates.

The System:	
Voyd <i>Valdi</i> turntable	£868
Morch tonearm	£650
Clearaudio <i>Goldmund</i> cartridge	£1,500
Michell <i>Iso</i> RIAA stage	£400
First Sound passive preamplifier	£2,097
Classe Audio <i>DR 15</i> power amplifier	£3,363
Marantz <i>CD 65 II</i> CD player	N/A
Sony <i>Pro-Walkman</i> cassette recorder	£249
Apogee <i>Stage</i> loudspeakers	£2,598
Symo <i>LS4X</i> loudspeaker cable	£49/M

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The Naim CDS





Hi-Fi Choice visits Japan and discovers that Aiwa plans to develop DAT as a video as well as audio source.

Dan Houston has his eyes opened.

How's about DAT, then?

They say that every dog has its day, but digital audio tape is a dog that was muzzled at birth five years ago. The muzzling of this new technology was imposed by a record industry already paranoid about sales losses 'caused' by hi-fi's first bastard medium - the humble compact cassette.

In spite of a recent US Congress investigation, which reported that home taping enhanced rather than detracted from record sales, the software gang has been determined to make tapers pay - both literally, by lobbying for a tax/levy on blank tapes, and by forcing manufacturers of DAT machines to adopt a 'solo copy' standard, whereby a digitally recorded tape cannot itself be digitally recorded. A chip in the machine effectively neuters the tape.

The solo copy method, better known by the stupid acronym SCMS (single copy management system), was only arrived at after a war of attrition, with the tired manufacturers on one side of the table patiently explaining to the sharp toothed music biz that better technology would be better for all.

DOA DAT?

Long after shady audiophiles could be seen gleefully leaving certain London hi-fi emporia clutching their expensive and 'illicit' DAT decks, the medium arrived for everyone. SCMS DAT machines have now been available in the UK for about 18 months, though some manufacturers are already selling third or fourth generation machinery. But this technology is expensive. DAT uses a recording system simi-



lar to a VCR (video cassette recorder) whereby a helical scanning head records or reads signals laid slantwise across the slow-moving tape. The engineering involved ensures this is never going to be a medium for the great stonewashed, and prices are always likely to remain more comparable to VCRs than conventional cassette decks. It was conceived as a hi-fi source, with the same 16-bit quantisation standard as Compact Disc, and was designed to allow audiophiles to record digitally their CDs (sampled at 44.1 kHz) for the car or personal DAT player.



Shrine on you crazy diamond; Aiwa managers offer Shinto prayers for success.

Portability has been one of the main attractions of DAT. It offers sound quality that many consider comparable to or better than a Uher or Nagra (quarter inch) portable analogue recorder without the latter's inherent bulk and weight. And many who have heard one of the few portables on the market will never look at a Sony *Pro-Walkman* with quite the same gleam in the eye as before.

The happy medium

Although DAT was developed by a group of companies led by Sony, it was Aiwa (half-owned by Sony) which produced the first domestic machine - the *XD-001* - in Japan in 1987. And Aiwa was also the first in the endemically-Japanese race to miniaturise the player. 1989's *HD-X1* was a paperback-size player oozing a comprehensive range of applications. You could set it up on a natty stand in your car, hump it around with its 90 minute battery pack as a recording tool or super-walkthing, hook it up to the hi-fi, or even use it with Aiwa's own active mini speakers. It's now available as the upgraded £450 *HD-S100*.

Aiwa has always been associated with the tape medium. It was first to produce a Japanese compact cassette recorder in 1964, and also had Japan's first stereo cassette deck in 1968. It stole a march on the world audio industry by introducing the first front loading (and therefore stackable) stereo cassette deck in 1975. There must be about a million variations on Aiwa personal stereos (Sony won't allow *Walkman* into the dictionary just yet), and many seem small enough to pose as credit cards - which you won't necessarily need to buy them.

But it was the story of DAT we were pursuing. After such a difficult birth, industry pundits have been long-faced

about the medium. How could such an expensive and tweaky thing survive, especially when there is so little pre-recorded music available? (At a guess less than 20 titles have been released by labels such as Chandos, Rough Trade, Demon and Factory, costing on average £25 each.)

The answer according to Aiwa is to turn it into a video as well as audio package. The company is at the forefront of digital video technology and will soon be offering cameras, playback equipment and the tape itself.

Choice's visit to Aiwa found us streaking out of Tokyo on the bullet train, gliding over 70 miles of super-smooth rail to the company's research and development centre at Utsunomiya. This city is one of the old Shogun capitals and an important staging post on the ancient route from Tokyo to the north island of Hokkaido. Nestling at the foot of the Nikko mountain range, the town combines this tourist attraction with some heavy industry. Honda has a plant here, and until recently Aiwa had two factories in the town. Even in February the place was warm, with wooden houses jostling together down claustrophobic and dusty streets; by July the humidity of the Tokyo plain would be enough to rot the cotton fibres in your suit - the Japanese here prefer not to shake hands, just in case a sleeve falls off.

The 40 year old company now manufactures much of its output in Singapore - or Gwent - and one of the Utsunomiya plants has become the research and development base. Cassette decks, VCRs, CD players, headphones, amplifiers and DAT machines are all designed and have prototypes built here. The main centre is split up over three floors with designers and engineers working in huge open plan offices. There are 36 computer terminals devoted to computer-aided-design of mechanical components, and 12 just for printed circuit board layout work. The place may seem huge, but then Aiwa has

Rock on; Will Aiwa's DAT players be the foundation stone of a new format?



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DAT machine manufacture takes place at one of Aiwa's subsidiary Japanese plants in Iwate, 400 kilometres away. This is common with many Japanese firms who prefer to use a Japanese workforce for the more intricate engineering tasks, farming out the production of more established technologies to a cheaper, overseas labour market.

Foreign exchange

With the formal exchanging of business cards completed, the assembled team of Aiwa engineers set out to explain what they hoped the future might hold for DAT. Without exception they were dismayed that the marketing of DAT had met with setbacks, but weren't worried about any potential 'threat' from DCC (digital compact cassette), scheduled to arrive by the middle of 1992, or Sony's MD (mini-disc) set to debut six months after that.

"This is a tape recording medium," Mamoru Niki, the Digital Recorder Engineering Division Manager told me. "As such it will be bought by people who are interested in making a recording, from satellite TV (digital), CD or another source. It doesn't matter to these people that pre-recorded software isn't available - they will only be interested in using blank tapes.

"As for DCC, it hasn't been marketed yet so it's not a threat. When it does arrive it won't be as good; if DAT is a high class system then DCC will only be middle class."

Sony's mini-disc system was similarly swept aside. Aiwa's engineers made the point that the sound quality of DAT would make it a clear winner with audiophiles who wanted the best. As such Aiwa continues to develop and manufacture its range of audio DAT machines. The *HD-S100* or the *HD-1000* series of semi-portable players use bitstream digital to analogue conversion and sell for upwards of £740 in Japan. The professional broadcast *HDX-3000* is priced at £1,000, while the *XD-S260* and *XD-S1100*, for partnering midi systems and separates respectively, go for around £450.

Aiwa claims there is a great future for DAT, and points out that whereas 20,000 players were sold in 1989, 1990 registered 60,000 sales and this year should see a

further doubling. But even so, the market for such machines is limited. After all, you can get a very capable cassette deck for £450 - and have none of the bother of converting to a new medium. Aiwa has therefore branched out, and developed two new audio/video DAT players.

The idea behind such machinery should appeal to someone who would like to integrate audio, video and compu-

allowing 1,400 still pictures to be recorded onto a standard 120 minute tape. Sampled at 14.32MHz (four times the subcarrier frequency), each picture lasts for 5.2 seconds. At 480,000 yen (around £1,900) it is also very expensive.

Audiophiles may turn up their noses at the eight bits available for sound quality, but Aiwa uses a non-linear eight bit conversion to improve dynamic range.



Ear today; Aiwa's engineers still maintain that DAT is the medium of the future.

ter applications. Multi media DAT, as it is called, will digitally store a series of still video pictures taken from a video camera, camcorder, TV tuner, VCR, laser disc player, tele-photo equipment, or scanner via computer — or indeed from another DAT video player. These can then be played back through a television video monitor, projector or computer. Sound, recorded by microphone, or from CD player, DAT machine or cassette deck, can then be dubbed over the pictures.

Multi-media is the message

Two machines were launched this summer in Japan. Both interface with NTSC format composite video signals (as used in Japanese and US terrestrial broadcast television). Both can also be controlled by a computer, which allows quick access to a library of video stills, for instance.

The *MMD-100* is the world's first DAT player to incorporate still video pictures and sound on digital audio tape. It uses eight bits for video and eight for audio,

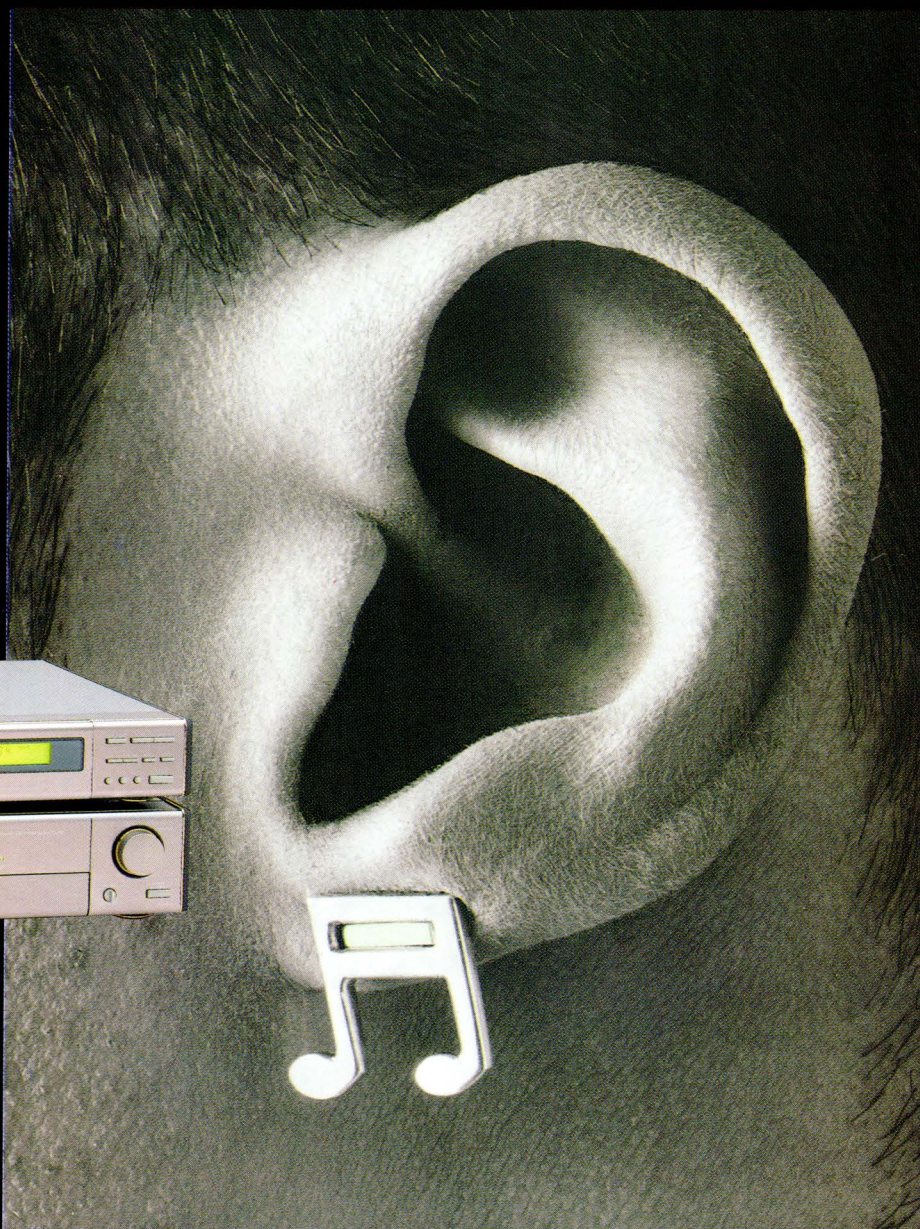
The specifications claim the audio output will have a respectable dynamic range of 80dB with frequency response from 20Hz to 20 kHz, and the audio signal should be theoretically better than an FM broadcast.

A second machine demonstrates how fast Aiwa is moving in its eventual quest to put a moving digital video image (FMV, or full-motion video, as it's known in the trade) onto DAT. The 200,000 yen (£800) *HDV-2000* uses ten bits for audio and just six for video to allow 3,600 still pictures on a 120 minute tape, with each picture lasting only two seconds.

The composite video signal is sampled to 6-bit resolution at 10.74MHz (three times the frequency of the subcarrier signal), which means that some picture resolution is lost. Indeed the *HDV-2000* has only 350 lines of horizontal resolution, compared to the 450 lines of the *MMD 100*.

While it's true that we were shown the machines five months before they were due on the market, there was no avoiding

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the fact that the *HDV-2000* was very inferior to the *MMD-100* in terms of picture quality. Glitches and digital 'noise' on the pictures were combined with a fuzzy image which certainly wasn't anything to do with the Sony *Trinitron* monitor. In contrast the *MMD-100* showed no obvious noise and much sharper pictures.

The Aiwa engineers understand that they still have some ground to cover before they can put moving pictures of any meaningful quality onto digital tape. They have already experimented with full motion video, and claimed to have developed a system with 256 lines of horizontal resolution as long ago as June 1990.

One goal is obviously to produce a consumer format which can give the

(physically twelve times larger) video cassette a run for its money. Digital photography is already viable for still cameras, and Aiwa itself is working on just such a system using DAT. Although the engineers were too diplomatic to mention the word competition, they are clearly hell bent on producing the hardware and software which will make DAT viable for video as well as audio applications. There's already an add-on convertor that enables an *HD-S100* to be used alternatively as a reference system for video stills.

"At present the Aiwa video DAT machines are only aimed at those who want to be at the forefront of technology," Mr Niki said. "This system isn't perfect but pioneers will want it, the same people

that bought the early CD players."

Aiwa wasn't ready to commit itself to a date for adding moving pictures to DAT, but the fact that the company was willing to demonstrate the progress so far suggests it is confident of success soon.

Nevertheless the managers often visit their small Shinto shrine to pray for commercial success, and a priest was due to hold a service there the following day. As one approaches the shrine, small white paper flags help to concentrate the mind on purity; under its little pagoda roof, statuettes of foxes (the Shinto gods of prosperity) remind the engineers of their ultimate task.

Although DAT may have born into a dog's life, the people at Aiwa plan to out-fox its critics yet.

The wider context

Although one must admire Aiwa's efforts to expand the flexibility and usefulness of a format in which many billions of yen have already been invested, rapid developments in other media and formats leave one still questioning whether DAT will ever manage to catch the commercial boat.

The Video 8 (8mm) camcorder format uses a cassette not much bulkier than a DAT tape, and Sony's top model offers 8-bit digital sound alongside high quality component analogue FMV (full motion video), and accurate time-code identification.

Philips meanwhile has demonstrated that its flagship S-VHS camcorder can deliver very good quality (analogue) still video pictures, and these can of course be digitally sampled and computer-processed if desired.

At the same time, the optical disc is starting to flex its multi-media muscles, developing both record/replay and playback only systems that involve various combinations of digital audio with analogue or digital, still or full motion video, alongside computer interaction.

These developments all fall broadly under the CD-I (interactive) and CD-ROM (read only memory) umbrellas,

but the inter-compatibility of different variations and applications is still a complex matter, as Barry Fox forcefully pointed out in *New Scientist* (21 September 1991). The imminent Kodak/Philips Photo-CD initiative, for example, which stores 100 better-than-high-definition still images on a 12cm CD, is actually a variation on the CD-ROM theme. However, discs will be played back using either a Photo-CD or a CD-I drive—both of which can also replay conventional audio CDs!

Certainly the 12cm optical disc offering rapid random access with digital FMV and sound is not too far from becoming a possible commercial reality. But all such future multi-media scenarios depend crucially on coming up with a specific new application that the whole world wants to buy. Some such 'killer app' has to come first, and in turn drive the sales of the appropriate hardware and software that will determine all our multi-media needs.



Little bits of what you fancy; Aiwa's video DAT is only one of several new digital formats designed for recording images, such as Kodak's Photo-CD.

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The Questions

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

1. In which Japanese city is Aiwa's research and development centre located?
2. How many systems are featured in this month's mini system roundup?
3. Which turntable is Chi Hung Tso currently using in his system?
4. What is Kodak's proposed digital video format called?
5. Who manufactures a £400 clock radio?
6. What type of headphone is the Sennheiser *Orpheus*?

Outboard DACs, add-on convertors, call them what you will, this is one area of the audio scene that's witnessing an explosion of interest. And it's not difficult to see why. After all, purchasing a new DAC must seem like the ideal upgrade: it allows you to keep your trusty CD player with all its familiar facilities while using the digital output to drive an external convertor. Hey presto, revitalised sound quality without the unnecessary expense of splashing out on an entirely new integrated player.

Choosing and Using . . . DACs

Thinking of buying a digital to analogue convertor but don't know where to start? Paul Miller explains what to look for — just like DAC!

Furthermore, because the digital output of all CD players must conform to an agreed standard (called S/PDIF or Sony/Philips Digital Interface Format) it is quite possible to upgrade an old 16-bit player with a modern bitstream convertor! So whether the digital output comes in the form of a coaxial socket or Toslink optical transmitter, the format of the digital data remains the same. They simply take the form of pulses of red light (optical) or pulses of electricity (coaxial). Peer around the back of your CD player (or CD transport) and you'll find one or both of these connections.

Meanwhile, back in the real world we find that nothing can be taken for granted. Sure, the format of the data is fixed; but different digital outputs still 'sound' very different from one another because of extraneous factors like jitter (a blurring of the digital edges) and RF noise. Theoretically, optical connections should offer an advantage over their coaxial cousins because fibre-data travels one-way only - there's no return path to circulate interference. Yet many coaxial connections still end up sounding superior because the digital 'edges' are more sharply defined.

Unfortunately the optical transmitters (in the CD player) and receivers (in the outboard DAC) are hampered by their restricted data rate. This doesn't mean that data is slowed down. Instead, the vertical edges of the digital signal become slanted and this leads to a degree of uncertainty in the exact position of these 1s and 0s in the outboard convertor. So freedom from interference is often traded for an increase in jitter.

There are other reasons why a randomly chosen CD transport/DAC combination or CD player plus

DAC upgrade might not sound any better than a decent integrated CD player. Certainly separating the noisy digital electronics and power supply of the transport from the sensitive analogue electronics of the DAC is worthwhile, but the improvements are not for free. You see, before communicating the data from digital output (in the CD player or transport) to the digital input (in the DAC) it's first changed from the standard language of I²S to that of S/PDIF.

The data is squirted over where it's translated back again into I²S within the outboard convertor. Now, because a conventional one-box CD player avoids all this malarky it also avoids the chance of extra jitter or, in the worse case, corrupted data. Choosing an outboard DAC should be straightforward, but when manufacturers fail to stick to the 'rules' (see *Tech Talk*) it makes life very difficult indeed.

The influence of facilities is another area that shouldn't be taken for granted as far as DACs are concerned. Now, none of these units is equipped with a variable output so the pros and cons of this option needn't concern us. However, several of our DACs are equipped with a phase invert facility. This changes the sign of each digital bit before the data is converted back into analogue music, shifting its phase by 180 degrees. It's the equivalent of swapping over the red and black speaker cables and can have the effect of sharpening the stereo focus of individual performers, depending on the absolute phase of the recording or tracks within a recording.

It has been suggested that phase-inversion has no audible effect, but many listeners report hearing obvious changes in performance with it engaged. Now, I'm not going to argue about the subjective effects of phase but it is worth knowing that changing the sign of the digital data can influence both the low-level linearity and nature of distortion produced by the DAC itself. And these effects may well be audible (see *Tech Talk*).

The tests

Before our (blind) listening commenced every converter was left powered-up in the lab for at least 48 hours, ensuring that each was thoroughly warmed up. Once again our panel selected a range of music that extended from folk (Mary Black and Christy Moore) through jazz (Marty Paich's Big Band) to classical (Prokofiev's *Classical Symphony*). Furthermore, because we could not rely on any one digital output being typical of the breed we took an overview of each DACs performance with three separate CD transports.

Clearly, we could not audition every available permutation of transport and DAC, nevertheless our choice of Meridian 200, Teac P-10 and Wadia WT3200 represents a very broad cross-section of the market in terms of both price and technology. In each 'Sound quality' section you'll find the CD transports listed in order of preference for that particular DAC. Some of the most encouraging combinations are not necessarily the most obvious and our results provide you with a comprehensive starting point for making your personal choice of outboard D/A convertor.

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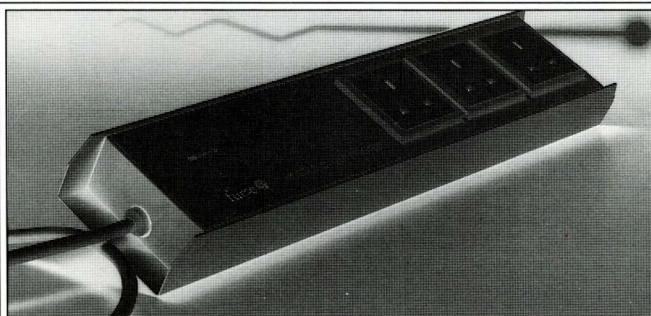
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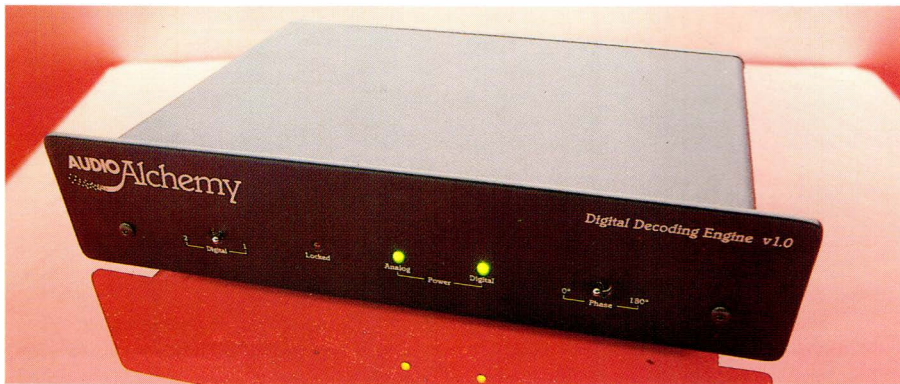
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Audio Alchemy DDE

ACOUSTIC ENERGY LTD, 3A ALEXANDRIA ROAD, EALING, LONDON W13 0NP. TEL: (081) 840 6305



Unlike the Alchemists of yore, the distributors of this *Digital Decoding Engine* really have struck gold. The *DDE* is seriously cute yet packed with features like selectable coax/optical inputs, a buffered digital output, phase inversion and even a separate I^S port to accommodate future upgrades.

Audio Alchemy has managed to squeeze all this into a matchbox by running the unit via an encapsulated 12V mains transformer, leaving every inch of space for the crowded PCB. There are surprises here too, for Audio Alchemy has followed Meridian's lead in using an SAA7274 ADIC (Audio Digital Input Circuit) instead of the ever-popular Yamaha.

Furthermore the DAC itself is the latest in the 7320-series, namely Philips' SAA7323 which employs second-order noiseshapers and a composite of 256 times oversampling to generate the Bit Stream. All in all, quite a hi-tech box of tricks.

Lab report

Comparing the *DDE* with Rotel's *RCD-965BX* (an SAA7323-based player - issue 100) is very interesting. The *DDE* suffers broadly similar levels of distortion (typically 0.0015-0.04 per cent at 0dB) and so produces a similar, if slightly cleaner looking, 3D plot. However at lower levels its linearity is less reliable, while the passband ripple seen on the 0dB response increases to a very obvious 0.5dB at -60dB.

The 1kHz/-70dB plots are also comparable, for though the *DDE* is 'leaky' at 44.1kHz at least AA has suppressed the 7.35kHz CLV tone that breaks through on Rotel's spectrum. On the other hand AA has been less scrupulous in removing the high level 352kHz dither tone injected midway through the 256 times oversampling filters...

Sound quality

Via the Wadia *WT3200* transport:

'Lively, nimble and yet well-controlled' was the conclusion of our panellists

who were equally taken by its solid, dry and tight bass. The very busiest sequences of Prokofiev's *Classical Symphony* were mildly congested but there was a sweetness and smoothness about its sound that prevented any of us from becoming fatigued or irritated.

Indeed, it proved to be far tidier handling the delicate percussion from the Christy Moore CD or the complex interplay of brass from our Marty Paich selection. So while its resolution was not flawless there was a freedom from the sort of extraneous 'hash' that permeated the music of competing DACs, leading to a pure, strainfree and engaging sound. Via the TEAC *P-10* transport:

Once again the *DDE* provided us with a very detailed sound populated with stable, true-to-life images of instruments and performers alike. Mary Black was especially well projected, tactile and believable. Furthermore it was one of the few times our panellists had heard what they described as the 'flanging' of the synthesiser (answers on a postcard please).

So this was a big and affable sound if not quite so involving - once again - with the busy Prokofiev Symphony, where there was a slight loss of space and airiness. Otherwise it was quick and lucid, flitting from note to note without appearing hard or relentless.

Via the Meridian *200* transport:

This combination possesses a realistic sense of scale with, on the whole, a very easy, truthful and detailed sound. However, there was some dissension with two listeners finding it mildly 'cloaked' by a one-note, resonant quality that coloured bass and vocals alike.

Conclusion

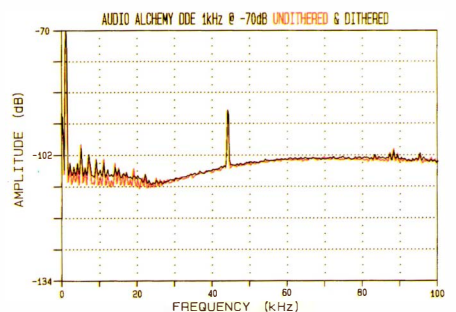
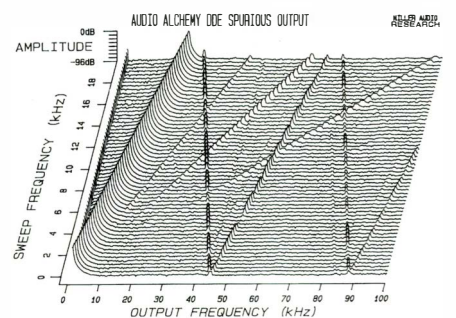
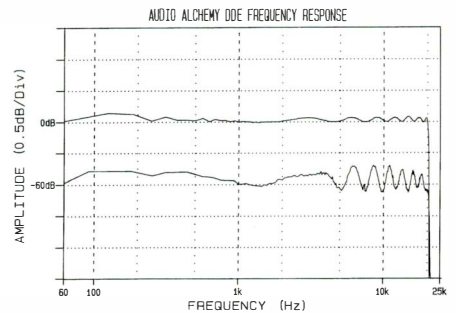
What a cracker! The *DDE* proceeded to trounce all our sub-£1,000 DACs with apparent ease, improving from transport to transport until we arrived at the *Wadia WT3200/DDE* combination. The prices of these two components may seem dispro-

portionate yet, viewed as a £2,200 CD player, it comfortably outperforms any integrated unit we have yet encountered. A reliable Best Buy.



TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.03dB	0.03dB	0.05dB
Channel Separation	91.1dB	90.3dB	77.7dB
THD vs Level, 0dB	-96.8dB	-93.0dB	-68.7dB
-30dB	-75.6dB	-62.0dB	-65.4dB
-60dB	-39.2dB	-31.5dB	-35.5dB
-80dB	-14.6dB	-11.1dB	-12.3dB
Dithered, -90dB	+4.20dB	-0.95dB	-3.30dB
Dithered, -100dB		+1.95dB	
Dithered, -110dB		+4.50dB	
Resolution@ -60dB		-0.14dB	-0.16dB
-80dB		-2.00dB	-1.21dB
-90dB		-3.65dB	-2.76dB
-95dB		-2.30dB	-4.10dB
-100dB		-5.55dB	
Peak Output Level, L		2.465V	
R		2.455V	
Relative Output Level		+1.80dB	
Output Impedance		230ohm	
Radio Frequency Spurious			352kHz @ 5mV*
1Hz Noise Modulation			+1.3dB
CCIR IMD, 0dB			-91.1dB
Suppression of stop-band IMD			55.3dB
De-emphasis Accuracy, 1kHz			-0.03dB
5kHz			-0.06dB
16kHz			+0.09dB
S/N Ratio (A-wtd), w emp, 0LSB			99.1dB
w/o emp, 0LSB			97.4dB
w/o emp, 1LSB			95.8dB
Typical Retail Price			£376



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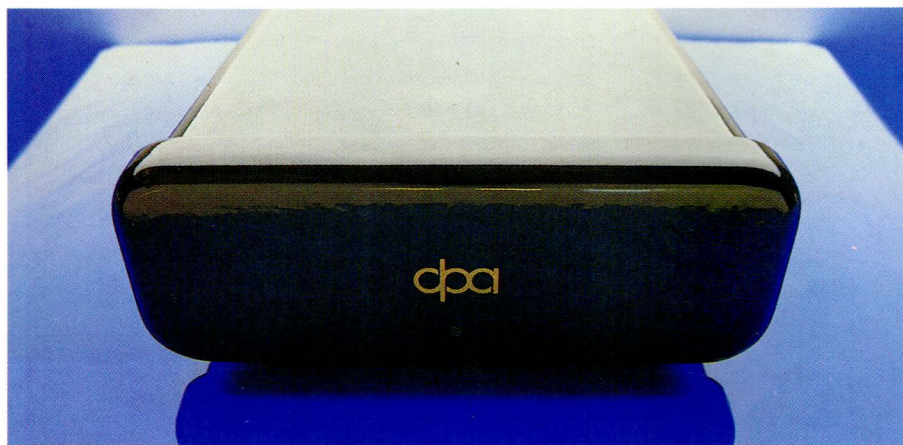
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Deltec Little Bit (Optical)

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Compared to many outboard convertors, Deltec's aptly-named *Little Bit* is a model of simplicity. Outside there's a distinctive, glossy-coated alloy case while inside there is just a single circuit board, a small 6VA mains transformer and just four full-sized integrated circuits. Deltec is an avid proponent of surface-mount technology, using pygmy components throughout the power supply, digital and analogue stages.

So in fact the *LB* is rather more sophisticated than at first it might appear, miniaturisation allowing Deltec to pack-in a host of tantalum electrolytics, for instance, on all power supply and reference source lines. Conventional ICs include a Yamaha interface chip and YM3414 eight times oversampling filter in addition to one of Philips' SAA7350 Bit Stream DACs.

Features are few though Deltec has improved this state of affairs recently with a new higher-speed (20Mbit rather than 4-5Mbit) Toslink optical input. The price has also been increased to £400.

Lab report

The biggest problem with our sample proved to be high levels of radiated interference which clearly exceeded the in-line output of just 9mV. RF-sensitive equipment in the lab (including my tranny!) was disturbed by this haze of noise. Deltec has since assured us that current production samples are free of this blight. Otherwise all is reasonably well. The 3D plot shows little distortion but does reveal some second order stop-band intermodulation at 88.2kHz (the V-pattern). Distortion obviously picks-up at lower levels though is not entirely removed by the dithered test signal at -70dB. Either way, the elevated 384 times oversample rate has reduced the ultrasonic noise produced by the 7350's third order noise-shapers. Just compare the 1kHz/-70dB plot with either Meridian DAC or the Philips/Marantz CD players in issue 100.

Sound quality

Via the Meridian 200 transport:

Without Deltec's *The Power* mains filter in tow, the *Little Bit* tended to emphasise the scale and importance of percussive sounds. It was not bright but just a little dirty. Nevertheless once the filter was introduced our panel failed to recognise this same 200/LB combination! Instead they reacted positively to its huge soundstaging and fine resolution of low level information. The harmonies on the Christy Moore CD were now clearer than with any other player heard that day. Furthermore there was now a better sense of the acoustic, the natural ambience thrown up by the sax on our Marty Paich selection. All this plus a great sense of scale and a tight, powerful but realistically balanced bass.

Via the Wadia WT3200 transport:

A very full, big and warm sound greeted our listeners which seemed deeper in the centre but shallower in scope towards the extremes of the soundstage. Nevertheless the panel were not as taken with this as they were with the Audio Alchemy, for instance. Very pleasant but vague, they suggested, as the plucked double bass from Prokofiev's Classical Symphony was slightly obscured by the softer focus of the bassoons.

Via the TEAC P-10 transport:

Definitely brighter and more dynamic than the Wadia's X-32, they thought, and free of the thick syrupy bass. Vocals were sharp and clean but there was more stage 'height' than stage width. Furthermore it became fierce sounding with the Marty Paich selection as a hint of raggedness permeated the entire upper end of the spectrum. Leaner, taut, but lacking 'oomph' was the consensus.

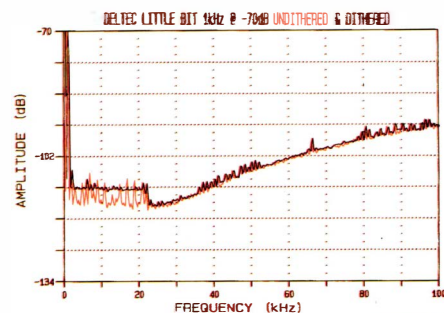
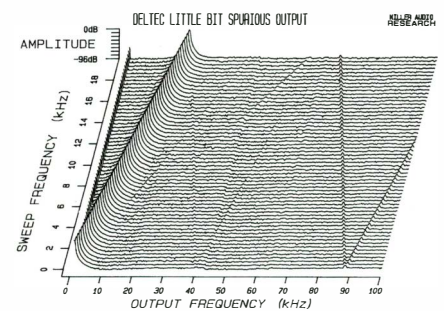
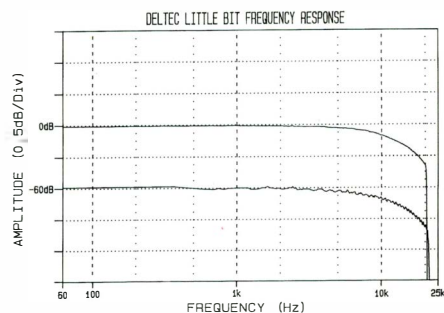
Conclusion

I have a sneaking suspicion that the RF noise radiated by this *Little Bit* did it no

favours in the listening tests. Either way, its very mixed reception must preclude a formal recommendation even though the 200/LB (plus *Power* filter) is one combination that represents great value.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.03dB	0.04dB	0.01dB
Channel Separation	96.3dB	98.4dB	107.8dB
THD vs Level, 0dB	-91.9dB	-90.9dB	-81.2dB
-30dB	-75.1dB	-73.6dB	-61.9dB
-60dB	-48.5dB	-46.2dB	-32.1dB
-80dB	-24.6dB	-26.3dB	-11.6dB
Dithered, -90dB	-19.8dB	-18.1dB	-3.75dB
Dithered, -100dB		-13.9dB	
Dithered, -110dB		-6.30dB	
Resolution @ -60dB		+0.03dB	+0.03dB
-80dB		+0.18dB	+0.30dB
-90dB		+0.30dB	+1.01dB
-95dB		+1.15dB	+0.10dB
-100dB		+1.30dB	
Peak Output Level, L		1.859V	
R		1.851V	
Relative Output Level		-0.65dB	
Output Impedance		<0.1ohm	
Radio Frequency Spurious		135MHz @ 9mV	
1Hz Noise Modulation		+1.3dB	
CCIR IMD, 0dB		-88.2dB	
Suppression of stop-band IMD		98.7dB	
De-emphasis Accuracy, 1kHz		+0.16dB	
5kHz		+1.41dB	
16kHz		+0.71dB	
S/N Ratio (A-wtd), w emp, 0LSB		102.7dB	
w/o emp, 0LSB		100.9dB	
w/o emp, 1LSB		100.9dB	
Typical Retail Price		£395 + £100	



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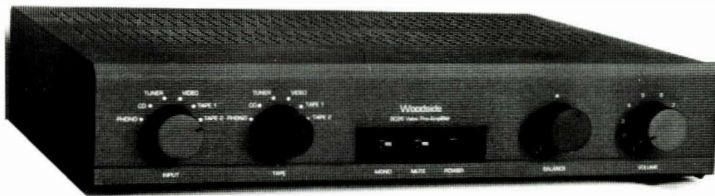
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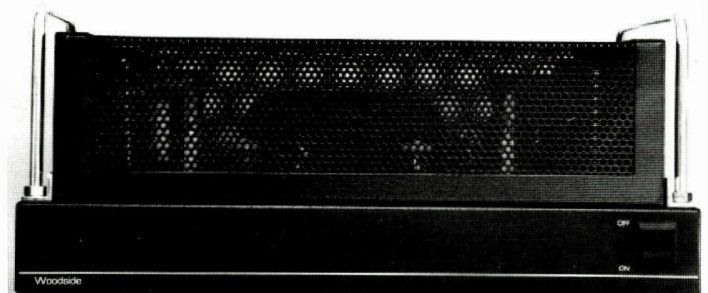


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"The SC26 pre-amp, though, is the real surprise. I expected the power amp to perform well, judging by earlier experience of the MA50 and the STA25 Mk IV. And I wasn't shocked to find that the STA35 seemed nicer to live with than its mono-block sibling. But the pre-amp dazzled me because of its composure.

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Ken Kessler Hi-Fi News July 91



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Deltec PDM2

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One of three DAC7 models featured in our tests, Deltec's *PDM2* is arguably the most sophisticated in its execution. First and foremost the *PDM2* is split into two matching cases, each housing one 'half' of Philips' latest Bit Stream system. The first box concerns itself with signal processing, employing the same Yamaha interface chip, eight times oversampling filter and *SAA7350* as the *Little Bit*.

In this instance, however, the *SAA7350* is used purely to generate a digital bitstream following third order noise-shaping and upsampling to 192 times. Clock, de-emphasis and L/R audio data is then transmitted in parallel form to the second box via no less than six high-speed (20MBit/sec) optical connections.

This unit concentrates on the 'analogue' half of DAC7 where the digital bitstream is converted to audio via a separate switched-capacitor IC called the *TDA1547*. You'll also find a trio of mains transformers tucked away in this case which feed a total of seven low-impedance supplies. Top quality components and expensive *DH-OA32* op-amps complete this intricate but refined design.

Lab report

Where to start? The *PDM2* has excellent channel separation, a vanishingly low output impedance, the lowest 1Hz Noise Modulation figure in the test, astonishing linearity and the best signal to noise ratio ever recorded for a Philips-based DAC. Distortion actually falls below the noise floor with dithered signals (see -70dB plot) while ultrasonic and RF noise are very well controlled. Its HF roll-off is unlikely to be audible though the de-emphasis error might be detected.

Sound quality

Via the Wadia *WT3200* transport:

Wow! This combination blitzed everything else in our test, the panellists re-

marking how even after three days of listening to the same CDs they could not only detect but relish new and hitherto concealed details. For instance, they could now hear Mary Black inhale before every line while the accompanying hi-hat decayed with exquisite realism. Low-level detail was exceptionally well resolved, drawing out a subtle lilt to the basic rhythm that was previously unheard.

Christy Moore's track leapt from the speakers, with height and depth in incredible proportions and no swamping of detail along the way. Similarly there were now plucked violin strings alongside the bowed contingent which had not been evident before. Rather than confuse the issue, the drums from our Marty Paich CD now pulled clear away from the brass, massive and solid in impact.

Via the Meridian *200* transport:

In this setting the *PDM2* followed all bass lines with a delicate rather than concussive impact, flowing with the music while still remaining very much in command. Vocals sounded sweet and natural with Mary Black appearing both incisively articulate but also mildly under-projected compared to some other DACs. Always measured and careful then, but perhaps lacking in drive with complex material.

Via the Teac *P-10* transport:

Judged the best of the (Teac) day for its excellent sense of focus and depth linked to a dynamic and weighty bass. The Prokofiev Symphony sounded very purposeful, as the *PDM2* tracked its dynamics faithfully while also preserving the natural colour of the different instruments. A very clean, balanced and natural sound, civilised but not uninteresting.

Conclusion

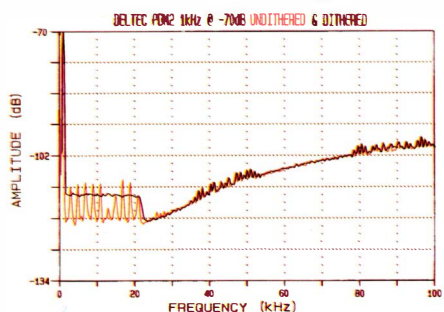
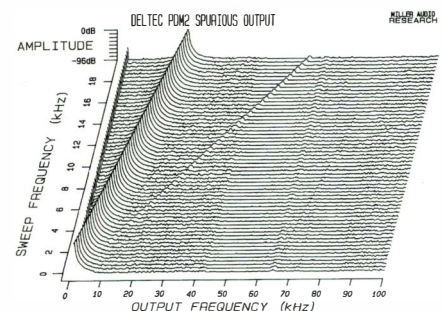
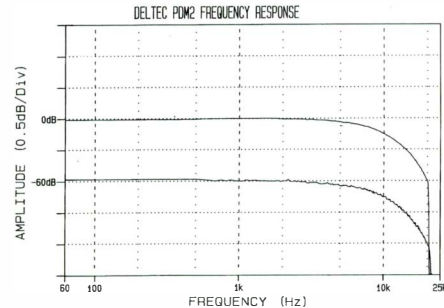
With the *PDM2*, Deltec has tackled both objective and subjective spheres with equal confidence. Technically it sets new standards for low-level linearity and dis-

tortion and, in concert with Wadia's *WT3200* transport, goes on to redefine many areas of CD sound quality. This combination simply has to be heard to be believed.



TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.09dB	0.08dB	0.10dB
Channel Separation	124.9dB	124.1dB	121.5dB
THD vs Level, 0dB	-109.9dB	-101.7dB	-82.5dB
-30dB	-93.2dB	-81.5dB	-65.7dB
-60dB	-58.8dB	-55.6dB	-36.4dB
-80dB	-28.5dB	-33.5dB	-15.9dB
Dithered, -90dB	-18.9dB	-25.2dB	-7.20dB
Dithered, -100dB		-18.1dB	
Dithered, -110dB		-12.1dB	
Resolution @ -60dB		0.00dB	+0.01dB
-80dB		+0.02dB	-0.01dB
-90dB		+0.01dB	-0.12dB
-95dB		+0.03dB	+0.95dB
-100dB		+0.04dB	
Peak Output Level, L		2.050V	
R		2.069V	
Relative Output Level		+0.25dB	
Output Impedance		<0.1ohm	
Radio Frequency Spuria		118.5MHz @ 7mV	
1Hz Noise Modulation		+1.0dB	
CCIR IMD, 0dB		-102.8dB	
Suppression of stop-band IMD		101.9dB	
De-emphasis Accuracy, 1kHz		+0.16dB	
5kHz		+1.32dB	
16kHz		+0.19dB	
S/N Ratio (A-wtd), w emp, 0LSB		106.7dB	
w/o emp, 0LSB		105.6dB	
w/o emp, 1LSB		105.7dB	
Typical Retail Price		£2,195 + £200	



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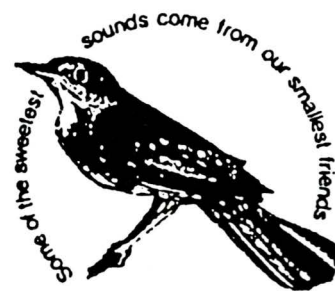
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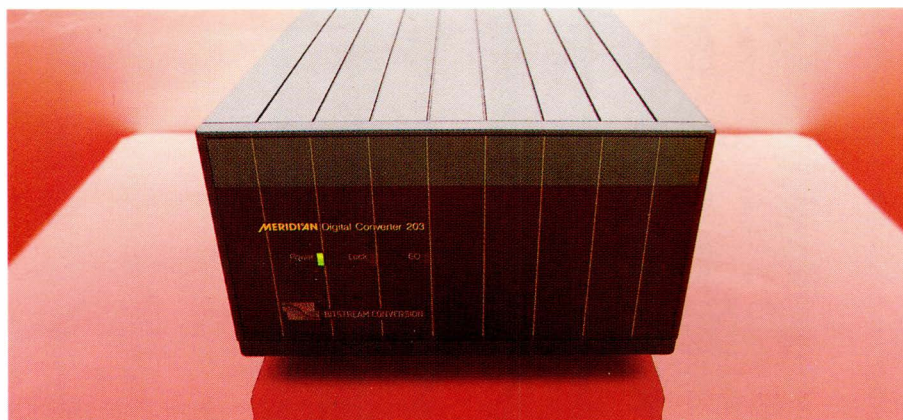
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MAIDSTONE, KENT ME15 6QP. TEL: (0622) 672 269



In the 18 months since its introduction, Meridian's 203 DAC has come to represent a classic and reliable upgrade. However, though its sober appearance has remained unchanged, as have the choice of optical and coaxial inputs, the latest 203 is far removed from the original. This has been an internal metamorphosis, the PDM stage having evolved from SAA7321 through a brief flirtation with SAA7323 before settling on the DAC7 version we have here.

As always, the 203 employs the services of a wideband VCO-based PLL (Phase-Locked Loop) and Philips' SAA7274 ADIC to access and demodulate the incoming data. Then it's all change with the SAA7321 now offering its services as a four times oversampling filter, the SAA7350 providing a further 32 times upsampling and third order noise-shaping while the TDA1547 converts the signal from a digital to analogue bitstream!

Meridian has not split the DAC7 components onto separate boards but has optimised all crucial tracks on this four-layer PCB for a 50ohm characteristic impedance. If you'd like to have your existing 203 upgraded, by the way, then the joys of DAC7 can be yours for just £250.

Lab report

Despite using the TDA1547 DAC, this 203 has more in common with Philips' 7350-based CD players than, say, Deltec's PDM2. For a start there's the SAA7321 oversampling filter which causes the rippling of both 0dB and -60dB frequency responses. More importantly, because Meridian uses an 11.3MHz clock-rate (rather than 16.9MHz) the 7350's noise shapers produce a higher concentration of quantisation noise between 20-100kHz.

This is obvious from the 1kHz/-70dB plot which is identical to that of new Philips/Marantz and Arcam CD players (see issues 95 and 100). Stopband images

on the 3D plot are almost swamped by this noise in a similar fashion. Otherwise the low output impedance, modulation noise and 0dB distortion are all very impressive. A pity then that the signal to noise ratio is compromised by spurious staggered at 11.025kHz intervals.

Sound quality

Via the Wadia WT3200 transport:

This pairing produced a warm, dynamic and very clear sound that was actually more atmospheric and 'bubbly' than that of its bigger brother, the 606. Christy Moore's track benefitted from a very open and airy acoustic while the articulation and phrasing of his lyrics was neither too rich nor too clinical. Its fluid demeanour was judged 'on the nail' by our panellists who also likened its solid bass to the PDM2 rather than its companion 606. An entertaining result.

Via the Meridian 200 transport:

Warm and bubbly once more with an equally impressive sense of space and stereo imaging. Nevertheless this sweet and engaging presentation was also a little soft according to our panel. For instance, Christy Moore's voice had assumed a fuller, blushing radiance whereas the higher pitch of Mary Black and strings (from the Prokofiev selection) were moderately forward by comparison. Still, its bouncy character maintained the enthusiasm of all who heard it.

Via the Teac P-10 transport:

Judging by the warmth and body of its sound one listener thought the 203 was a multibit DAC! Otherwise its soundstaging was a little close, smothering the richness of Christy Moore's voice and stripping away some of its rough character.

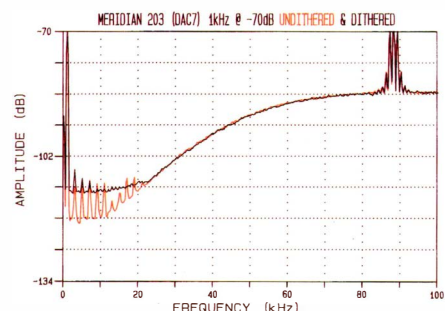
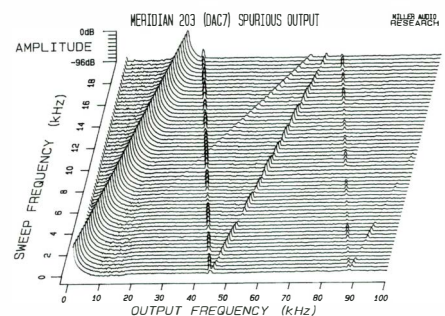
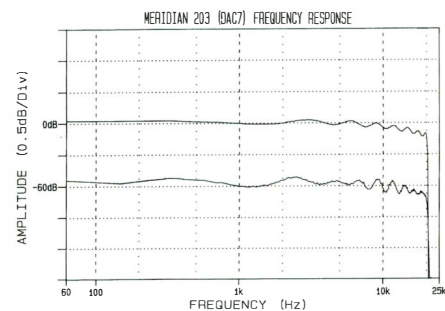
Conclusion

There are a couple of technical wrinkles that require Meridian's attention yet the 203's very detailed and rich character was

still sufficiently appealing to seal its recommendation. The warm, bubbly and engrossing sound of the 200/203 combination represents especially good value.

TEST RESULTS

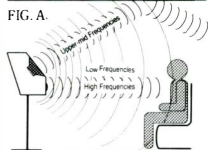
	20Hz	1kHz	20kHz
Channel Balance	0.07dB	0.07dB	0.06dB
Channel Separation	133.6dB	127.7dB	115.6dB
THD vs Level, 0dB	-111.6dB	-104.2dB	-73.6dB
-30dB	-83.2dB	-78.0dB	-50.6dB
-60dB	-46.0dB	-46.6dB	-21.8dB
-80dB	-23.6dB	-23.9dB	-11.9dB
Dithered, -90dB	-9.95dB	-14.3dB	+7.50dB
Dithered, -100dB		-12.1dB	
Dithered, -110dB		-6.40dB	
Resolution @ -60dB		+0.05dB	+0.03dB
-80dB		+0.64dB	+0.23dB
-90dB		+1.66dB	+0.77dB
-95dB		+1.88dB	+1.60dB
-100dB		+1.86dB	
Peak Output Level, L		2.278V	
R		2.296V	
Relative Output Level		+1.16dB	
Output Impedance		8.8ohm	
Radio Frequency Spurious	88.2kHz/1.9MHz @ 10mV		
1Hz Noise Modulation		+1.4dB	
CCIR IMD, 0dB		-98.2dB	
Suppression of stop-band IMD		55.3dB	
De-emphasis Accuracy, 1kHz		-0.04dB	
5kHz		-0.25dB	
16kHz		-0.25dB	
S/N Ratio (A-wtd), w emp, 0LSB		108.7dB	
w/o emp, 0LSB		101.6dB*	
w/o emp, 1LSB		103.9dB	
Typical Retail Price			£560



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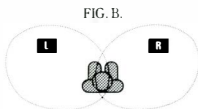


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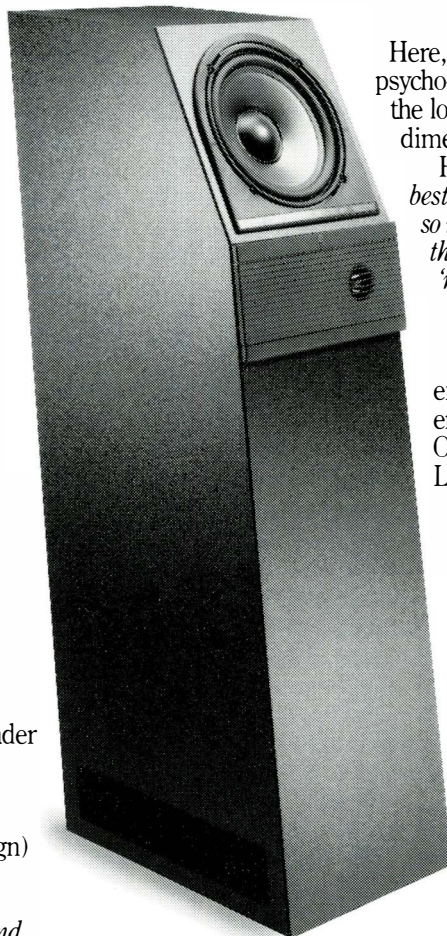
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**Stereo Review*, June '91 review of AR H/I Model M4.



Meridian 606 (DAC7)

MERIDIAN AUDIO LTD, ECCLESTON ROAD, TOVIL,
MAIDSTONE, KENT ME15 6QP. TEL: (0622) 672 269



Meridian's flagship converter was the first to be updated with Philips' DAC7 chipset, though much of what was learnt has also been put to good use in the latest 203. Nevertheless the 606 is the more sophisticated of the pair, for here Meridian has separated the sensitive DAC components from the PLL and SAA7274 interface circuitry by housing each in its own enclosure. Hence the 606 is not only better finished than the 203 but it's also twice the width.

Furthermore, the 606 benefits from three discrete crystal-based oscillators (in place of VCOs) which offer a broad 150ppm capture range while also minimising digital jitter. These cope with the three possible sample frequencies (32, 44 or 48kHz) over the four different inputs (two coaxial and two optical). Phase-inversion is also provided as a token facility. So the 606 may be equipped with the same complement of digital ICs as the 203 but its various dedicated power supplies and new Precision Monolithics op-amps all contribute to a very individual sound. Once again, implementation is everything.

Lab report

Meridian has improved upon the 203's technical performance with this unit, maintaining the superb 0.00026 per cent THD (20Hz at 0dB) but keeping a tighter grip on linearity from -60dB to -100dB and, as a result, reducing 1Hz noise modulation to just +1.2dB. Furthermore, the filter ripple on both 0dB and -60dB responses is better controlled, even though the ultimate signal to noise ratio is compromised in exactly the same fashion as the 203. The 3D plots are almost identical courtesy of the wave of ultrasonic noise. However, at lower levels the 606 makes better use of dithered signals (black trace, 1kHz/-70dB), trading distortion for noise and increasing its dynamic range over the 203. Once again the input impedance trend

varies from 46-59ohm, so many CD transports will be mis-terminated.

Sound quality

Via the Wadia WT3200 transport:

Auditioned directly after the WT3200/PDM2 combination, this alternative DAC7 converter yielded a fuller but slightly thicker sound, warm and personable if not a model of clarity. Our listeners commented that its presentation was somehow smaller in scale and perhaps not quite so authoritative as it might have been. As a result the Prokofiev Symphony was slightly stilted even though the jazz selection was lively and interesting, driven along by a firm sense of rhythm. Above all, its music was sweet and very clean even if, according to the panel, it could do with letting its hair down occasionally.

Via the Teac P-10 transport:

In this one instance the 606 enjoyed a better sense of focus with a more involving, gripping quality than the 203. Its sense of scale was also more impressive, leading our panellists to suggest it sounded 'louder', more dynamic but also more forward. Very nice, they said, but you could 'hear' the transport imposing some character.

Via the Meridian 200 transport:

A full, rounded bass linked to an open and fairly expressive treble gave the impression of extra ambience. Nevertheless vocals tended to lack projection which, together with a slight greyness or civility about the sound, often led to it appear processed or strained. An odd result, considering the nature of the CD transport.

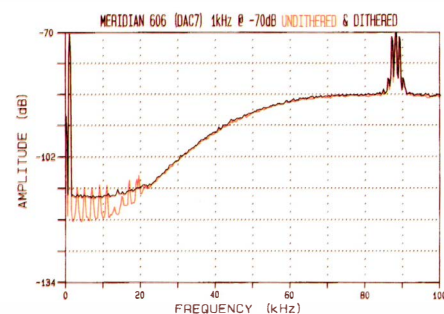
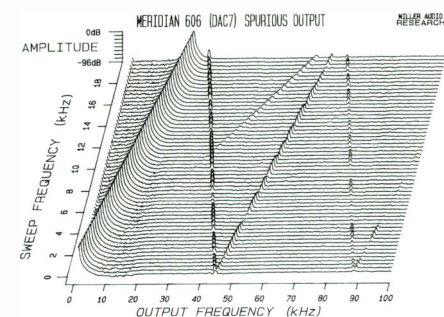
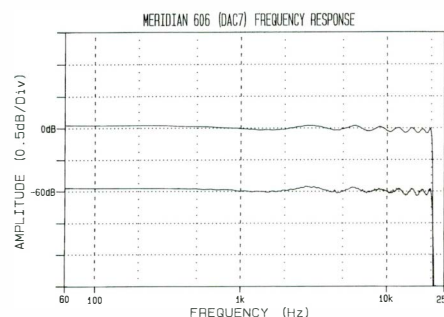
Conclusion

Compared to Meridian's 203 DAC7 convertor this upmarket version is undoubtedly more refined and courtly. Indeed several listeners likened its civilised approach to that of the Stax, even though the latter is rather less fussy about the choice

of CD transport. The 606 was not sufficiently vibrant to sustain the enthusiasm of our panel. And this, along with its fickle reaction to different transports, thwarted any chance of recommendation.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.10dB	0.10dB	0.09dB
Channel Separation	139.1dB	121.8dB	117.7dB
THD vs Level, 0dB	-111.7dB	-104.0dB	-73.7dB
-30dB	-97.1dB	-75.2dB	-51.0dB
-60dB	-55.2dB	-50.0dB	-22.6dB
-80dB	-28.4dB	-32.5dB	-2.80dB
Dithered, -90dB	-18.0dB	-20.7dB	+7.60dB
Dithered, -100dB		-14.4dB	
Dithered, -110dB		-8.30dB	
Resolution @ -60dB		+0.01dB	+0.01dB
-80dB		-0.08dB	-0.05dB
-90dB		-0.27dB	-0.37dB
-95dB		+0.05dB	-0.09dB
-100dB		+0.35dB	
Peak Output Level, L		2.319V	
R		2.346V	
Relative Output Level		+1.34dB	
Output Impedance 47ohm			
Radio Frequency Spurious		11.3MHz @ 6.5mV	
1Hz Noise Modulation		+1.2dB	
CCIR IMD, 0dB		-98.5dB	
Suppression of stop-band IMD		55.2dB	
De-emphasis Accuracy, 1kHz		-0.04dB	
5kHz		-0.23dB	
16kHz		-0.15dB	
S/N Ratio (A-wtd), w emp, 0LSB		105.0dB	
w/o emp, 0LSB		100.4dB*	
w/o emp, 1LSB		105.8dB	
Typical Retail Price			£1,350



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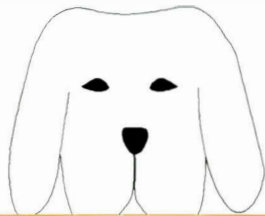
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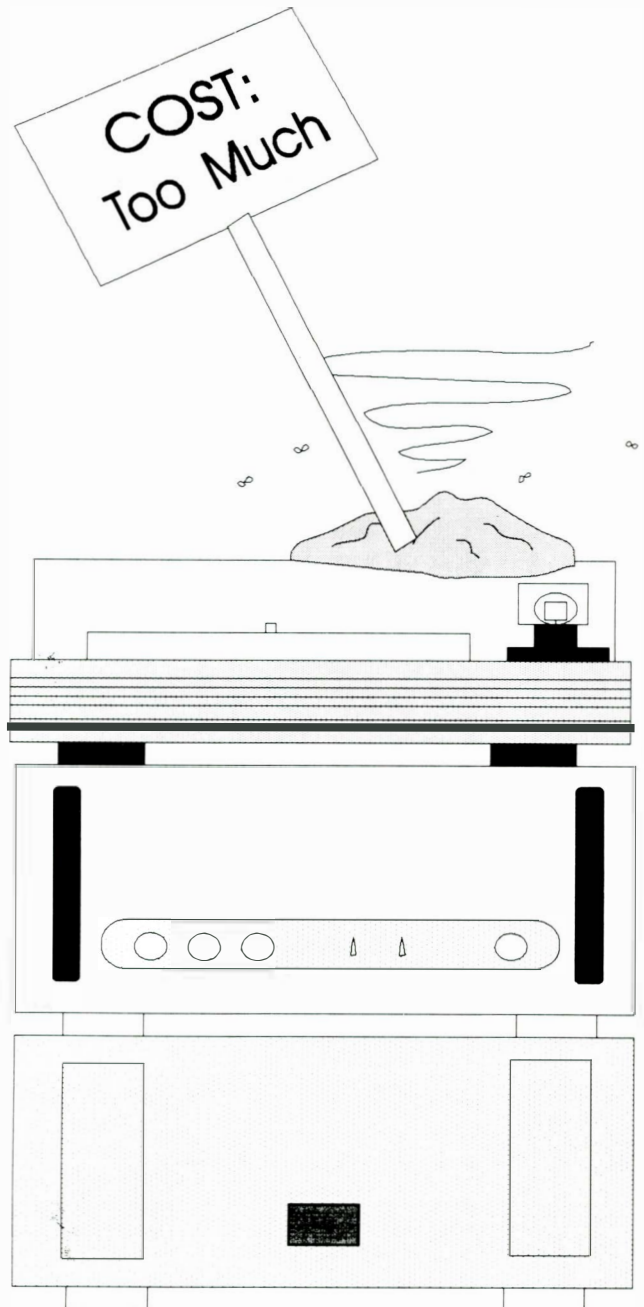
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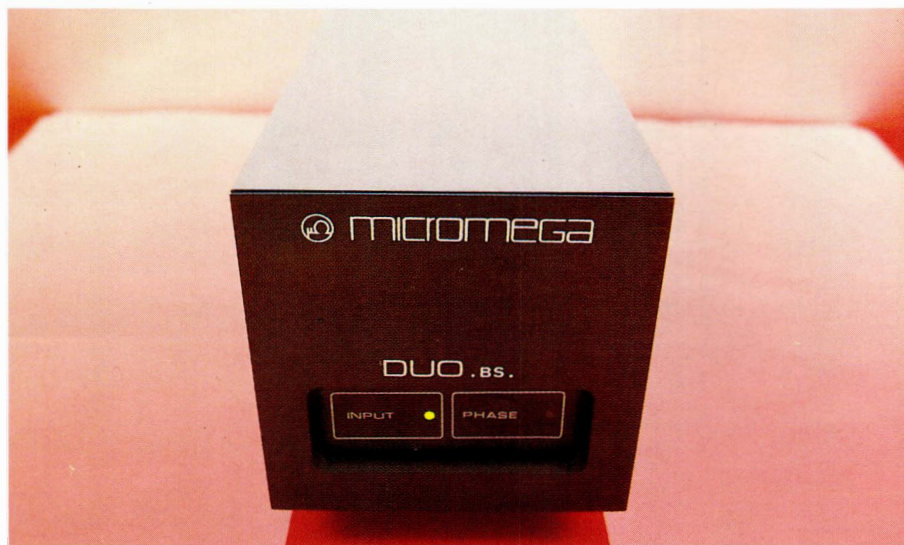


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Viewed from the front this is a very elegant package, its square alloy fascia punctuated by two soft-touch controls. These cater for input selection (green for coax and red for the Toslink optical) as well as absolute phase (green is positive and red means phase-invert). And that, featurewise, is your lot.

Packed inside this deep alloy box are no less than five separately regulated power supplies and a proprietary analogue output stage that's based entirely on discrete components. The MkII status is justified by Micromega changing over to a Yamaha interface chip even though the basic topology of the *Duo BS*, with its single-ended SAA7321 DAC, remains largely unchanged.

Lab report

This is not the healthiest of DACs. On the one hand there is good channel separation and a standard 2V output via a very low 7ohm impedance. On the other, its linearity deviates by a wild -11dB/-6dB (R/L) at -90dB while distortion climbs to 11.4/32 per cent (R/L) at -80dB. This is 10 times higher than a state of the art Bit Stream unit. Noise is also very high, compromising its signal to noise ratio (just 97dB A-wtd) and lopping some 16dB off its dynamic range. Just look at the 1kHz/-70dB plot. Noise also infests the -60dB frequency response but it does tend to smother the nasty side-effects of LF noise modulation, hence the good +2dB figure recorded here. Still, at least its ultrasonic noise seems better controlled than some 7350-based designs like the 203 and 606.

Sound quality

Via the Meridian 200 transport:

If a DAC tends to err in favour of a

light, tuneful and dry sound then Meridian's 200 transport usually makes a good partner. So it was here, the 200/BSII combination providing a sound with plenty of 'go and bounce' even if it did become a little ragged in the process. All our listeners appreciated the sense of drive, even if they did notice the slightly forward and sibilant quality of Christy Moore's voice. Its timbre was rawer and rougher than usual but not unattractive for it, the dynamic presentation appealing to the panel. Via the Teac P-10 transport

On this occasion Mary Black's voice was spread across the width of the soundstage, lacking the focus and tautness enjoyed with either the Woodside or Audio Alchemy (its immediate competition). Furthermore many accompanying instruments were heard to gravitate towards the extremes rather than the centre of its soundstage. Despite these spatial anomalies the sound was still reasonably involving with a fair sense of body and weight. As the panel said: cosmetically 'on the level' but holds back when it comes to subtle detail.

Via the Wadia WT3200 transport:

There was a distinctly electronic and 'bitty' sound to this combo that might initially be interpreted as incisive detail but is in fact a low-level hash-like distortion. Cymbals have an edgy, jangly quality while the overall balance is slightly cold and unfriendly, a leanness that could become fatiguing.

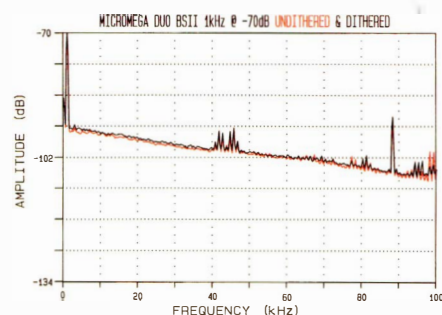
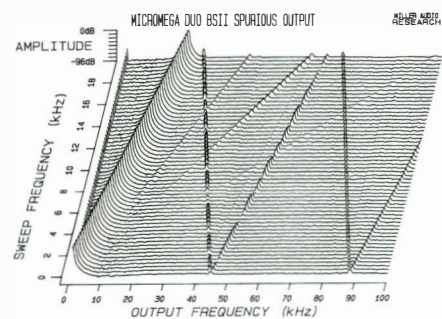
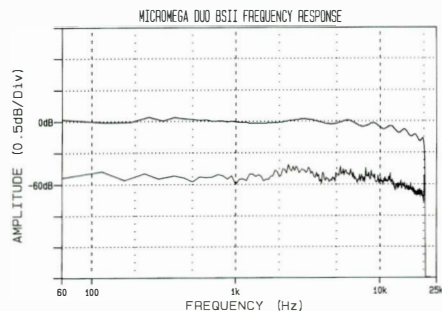
Conclusion

Not a bad little unit but its 57-60ohm input impedance reduces its compatibility with all CD transports. As a result the successful pairing with Meridian's 200 comes as little surprise (the 203/606 are

similarly mistermated) and as a one-off combination can be recommended. As an all-round reliable upgrade for your CD player, however, the Duo BSII fails to make the grade.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.27dB	0.27dB	0.35dB
Channel Separation	91.4dB	100.1dB	91.7dB
THD vs Level, 0dB	-98.2dB	-92.7dB	-72.1dB
-30dB	-73.7dB	-65.2dB	-67.3dB
-60dB	-37.9dB	-34.6dB	-37.5dB
-80dB	-14.0dB	-18.9dB	-11.5dB
-5.60dB	-5.60dB	-10.5dB	-4.55dB
Dithered, -90dB		-8.10dB	
Dithered, -100dB		-4.50dB	
Dithered, -110dB		-0.14dB	
Resolution @ -60dB		-1.73dB	-0.19dB
-80dB		-11.2dB	-2.24dB
-90dB		-7.60dB	-5.48dB
-95dB		-5.70dB	-2.60dB
-100dB			
Peak Output Level, L		2.134V	
R		2.069V	
Relative Output Level		+0.43dB	
Output Impedance		7.3ohm	
Radio Frequency Spuriae	147MHz/2.82MHz @ 15mV		
1Hz Noise Modulation			+2.1dB
CCIR IMD, 0dB			-80.6dB
Suppression of stop-band IMD			55.4dB
De-emphasis Accuracy, 1kHz			+0.06dB
5kHz			+0.25dB
16kHz			+0.06dB
S/N Ratio (A-wtd), w emp, 0LSB			98.7dB
w/o emp, 0LSB			96.7dB
w/o emp, 1LSB			96.9dB
Typical Retail Price			£500



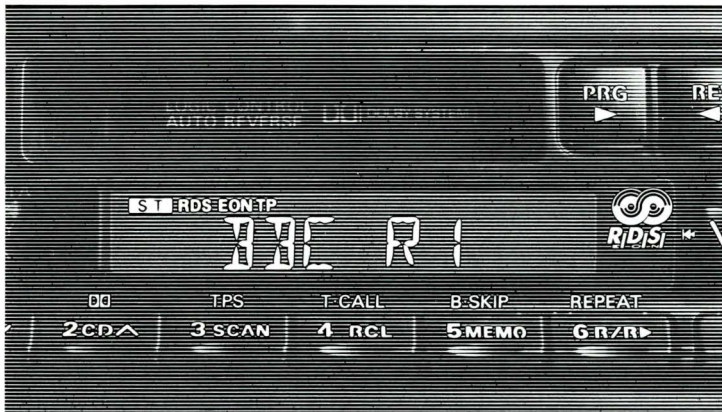
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Stax DAC-Talent

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Stax had been synonymous with electrostatic headphones for so long that when it suddenly entered the digital market with an outboard DAC it took many enthusiasts by surprise. Surprise soon turned to horror when the price of the high-end *DAC-X1t* was announced, so Stax's engineers set to work on a 'compact' model that would offer more than a flavour of this reference machine. Enter *DAC-Talent*, a modestly-titled unit built into an equally unpretentious gold case and equipped with both coaxial and optical inputs, a mute and phase-invert facility.

Stax opted for a popular Yamaha interface IC (cf Deltec and Woodside), a quality eight times oversampling filter from NPC and a pair of 20-bit DACs sourced from Burr Brown. Each DAC employs two complementary 19-bit convertors, thereby doubling the number of quantisation steps to that of a true 20-bit device. Pioneer used this DAC in their older PD-8500 and PD-93 players, by the way (see issue 95).

Lab report

Textbook stuff, this. The 3D plot betrays the merest hint of second and fifth harmonics but also demonstrates the superb 104dB stop-band rejection of the eight times oversampling filter. Both 0dB and -60dB responses are flat, ripple and noise-free while the DAC's low-level linearity is beyond reproach with errors under 1dB at all frequencies.

Low-level distortion is also incredibly good, up with the very best bitstreamers, in fact. Just look at the 1kHz/-70dB plot which highlights both its superb out-of-band filtering and near-ideal response to a dithered input (black trace) as distortion is traded for pure noise. De-emphasis is spot-on while the 110dB signal to noise ratio (A-wtd) is actually better than all current bitstream designs. Slick, very slick.

Sound quality

Via the Meridian 200 transport:

This proved to be the Stax's most complementary pairing, drawing out more air, freedom and expressiveness from all our CDs. Compared with either the Wadia or Teac transports, percussion from our Marty Paich disc now sparkled with life, appearing crisp and tight yet never hard or aggressive.

Quite simply, there was an immediacy and urgency about the sound that commanded the attention and applause of our listeners who reacted positively to the improvement in rhythm and coherence of the music. It really makes the 606 - its immediate competition - sound processed and synthetic.

Via the Wadia WT3200 transport:

By encouraging a slight emphasis to the lower treble and a mild bloom to the upper bass, this duo gave the impression of extra loudness (don't forget, each DAC was precisely matched for output level). This supplemented the bite and thrill of strings from the Prokofiev CD while also sharpening the focus of the sax from our Marty Paich selection. So, on the whole, this pairing has a lively, detailed and fairly dynamic sound even if its bass can lag behind.

Via the Teac P-10 transport:

The Stax was at its smoothest on this occasion but it was also markedly softer, especially in the bass. Tonally it provided a halfway house between the X-32 and *Little Bit*, but while everything seemed fine on a cosmetic level there was a vagueness about the sound that diluted its sense of rhythm.

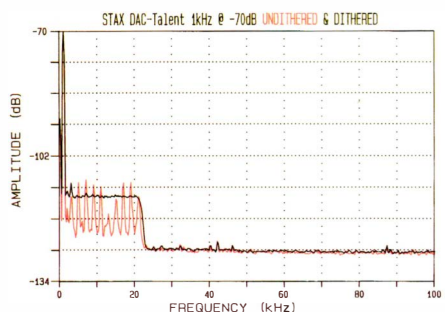
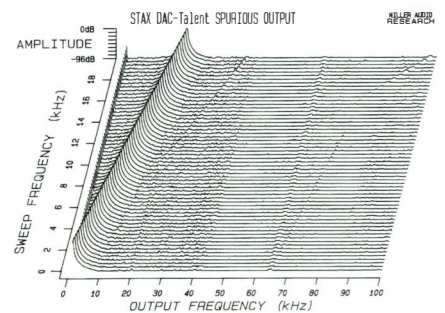
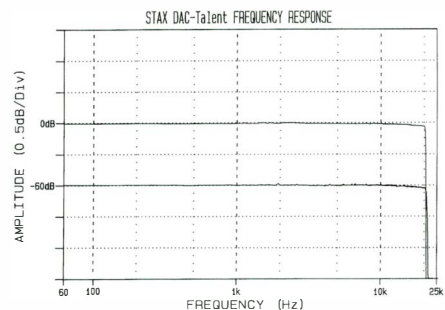
Conclusion

It is difficult to imagine the *DAC-Talent* causing any listener offence or fatigue, though with certain transports it can sound a touch too smooth and gracious

for its own good. The 200/*DAC-Talent* pairing is most certainly worth exploring, however, particularly in comparison with Meridian's similarly-priced DAC7 convertor.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.00dB	0.01dB	0.01dB
Channel Separation	126.5dB	123.5dB	116.0dB
THD vs Level, 0dB	-107.5dB	-101.2dB	-81.4dB
-30dB	-73.5dB	-75.0dB	-75.1dB
-60dB	-53.2dB	-51.5dB	-46.7dB
-80dB	-28.7dB	-30.7dB	-27.5dB
Dithered, -90dB	-18.1dB	-21.9dB	-20.8dB
Dithered, -100dB		-20.8dB	
Dithered, -110dB		-11.9dB	
Resolution @ -60dB		-0.01dB	-0.01dB
-80dB		-0.19dB	-0.24dB
-90dB		-0.53dB	-0.97dB
-95dB		-0.25dB	-0.80dB
-100dB		-0.05dB	
Peak Output Level, L		1.840V	
R		1.841V	
Relative Output Level		-0.72dB	
Output Impedance		206ohm	
Radio Frequency Spurious	152MHz/2.82MHz	@ 6.5mV	
1Hz Noise Modulation		+12.3dB	
CCIR IMD, 0dB		-98.4dB	
Suppression of stop-band IMD		104.4dB	
De-emphasis Accuracy, 1kHz		0.00dB	
5kHz		0.00dB	
16kHz		-0.04dB	
S/N Ratio (A-wtd), w emp, 0LSB		110.1dB	
w/o emp, 0LSB		109.8dB	
w/o emp, 1LSB		110.1dB	
Typical Retail Price			£1,395



Wadia Digimaster X-32

ACOUSTIC ENERGY LTD, 3A ALEXANDRIA ROAD, EALING,
LONDON W13 0NP. TEL: (081) 840 6305



Affordable is not a term readily associated with Wadia products and the X-32, despite it being the baby of the range, is certainly no exception. Still, the X-32 is significantly cheaper than the X-64.4 and for this you must accept sacrifices in build quality and sophistication. The power supply, for instance, is a rather basic affair while the input, oversampling, DAC and analogue circuitry are all crowded onto one board.

Nevertheless the X-32 does share many of the features lavished on Wadia's costlier DACs, including a crystal-based clock recovery circuit and a Hewlett Packard 25MHz (<35MBd) optical receiver that's compatible with the AT&T optical output included on Wadia's CD transports.

More importantly the X-32 is also equipped with Wadia's proprietary digital filter which, in this version, interpolates seven new values per original sample using a series of polynomials stored in a pair of Eprom 'look-up' tables. The data is then delayed by one-quarter of the eight times oversample frequency and then addressed to four mono 18-bit DACs (per channel) in sequence, thereby conferring the benefits of true 32 times operation.

Lab report

Wadia's oversampling filter dominates the technical performance of the X-32 with mathematics that were conceived to avoid all passband ripple. However, the limited number of taps cause a drop of some 3.6dB at 20kHz while also undermining the rejection of stop-band images.

The 18-bit DACs are responsible for a peculiar but repeatable glitch in the -60dB frequency response in addition to a spray of odd-order distortions extending from the third to 99th harmonic (dithered or undithered) on the -70dB plot. Linearity has also drifted, resulting in errors of

-6.7dB at 1kHz and +18dB at 20kHz. This means the response of the DAC at -95dB will be skewed by about +25dB from 1-20kHz.

Sound quality

Via the Wadia WT3200 transport:

Our listeners remarked upon a certain stylised clarity, a stark confidence about the sound of this duo with its highly articulate vocals, crisp percussion and a very positive sense of rhythm. Yet there is also a fundamental loss of richness, a sparseness about the sound that prompted one panellist to suggest the soundstage was dotted with 'holes'. Not synthetic, hard or strained, they contended, but simply lacking in feeling, richness and body. Via the Meridian 200 transport:

Now the X-32 was utterly free of the bloated, boomy resonance that compromised its performance with the Teac transport, yet for all its added sparkle and neutrality it still lacked the transparency and engaging quality expected at this price. Oddly enough our panel likened its tonal balance to the Woodside DAC2, if lacking this product's resolution, scale or spaciousness. This was a smaller and simply less engaging sound that failed to generate much enthusiasm. Via the Teac P-10 transport:

Here the X-32 was not especially dynamic even though it was well balanced, preferring to craft a deep rather than wide soundstage. Nevertheless all our listeners concluded that it lacked drive and verve, the bloated and syrupy quality of Christy Moore's voice only adding to the derision heaped upon its performance.

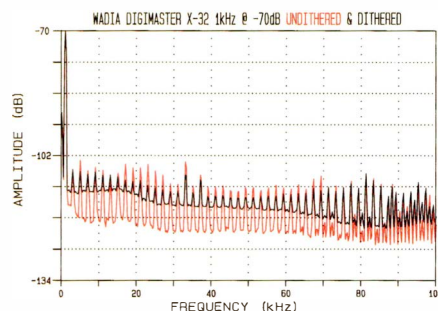
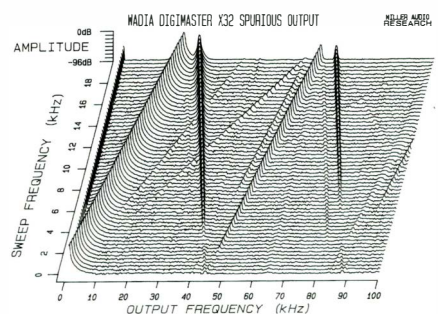
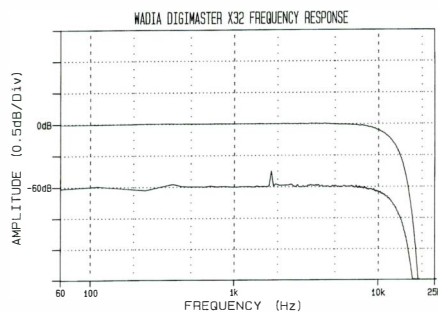
Conclusion

All in all, the X-32 is perhaps not the most impressive exponent of the archetypal 'Wadia sound'. Sure, it can appear both

dynamic and confident but this is readily offset by a lack of smoothness, refinement and subtlety. This, plus the host of technical peculiarities, must preclude any formal recommendation.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.04dB	0.04dB	0.04dB
Channel Separation	134.8dB	127.6dB	129.0dB
THD vs Level, 0dB	-93.8dB	-90.1dB	-78.7dB
-30dB	-78.6dB	-73.4dB	-56.8dB
-60dB	-48.9dB	-43.7dB	-26.1dB
-80dB	-19.1dB	-19.0dB	-8.10dB
Dithered, -90dB	-5.90dB	-13.8dB	-9.50dB
Dithered, -100dB		-11.9dB	
Dithered, -110dB		+5.30dB	
Resolution @ -60dB		-0.01dB	-0.02dB
-80dB		-0.11dB	+1.89dB
-90dB		-6.52dB	+8.82dB
-95dB		-6.70dB	+17.9dB
-100dB		-5.95dB	
Peak Output Level, L		2.542V	
R		2.529V	
Relative Output Level		+2.06dB	
Output Impedance		4ohm	
Radio Frequency Spurious	62.5MHz/125MHz @ 24mV		
1Hz Noise Modulation			+10.5dB
CCIR IMD, 0dB			-92.8dB
Suppression of stop-band IMD			7.45dB
De-emphasis Accuracy, 1kHz			-0.02dB
5kHz			-0.09dB
16kHz			-0.10dB
S/N Ratio (A-wtd), w emp, 0LSB			106.5dB*
w/o emp, 0LSB			104.5dB
w/o emp, 1LSB			104.1dB
Typical Retail Price			£1,900



Wadia Digimaster X-64.4

ACOUSTIC ENERGY LTD, 3A ALEXANDRIA ROAD, EALING,
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Five grand later and we come to the Digimaster X-64.4, Wadia's most substantial singlebox convertor. This is an ugly looking but very flexible crate dotted with status indicators. You have a choice of two coaxial BNC's, one Toslink optical and one ST-connected AT&T optical input, Class 1 or 2 clock tolerance, phase inversion and both unbalanced (phono) and balanced (XLR) analogue outputs.

Beneath the hefty alloy casework this unit reveals itself as a modular design, separating the digital input, signal processing (oversampling), DAC and analogue filter stages onto four isolated cards. As a consequence any future developments may easily be accommodated by simply replacing the appropriate PCB. Anyway, the X-64.4 uses twice as many DSP16 processors and Eprom look-up tables as the X-32 to interpolate 15 extra samples and so raise the data rate to 16 times. This is then addressed to four 18-bit DACs via a delay line to realise the claimed 64 times oversampling rate.

Lab report

Once again, it's the proprietary oversampling filters that dominate the proceedings, cutting short the frequency response and failing to tackle stop-band images (3D plot) which rise up rapidly in response to audio signals above 5-5.5kHz. Yet the X-64.4 has its good points, like the fine 120dB+ channel separation, excellent 108dB signal to noise ratio and suitably low 4ohm output impedance. The output level, however, is determinedly high at 2.5V (+2.0dB above standard).

The multibit DACs suffer some +9dB of noise modulation but at least their 1kHz linearity shows better trimming than the X-32. However, it's the undulating impedance trend of the digital input (see

Tech Talk) that is most worrying, causing reflection, interference and jitter before the data even reaches the DAC...

Sound quality

Via the Teac P-10 transport:

After some deliberation our panellists decided that they liked this particular combination, praising it for an open and airy quality that seemed to bring extra depth and space to its music. Compared to most DACs we auditioned on the 'Teac day' this unit revealed the natural reverberation of both the Prokofiev and Marty Paich recordings with confidence and gusto. Vocals were also very clear and communicative.

Via the Wadia WT3200 transport:

This proved to be a deceptive combination. Deceptive in that its abundance of detail and excitement are initially impressive even though, in time, a grainy, gravelly quality rears its head. Nevertheless its sense of imagery was good, grouping the instruments from our Prokofiev CD in a realistic fashion even if the timbre of each instrument was still mildly hazy.

Via the Meridian 200 transport:

Grey, grainy, boring and undynamic ventured the listeners, while comparing it with Meridian's equally uninspiring 606. So while this duo had less vices than the 200/606 it was simply more anonymous, lacking any euphonic quality.

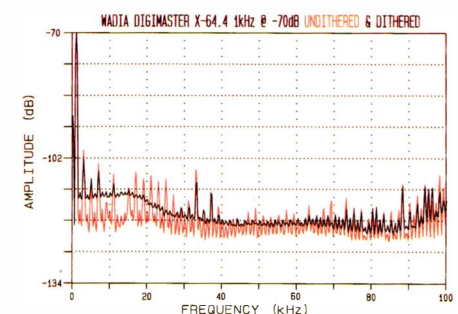
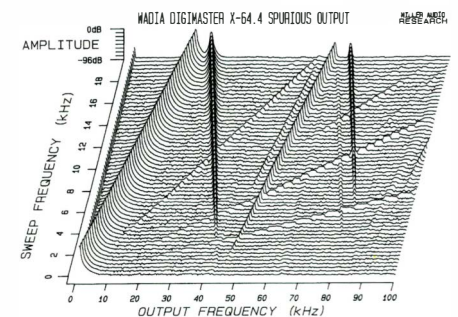
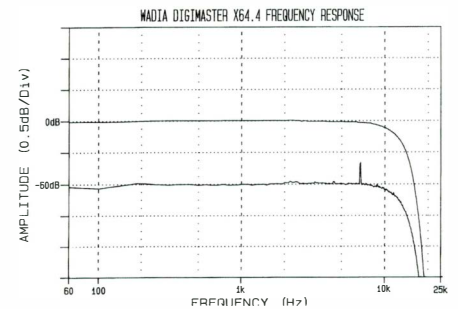
Conclusion

The Meridian/Wadia combination prompted a similarly dismissive reaction in our CD transport survey (issue 96) though perhaps the WT3200/X-64.4 should have stormed through very much more convincingly. But then the more complex a piece of equipment, the more chance there is that something can go

adrift or just plain wrong, a possibility I've elaborated upon on page 115. For now, however, our listeners considered that if this X-64.4 was representative of the breed then extinction was on the cards.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.01dB	0.02dB	0.02dB
Channel Separation	126.3dB	123.0dB	124.1dB
THD vs Level, 0dB	-100.7dB	-95.3dB	-76.7dB
-30dB	-81.7dB	-75.2dB	-59.7dB
-60dB	-46.7dB	-44.6dB	-29.9dB
-80dB	-20.7dB	-23.5dB	-11.8dB
Dithered, -90dB	-9.60dB	-17.4dB	-5.25dB
Dithered, -100dB		-15.3dB	
Dithered, -110dB		+6.75dB	
Resolution @ -60dB		+0.12dB	+0.16dB
-80dB		+1.21dB	+1.63dB
-90dB		-0.32dB	+3.84dB
-95dB		-0.32dB	+12.4dB
-100dB		+0.65dB	
Peak Output Level, L		2.521V	
R		2.516V	
Relative Output Level		+2.0dB	
Output Impedance		4ohm	
Radio Frequency Spurious	36.1MHz/706kHz	@ 16mV	
1Hz Noise Modulation		+8.7dB	
CCIR IMD, 0dB		-93.5dB	
Suppression of stop-band IMD		7.46dB	
De-emphasis Accuracy, 1kHz		0.00dB	
5kHz		-0.03dB	
16kHz		-1.06dB	
S/N Ratio (A-wtd), w emp, 0LSB			111.1dB
w/o emp, 0LSB			108.3dB
w/o emp, 1LSB			108.1dB
Typical Retail Price			£5,000



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The dream was short-lived. A few days later he called me in desperate straits. His amplifier had overheated so much that it's feet had melted. When he tried to pick it up it was so hot he had dropped it onto the CD player, damaging that too!

I went round there immediately - it was still so hot that I had to use his boxing gloves to move it. Back at the shop I phoned Arcam. "How awful", they said, "you'll have a new Delta 70.2 tomorrow."

"You may be interested to know that our customer is a boxer," I teased.

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

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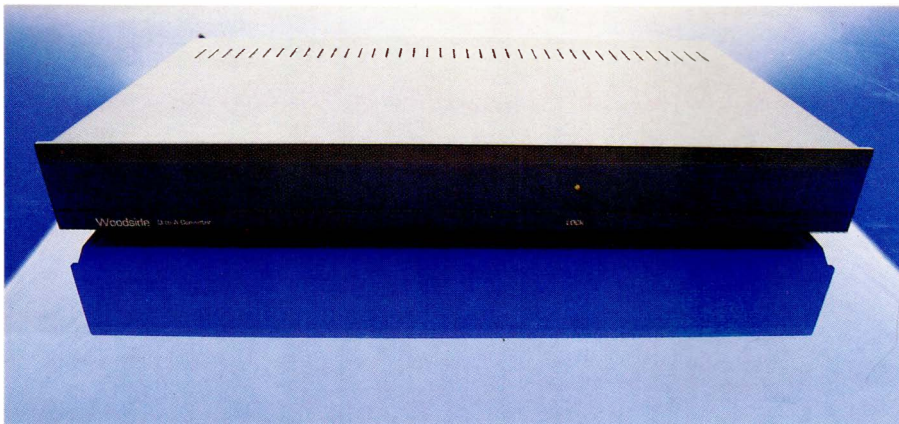
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Take a Woodside CD player and transfer everything that lies beyond the decoder into a featureless box, add a Yamaha interface chip and, broadly speaking, you've got yourself a DAC2. So, bearing in mind the very mixed reaction inspired by Woodside's CD player (issue 95), the cards were firmly stacked against its matching outboard DAC. But nothing is a foregone conclusion and the DAC2 proceeded to wow our listeners with a very commanding and consistent performance.

Externally the DAC2 is about as boring as a matt black box with a yellow LED can be, even the rear is barren with the exception of a 75ohm BNC input. Inside things are a little more interesting, for here you'll find the popular Yamaha YM3623B interface chip pre-clocking input data for Philips' SAA7220P/B oversampling filter and TDA1541A DAC.

After this we find a decent Analogue Devices op-amp (for current to voltage conversion) followed by passive filtering using close-tolerance polystyrenes and Holcoresistors. There's no extra gain here so the final output level is half that of other CD players/DACs - beware of A/B demos.

Lab report

Philips' evergreen 16-bit chip set provides a very familiar set of figures from the mild ripple on the frequency response to the characteristic stop-band images (V patterns) undulating across the 3D plot. Distortion starts getting a little messy at lower levels (typically 0.5 per cent at -60dB) and lacks the full dynamic range achieved by the DAC7 bitstreamers.

RF noise is far too high while its linearity is skewed at -90dB. Furthermore, a significant 1Hz noise modulation succeeded in tripping-out Woodside's DC-sensing relay. The lowest frequency not to mute the DAC2 is 5Hz, yielding a noise mod figure of +7.4dB.

Sound quality

Via the Meridian 200 transport:

A crisp and lively sound with an excellent sense of resolution and focus greeted our listeners. It even seemed able to resolve the delicate hi-hat from Mary Black's *Columbus* in a way unmatched by either the Stax or 606. Tonally this combination was more neutral than the 200/Stax with a better sense of texture and layering within the soundstage.

The richness of bass from Marty Paich's CD was certainly very engaging even though it did not descend to the very lowest levels. On the other hand, switching over to the Prokofiev disc unleashed a sound that swelled impressively, capitalising on its sense of scale and dynamics. Via the Teac P-10 transport

Here the DAC2 seemed very clear and revealing but also lacked weight and body. The panel commented favourably on the intelligibility of its music even if dynamics were sadly muted. Christy's voice was husky but not bloated, while the shimmer of the cymbals was slightly curtailed, lacking the extension of the very best.

Via the Wadia WT3200 transport:

Cool and crisp, they thought, with a refined but confident demeanour that kept everything tightly focussed. Once again, Christy's vocals sounded very clear though not especially forward, just as the bass had plenty of drive without sounding cumbersome. On some occasions it almost seemed too quick and lucid, however, penetrating the Prokofiev Symphony too fiercely and even leaving 'a slight hole' through the middle.

Conclusion

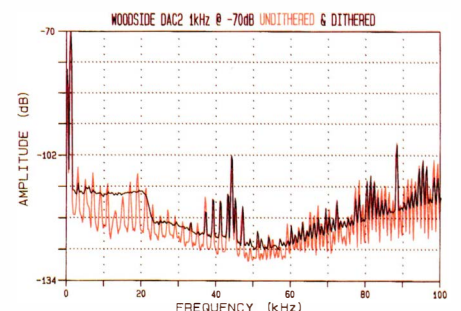
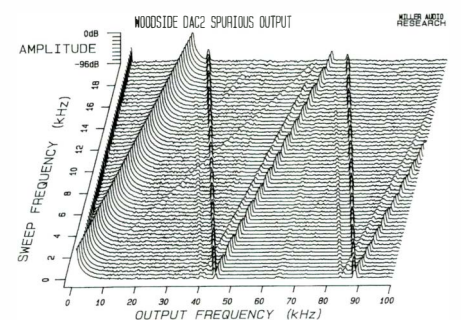
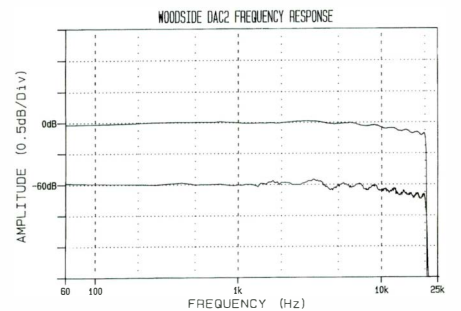
Neither new, innovative nor offering any technical advantage over the Woodside CD Player, the outboard DAC2 nonetheless steals something of a subjective lead over its rivals. Furthermore, its accurate 75ohm input impedance trend and insen-

sitivity to RF noise means the DAC2 should be successful with most CD transports, and it's this fuss-free compatibility that wins Woodside a hearty Recommendation.



TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.09dB	0.09dB	0.10dB
Channel Separation	97.7dB	97.7dB	83.4dB
THD vs Level, 0dB	-105.0dB	-102.6dB	-81.6dB
-30dB	-74.6dB	-68.6dB	-62.9dB
-60dB	-44.7dB	-45.5dB	-36.1dB
-80dB	-20.2dB	-24.8dB	-20.9dB
-9.40dB	-9.40dB	-14.9dB	-20.4dB
Dithered, -90dB			-13.7dB
Dithered, -100dB			+1.05dB
Dithered, -110dB			+0.01dB
Resolution @ -60dB	+0.01dB	+0.11dB	
-80dB	-0.55dB	-0.17dB	
-90dB	-5.43dB	-0.23dB	
-95dB	-2.30dB	+5.09dB	
-100dB		-2.35dB	
Peak Output Level, L		1.001V	
R		1.011V	
Relative Output Level		-5.96dB	
Output Impedance		612ohm	
Radio Frequency Spurious		90.4MHz @ 92mV	
1Hz Noise Modulation			+7.4dB
CCIR IMD, 0dB			-96.1dB
Suppression of stop-band IMD			41.6dB
De-emphasis Accuracy, 1kHz			-0.01dB
5kHz			-0.02dB
16kHz			+0.03dB
S/N Ratio (A-wtd), w emp, 0LSB			102.3dB
w/o emp, 0LSB			100.6dB
w/o emp, 1LSB			101.8dB
Typical Retail Price			£510



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Great Hi-Fi Stories... No. 4

Neighbourly love.....

I recently sold a complete Sony ES system and some speakers to a customer. A couple of days later he rang to say that a tweeter had blown. We dutifully went out and replaced it.

A few days later the same thing happened.

"You're sure you're not using too much volume?" I asked. He was sure. This time we replaced the tweeter but also checked the amp and the cables.

Not more than three days later, true to form, he rang again - same problem and no, he hadn't thrashed them. I was getting annoyed - this was beyond a joke (not that it had ever been). Either the cross-over was the problem, or he was secretly trading in tweeters.

I went over to his house, deciding that this was the last time. He greeted me at the door, looking decidedly sheepish.

"Listen, sorry mate, there won't be any more problems, honest...." and handed me a letter.

It was a final warning from the council to keep the noise down.....

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Conclusions, Best Buys & Recommendations

Paul Miller sorts out the winners from the also rans in this month's outboard digital to analogue convertor survey.

Much to our surprise, Wadia's *X-64.4* proved to be something of a disappointment. After all, we had used this as a 'reference' DAC in our transport survey. Yet this exciting performer seemed to have lost its shine, appearing both hazy and rather fatiguing with its own *WT3200* transport in tow. Subsequently the lab tests revealed an inductive LF impedance trend plus gross errors in the DAC's low-level linearity (left channel only) - both indicative of serious faults that were later confirmed by the distributor. Heaven knows how many people had evaluated this demo *X-64.4*. A fresh *X-64.4* returned the celebrated Wadia 'sound' which thundered from the speakers with renewed energy, enthusiasm and not a little style. This is a personal observation because the lab work was conducted after our 'blind' listening sessions. Nevertheless, the scale and atmosphere of its music was close to electric: powerful, dynamic and expressive if perhaps a trifle too ebullient for the most sedate and reserved of recordings.

Wadia's *X-32* is rather less advanced in its construction than the modular *X-64.4*. They may adopt similar processing techniques but the two machines are poles apart in execution. Nevertheless the Wadia trademarks of clarity and crispness were obvious enough on audition, even if the music as a whole lacked richness, warmth and body.

At this elevated price the *X-32* was thoroughly trounced by Deltec's latest *PDM2*, the costliest Bit Stream unit in our test. This is a remarkably advanced implementation of DAC7 technology, so much so that it even caused Philips' engineers to reassess the technical prowess of their own *SAA7350/TDA1547* chipset. The *PDM2* sounds utterly clear and effortless, a thoroughly coherent and believable performance that had our listeners entranced. This is certainly the most impressive but also the most realistic and captivating front-end I've ever encountered, digital or analogue! (steady - *Ed*) Just don't forget to include a couple of Deltec RF mains filters in the package...

There were another pair DAC7 convertors in our group, the Meridian *203* and *606*. For one reason or another the *606* was the least successful of the two, so genteel and civilised in its presentation that it often knocked the immediacy and grit from a performance. Never offensive, simply too cautious.

By contrast the cheaper *203* was less fussy about the choice of transport while offering a sound that combined the warmth and affability of the *606* with a bubbly, vibrant character all its own. If nothing else the *203* demonstrates that a mellow sound need not be uninteresting, a result that further undermines the

606 while securing a hearty recommendation for itself. Owners of earlier *203*s should certainly take advantage of the upgrade facility being offered at all Meridian dealers.

At this point I should squeeze in Stax' elegant 20-bit convertor, the *DAC-Talent*. Funnily enough its very natural and sober quality was likened to the *606*, though when united with the *200* its extra airiness, clarity and commanding presence swept the *606* from our minds. Its music was marginally less gripping with either the *WT3200* or *P-10*, but while it's at its best with the cheapest transport, who's complaining? A very near-miss for Stax on this occasion.

Micromega's latest *Duo BS* convertor might make use of an earlier Bit Stream technology but the design of its digital input makes it a good match with Meridian's own *200* transport. This was reflected in our listening tests where it scored with its lively and immediate sound, confident in its projection and sense of 'speed'. Yet there is a brighter and rougher side to the *Duo* that rears its head with other transports, a result that was mimicked by Deltec's *Little Bit* convertor. Once again, here's a budget DAC that gives off its best with the Meridian *200* but whose power and bass extension is diluted by an unpredictable interaction with other transports.

Rather more consistent and impressive was the *DAC2* from Woodside, something of a surprise winner bearing in mind its 'equivalent' 16-bit CD player bit the dust in a recent test (issue 95). Nevertheless the *DAC2* won the affection of our panel with its crisp and articulate sound, lucid and nimble while also avoiding the grainy, gritty colorations so often ascribed to conventional multibit convertors.

This brings us to the *Digital Decoding Engine*, the cheapest yet possibly most dependable DAC in our survey. It has an easy-going but deliciously rich and believable quality that manages to shine through regardless of slight changes in balance triggered by a change in CD transport. It is this sweet and unfatiguing temperament that most attracted our listeners, for while the *DDE* fails to tease out the very subtlest of details it still sounds convincingly lush and vibrant.

This in itself earns Audio Alchemy our solitary Best Buy. But add to this its inherent versatility, range of features and upgrade options (a DAC7 add-on will soon be available which uses the *DDE's* I²S output) and you've an unbeatable package. So here is a DAC that's almost guaranteed to bolster the quality of your existing CD player while harbouring enough in reserve to partner Wadia's £1,800 CD transport and knock all £2,000+ CD players for six! Yep, a genuine gold-plated Best Buy.

Broadly speaking, the lab tests follow in the wake of those I've already outlined for CD players (issues 95 and 100) with extra measurements detailing the digital input impedance and both dithered and undithered distortion spectra for the -70dB tone. Such are the benefits of colour pages! Once again, 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 DAC.

Tech Talk

One man and his DAC. Paul Miller goes through the lab test procedures and explains the significance of the various results.

Like a conventional CD player these DACs are supposed to adhere to a nominal 2V output, though many manufacturers will hike this up to 2.2V or more to give them a dB's edge in A/B listening tests. For our auditioning the final voltage level reaching the speakers was adjusted for each and every DAC, ensuring that the sound level was consistent from product to product. So though our listeners still felt some DACs were 'louder' or 'quieter' than the norm, these were genuine observations relating to balance and presentation rather than absolute level. Remember, the loudest DAC is not necessarily the best DAC.

A certain ratio

Then there's the signal-to-noise ratio which is determined with and without de-emphasis as a ratio of this maximum output (all DAC current sources on = 0dB) against full digital zero (all DAC current sources off). However as some new bitstream convertors have the unfortunate habit of temporarily switching off when faced with a stream of digital zeros (leading to an artificially high S/N ratio) another S/N ratio measurement is taken with the zero signal offset by 1LSB. This fools the DAC into keeping the noise-shapers ticking over and so gives a poorer but more realistic result. Be suspicious of any CD player or DAC that shows a large discrepancy between the 0LSB and offset measurements!

In common with the CD player tests I've provided running totals of distortion vs frequency from 0dB (peak level) to -90dB. The CD format uses a uniform

quantisation scheme so the lowest distortion is achieved with the highest (loudest) signal level where more, or all, of the 65536 quantisation values are engaged. At lower levels there are progressively fewer quantisation values, or steps, available to describe the amplitude of each sample so an error begins to build up which, in turn, increases distortion. You'll also notice that distortion mounts up faster at 20kHz, particularly with bitstream convertors where their ultrasonic noise climbs away from the audioband.

This effect can be seen on the plots of 1kHz @ -70dB which also allow you to compare any improvement in performance with a dithered (black trace) rather than undithered (red trace) 1kHz tone. Dither is usually introduced as a Gaussian or Triangular noise which has the effect of re-randomising the fixed and predictable quantisation errors that accompany low-level signals. So, not only do ADCs (Analogue to Digital Convertors) require dither when recording but so do many quantisers used by oversampling filters and noise-shapers in both multibit and bitstream DACs!

Take a look at the plot for Deltec's PDM2. Here the red trace shows a characteristic sequence of odd-harmonics that are all due to quantisation errors in the digital coding of the -70dB signal. Yet when dither is introduced (black trace) the fixed error is 'smeared' and so appears as a slight increase in noise rather than harmonics. 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 DACs, by any means, prove to be entirely successful in this regard.

Just one of those phase

Both low-level distortion and linearity are also influenced by the facility of 'Phase Inversion'. This option is executed in the digital domain, usually before the oversampling filter and DAC proper, where the sign of each bit in the 16-bit word is reversed: ie 1000101110010111 becomes 0111010001101000. You can see from this that alternate 'bits' would be switched on or off once the data reaches the DAC, so it would be uncanny if the linearity and distortion were identical on each occasion. The linearity of Stax's *DAC-Talent* drifts by 0.2-0.4dB in phase-invert mode, for instance, while the nature of THD changes from second and fourth to third and fifth with Audio Alchemy's *DDE*. The point is, don't be surprised if you do hear a difference once 'Phase Invert' is engaged!

This brings us to a commonly overlooked yet potentially crucial specification: the impedance trend of the coaxial digital input. This is something we touched upon in our CD transport survey (issue 96) as we wrestled with the relative compatibility of digital outputs and digital inputs. We've already mentioned that the serial datastream passing from

transport to DAC must adhere to the S/PDIF standard, appearing as blocks of 384 32-bit words.

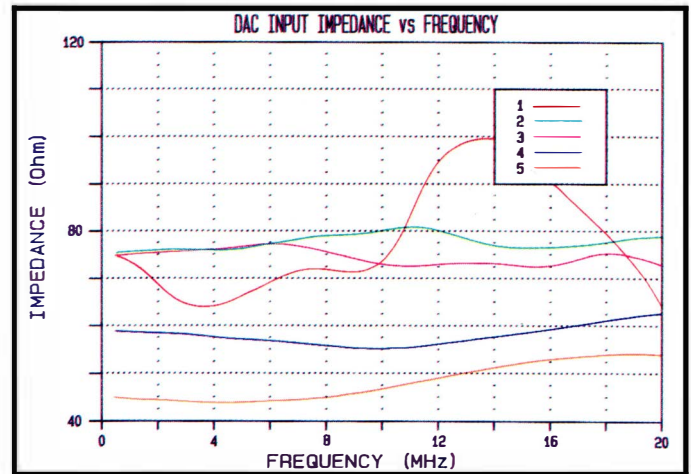
This data is transmitted at 2.8224Mbits/sec, a very high frequency which is firmly in the RF (Radio Frequency) spectrum. So, like any RF signal, for this data to be transmitted most efficiently the characteristic impedance of both transmitter (digital output), receiver (digital input) and connecting cable must be matched. In this instance the impedance is 75ohm, so you'll find that most decent well-shielded 75ohm coaxial FM downloads make great digital interconnects!

However, cast an eye over the two multi-colour impedance plots and it's easy to see that only a few DACs offer anything like a 75ohm input impedance over their working 500kHz-20MHz range. The Meridian 203 (orange, graph 1), 606 (orange, graph 2) and Micromega Duo BSII (blue, graph 1) all fall short of 75ohm when faced with a standard 500mV digital signal. Assuming the digital output has an impedance of 75ohm then only 60-80 per cent of the original signal level is received while the remainder is reflected, setting up standing waves within the cable. It's important to appreciate that while no data is 'lost' by this mismatch, the knock-on effects of RF noise, reflected signals and decreased edge definition may well contribute to digital jitter within the convertor itself.

Perfect timing

Only after it's run the gauntlet of a mis-matched line does the data reach the ADIC (Audio Digital Input Circuit) housed within the convertor. The ADIC recovers the clock signal buried within this serial datastream before demodulating the signal to reveal the three parallel lines of data, clock and word select (L or R). This is necessary to return to the inter-chip standard called I²S, but it's just another process than can contribute to jitter.

Back to the digital inputs. In Meridian's case these are active inputs, designed to accelerate the risetime



Graph 1

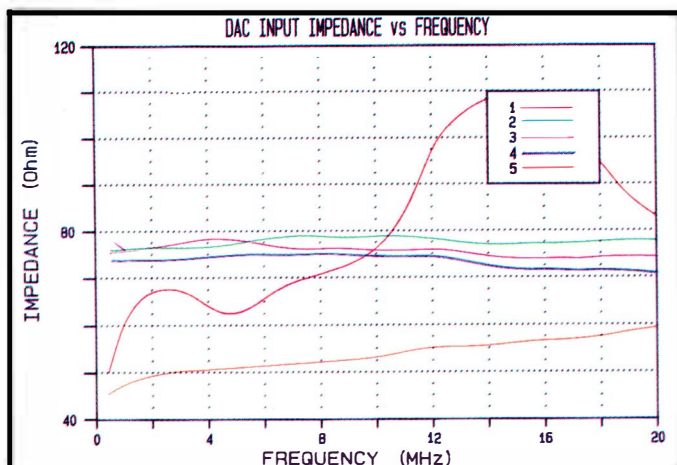
of the digital 'edges' to give a sharper transition point. Funnily enough, this dodge works especially well with its own 200 and 602 CD transports... Yet teamed-up with a transport like the Wadia (whose line-driver output has a naturally fast risetime) this technique also stimulates overshoot and ringing. Wadia's own DACs also use an active input, but these have an impedance trend that initially declines from 75ohm to about 64ohm.

This has a 'braking' effect on the initial edge of the digital transition which slows the risetime of signals emerging from conventional (ie transformer-coupled) CD transports. By contrast, Wadia's own transports are perfectly suited to the task even if, in this instance, the 1-4MHz impedance trend of the X-64.4 (red, graph 2) suggests a fault condition. Compare this curve with that published in our CD transport survey (issue 96) and it's easy to see that both the X-32 and X-64.4 should share the same impedance characteristics. The impedance of the 'correct X-32' curve (red, graph 1) begins to climb above 5MHz, prompting a series of characteristic resonances that are stamped over the digital output of all connected CD transports. Eitherway, only the Wadia WT3200 and WT2000 give a suitably fast and sharp transition point when used with Wadia DACs.

Following the standards

Audio Alchemy (pink, graph 1), Deltec (green, graphs 1 & 2), Stax (blue, graph 2) and Woodside (pink, graph 2) all employ passive inputs that broadly conform to the 75ohm standard. These are the DACs that should give the most consistent and reliable performance with an arbitrary choice of digital output. But then if two digital outputs both have the same characteristic impedance (75ohm), the same voltage level (500mV) and the same risetime they may still react differently with these 'reliable' DACs depending on the amount of jitter caught in between. Even when dealing with 1s and 0s, nothing but nothing can be taken for granted.

Graph 2



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Readers Write

CHOICE ANSWERS

More sparkle and space please

I am currently using a Linn LP12/ Ekos and Philips CD624 with Linn LK1/LK2 amplification and KEF 104 speakers. The LP12 and the CD624 are fine and like the sound of the KEFs but I'm not so happy with the amps. The preamp is great in terms of its ease of use and multiplicity of inputs (and I love the remote) but the power amp doesn't give the kind of sparkle and space that I'd like.

I'm thinking of changing over to a pair of Musical Fidelity MA50s but before I do that do you think they might be what I'm looking for and will they work well with the LK1? Or is there a better way of achieving my goal for the same outlay, or less?
P A Loe, Warwick, Warwickshire.

Not being totally au fait with the

compatibility of Linn preamps and alternative power amps I put your suggestion to Caroline at Bradys, Covent Garden. She said that there would no problem with compatibility but that the P180 (£899) would be much more likely to give you what you are looking for sonically.

Alternatively you could change amps completely. I've found that the notorious Pioneer A-400 works exceptionally well in the company of more expensive components such as yours, you can even use the LK1 and retain remote control.

The A-400's middle name is sparkle and space so this might prove to be a very effective option, and an inexpensive one to boot.



Musical Fidelity's P180 - a good partner for a Linn LK1.

Re-blasting the past



My present system consists of a Rotel RP830/Ortofon MC10 Super record player, Sharp RT-200 cassette deck, Philips CD471 Compact Disc player, Pioneer A-5 amplifier and Kef Cantor III loudspeakers.

I have recently acquired a secondhand Quad 22 control unit and II power amplifier and I intend to replace the components in the power amplifier with modern equivalents. What I would like to know is whether it's worthwhile replacing the same in the control unit or to replace the preamp with the Croft Micro II Special.

I'm also going to upgrade the turntable to a Michell Synchro with a Rega RB300 arm. I'll probably stay with the cartridge I have. I will, of course, be acquiring a second pair of Quad II amplifiers and bridging them to boost output to 30W per channel.

It is probably not worth going to town on the 22, preamplifiers have improved quite considerably since it was designed. You would probably be better off with either one of the Crofts or the combination of a good phono stage such as the Moth with a passive preamp (as long as your interconnects aren't too long). As for doubling up your IIs, if the Cantors are reasonably efficient you may find that one pair is adequate, though of course two would give you a bit more welly.

On the subject of turntables it might be worth checking out the new Michell Mycro before you part with the readies. This is a sort of Gyro'd Synchro, or a Synchro with an inverted bearing and the same composite platter as the Gyrodec.

**Roksan
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The Rega supporters club

I recently bought a Rega Planar 3 turntable with a Rega Bias cartridge and I'm listening to it with an Arcam Alpha II amp and Heybrook Point 5s2 speakers, the latter bi-wired with Linn K20 and supported with JPW stands.

After listening to the system for a few months I have found the sound a trifle unruly. Would a change of cable cure this?

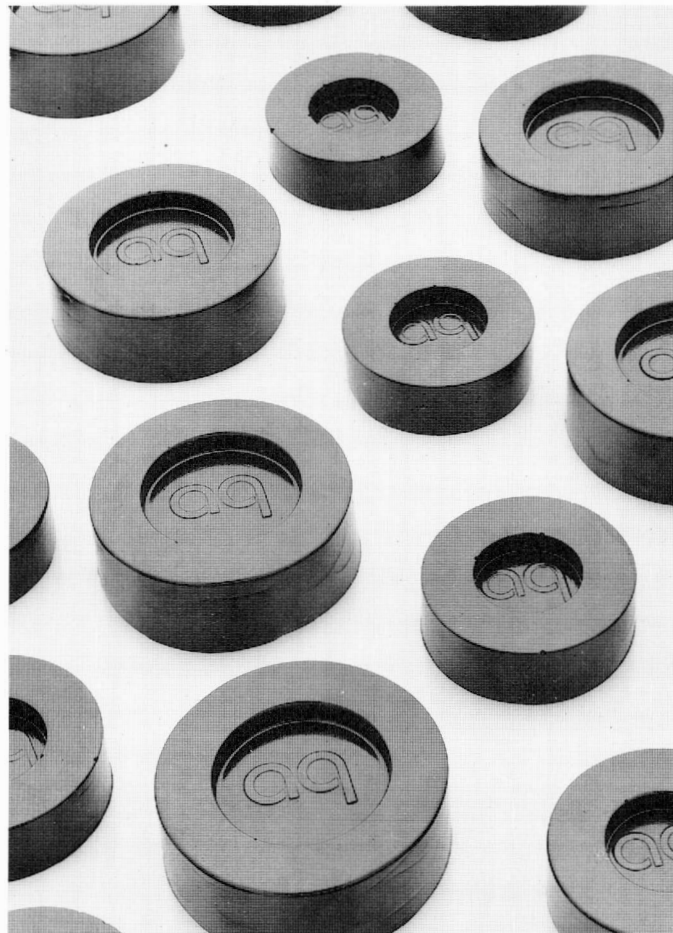
I would like to buy a better cartridge for the Rega, would an Elys be a good alternative?

I like a detailed, involving, clear sound and tend to play records at low to medium volumes.

P J Sims, Portsmouth, Hants.

What have you got your Rega on? If its not on a proprietary hi-fi support then this is an area to concentrate your budget on. The Rega has limited vibration rejection capabilities and it appreciates good quality support. A Mana would be the best option, but if that's too expensive a Sound Organisation or Alphason would be a good alternative. Sorbothane feet are another option.

A change of cartridge to an Elys would give you a more involving sound and improved detail resolution which should also help.



Sorbothane feet can give worth while improvements, particularly with vibration sensitive decks such as the Planar 3.

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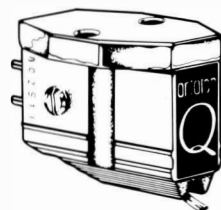
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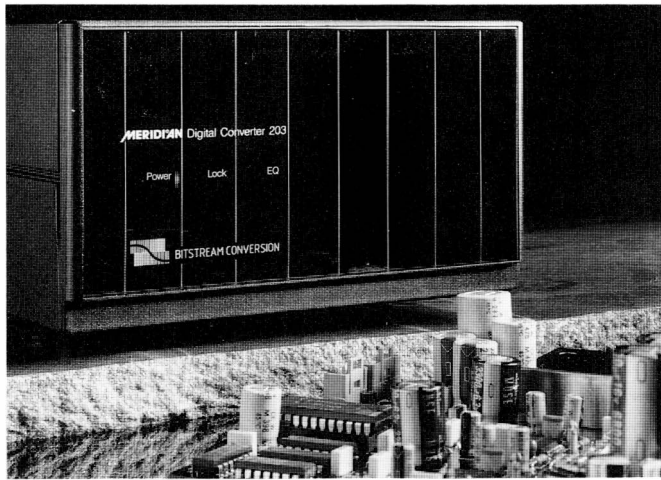
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A question of setting priorities

As a classics man, I'm reasonably happy with my current system: Philips 850-II CD, Quad FM4/44/306 tuner and amplifier Spondor SPI speakers and Sennheiser HD 540 headphones - through which I do quite a lot of my listening at present to avoid waking the next generation! The interlinks and speaker cables are all good quality - and beyond that don't interest me! I seldom play vinyl or cassette tapes these days. I do quite often play video-tapes or mono TV sound through the system though, using a good quality pre-Nicam hi-fi stereo VCR that's about five years old.

Given that I have about £500 to spare (a premise which my wife might dispute!) I wonder what would be the most effective way to spend it? Should I get a standalone D/A convertor, and if so which? What about a Nicam tuner - again, which one - or would it be a better investment to



Meridian's DAC7 203 is a worthwhile CD player upgrade.

save a bit more and get a decent new Nicam VCR? Should I try to save rather a lot more and replace the Quad - which I do like rather a lot for its solid quality - or the speakers? Or should I simply

splurge a bit on my disc collection?

Dr Eric Webb, Milton Keynes.

Which area you upgrade hinges on which area you feel is most

wanting, and by the sound of it you seem to be reasonably happy with the system as a whole. A good DAC would undoubtedly improve the sound of your CDs however, we'd recommend the latest DAC 7 Meridian 203 (£560), or the Audio Alchemy Digital Decoding Engine (£380).

And a Nicam tuner such as the Arcam or Cullam would be a boon to your off air viewing as well as giving far better sound than most Nicam TVs and VCRs. However, bear in mind that if you receive ITV Central and BBC South East then your signals come from the Oxford transmitter and you won't be able to receive BBC broadcasts in Nicam. Alternatively you could get a Dolby Surround Sound decoder and another pair of loudspeakers (or a subwoofer) and go for the full cinematic effect.

It looks as though you've got some prioritising to do.

Whatever happened to phono?

There is a trend within the budget hi-fi industry which I find worrying and which is inhibiting my purchase of a budget system.

Whilst the turntable companies fight off CD by improving sound quality to a point that is fantastic value for money, the amplifier manufacturers have abandoned them completely. The reviews of the new Arcam Alpha 3, Pioneer A-400 and

Sony amps have all recently concluded that 'this amp is not for vinyl nuts', backing up this point.

Given a budget of £700 to buy a 'proper hi-fi' for my collection of Rock, Pop and Folk LPs what should I be listening to?

I am considering the Rega Planar 3, Linn Basik and Revolver turntables with the B&W 620 speakers after their

excellent recent review in *Hi-Fi Choice*.

Anthony Payne, Cardiff, Wales.

I understand your concern but given the situation with software it is hardly surprising that in a very competitive sector of the market manufacturers have to target the majority of prospective purchasers. That said, however, if you read the Editor's review of the Arcam Alpha 3 (Sessions) you'll see that he found that it worked very effectively with his turntable.

We haven't reviewed the new Sonys yet but the Pioneer does work quite well with some cartridges. It is, however, a bit optimistic to hope that any amp at this price is going to provide first class phono amplification when this a job that even some £1,000+ preamplifiers have difficulty doing.

Given your budget we'd recommend you listen to the Alpha 3, A-400 and Marantz PM40SE and that you add the Systemdek IIX/900 to your list of turntables.

Womens' intuition

Thank-you for an informative issue on choosing loudspeakers (issue 98, September). In *Tech Talk* you give thanks to your listening panel which, I notice, consists entirely of men.

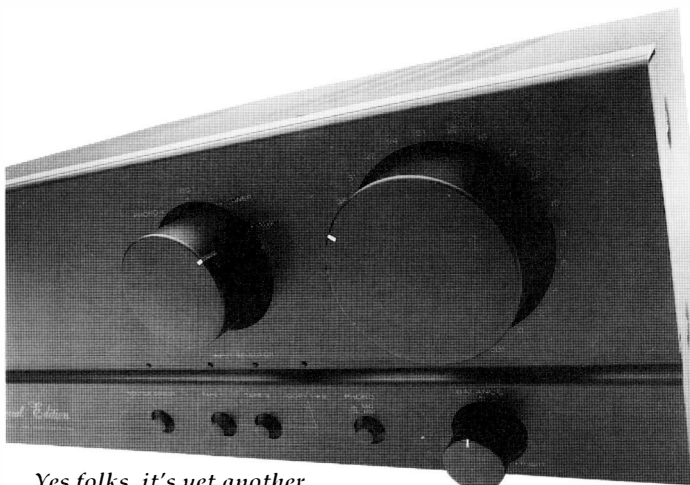
My experience of selling hi-fi reveals that, contrary to popular opinion, there are women who are as critical about sound quality as any male audiophile.

Why was the decision taken to use an all-male panel and do you think it matters?

Judith Thomas, New Malden, Surrey.

Too right! As the only ms-hap in this otherwise man-made team, I can put your mind at rest. We do not have an all male policy; it's just that we rarely get female volunteers.

I have been frequently asked to join the listeners, but to date I've been too busy at the production desk to actually get there. However, I do plan to in future, as we believe that more women panellists would give a more balanced perspective. Janet Moorhouse, Production Editor.



Yes folks, it's yet another unashamed plug for a budget super amplifier!

Lift Homesystems.



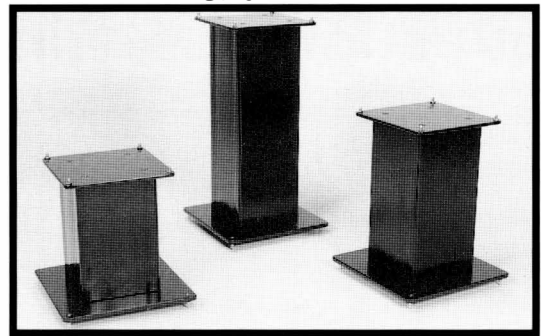
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21st Century Fox

Why do national newspapers feel under no obligation to check technical facts?

Years ago the *Evening Standard* ran a video column written by someone from the management floor who repeatedly demonstrated that he knew less about video than most readers. Then, more recently, we had that daft article by John Peel about CD.

Now we have a full page moan by Stephen Games (who he?) about BBC Radio 4. A news bulletin about Russia had elbowed *Down Your Way* off the long wave. The bone of Mr Games's contention is that Long Wave has a 'muffled, womb-like acoustic' rather than the 'icy clarity of FM'. He doesn't actually use the word 'mellow' but I suspect that is only because he didn't think of it.

Hey — can't find that on the radio? Barry Fox tuned in, turned on and found it got his hackles rising this month. Radio Talk . . .

All this is opinion and Games is entitled to it. But not when he backs it up with factual errors. FM, he says with a question mark, is 'surely a Japanese invention'. Stereo, he brands an 'unhealthy German obsession'.

Rubbish. FM was invented in the mid Thirties by Edwin Armstrong, an American. He ended up committing suicide in 1954 because he grew sick and tired of fighting the major electronics companies in the USA, especially RCA, for patent royalties.

The stereo system used on FM also came from the USA. Following on from work done by Armstrong, Murray Crosby developed a method of multiplexing a compatible signal in 1953. This became known as the Zenith-General Electric system and in 1961 the Federal Communications Commission made it the national standard.

The BBC started testing the Zenith-GE system out of Wrotham in 1962. Radio 3 started using it in 1966.

These are not difficult facts to discover, Mr Games. All you have to do is open a few books or make a phone call to the BBC.

Wave on

The real advantage of long wave is, as Games also notes, that the signal travels a long, long way. Its low frequency, long waves hug the Earth's curvature right across the UK and into Europe. In the UK there are places where LW reception is far more reliable. But in the future this is what Digital Audio Broadcasting will offer.

The key advantage of DAB is that the digitally coded signal, similar in quality to DCC, can be broadcast on the same frequency by any number of transmitters.

The receiver just locks onto one and ignores the others. It rejects multipath reflections, too, treating them as digital errors. So a DAB broadcast can come from satellites and terrestrial relays, all on the same

frequencies. In this way DAB coverage can be local, national or international. We shall be able to drive across Europe listening either to the BBC or Continental stations.

The BBC staged a remarkable demonstration of DAB in Birmingham recently. What a pity Mr Games doesn't seem to have got there.

Damn that radio song

The BBC doubts that Europe will be able to agree on satellite frequencies for DAB until the end of the decade. So the BBC wants to broadcast DAB in Britain, on VHF. Unfortunately the frequency slice needed for national DAB coverage has already been eaten into by the frequencies allocated for national commercial FM stereo stations.

Three consortia put in bids to run INR1, Britain's first national commercial radio station. This is the station on which the Home Office and Radio Authority decreed there shall be no rock or pop music. So the applicants will have to survive on a diet of classical and light music.

The winning bidder for INR1 has already dropped out. The backers could not raise the money promised. Now the second highest bidder has been given a chance. In the recession it seems very doubtful that any non-pop national station can survive.

Look at Jazz FM in London. JFM had a wonderful chance and blew it. The chance was to serve a hard core of dedicated jazz buffs with a tightly budgeted station. The buffs would have made a loyal audience and for the most part had the disposable income which advertisers are always looking for.

Instead, Jazz FM frittered money away on unnecessary high tech computer equipment, of the type used in modern pop stations.

Whereas US jazz stations employ people who love jazz and are willing to work for reasonable rates, Jazz FM paid higher rates for professional 'personalities' who clearly knew nothing about the music they are playing.

With the notable exception of some musicians who double as presenters (Campbell Burnap, Digby Fairweather and founder Dave Lee) and music buffs (like Benny Green and Malcolm Laycock) these pro presenters made listeners wince by mispronouncing names (like Mile Davis, Lee Ritenhour and Bix Beiderbecker). In crass ignorance of the music they made banal comments ("well that's a good old good one") when silence would be golden. In the evenings they just imitated Capital or Radio One.

Now Jazz FM looks likely to give up on jazz and employ yet more DJs with a Radio One or Capital track record. If so the station may well lose its franchise. I for one will complain to the Radio Authority about breach of contract. And I won't be the only one.

Likewise if INR1 ever goes on air and employs professional presenters who know nothing about the music they play and introduce records by Beethoven, Berlioz, DeVorjack and Brahms, that too will go down the pan.

The poor prospects for INR1 create a golden opportunity for the government to step in, freeze the franchise and re-allocate the frequencies for DAB.

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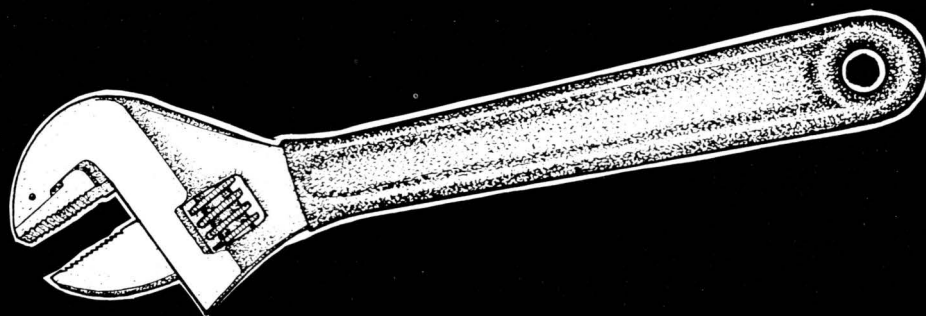
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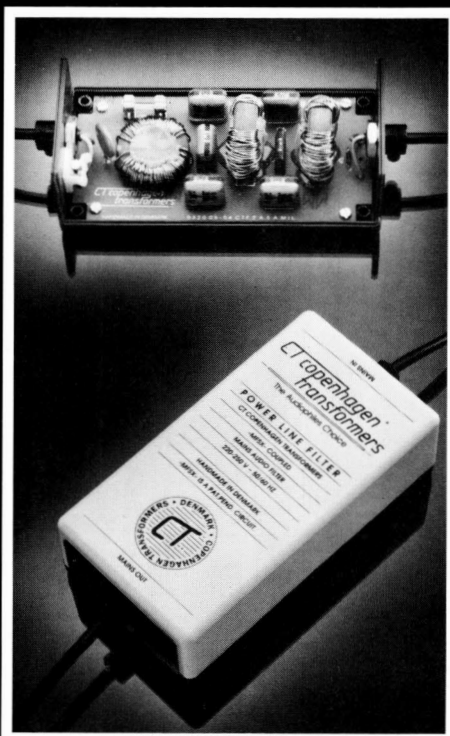
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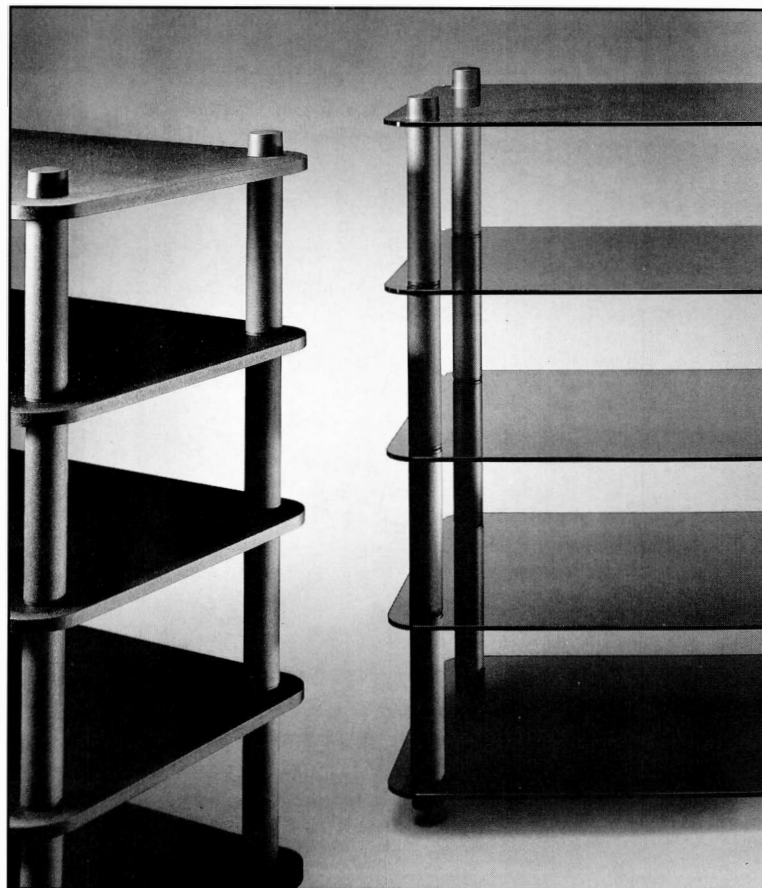
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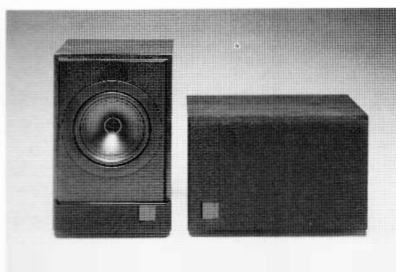
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As befits its relatively low cost, the £420 Aiwa NSX-D5 is a little more basic than usual. Take for example the graphic equaliser (please!). Most of the test group have seven band equalisers with memories to store a number of patterns; the NSX-D5 is limited to five bands and manual controls, which of course means no memories. You have to go to the other end of the price spectrum to find systems like the Denon which omit equalisers altogether! On the other hand this Aiwa is ahead of the pack in interconnectability. Sockets are provided for an outboard tape deck and one other line source item, with the extra connections to handle video as well as audio signals in both cases. However, the omission of a phono (vinyl disc) input is both surprising and disappointing.

Like its peers, there's a rudimentary surround sound system, but here it's possible to plug in a second pair of speakers to support the facility, making it only a complete writeoff rather than the usual absolute disaster!

Also included is a sound enhancing system called BBE which gives 'astounding definition and clarity' using complex bandpass filters to correct 'losses of upper harmonics and improper phase characteristics'. The effect is crude and one-dimensional, rather akin to a simple output boost in the presence region. Aiwa claims to be the world's first manufacturer to use BBE in domestic high fidelity equipment, and on present evidence it might well turn out to be the last.

Microphone mixing is possible; a headphone socket is fitted and there is even a socket to integrate an Aiwa DAT recorder (model XD-S260) into the system's control electronics, enabling rudimentary operation via the system handset. There's even an optical digital output socket, allowing DAT recordings to be made from CD in the digital domain.

The Aiwa system is based on two main units which can be stacked vertically or used side by side. The components are a generous 27cm wide, and the system as a whole is significantly larger than, say, the Sanyo or Technics models. Build quality is strictly average, but like most minis the standard of finish is exemplary, helping to justify the price premium that even this budget mini commands over an otherwise comparable midi system.

Cassette deck & CD player FD-N5

In the olden days Aiwa was known primarily for cassette decks, and although times have changed, many Aiwa systems still show evidence of a continuing legacy from the past. This system too displays a little more attention to detail than usual in the design of the cassette mechanism, most immediately noticeable by the smooth and relatively quiet way transport modes are engaged and released.

Both transport mechanisms offer full auto-reverse operation, though only one is capable of recording, and the playback only transport is fixed in a 'both sides,

then stop' play mode. Search modes include track and blank skip, but noise reduction is restricted to Dolby B, record levels are set automatically and there is no tape counter — until recently a lowest common denominator cassette deck feature.

The lowest of any of the models on test, wow and flutter measured an excellent by any standards 0.04 per cent. However, it was impossible to run the replay test response because the deck made up its mind that the test tape was 'empty' and went into blank skip mode in the middle of the run.

The Compact Disc user will find a player which offers a standard mix of goodies: programming, random play, repeat including A-B mode, and a first 20 track calendar display. No surprises then, but track search is painfully slow, and the track skip keys only operate in stop or pause modes, which is tedious.

Like most systems of this type, recording from CD is aided by a variety of means which prevent tracks being recorded across tape side breaks and minimise tape wastage, and can record only a specified selection of tracks. It's even possible to feed new discs into the player to fill up tapes and still maintain the automatic editing features.

Tuner, timer & amplifier RX-N5

The radio user will be able to store no fewer than 48 preset stations, 16 each on

FM, MW and LW, with stereo/mono switching to help cope with weak and noisy signals. A time display is always shown, doubling as a power indicator, and the associated timer has every day and once only settings. A sleep timer is also available, but no specific wake-up timer, though the every day function could be used for this purpose.

Besides BBE, the depth of whose effect can be varied, the amplifier has an unswitchable bass boost circuit, unaccountably called T-Bass. This simply and unavoidably boosts the bass output over and above any correction applied by the equaliser, so any substantial lift in the 70-350Hz region on top of T-Bass will prove uncomfortable at the very least. Power output measured 28 watts per channel.

SX-N5 loudspeakers

First appearances suggest overkill, but the SX-N5 does at least include what looks like a legitimate tweeter, instead of the pocket radio lookalike which passes muster with most prepackaged systems. A small cone midrange and a bass driver complete the hardware complement.

Under the skin engineering is virtually non-existent, but the enclosure is a little larger than usual, and quite solidly constructed. The measured in-room frequency response shows some excess output in the 100—200Hz region, presumably due to the action of the T-Bass circuit. The response shape looks satisfactory in other respects.

How it performs

Any criticisms made here must be related to a price which easily undercuts the other

models under test. Taking this into account, the rather dark and undifferentiated tonal colourings, the soft, woolly bass and the under-characterised upper midband and treble are qualities that can probably be excused, even lived with. Certainly the system lacks the uncouth aggression of certain low cost alternatives, and some musical material helped it sound better than you might expect from the above — the *Allegretto* from *Shostakovich 5* (Jarvii/SNO on Chandos came over as warm and spacious.

The cassette deck, which appeared so promising, turned out to have some important weaknesses, one of which can fairly be described as fatal. Although pitch integrity was every bit as good as the numbers promised, output uniformity was anything but.

Even after cleaning the heads and guides (using cleaning sticks and industrial alcohol - not one of those useless cleaning tapes), treble output with one of the two transports varied wildly as the tape progressed. The other transport was better, but not completely blameless, and some inadequacy in the design of the tape path or tape tensioning system seems implicated.

I also had problems with the blank-skip feature referred to earlier. A number of recordings I made managed to trigger it repeatedly, for example the opening of Mozart's *Piano Concerto K595* (Vegh/Schiff etc on Decca), which isn't even all that quiet. This is a significant problem and by any standards a startling oversight.

The FM tuner section sounded coloured and synthetic, even - surprisingly - on Radio 4 speech. Music was repro-

duced with an ungracious character out of keeping with the CD player, which contrary to some of the stereotypes actually sounded more open and articulate than FM radio, and much more like real music.

Verdict

This system is significantly flawed by a cassette deck which was incapable of playing through many works without skipping quiet passages - or not so quiet passages - and also had an unstable output due to poor tape-to-head contact.

There are other problems too, but in general, and leaving the cassette deck aside, this system is a reasonably civilised one at the price.

TEST RESULTS

Cost with speakers	£420, without n/a
Options	<i>XD-S260</i> DAT recorder
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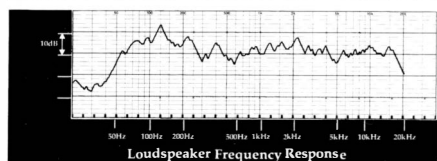
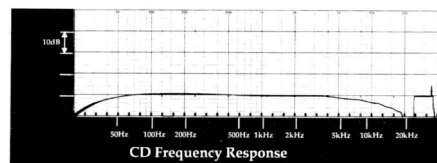
TUNER	
Sensitivity	average
Signal/noise	below average

CASSETTE DECK	
Wow & flutter (wtd)	0.04%
Signal/noise ref 0dB Type II	n/a
Distortion 0dB Type II	n/a

COMPACT DISC PLAYER	
Signal/noise (measured at amp Tape Output)	88dB

AMPLIFIER	
Power output/channel (80ohms)	28/ 28/28 watts
(20Hz, 1kHz, 20kHz both channels driven)	

LOUDSPEAKERS	
Sensitivity	average



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AUDIO NOTE

REAL AUDIO AMPLIFICATION

All the best Audio Note pre- and power amplifiers incorporate the same fundamental adherence to good engineering principles, respect for research and development and application of novel ideas and innovation that one would expect from a company that has quietly been in the forefront of audio development since the mid 1970's.

Mr H. Kondo, President of Audio Note, has an astounding record when it comes to designing products that do not age with the on-slaught of ever more technology. This may lead you to think that he is a nostalgic man, who prefers to dwell on times past, instead of living with reality, but nothing could be further from the truth, Kondo-san is probably the last living individual working with audio design, from a culture where multi-technological skills allow cross breeding, in terms of the understanding and use of a multitude of technologies. This creates a mixture of fascination with new technologies and innovation, combined with a historical perspective and respect for previous achievements that helps blend all the ingredients into the best total compromise of all available technologies, new and old alike.

The ON-GA-KU is just one example, everybody that has heard it has been touched by its unparalleled level of clarity, through the ON-GA-KU instruments and voices breathe, music flows with a grace and expression that demonstrates that there is an amplifier which is genuinely on a different level of performance. The ON-GA-KU defies all arguments about hierarchical importance just as it makes a mockery of anyone to categorise its sound.

From the lo MC-cartridges to his massive horn loaded speaker systems, Mr Kondo applies a rare insight into and appreciation for what design criteria create products that have genuine timeless qualities in them, common to them all is that they make music in a way which leaves little room for improvement.

The following are some of Mr Kondos thoughts on amplifiers:

"There are three types of valve amplifier on the market. The first is the old classical circuits, but with new components. The third group are built with contemporary circuit

design and techniques. It is well accepted in the market that all types of valve amplifier generates a sound that is rich in expansion unlike transistor amplifiers, which typically sound like something mixed with impure ingredients. Nevertheless it is questionable whether existing valve amplifiers are designed and engineered to make the best of the valves as material components.

When I take into consideration that most valve amplifier lovers are generally also classical music fans, I appreciate that they continue listening to a real classical or semi-classical amplifier, because they feel refreshed by the vast expanse of sound, or they maybe feeling a bit of warm nostalgia with the glowing filaments.

The big question is whether the amplifiers in category three should be included as valve amplifiers, since they, in much of their design, only depend on an image of valves, not much of which is in their sound.

There is a big gap in the concept between group 1 and 2, and group 3, the first two are built quite faithfully to the old style which will survive as a not-wrong technology brought up over 80 years of history. So what about the third category?

They are based on the modern mass production cult, whose sole aim is cheapness and profit, where marketing replaces research and cheap components and circuit boards rule. Printed circuit boards have a critical problem, where the copper crystals are flatly clad with only 35 micron thickness and 2mm width. Current flow through such a flimsy wire will cause a sound most un-valve like.

Triode of Pentode.

In the history of valves, one of the big themes were how sensitive a valve could be designed. The first technique was to subdivide the grid pitches, only to worsen linearity as shown in lg-lp characteristics. A pentode structure was then badly needed to obtain high efficiency with a smaller envelope size as seen in later power pentodes. This has taught us that a Triode with low efficiency, but great linearity, is quite ideal. Hence the use of old circuits with old valves even today.

Highly sensitive pentodes used in both voltage and power applications also resulted in a competition of how much NFB (negative feedback) could be applied in that glorious age of valve amplifiers. It is interesting to note that all such pentode designs have been scrapped and cannot be found today.

Valve or Transistor.

A comparison between simple elements judged the transistor superior to the valve, but another important examination on operating current of elements was not discussed. A valve operates on a high voltage but a low current, whereas a transistor is opposite in nature, and that fact poses a number of very serious questions.

Since high current flows create strong magnetic fields, heat is generated and resistance is therefore varied. Since the gain of each design is small, circuits are complicated, resulting in a need to use circuitboards, which further introduces problems. In a valve amplifier, stage gain is high, circuits can therefore be made simple, each component can be laid out with sufficient space between and hardwired with heavy gauge wire, this type of layout improves sound and reliability.

Chassis Materials.

It can be demonstrated that chassis material influences the sound a great deal. Steel chassis' make the sound cold, and aluminium produces a heavy sound. In comparison a copper chassis will make the sound deep and rich. This is due to the material's electric resistance and hysteresis characteristics. Copper is non-magnetic, and has low resistance so there is no magnetic fields generated by electric currents and therefore no effect on sound quality.

Sound Wiring.

The purity and conductivity of a wire greatly influences the signal flowing through. Audio Note 99.99% pure silver wires are distinguished by the following characteristics:

- 1 Lowest resistance of all electric materials
- 2 Best heat conductivity of all metals
- 3 It is very soft in physical flexibility

A silver molecule is rich in affinity with other metals. As there are less electrical insulative layers between molecules, the "electrical wall" is therefore low in height and allows most of even the smallest electric current signals to skip the wall between crystals enabling weak or small signals to pass freely, (hence the desire for long crystals). This is why Audio Note silver excels especially in passing small signal (pianissimo) information.

Furthermore, in regard to point three above, when an electric current flows in a wire, a magnetic field will be generated around it, this magnetic field produces "magnetic distortion" in the wire itself, which is always accompanied by the "wire crying" phenomenon. When a wire "cries" it influences the signal current flowing in the wire, creating a sound peculiar to the wire material. Audio Note silver wire, however, due to its softness, purity and mass, and has little "wire crying" and therefore offers a clearer and better sound quality, than other wires."

All Audio Note amplifiers use silver wire in their signal wiring, but due to its cost, only the best and most expensive amplifiers have silver wire in their output transformers and signal capacitors, which put them in a different league in terms of ability to portray the changes in pulse of any piece of music.

Central to the philosophy behind all Audio Note products is the longevity of each product, in terms of its reliability and especially its sonic performance. Therefore you will see no quick fix solutions, no frequent model changes and no compromise products bearing the Audio Note name. This will guarantee that your Audio Note purchase will retain its value in every sense of the word for many years to come.

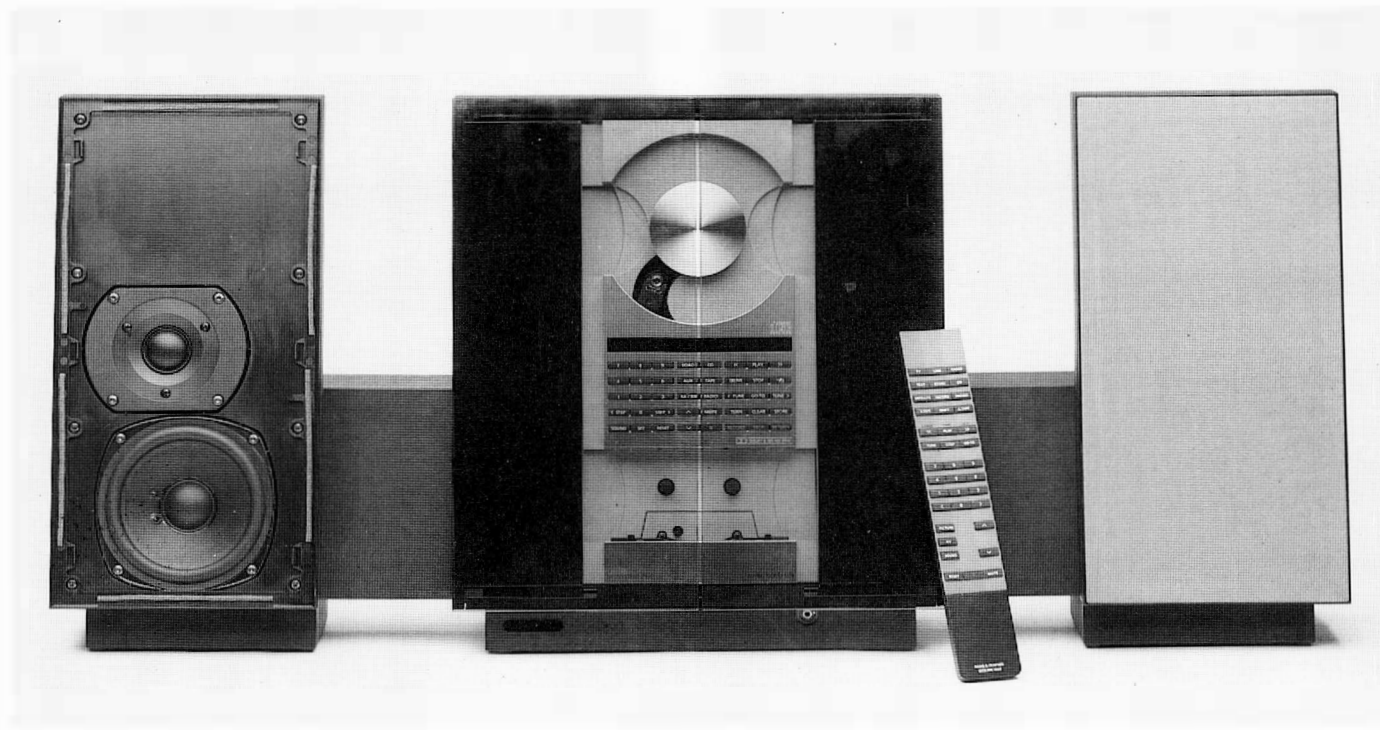
Peter Qvortrup

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

**Tel: 0273 821371
Fax: 0273 771808**

Bang & Olufsen Beosystem 2500

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GLOUCESTER GL4 7DE. TEL: (0452) 307377.



There's rather more to the Beosystem 2500 than meets the eye. The system can be left as a single unit, freestanding on a firm surface or fixed onto a wall using an optional bracket. The speakers may also be separated from the main electronics package, which is obviously stereophonically advantageous, if a bit clumsy in practice because each speaker needs to be fed mains power as well as audio signals.

Although ergonomically designed with hands-on operation very much in mind, the system can also be remotely controlled, and was supplied with the cheapest of these options, the very solid *Beolink 1000* handset, which covers most of the system controls and also allows some integration between the 2500 and other B&O A and V components. More sophisticated and capable remote control units are also available, allowing more extensive integration and access to sophisticated internal timers, to the point where a 2500 can even form the heart of a complete multi-room set-up. It's even possible to substitute larger active loudspeakers (which include their own power amplification) to deliver comparable quality to other, larger B&O systems. The 2500 has no on-board video switching capability, but there is a line input which could perhaps be fed TV sound, or alternatively take signals from B&O's line source record deck (with built in RIAA stage).

The real head-turner is the sliding double glass door system which opens as you reach towards the illuminated central con-

trol panel. Withdraw the hand and the door closes - after a decent interval of course. The elegant appearance (from every angle) is enhanced by a range of alternative speaker grill colours to suit different room decor. The full list includes cobalt, grey, black, cerise and jade, and I'm a little surprised there isn't something a little more exotic - pink polka dots on a wavy green background sounds tasteful.

The 2500 is a near-ideal transportable, though some parts of the system - eg the glass doors - look vulnerable and should be removed for transit. The CD transport also needs to be battened down, though the locking screw is captive. Certain features also encourage transportability, the lithium battery backed system memory, for example, and the two separate banks of radio presets which could be programmed for two different locations (though they could equally be his 'n hers selections).

Tuner

The tuner has two banks of 20 presets, which can be assigned randomly on FM, MW and LW. A telescopic aerial is supplied for situations where an outdoor aerial is unavailable. An RDS (radio data service) kit is available as an option, and this also allows non RDS stations (FM and AM) to be assigned display names.

Cassette deck

The cassette mechanism has a single transport, with Dolby B noise reduction and

also Dolby HX Pro (which B&O helped invent). A track search feature is included too, but no tape counter. Recording levels are set automatically, but in a way which avoids constant record level re-setting and the gain riding that results by simply reducing the level only if a peak comes along that threatens to overload the tape, and not increasing it afterwards when the signal level drops. It works pretty well most of the time, but can be upset by source material that starts quiet and then builds. Wow and flutter measured 0.17 per cent which is a little disappointing, and the prerecorded response shape shows a fairly sharp 4dB treble peak.

Compact Disc player

To insert and play a Compact Disc involves selecting 'load' on the control panel, having first stimulated the glass door opening by reaching out towards the controls. The centre clamp then swings up in what Paul Messenger indecorously but memorably described as a 'rampant' angle from the very effectively spring-decoupled chassis (see issue 92). The range of play functions available is not wide, but is more than sufficient to allow some quite sophisticated tape editing.

Amplified loudspeakers

The amplifier/speaker design is the most innovative part of the package. The aim was to achieve high sound pressure levels and relatively deep bass from loudspeakers far too small to do either in the normal

way, and this has been achieved by using active crossovers to drive one power amplifier per drive unit. Output is progressively boosted below the point at which bass output would normally begin to fall, but overdrive is inhibited by a combination of a long voice coil throw and steep high pass filtering below about 50Hz. A higher than usual moving mass lowers the system LF resonance, but inevitably this has an impact on transient response.

No power output is quoted, and no measurements could be run - or would have been meaningful - due to the highly integrated nature of the design. The power amplifiers and supplies are housed in the base of each of the diminutive but impressively heavy loudspeaker enclosures. The overall frequency response shape shows some excess energy from around 100Hz up to beyond 500Hz, which helps give the subjective impression of loudspeakers considerably bigger than their real size. Positioned hard up against a wall, there's useful output available down to around 50Hz, which is better than some of the other speakers managed, but only just.

How it performs

What's different about the Bang & Olufsen is first and foremost a matter of style. The 2500 is fundamentally a fashion statement. B&O's implication in the literature that it is true high fidelity is disingenuous: when it looks like a duck, swims like a duck and walks around on padded feet,

you know it's no bunch of petunias.

But I was pleased by the large scale sound of this system. The midband and treble are pure and clean; their hear-through transparency nicely complementing the CD player and tuner. Nevertheless the sound as a whole had little of the out-of-the-box feel that was so much a part of the higher frequencies. Subtle colorations and compression effects, and a suggestion of electronics being worked hard behind the scenes, kept the sound stubbornly earthbound, even with chamber music which is generally lightweight in the lower frequencies. Detaching the speakers helps quite a lot here, and the sound is nevertheless than miraculous when judged against the *size* of the system. Evaluated in any other way, however, it begins to show its weaknesses.

I was a little annoyed to find some of the more foolish weaknesses of other systems perpetuated in this exotic clean sheet design. One example is that the CD stops dead when switching to radio, another that tapes cannot be wound while playing a CD. There are some other idiosyncrasies too, of which the most annoying is the lack of consistent automatic source selection. From radio, for example, it is not enough to start a (loaded) disc by pressing 'play', you must first select CD.

The CD player is an excellent product of its type, with a very clean, quick sound and levels of detail combined with smoothness that at times is little short of exquisite. The tuner is also excellent, providing large-scale hiss-free stereo with excellent imagery and a seamlessly neutral and dynamic sound - at least as far as the capabilities of the system to resolve these virtues.

Sadly the cassette deck is not of the same standard. It sounds a little rough and lacks the hear-through clarity of the other sources, though the bass sounds solid enough and imagery is stable in the lateral plane. However, B&O's solid reputation for innovatively and well crafted cassette decks - not to mention the high cost of this system - had led me to expect rather more.

Verdict

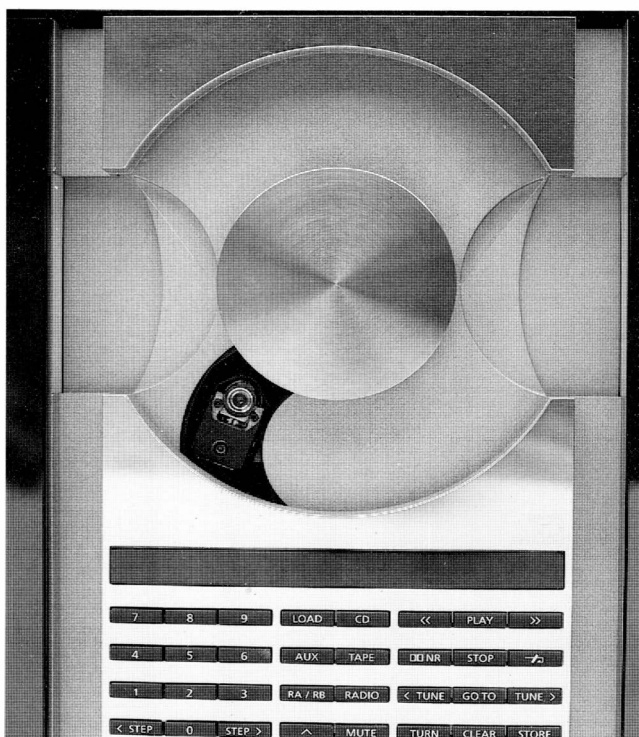
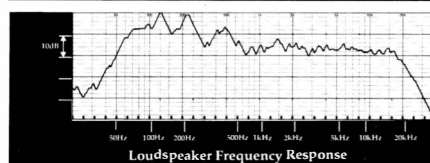
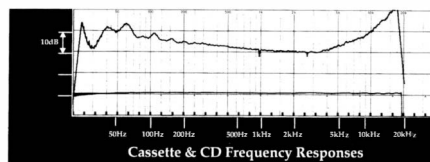
At the end of the day this system fails to achieve formal commendation because its sound quality is not commensurate with the price. Even the vaunted ergonomics provide some grounds for criticism: a number of the main operating features are clumsily executed and could easily have been improved. But that is perhaps to miss the point.

Although nothing in the accompanying literature explicitly says so, the *Beosystem 2500* is essentially a cross between a ghetto blaster and a music centre — an all-in-one functionally dedicated package which includes cassette deck, tuner, CD player, amplification and speakers, all executed with tremendous style.

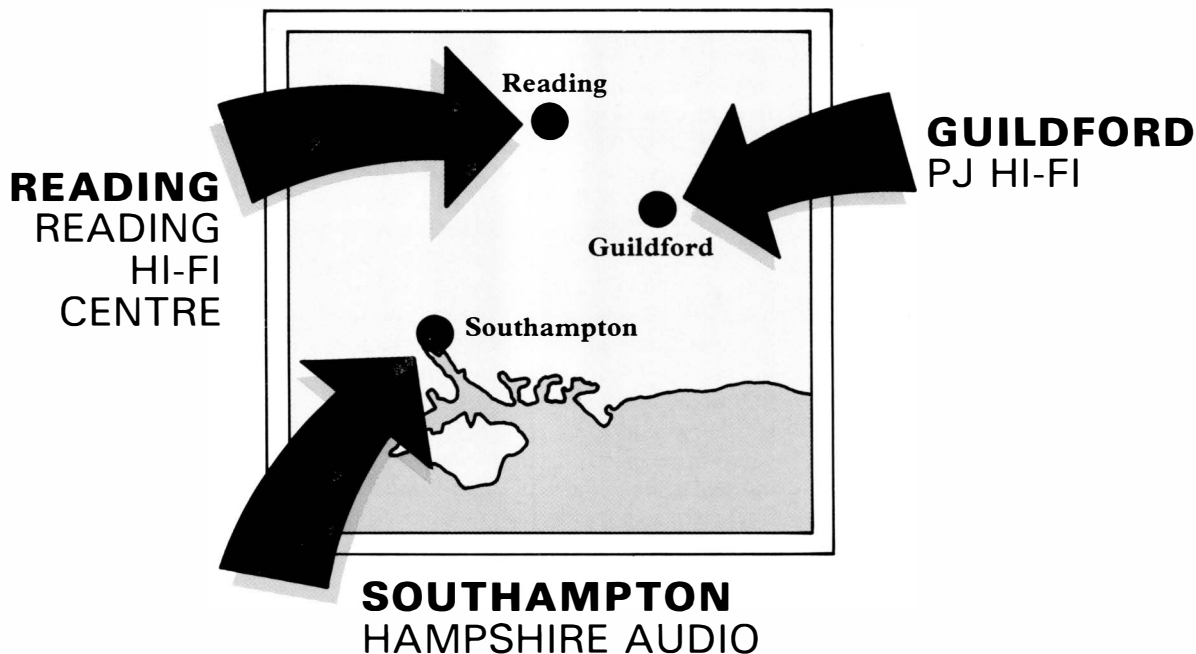
The difference between the B&O and lowlier ghetto blasters and music centres lies in the sophistication and innovativeness of the audio and mechanical engineering involved, and the very high cost (this is truly a system for those who don't need to ask the price). But especially in the surprisingly civilised and capable way it goes about reproducing music. It is in its way a thing of beauty that's also beautifully made, and should last for year after year.

TEST RESULTS

Cost with speakers	£1,999
Options RDS kit, various Beolink remotes, speaker grille cloths etc	
Size main unit	36x32x16cm (hxwx d)
Size loudspeakers	36x26x16cm (hxwx d)
TUNER	
Sensitivity	high
Signal/noise	average
CASSETTE DECK	
Wow & flutter (wtd)	0.17%
Signal/noise ref 0dB Type II	n/a
Distortion 0dB Type II	n/a
COMPACT DISC PLAYER	
Signal/noise (measured at amp Tape Output)	100dB
AMPLIFIER	
Power output/channel (80hms)	n/a
(20Hz, 1kHz, 20kHz both channels driven)	
LOUDSPEAKERS	
Sensitivity	n/a



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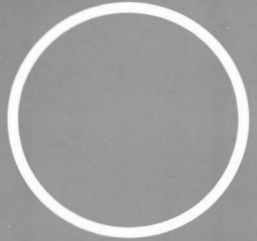
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Goldring Black Satin loudspeaker stands are attractively finished in black and audiophile spikes for rigid mounting and placing are provided at both the top and bottom of the stands.



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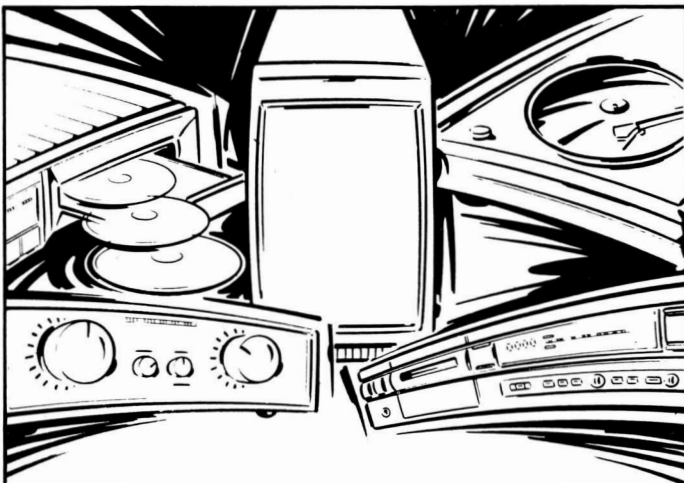


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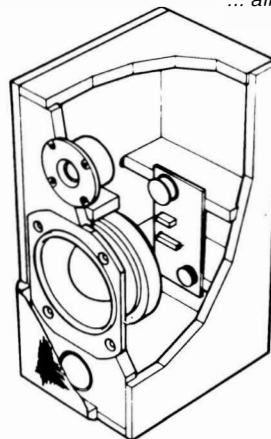
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"... all in all, highly recommended"

Paul White, Home & Studio
Recording magazine.

The kit includes bass and treble units, flat pack cabinets (accurately machined from smooth MDF for easy assembly), long fibre wool, assembled crossovers, reflex ports, binding posts, grille fabric etc...



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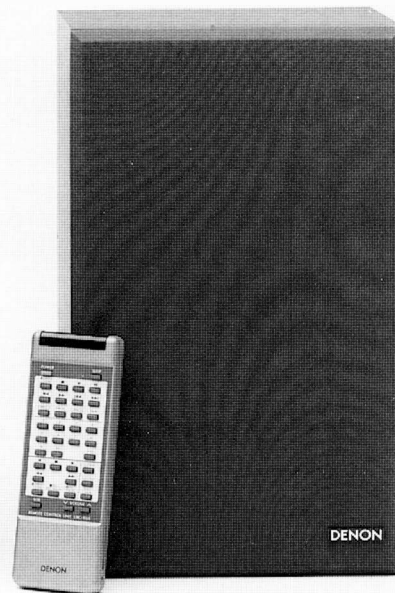
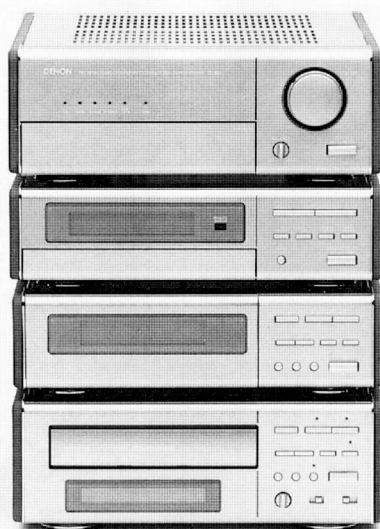
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Denon D100

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With this system, Denon is making a determined play for the floating audiophile vote - or the nearest there is to such a constituency amongst mini system purchasers. Everything about the *D100* oozes quality. Each component is entirely separate, even down to having its own internal power supply, so it doesn't have to share with the other components, which is the usual cost-saving but sound-robbing solution forced on designers. But cost constraints are less of an issue here; the £730 Denon is by no means a cheap system. The components are all made to much higher than usual standards, the smoothly rounded horizontals of the titanium facias and the odd bit of not too discrete gold flashing all speak of fine engineering, an impression that is not dispelled by internal examination.

The 'killer', as the supplied propaganda modestly puts it, is the loudspeakers, which are made in the UK to 'audiophile' standards (a much overworked word, on consideration), and which "outperform the usual Japanese econoboxes by such a degree that there is no fair comparison with other manufacturers' minis".

Most but by no means all of the usual mini system features are present in one form or another. Source selection is automatic: press 'play' on the CD player, and the CD input to the amplifier springs to life. The remote control covers all the usual eventualities and a clock/programme timer operates in the approved manner. The fact that there is only one

cassette transport is further evidence of its audiophile pretensions.

The only slight operational hiccup is the difficulty of reading the control labels under some lighting conditions. The problem is due to a lack of contrast between the graphics and the bare and reflective fascia metalwork.

The 25cm component width is less than most, as is the total height, making this an extremely compact system even though the electronics are subdivided into four separate and individually supplied components. The single cassette transport, loading tapes horizontally, is one reason, but another break with convention is a CD player display immediately in front of the loading drawer which drops down to allow discs to be loaded.

UTU-100 tuner/timer

The *UTU-100* distributes mains power to the other units via switched mains outlets on the rear, the switch on the unit turning the complete system on and off. A time readout is shown when power is off, and the timer has sleep and every day functions, the controls for which are concealed behind a drop down flap, alongside the tuner presets and other minor controls. Visible 'preset call' keys initiate a search through the preset stations, which can also be called up by the numeric keypad on the remote control. Up to 30 stations may be stored on FM, MW and LW, and stereo/mono switching is provided for weak signals. The display, in common

with those on the cassette deck and CD player, is an attractive green backlit LCD panel.

UDR-100 cassette deck

With only one transport, the *UDR-100* cassette deck can hardly be expected to dub cassettes or play two tapes continuously, sequentially or even inside out. Dual transport cassette decks are such an ingrained part of packaged system life, it's almost as though they're an essential ingredient in any system's self-respect. However, a moment's consideration leads to different conclusions. Cassettes are not good sources for dubbed recordings, because of the multiple generation exaggeration of hiss and wow and flutter, and sequential play is normally only used for parties - and not necessarily the best kind of party . . .

The deck has a smooth drawer-loading mechanism and features Dolby B, C and Dolby HX Pro headroom extension circuitry. The auto-reverse transport features an optical end-of-side detector that reduces the usual eight to ten seconds of changeover silence to about one second. There's a track search feature, a tape counter and - wonder of wonders! - a record level control and meter. Which means none of the usual compromises (excessive noise and squashed loud passages) associated with auto record level setting. Wow and flutter checked out at 0.08 per cent, with an acceptable signal/noise figure to match. If the playback response shape is



any indication, prerecorded tapes should sound a little bright, but probably quite detailed.

UCD-100 Compact Disc player

Rather more sophisticated than most mini size CD players, the *UCD-100* has a dual 18-bit Super Linear D/A convertor. Some attempt has been made to sweep away the traditional front panel clutter, leaving a small group of controls which give a variety of play, programme and repeat modes, and facilitate tape editing in conjunction with the *UDR-100* cassette deck. An electrical digital output is available to feed a DAT recorder (or outboard convertor).

UPA-100 amplifier

Volume and balance controls and the row of LEDs which show which input has been selected (which is normally done automatically) are all in plain view, whereas most of the minor amplifier controls are hidden behind a flap. Open it and you'll find manual source selectors, bass, treble and Super Dynamic bass (sic) controls, plus a headphone socket. Note the absence of graphic equalisers (hooray!) and the inclusion of additional inputs for a record deck and an external tape deck. Power output measured around 40 watts/channel.

USC-100 loudspeakers

Denon told no porkies - this is a real high fidelity loudspeaker; a two-way unit with a strong, sealed enclosure, a small soft dome tweeter and a pulp cone bass driver. There's nothing exotic about it, and construction is clearly cost constrained, but it

is, as promised, light years ahead of most of the competition. The midband and treble measure very smooth and even, but a fairly strong low frequency 'bloom' appears to be built in, perhaps to add warmth and scale to the sound.

How it performs

The Wharfedale-built speakers are not beyond criticism. They're not 'voiced' very well: the bass 'bloom' sounds unnatural and underdamped, and some odd, low level colorations are heard throughout the midband. Consequently stereo images are somewhat inconsistent and lacking in depth. But even so they're considerably better than any of the other system loudspeakers under test. The treble quality in particular is much finer (aided and abetted by the system amplifier), with the result that tonal colours are much more subtly expressed and vocal articulation is more complex and realistic (notably in John Lee Hooker's *My Dream* from *The Healer*, which emoted like mad and was much more meaningful via this system than any of the others).

The loudspeakers are supported by some excellent electronics, which in each case approaches or achieves budget high fidelity standards. This even applies to the cassette deck, the combination of singularity and superiority emphatically illustrating that the more provided elsewhere equals worse! Prerecorded tapes and recordings alike sound solid and stable in a way that eludes most other systems. Pitch stability is excellent, and treble evenness and quality was always a strong point. The measured replay treble excess is innocuous enough in practice,

just leading to a slightly over-lively sound. In any case, it is in the nature of cassette decks that some high frequency output will be lost over time.

The CD player was fully in keeping with the rest of the system. It was capable of extracting the best from the amplifier and loudspeakers, and provided a strong blend of analysis and dynamics without any unwelcome edge and grain.

Verdict

Although it isn't cheap, the Denon *D100* is very reasonably priced considering the excellence of the engineering provided. For once a system sounded as good as it looked, and the fine underlying build quality is a fair guarantee that it will continue to deliver the goods for many years. The features that are missing, frankly, are probably not worth having.

TEST RESULTS

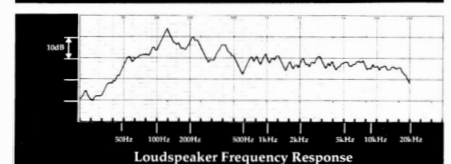
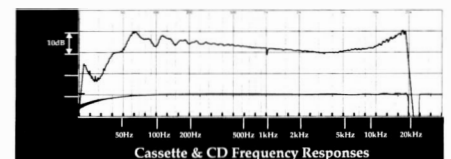
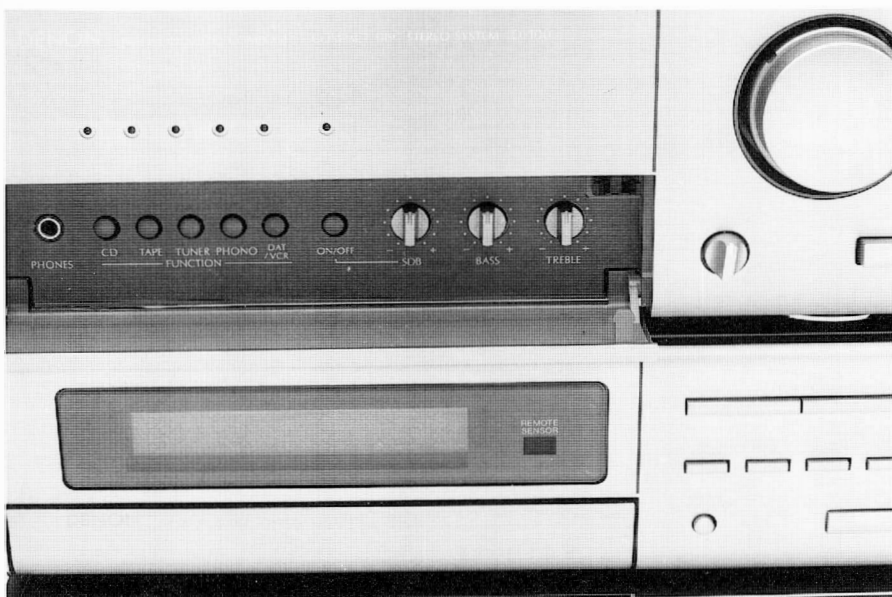
Cost with speakers	£730, without n/a
Options	none
Size main unit	34.5x25x35.5cm (hxwxwd)
Size loudspeakers	34x17x23cm (hxwxwd)

TUNER	
Sensitivity	high
Signal/noise	high

CASSETTE DECK	
Wow & flutter (wtd)	0.08%
Signal/noise ref 0dB Type II	57.5dB
Distortion 0dB Type II	1.2%

COMPACT DISC PLAYER	
Signal/noise (measured at amp Tape Output)	>96dB

AMPLIFIER

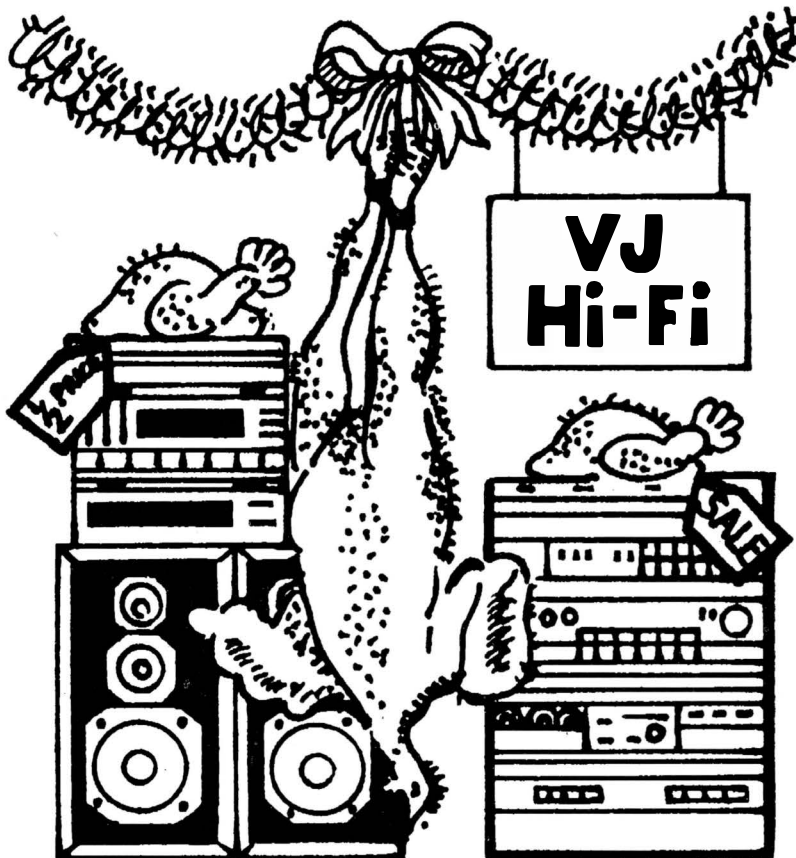


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JVC Mini MX-70

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Despite a forced air fan cooling system to reduce the requirement for large cooling fins in the amplifier, this is far from the smallest mini system around, being both relatively tall and a full 27.5cm wide. It's extremely well finished and has a range of powerful features, though many are of limited use. Appearance is largely conventional but nicely detailed, while the displays have attractive yellow fluorescent elements. The remote control is large and complex, but sensibly laid out with good control differentiation. This well thought through item, combined with a rational front panel layout confers good ergonomics, marred somewhat by an excess of controls which even includes basic operation of a JVC brand DAT recorder.

Setting up is an uncomplicated procedure, assisted by clearly identified ribbon cables, though the loudspeakers demand twice the usual complement of two-core cables apiece (see later). The system can cope with an external tape deck (DAT, or a VCR perhaps) or a line source, and also a record deck. Microphones may also be connected too, and their output mixed with other sources.

FX-MX70BK tuner

This dual purpose tuner covers the usual three wavebands - FM, MW and LW - and provides a healthy total of 40 random presets, with sequential search of presets available on the tuner itself, and random preset selection using a numeric keypad on the remote control. Mono/stereo

switching is available, the mono setting drastically reducing noise and interference when receiving weak signals.

The tuner's alter ego is a clock/timer. In fact there are several timers, including two programme timers, a daily programme timer, and separate sleep and wakeup timers. These facilitate unattended recordings, typically off air, as well as pre-programmed radio, tape or disc play operations.

TD-MX70BK cassette deck

The cassette deck allows CDs to be dubbed very tidily onto tape, with appropriate handling of side breaks and with tracks re-arranged to ensure optimum length matching.

The deck itself has two auto-reverse mechanisms, one of which is a recorder/player while the other undertakes replay only. Dolby B and C are both included, as is Dolby HX Pro which gives stronger, punchier sound with low bias ferric tapes.

Wow and flutter measured a high 0.25 per cent, but the uneven level and coarse nature of the signal monitored during the test told its own even more eloquent story. The playback only frequency response, which corresponds to what you'll hear with prerecorded material, shows a +5dB extreme treble peak.

AX-MX70BK Compact Disc player

Would that all domestic hi-fi CD players were this straightforward and sensible.

There are few special features (in stark contrast to the amplifier), but there is no shortage of anything useful, including the usual play and programming options. In common with most other mini systems, random track search can only be initiated from the remote control.

DX-MX70BK amplifier

The amplifier measured very close to the claimed 23 watts/channel — something which contrasts uneasily with the audible impression so that it runs into heavy distortion as soon as the volume is raised above the kind of middling levels that might be obtained from a large personal stereo.

A surround sound facility of sorts is provided, but is something of a smoke and mirrors affair since there is no facility for extra speakers beyond the normal front stereo pair. The amplifier is also equipped with a seven band graphic equaliser, which by long JVC tradition is described as an SEA - Sound Effects Amplifier. This can store user-defined patterns, and has six preset shapes of its own, while the display window can also be switched to show the output in each band in different ways, which will be good news for those who listen with their eyes.

A potentially more useful feature dubbed CSRP can remember a series of control positions for each input, covering volume, SEA and surround sound settings, which can then be recalled automatically each time that input is selected.

SP-MX70 loudspeakers

These curious looking loudspeakers are approximately the same dimensions as most of the others tested, and can even be stood neatly each side of the electronics stack, though that does involve sacrificing anything that might be described as stereo, even in enhanced 'surround' mode.

The visible components of the SP-MX70 consist of two identical looking miniature drive units, alongside which a hole allows sound to escape from a third internal drive unit, described euphemistically as a subwoofer. To accommodate this configuration, two pairs of wires feed each enclosure, and system amplifier and speakers are effectively inseparable. Build quality is no great shakes.

According to the manual, the 'subwoofer' has an LF bandwidth extending to 28Hz, though the measured performance hardly justifies this claim, even without placing amplitude limits on the frequency response. Output is peaked up in the 80-120Hz region, and declines sharply below. Even large, floorstanding monoliths find it hard to produce useful output around 28Hz, but any half respectable speaker can put this JVC's sucked out and rough midband to shame. Placing an ear close to the hole from which the sub-bass is supposed to emerge uncovered nothing more than a peculiar grunting noise, and no sense of the air turbulence that a real subwoofer inevitably creates.

How it performs

Although the system worked correctly via loudspeakers, I couldn't obtain correct stereo operation via headphones, while switching the tuner to mono (or listening on AM) caused output cancellation when the balance control was centred.

The loudspeakers, for all their infernal cleverness, audition oddly and unsatisfactorily, and dominate the performance of the system as a whole. Their sound is forward and explicit in the midband, but rough and even rather 'spitty' at higher frequencies, with some sharp, 'phasey' resonances, and a 'shouty' balance when loud. At the same time there's no true upper treble, and therefore no real air or light in the way known tonal colours, for example of orchestral strings, are reproduced.

The depth and weight of bass is disappointing, though I valued the extra midrange presence which occasionally made sense with some material. Piano has quite strong projection and sounds suitably forceful played *forte*, and some vocal material was well handled too, albeit with some coloration. However, very strong phasey effects, presumably due to poor integration between the different drive units, made listening rather an edge of the seat affair, unpredictable stereo imaging varying significantly with pitch.

Switching in the 'surround' circuit had the effect of throwing stereo images outside the area bounded by the speakers, but did so in an erratic, music dependent way and at the cost of even more of the aggressive phasiness which is such a prominent feature of the system.

Although the electronic components seemed to behave much better than the loudspeakers, it is difficult to be certain of the fact or exploit their virtues without a loudspeaker transplant, and the amplifier is not really good enough to drive fully fledged high fidelity loudspeakers without itself sounding a little rough and out of control.

The cassette deck is no match for the other

components. It makes acceptable recordings on Type II (chrome bias) tapes, but Type I ferric tape recordings are typically rather flatter sounding. Prerecorded material sounds detailed if a little lacking in presence.

Predictably, the CD player and tuner produced the best results, with a clean set of listening notes in each case. The tuner needs a decent aerial, but is selective enough to do justice to most reception conditions, whilst the AM side was more than usually intelligible.

Verdict

Oh dear - another system let down by awful loudspeakers which make a complete nonsense of the special claims made for them. Cold tonal renderings, phasiness and lack of 'air' are the predominant observations. The rest of the system is satisfactory, but no more than that, and although the system looks the part, ergonomics are also on the untidy side - though this is a common complaint.

TEST RESULTS

Cost with speakers	£650, without n/a
Options	none
Size main unit	36.5x27.5x26.5cm (hwxwd)
Size loudspeakers	37x18.5x26.5cm (hwxwd)

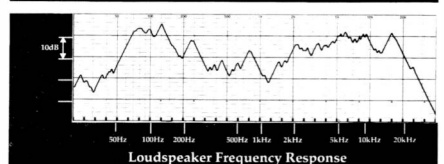
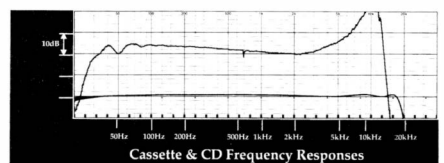
TUNER	
Sensitivity	average
Signal/noise	good

CASSETTE DECK	
Wow & flutter (wt)	0.25%
Signal/noise ref 0dB Type II	n/a
Distortion 0dB Type II	n/a

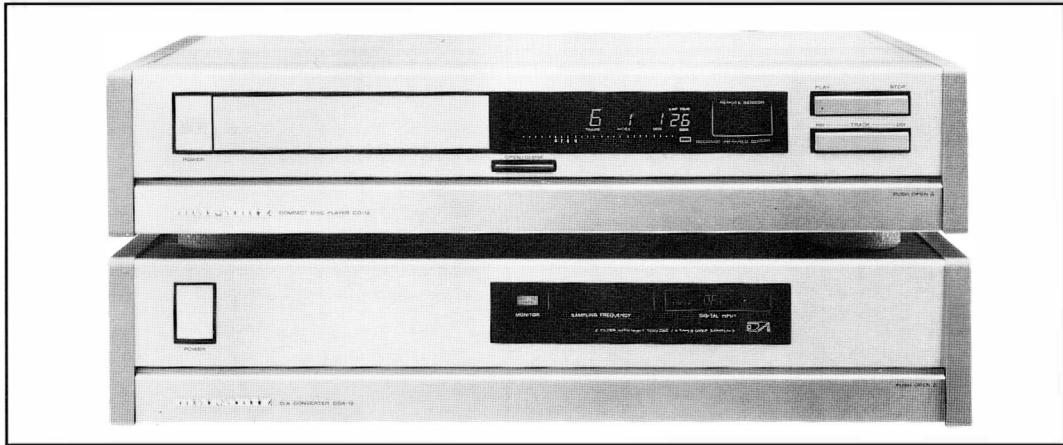
COMPACT DISC PLAYER	
Signal/noise (measured at amp Tape Output)	96dB

AMPLIFIER	
Power output/channel (80hms)	20/25/ 25watts
(20Hz, 1kHz, 20kHz both channels driven)	

LOUDSPEAKERS	
Sensitivity	average



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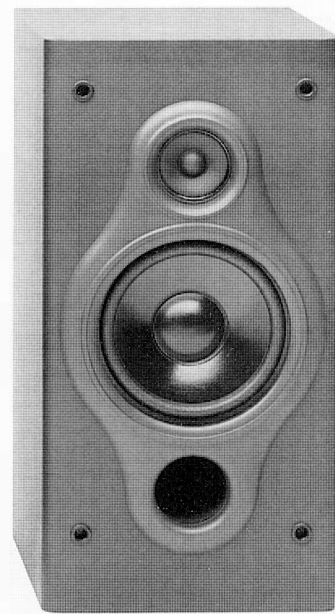
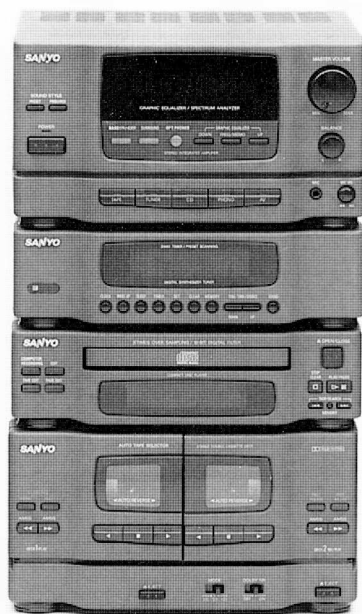
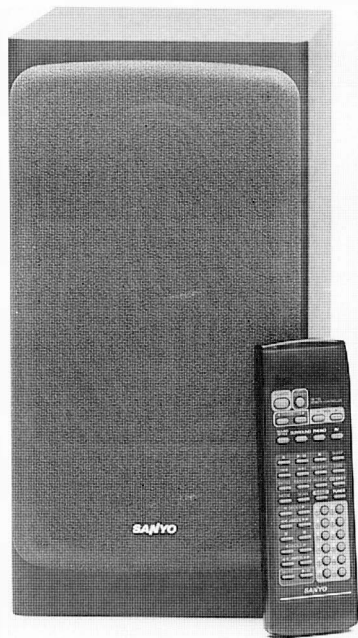
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Sanyo SYS T55E

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Some system manufacturers pay little more than pay lip service to the idea of mini-ism (if it can be called that), which makes their minis very difficult to mix and match with standard full size components. This Sanyo system does not come into this category; its width is sensibly exactly half the 43cm of a conventional full-width component. The *T55E* can be piled vertically in the narrowest of spaces, or split into two and placed side by side, in which case standard full width components can be stacked neatly on top or underneath.

Notwithstanding its comparatively low price, the system includes a pair of wireless infra red headphones. Few such devices are available separately for less than three figures, so this certainly enhances the value for money theme of the system, even though no provision is made for ordinary wired headphones. (Accessory headphone adaptors are available from QED and others.)

The system is supplied as fully discrete (though not independently self-sufficient) components - CD player, tuner/timer, twin cassette deck, plus amplifier (which doubles as the power supply for the other components) and loudspeakers. The amplifier is equipped with sockets allowing an external record deck and tape deck to be patched into the system. The tape circuit has a video input capability, and an output is provided to drive an attached television monitor. The system will also accept plug in microphones.

DC-T55 TU tuner

In common with other mini systems, the Sanyo tuner doubles as a system timer. A clock display shows alongside the tuning information, and the unit can be programmed to record a specified station or just play a CD or tape at a specified time. Independent sleep and wakeup timers are also included.

In its role of guardian and controller of the airways, the Sanyo can memorise as many as 24 FM and 12 MW/LW frequencies in three banks of 12. Mono output is also available from the remote control, to help deal with weak, hiss-bound signals. RF performance is good on FM, but less so on AM, which offered reasonable suppression of interference but rather poor intelligibility.

DC-T55 DK cassette deck

The deck is fully logic controlled, but a number of the most important controls are placed on the cassette loading doors which gives a rather tacky feel. Only one of the two transports records, and only Dolby B noise reduction is fitted, though both decks offer full auto-reverse operation. A simple next/current track-search feature is included on both transports, but there's no tape counter.

The issue of CD-to-tape dubbing has been thoroughly tackled with the help of some sophisticated electronics. Press the 'Computer Recording' button and the tape to be recorded is first rewound and then advanced to a point just after the leader.

Various track edit possibilities are available when recording from CD, and high speed tape dubbing is also available to the impatient.

The playback response shape is surprisingly accurate up to the highest frequencies, but wow and flutter couldn't be measured due to the lack of external inputs from which to record.

DC-T55 CD Compact Disc player

This a standard drawer loading player. All the fancy controls - random track select, intro play, random play, repeat, plus access to various time displays - are available only from the remote handset. The player is functionally satisfactory enough, save that track search is impossibly slow. Surprisingly, the frequency response tails off slightly in the treble.

DC-T55 AMP amplifier

Centrepiece of the 15 watts/channel amplifier is a large bi-colour display which doubles as a spectrum analyser, seven columns showing the approximate energy content in each frequency band. Alternatively it displays the tailored shape of the response curve, up to six of which can be stored. Default pre-set patterns are programmed in, and labelled by Sanyo as pop, jazz, classical and so on, none of which should be taken too seriously. Pattern memory programming and manual control are also available.

Something called a BASSXPANDER



can be used to 'enhance' the bass, though this appears to be nothing more than simple bass boost. An even simpler matrix surround sound circuit is also provided, but don't confuse this with Nicam or any other fully-fledged (or even half-baked) surround sound system. There isn't even a facility to use extra speakers to make proper use of the out of phase surround sound data that the circuit generates.

SX-T55 loudspeakers & DC-55TR/HP IR transmitter & headphones

The loudspeakers are slim and relatively tall. An impressive looking bass driver is coupled to a cone tweeter, both units dressed by a gaudy plastic moulding which incorporates a reflex port. Engineering is of a low standard, and by no means comparable with high fidelity practice, yet the in-room frequency response is hard to fault, with an impressively neutral overall balance and just a suggestion of tweeter misbehaviour in the top octave or so.

The headphones receive their signal from a transmitter which is placed close to the rest of the equipment. This has a 120 degree lateral coverage, can be manually adjusted in the vertical plane and reoriented using the remote control in the lateral plane.

The headphones themselves, powered by two MN1500 cells, include an on/off switch and individual level controls for each earpiece. The IR receivers, one of

which should always be in direct line of sight to the transmitter, are housed at the ends of the headband. The earpads are faced with reticulated foam, but comfort is compromised by the unit's comparatively high weight and correspondingly high inward pressure on the ears.

How it performs

On the whole this system is a real success, due it seems to a fundamentally well conceived loudspeaker and amplifier package. The loudspeakers are largely free from coloration and deliver a surprisingly gutsy sound, with a vibrant sense of colour and quite solid dynamics, though a strong bass 'bloom' and consequent loss of tunefulness in this region cannot be totally ignored. The amplifier keeps the loudspeakers in control and allows them to play loud and soft in a seamless and relatively homogenous way, without significant changes in sound with level.

The cassette deck is responsible for some fairly serious crimes against music. Although not unmanageable, critical material shows up a lack of pitch integrity which makes listening a slightly uncomfortable affair at times, though people do differ markedly in their tolerance to moderate levels of wow and flutter. The main failing, however, is the loss of transparency and detail. The brilliantly lit opening of Respighi's *Pines of Rome* (on the Dutoit/Decca label) sounded rather heavy and ploddy, and this was mirrored by similar losses when playing other prerecorded material.

The radio works well, however. Background hiss is well suppressed, and although there's a slight rounding off of fine detail - characteristic of the system as a whole - there's nothing here to cause offence. That said, the AM radio is less articulate than some of its competitors.

Objectively the Compact Disc player is not one of the best. In addition to primitive disc handling, it's also rather sensitive to disc condition. In the system context, however, it does a fine job, and is easily the best of the source components fitted, even if its lead over good FM sound was

occasionally a little tenuous.

The same cannot be said of the headphones. Though hiss was never entirely absent, these were able to receive signals reliably over a large area, albeit with occasional sharp bouts of background noise. A certain part of the midband sounds clear and sharp, but the treble is vague and the bass positively absentminded. Coloration levels are high, and I'd rather settle for a good pair of standard headphones.

Verdict

Objective failings there are by the bucketload, but underneath these lies a fundamentally competent system. You'll lose a proportion of fine detail, and the bass is on the warm and loose side, yet it was a pleasure to listen to music through this system, even with the weaker sources. The infra-red headphones, however, are a gimmick that doesn't really pay its way, and an ordinary headphone socket should never have been omitted, I/R cans or no.

TEST RESULTS

Cost with speakers	£500, without n/a
Options	none
Size main unit	37x22x25cm (hwxwd)
Size loudspeakers	37x18.5x26cm (hwxwd)

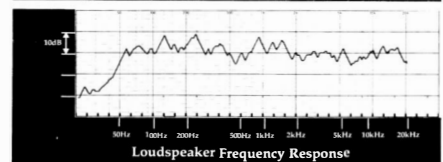
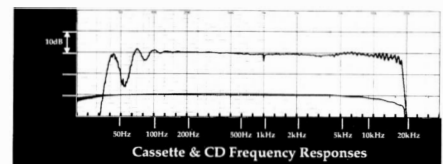
TUNER	
Sensitivity	high
Signal/noise	good

CASSETTE DECK	
Wow & flutter (wtd)	0.20%
Signal/noise ref 0dB Type II	n/a
Distortion 0dB Type II	n/a

COMPACT DISC PLAYER	
Signal/noise (measured at amp Tape Output)	72dB

AMPLIFIER	
Power output/channel (80Ohms)	15/ 20/ 18 watts
(20Hz, 1kHz, 20kHz both channels driven)	

LOUDSPEAKERS	
Sensitivity	average





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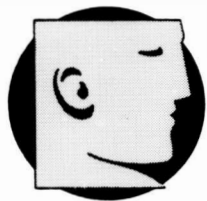


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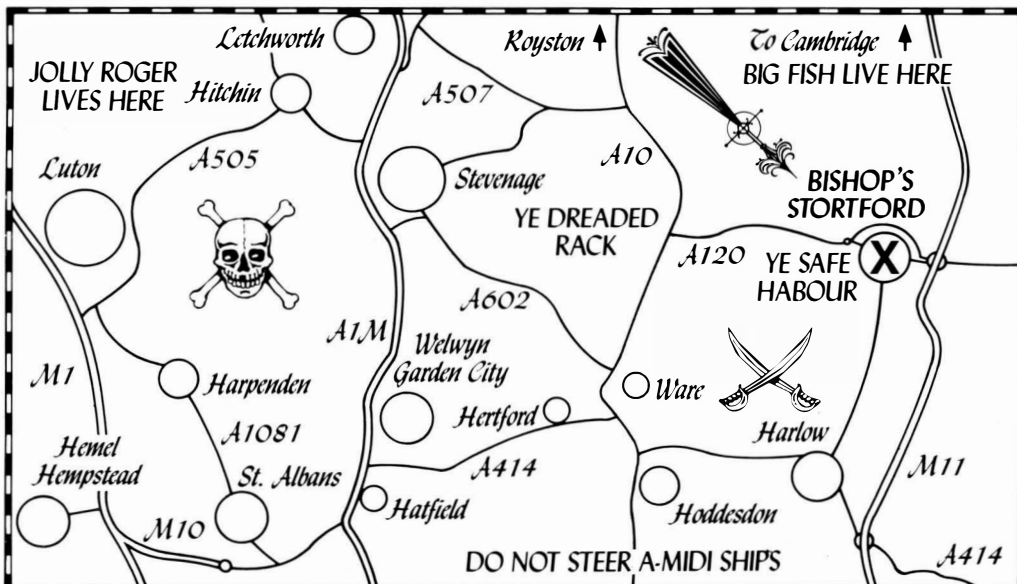
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Sharp System S600H

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In contrast to most of the other systems in this test, Sharp's *CD-S600H* is not constructed from several separate components. The electronics are packaged in two boxes of equal size, which can either be stacked vertically or placed side by side. One contains the CD player and preamplifier, while the other houses the cassette deck, tuner (except for its display) and power amplifier. The front panels are smoothly finished in a dark metallic plastic with excellent if rather wordy graphics, the overall effect being of high quality, even subtlety.

Housing more than one component in each box saves both space and money. The components are a relatively wide 27cm, but the equipment stack height is a few centimetres lower than most other systems.

Sharp is well known for its sophisticated flat display technology, and the *S-600H* is fitted with something much more exotic than the usual fluorescent display — a blue backlit LCD display panel with very well formed display elements. This is one of the first pieces of audio equipment to use such a display, though Sony's portable DAT recorder has something similar.

Flexibility is not this Sharp's strong suit. Although headphones can be connected, there is no input for a microphone, and no spare input for an outboard DAT or other form of tape recorder either. The only spare input is in fact for a record deck.

CD-S600H CD player & control amplifier

The CD player offers a fairly typical selection of features. The display area includes a calendar type readout, random track access is available from the remote control, and all kinds of play modes are available including programme and random play. However, the only pause button is on the remote handset, and as with so many mini (and midi) systems, power to the CD player is cut whenever a different source is selected, a feature I find intensely annoying.

One of the main selling features of this system is its so-called 'Sound Field' control. One of its features adjusts tonal balance using a seven band equaliser, incorporating six preprogrammed patterns including two designed to apply suitable equalisation for tapes destined for car or headphone use. But Sound Field processing also takes in a so-called Sound Expander Mode, which provides four stereo image widths - narrow, pass (normal), wide and spacious.

CD-S600H tuner/timer, cassette deck & power amplifier

The tuner section is a fairly typical implementation capable of memorising 20 FM and 10 FM/MW frequencies. Stereo/mono status is memorised along with the frequency data, though stereo will automatically revert to mono if the signal becomes *very* weak. One rather nice little

extra to help those for whom setting up presets is a closed book is automatic station programming. Select the waveband, press 'auto memory' and all acceptably strong signals are automatically allocated presets.

The cassette deck has most mod cons including Dolby B of course, but not Dolbys C or HX Pro. Like most mini system cassette decks, only one of the transports records but both have auto-reverse mechanisms.

The main transport controls are shared, which means that the appropriate transport must usually be selected first if two tapes are loaded, though dubbing operations at normal or high speed can be started with a single key press. Wow and flutter could not be measured because there was no external input capable of accepting the test signal, and the prerecorded response shape showed a calamitous fall in the treble.

Recording, which suffers the intervention of automatic level control, can be performed almost without user intervention, and includes powerful facilities for editing CDs onto tape. Record mode may also be actuated by a built in timer, which can operate independently as a sleep timer.

CP-S600H loudspeakers

Utterly conventional is the first phrase that springs to mind. The loudspeakers have an unobtrusive, almost low-key appearance, and are proportioned much like most of the other speakers. The drivers

consist of a small 12cm bass/midrange unit and a 5cm so-called tweeter. The latter is similar to the kind of unit found in small portable radios, which may help explain the rather raucous treble. The measurements show some raggedness throughout the audio band, though the overall response shape is close to neutral.

How it performs

Auditioning revealed that this was one of the more interesting and attractive systems. Like the similarly priced Sanyo system it is simply very enjoyable to listen to, partly because it is comparatively uncoloured and clean. In contrast to the Sanyo, however, this Sharp is a great deal leaner and, er sharper in presentation. The amount of detail extracted from known recordings was verging on what would be expected of a good budget hi-fi system.

Although other aspects of the system downgrade the final sound quality somewhat, the S600H remains at its core a strikingly effective tool for exploring as a well as simply soaking up music.

These 'other aspects' are mainly concerned with specific shortcomings in the individual source components, the cassette deck in particular. As the measurements indicated, prerecorded tapes sound thick and gluttonous, any detail vanishing down a black hole of treble dullness. Much the same observations were made when recording too, the loss of detail and top end presence being quite severe. Gain

riding is apparent with very dynamic material (my test tapes include a very compressed sounding Respighi *The Birds* and likewise with some Mary Black songs), and pitch integrity is none too hot. All in all, this cassette deck was disappointing, even by the dismal standards that generally prevail amongst system cassette decks.

I had a problem with the AM radio, which acted as an interference trap *par excellence*, refusing to provide a clean signal even when other rival systems were sounding as clear as a bell. The FM side was much more satisfactory, however. Like the CD player, it was basically open and neutral, with a tendency perhaps to leanness and dryness, though it's difficult to allocate such characteristics to an individual source rather than the system as a whole.

Prolonged experience pointed up certain ergonomic shortcomings that were not apparent on first examination. The CD loading drawer can't be opened unless the system is explicitly set to CD, for example. Hit the 'tuner' key while a CD is being disgorged and the drawer sticks half way, which could make you look a little foolish when demonstrating the system to the Joneses.

It also prohibits a perfectly natural task like listening to the radio whilst preparing a disc for play. I found the electronic rotary volume control with its gimmicky but far from useful volume readout increasingly irritating. It's too slow: mechanical rotary volume

controls can be turned at any speed, and a mark on the circumference provides a built in means of registering the level to which they're set. Since this inherently superior approach has been available for the last hundred years, why bother to employ a palpably inferior high tech alternative?

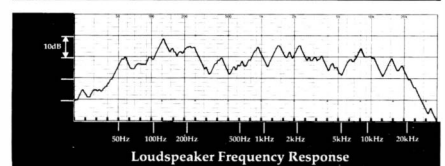
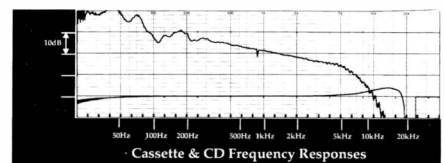
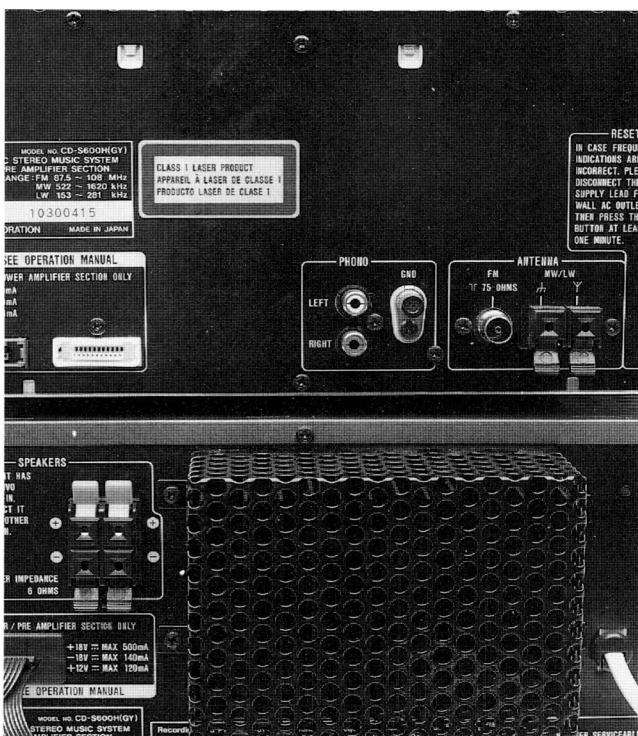
Verdict

A number of specific shortcomings let down what is on the whole a very presentable sounding system, but which falls a little short of achieving the criteria for a formal recommendation. The worst feature is undoubtedly the

coarse and flat sounding cassette deck, though the AM radio is also likely to give problems in practice. The rest of the system, however, sounds excellent, and the consistently sharp, detailed quality should win it many friends. Other highlights include the excellent high-tech backlit display; lowlights are that volume control and the lack of external flexibility.

TEST RESULTS

Cost with speakers	£530, without n/a
Options	none
Size main unit	32x27x27.5cm (hxwxwd)
Size loudspeakers	31.5x16x21.5cm (hxwxwd)
TUNER	
Sensitivity	average
Signal/noise	good
CASSETTE DECK	
Wow & flutter (wtd)	n/a
Signal/noise ref 0dB Type II	n/a
Distortion 0dB Type II	n/a
COMPACT DISC PLAYER	
Signal/noise (measured at amp Tape Output)	96dB
AMPLIFIER	
Power output/channel (80ohms)	17/17/17 watts
(20Hz, 1kHz, 20kHz both channels driven)	
LOUDSPEAKERS	
Sensitivity	average



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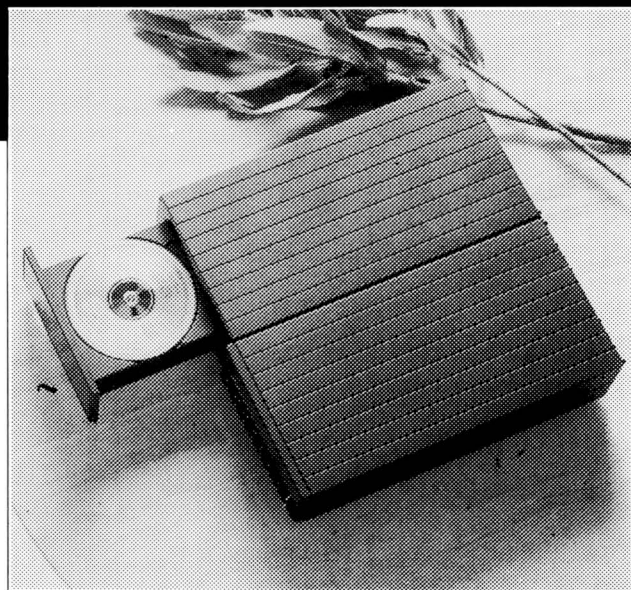
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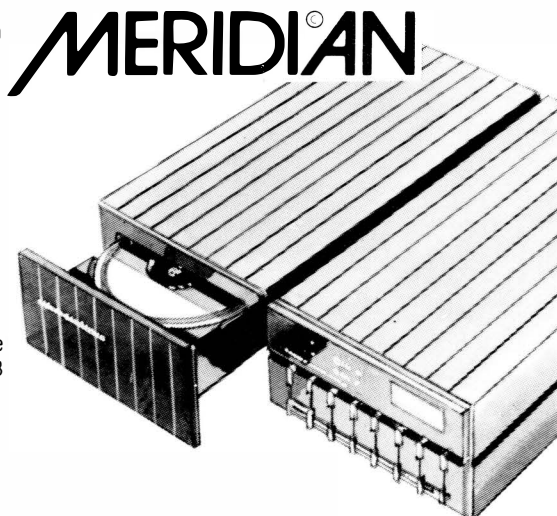
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Technics SC-CH7

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One of the less expensive systems of its type, this £550 box of tricks is also the most compact of all the traditionally packaged systems (excluding the B&O which is quite different and cannot be directly compared). Like the Sanyo but in contrast to all the others, this is a true mini in the sense that component widths are held down to 215mm, which is precisely half the 430mm standard component width. The height of the system is also less than usual, not least because the CD player's display panel covers its loading drawer.

Not only is the Technics small, it is also flexible, and may be stacked vertically or laid out in either of two horizontal configurations, two or three components wide.

Once the interconnections have been made, the rear panel can be smartened up using simple snap in plastic covers, an especial advantage if the system is placed on a room divider. Apart from the ribbon cable that ferries supply, control and audio voltages from component to component, interconnections are limited to those required to add a record deck and an outboard tape deck (or any line source). Headphones and microphones can also be used.

Note that the loudspeakers are totally dedicated designs with special four-wire connections, and the provided cables are far too short for proper stereo placement. One consequence is that it is impractical to change or upgrade the speakers.

The usual features include automatic

source selection, for example when play is pressed on any of the source components. In addition the remote control has three prominent 'easy play' buttons, one each for CD, cassette and tuner, which start the appropriate source and select the amplifier input accordingly.

ST-CH7L tuner/timer

The tuner has 28 available presets on the standard FM, MW and LW wavebands, and these may be randomly assigned apart from certain restrictions over the number of AM stations that can be stored.

A clock and timer with daily and weekly settings and a sleep mode shares the same packaging and part of the fluorescent display panel. Besides allowing absentee off-air recording, the timer can play one source in sleep mode at a low volume, and then wake you up the next morning with a much higher volume setting and a different source, making for a very superior alarm clock indeed.

RS-CH7 cassette deck

Behind a double width flap lurk two auto-reverse transports, one of which is for replay only and will normally be used only when dubbing (at normal or double speed) or for sequential play.

Tape management is assisted by track search and an electronic tape counter which can read from either transport. Just the one set of transport controls is assigned automatically; the arrangement is visually clear, but it can be hard to gauge

what you're doing incorrectly. Dolbys B and C are included, but record levels can only be set automatically, which implies some loss of absolute fidelity.

The measured behaviour was not inspiring. The response plot which applies to prerecorded material is extremely treble shy, whilst wow and flutter is an uninspiring 0.21 per cent, while the effects of the lack of pitch accuracy were only too obvious with the 3.15kHz test signal.

SL-CH7 Compact Disc player

This unusually compact drop-front player has a well filled display with a calendar type readout and a range of other indicators. Besides the standard range of play and trick play modes, there are various tape edit modes, including one which fades the recording out at the end of side one and restarts the recording on side two from the beginning of the same track, and one that avoids recording a track that can't be fitted in before the side break. All this is additional to the usual editing functions which can rearrange the track running order and, if required, fade out the end of a recording.

SU-CH7 amplifier

Instead of a standard stereo amplifier, there are two independent stereo power amplifiers inside the case, one 25W/channel job for the bass and 5W/channel for the mid and treble, confirmed by the measured RMS figures.

Independent control over the low and



high frequencies is intended to achieve 'thundering bass that will really get your heart pounding', but see later.

The graphic equaliser is a little different from most. Rather than providing individual control over nine frequency bands, there are six preset equalisation modes, any one of which can be strengthened or reduced by a large front panel device called Sound Jog, which also controls a 'sound spread' feature, enabling the stereo width to be continuously varied. This is coupled to a spectrum analyser display with various alternative pretty but pretty useless display modes which help illustrate what you're listening to. Surely electronics is going mad...

SB-CH7 loudspeakers

Strongly built with a smooth, rounded baffle (worthwhile acoustically), this two-way design has a small cone tweeter and an enclosure broken up into separate but connected chambers.

Described by Technics as a three port design, a series of cavities distribute low frequency resonances across a range of frequencies in the hopes of lowering the bass cutoff point. In practice the SC-CH7 looks like a well optimised loudspeaker of its type, though the in-room measurements suggest that bass extension is no greater than usual.

How it performs

This is an interesting system which combines many of the better qualities of the

Sanyo and the Sharp systems. It has the Sanyo's warmth and fullness, through a bass region that is in constant danger of overkill even before attempting to use the Super Bass circuit. The latter is a classic case of over-egging the pudding, and in my judgement is scarcely ever useable unless you really like your bass grossly overdone. Most of the preset equalisations merely compound the sins by adding even more bass boost, but it is possible to achieve a reasonable balance with care.

Like the Sharp, this Technics offers excellent resolution of fine detail, though the former's faintly hollow metallic coloration is here replaced by a smoother and considerably silkier quality. Intriguingly, this quality shines through irrespective of the settings of the equaliser and other controls; it's a deep down, inherent characteristic of the system.

The rest of the story goes largely by the form book. The cassette deck sounds entertaining at best, unacceptable at worst, pitch instability lurking behind a rather coarse and uneven treble quality. As the measurements imply, prerecorded material sounds dull and lacking in detail, and to a lesser extent the same applies when recording, especially on ferric and chrome bias tapes. Metal tapes sound a little more neutral, but certainly not better in any other respect, and cannot be considered cost effective.

Happily, the other source components were evenly and well behaved. The FM radio section sounds clean and detailed, and even produces a reasonably coherent stereo image from some Radio 3 broadcasts monitored during the test. Even the AM section works satisfactorily. The CD player is better still, and consistently capable of an open, involving standard of music reproduction across a wide range of material.

One small point concerns the amplifier's fan cooling. The fan is thermostatically triggered, but when it comes on it does so at full speed, producing an annoying steady whistle.

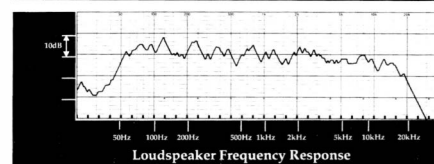
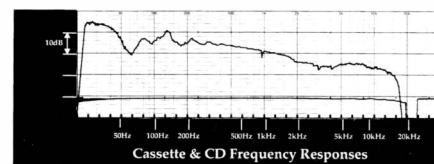
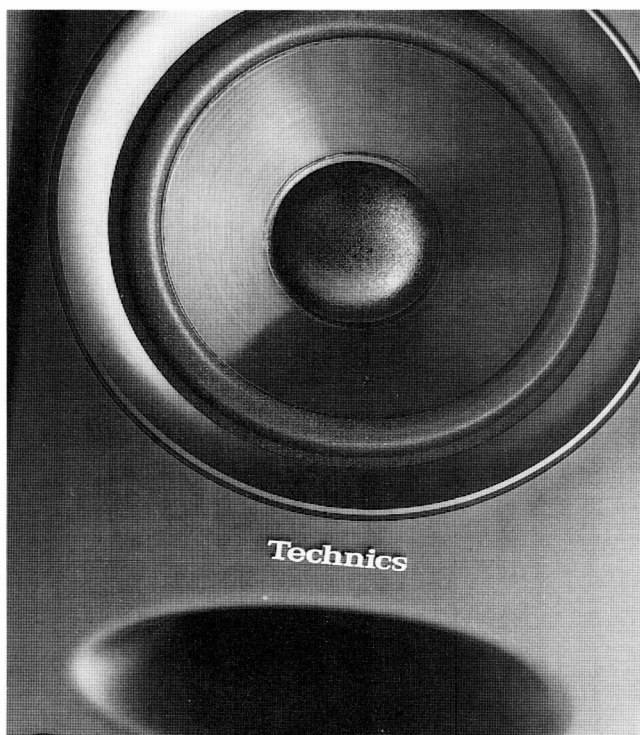
Verdict

This model is a good all rounder, and can be confidently Recom-

mended. The cassette deck is weak but both other sources are fine. Sound quality is a little lush, but smooth and sweet with it, and the whole is exceptionally compact even by mini system standards.

TEST RESULTS

Cost with speakers	£550, without n/a
Options	none
Size main unit	33x21.5x30.5cm (hwxwd)
Size loudspeakers	33x16.5x30.5cm (hwxwd)
TUNER	
Sensitivity	good
Signal/noise	good
CASSETTE DECK	
Wow & flutter (wtd)	0.21%
Signal/noise ref 0dB Type II	n/a
Distortion 0dB Type II	n/a
COMPACT DISC PLAYER	
Signal/noise (measured at amp Tape Output)	>96dB
AMPLIFIER	
Power output/channel (8Ohms)	25+3/28+5/25+5 watts
(20Hz, 1kHz, 20kHz both channels driven)	
LOUDSPEAKERS	
Sensitivity	average



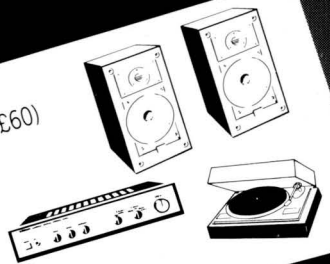


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Sony TAF540E	379.95	392.95	412.95	424.95	444.95	459.95	499.95
Technics SUVX500K	324.95	336.95	356.95	368.95	388.95	404.95	444.95
NAD 3240	356.95	368.95	388.95	404.95	419.95	436.95	476.95
Marantz PM40SE	388.95	399.95	419.95	432.95	452.95	468.95	509.95
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Technics SUVX600K	356.95	368.95	388.95	399.95	419.95	436.95	476.95

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RA820 BX4 Amp	£189.95	£132.95
RCD 865 CD Player	£299.95	£194.95

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OPTIONS

The following Compact Disc Player or Turntable may be ordered instead of the Dual CS503/2 in the above systems.

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 - Denon DCD580
 - Denon DCD660
 - Denon DCD860
 - Denon DCD960
 - Marantz CD41
 - Marantz CD42
 - Marantz CD52
 - Marantz CD62
 - Marantz CD72
 - Nad 5420
 - Nad 5425
 - Nad 5440

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- add £35
- add £55
- add £115
- add £155
- add £55
- add £25
- add £55
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- add £55
- add £155

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- deduct £20
- add £25
- add £55
- add £85
- add £250
- deduct £15
- add £5
- add £25
- add £105
- add £155
- add £105
- add £155
- add £115
- add £155

TURNTABLES

- Technics SLPG200AK add £15
- Technics SLPG400AK add £35
- Technics SLPG500AK add £55
- Dual CS505-4 add £25
- AR EB 101 add £100
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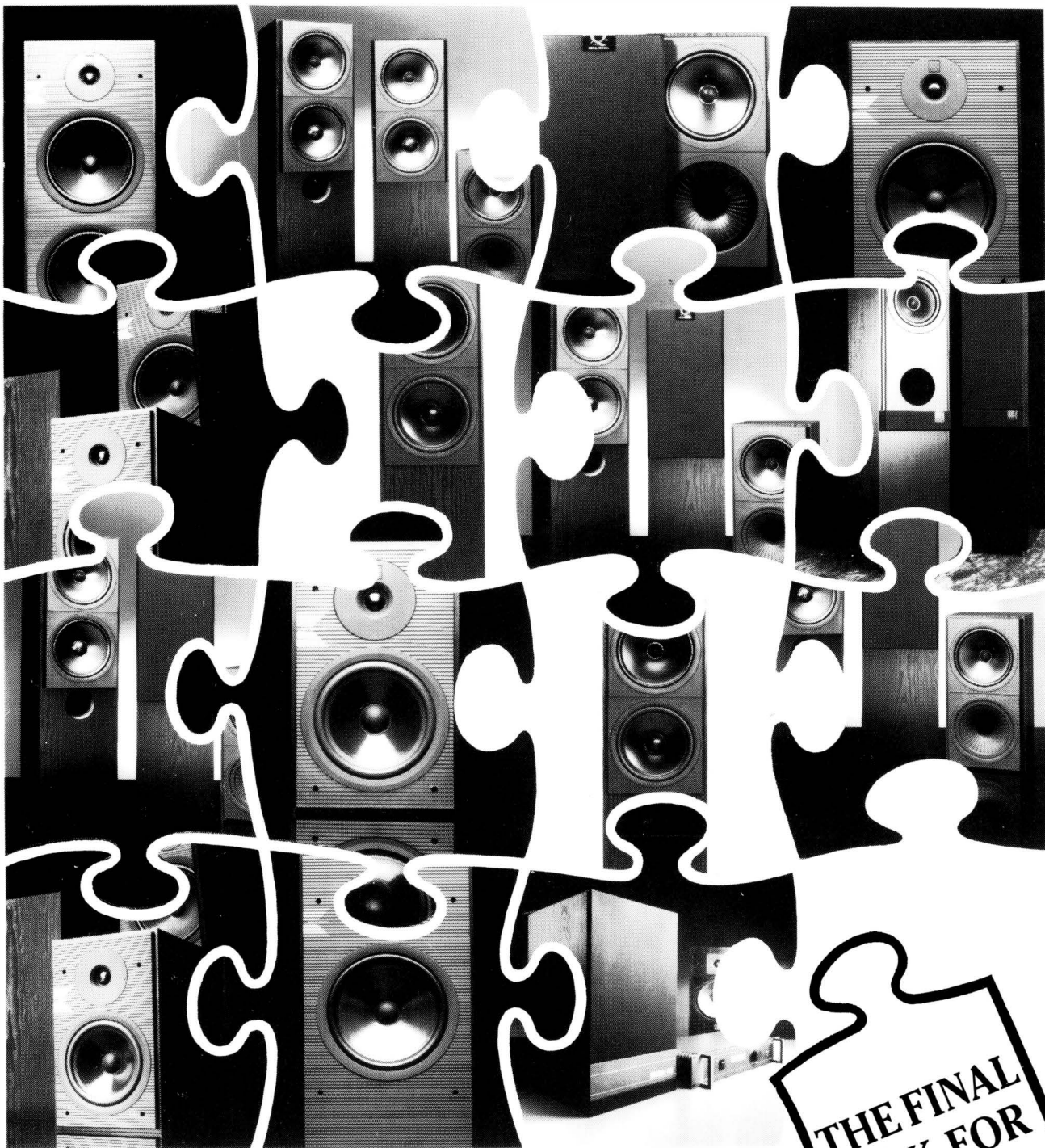
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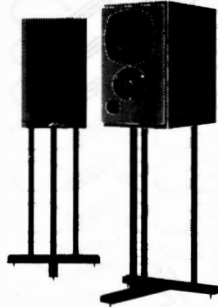


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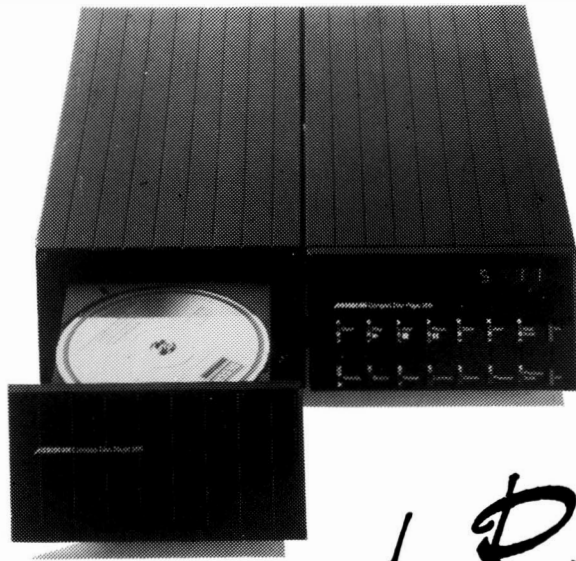
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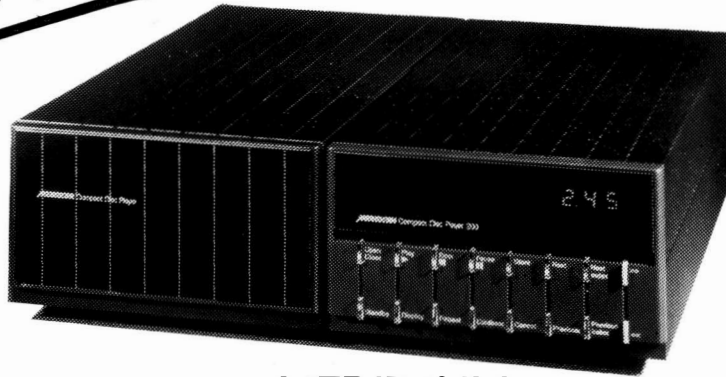


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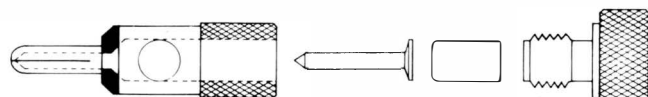
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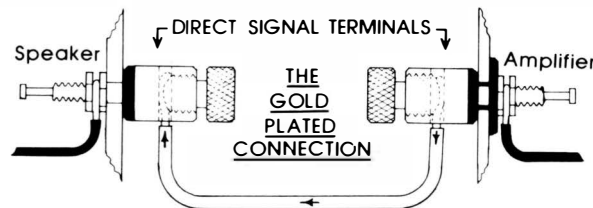
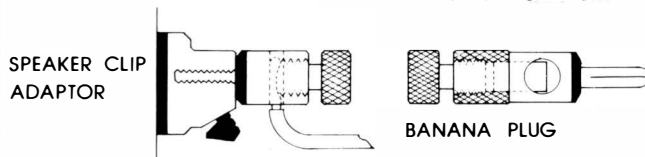
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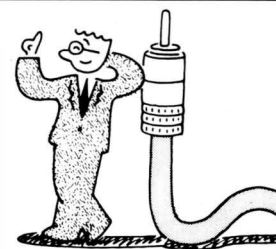
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
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Choosing a good hi-fi dealer is the most vital step in acquiring the system that is right for you. This unique directory gives full information on dealers in your area.

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WENTWORTH AUDIO, 83 High Street North, Dunstable. (0582) 663383. Pioneer, Marantz, Pink Triangle, Musical Fidelity, Yamaha, Ariston, Linn, Acoustic Energy, Revox, Monitor Audio. 2 large single speaker dem. rooms. 1 general showroom. No appt. nec. Home trial. Free install. Service dept. Access & Visa. Tue-Sat 10-6

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B&B HI-FI, 11-12 Market Place, Reading, Berkshire, RG1 2EG. (0734) 583730. Aiwa, Denon, Kenwood, Mission, NAD, Panasonic, Pioneer, Rotel, Sony, Technics. Free installation. Service dept. Access, Visa, Credit Facilities including interest free credit subject to status. 9.30-5.30, Sat 9-5.30. Also at: Bracknell, Maidenhead, High Wycombe, Newbury. NEWBURY AUDIO, 2 Weavers Walk, Northbrooke St., Newbury, Berkshire RG13 1A1 (0635) 33929. Linn, Naim, Roksan, Exposure, Creek, Epos, Royd, Denon, Nakamichi. Single speaker dem. Room. Appts. necessary. Home trial facilities. Free installation. Service dept. Late appointments Access, Visa. Interest free credit subject to status. 6 days 9.30am-6pm RADFORD HI-FI, 43 King Edward Court, Windsor. (0753) 856931. Choose from a huge selection of the world's leading hi-fi manufacturers in one of our modern dem rooms. Expert advice and personal service guarantee your total satisfaction. FREE home trial, FREE installation. Visa, Access credit facilities. 9-5.30 Tue-Sat. **BADA**

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GILSON AUDIO LTD, 172 Borough Road, Middlesbrough. (0642) 248793. Linn, Exposure, Arcam, Mission, Cyrus, Denon, Marantz, Rotel, Pioneer, Audiolab, Tannoy. Demonstration facilities in main shop and 1 dem. room, appt nec, home trial facilities, free install. on request, service department. Access, Visa, HP. 10-5 - 6 days.

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BANG & OLUFSEN CENTRE - HI-WAY HIFI (MARLOWES) Ltd, Unit 32, Marlowes, Hemel Hempstead. (0442) 235755, Fax: (0442) 231825. Stockist also of Kenwood, Pioneer, Technics, Yamaha, Aiwa, JVC, Bose, Heybrook, Wharfedale, Sony, etc.

DARBYS OF ST. ALBANS, 6 Market Place, near the clock tower, St. Albans, Herts. (0727) 50961. Alphason, A&R Cambridge, Bang & Olufsen, Denon, JBL, Harman Kardon, Musical Fidelity, Quad, Ruark, Sony, Home demonstrations, free delivery and installation. Sales rental service. In house credit. Lombard, Tricity, Mon-Sat 9-6

STUDIO 99, 82 High Street, Harpenden. (05827) 64246. Linn, Naim, Meridian, Gora, Nakamichi, Mission/Cyrus, Quad, Creek, KEF, Bang & Olufsen, Yamaha etc. Quiet single speaker dem room. Appts nec. Home trial, free install. Service Dept. Visa/c, Access/c & finance terms. 9-5.30pm (Mon/Sat). Closed Weds.

BADA
THE AUDIO FILE, 27 Hockerill St, Bishops Stortford, Herts CM23 2DW. (0279) 506576. 9.30-5.30 6 days. Dealer Of The Year 1988/89. Linn, Naim, Rega, Quad, Cyrus, Arcam, Musical Fidelity. 0% credit.

BADA

NORTH HUMBERSIDE

MURRAY HI-FI, Princes Dock Side, Hull. (0482) 227867. Linn, Naim, Rega, Arcam, Yamaha, Royd, Epos, Creek, Nakamichi, Rotel. Full demo facilities. No appts nec. Free install & delivery. Service dept. Full 2 year guarantee on all products. Access, Visa, Lombard Tricity, Licensed credit broker. 10-6 Tue-Sat

JUST AUDIO, 2A Foston Lane, North Frodingham, Driffield. Tel 0262 488700, call for details.

SUPERFI, 4 Dock Str, Queens Gardens Hull, HU1 3DL. (0482) 24051. See main entry under Nottinghamshire for full details.

KENT

JOHN MARLEY HI-FI CENTRES, 2 Station Rd, West Canterbury. (0227) 769329. Also at Dover - (0304) 207562. B&W, Heybrook, Magnum, M.Y.S.T., Nakamichi, Pink Triangle, Rotel, Sansui, Technics, Quad. Dem and home trail 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. Kenwood, Pioneer, Sony, Technics, Bose, Tannoy, B&W, Goodmans

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 to 5 only). Service Dept.

BADA
PROGRESSIVE AUDIO, Rainham, Kent. (0634) 389004. Alphason, Audio Innovation, Conrad Johnson, Proac, Raymond Lumley, Rock Reference, Snell, TDL, Voyd and others. Dem by appt., please phone. Home trial. Free installation. Access, Visa.

STANDENS, 92a High Street, Tonbridge, Kent TN9 1AP. (0732) 353540. Pink Triangle, Kelvin Labs, TDL, Ruark, Marantz, Quad, Musical Fidelity, Micromega, NAD, Arcam. 2 Demo rooms. Home trials. Free installation and Service dept. Access & Visa. HP terms and Bada credit charge. 9.00-5.30 Mon-Sat except Wed 9.00-1.00

BADA
VOLUME ONE, 41 Upper Wickham Lane, Welling, DA16 3AD. (081) 304 4622. Arcam, Creek, Quad, 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

MONITOR SOUND, 54 Chapel St, Chorley. (02572) 71935. A&R, Denon, Dual, Pioneer, Quad, Rogers, Rotel, Spondor, Technics, Thorens, etc. 2 dem rooms. Open Mon-Sat, closed Weds. Free installation. Credit to £1000. Access, Visa. Service dept

NORMAN AUDIO, 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

ALPHA AUDIO, 1-3 Guildhall Lane, Leicester LE1 5FQ. (0533) 530 330 Allison, AR, Denon, Luxman, Proton, Revox, Teac, Thorens, plus lots more. 3 dem rooms. Jovial, friendly, crazy staff. Relaxed atmosphere. Home trial facilities, free installation, service dept on premises. Credit facilities (sort of interest free), 10-5, closed Thurs afternoons (sometimes). MJS HI-FI, 80 Stapleton Lane, Barwell, Leicester LE9 8HE. (0455) 846977. The Rock, Audio Innovations, Kelvin Labs, Snell, Helius, Sugden, Ruark, Concordant, Valdi, JPW. Dem and home trial facilities. Mon-Sat 9.30-7.00. Free installation and service dept. Visa, Access

THE LEICESTER HI-FI CO, 6 Silver Walk, St. Martins Square, Leicester LE1 5EW. Tel: (0533) 539753. Fax: (0533) 626097. Arcam, Creek, Marantz, Mission/Cyrus, Musical Fidelity, Nakamichi, QED Hi-Fi, Quad, 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. Leicester's first Bada member.

BADA

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

SOUNDS AROUND, 146A Clarendon Park Road, Leicester LE2 3AE. (0533) 702442. (Specialists in used Hi-Fi). A.R. Celestion, TEAC, Mordaunt Short, Tannoy, Marantz, Wharfedale, Philips. No appts necessary, free installation. Service dept. Access, Visa. Tue-Sat 10-5

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 ACOUSTIC, West Ealing. (081) 998 9041. Audio Dimensions, Audio Innovations, Audion, Audio Note, ATC, D.C.M, Glastonbury, Goldring, Helius, Infinity & Modulas, JPW, Lynwood, Mana Acoustics, Marantz Audiophiles, Michell, Nova, Ongaku, Oracle, Originlive, Ortophon MC3000II+MC5000+T3000, Pirates, Rata, Revox, Rotel, Rose Industries, Rock Reference, Snell, Supra, Systemdek, Target, Triangle Products, Valdi, Vecture, Voyd & Reference Voyd, Home Demos. Free install. Single Spker Demo. Free System Design. Free knowledgeable service. Access, Visa. 9.30-6pm. Till late Mon-Sat. Demo by appt. please

The Choice Dealer Directory

AUDIO CHOICES, 66 High Road, Leytonstone, Stratford E15. (081) 534 6987. Marantz, A&R, Musical Fidelity, SD Acoustics, Rotel, Audio Technica, Ruark, Roksan, Moth, Nakamichi, B&W, Van den Hul, Dual, Pink Triangle, Alison Acoustics. Dem room, home dems within M25 area. 10.30-7.30. AUDIO VENUE, 24 Church Road, Crystal Palace, London SE19 2ET. (081) 771 7787. Linn, Naim, Nakamichi, Marantz, Dual. Credit available. 2 yr warranty. 2 demo rooms. Closed Weds

AUDIO T, 190 West End Lane, West Hampstead, London NW6 1SQ. (071) 794 7848, Fax (071) 431 3570. Great hi-fi from Linn, Arcam, Denon, Meridian, Mission/Cyrus, Rotel, Proac, Micromega, Yamaha and many more. Tue-Sat 10-6pm. 2 single spker dem room. Free del. and instal

BADA

BILLY VEE SOUND SYSTEMS, 248 Lee High Road, London SE13. (081) 318 5755. Linn, Rega, Naim, Nakamichi, 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 HOJA. (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, Dual, 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-WAY HI-FI LTD, 313-315 Edgware Road, London (071) 402 2441, 287-289 Edgware Road, London, (071) 723 5891, 242 Tottenham Court Road, London, (071) 636 5974. Stockists of Nakamichi, B & W, Yamaha, Denon, Technics, JVC, Pioneer, Teac, Sony, Aiwa etc. Fax No (071) 724 6101

.KJ WEST ONE, 26 New Cavendish St, London W1M 7LH. (071) 486 8262/63. Fax (071) 487 3452. Arcam, Audio Research, Acoustic Research, Apogee, Arcam, Audiolab, Creek, Epos, Linn, Meridian, Musical Fidelity, Pink Triangle. Appts nec. Home trial. Free installation. Service dept. Major credit cards. Mon-Sat 10-6pm. (Late night 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-. 2 dem rooms, appointments preferred, home trial facilities, free installation, service department. Visa, Access, Amex, Full credit facilities, including interest free. Mon-Sat 10-6.

NICHOLLS HI-FI, 430-434 Lee High Road, Lewisham, London SE12 8RW. 081 852 5780. Sony, Technics, Harman, JBL, Mordaunt Short, Kenwood, Panasonic, Hafler, Sumo, B&W. Demo facilities, no appt. nec., home trial facilities, free installation, service dept.. Credit available, Visa, Access. Open 9.30-6 Mon-Sat, Thurs 9.30-1pm.

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

SOUTH LONDON HI-FI & VIDEO, 210 Brixton Hill, Streatham SW2. (081) 674 4433/2033. Denon, Rotel, Yamaha, Kenwood, Tannoy, B&W, Inakamichi, Dual, Thorens, Technics, Monitor Audio. Single speaker demo room. Appts. not nec. Installation available. Service Dept. Access, Visa, Amex. Interest Free & Standard credit. 9-6, 6 days

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 & financeterms. 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

TIME AND TUNE, 218/220 Whitechapel Road, London E1 1BJ. (071) 247 0567/B/9. Akai, Aiwa, Bose, Hitachi, Kenwood, Mitsubishi, Panasonic, Philips, Pioneer, Sony, Technics. Home trial facilities. Free installation Service dept. Instant HP. 9.30am-6pm Mon-Fri, 9.30am-2pm Sun, Sat Closed.

TUNE INN, 124-126 St. Mildreds Road, Lee, London SE12 0RG. 081 698 4446. Huge range of fully guaranteed used equipment, Part exchange welcome. Full service facilities. Great after sales. Demos available on all equipment. Best offers for unwanted equipment.. collection arranged. Access, Visa, Amex. credit facilities. Mon-Sat 10-6.30

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. Rotel, NAD, Technics, Philips, Aiwa, Kenwood, Tannoy, Wharfedale, MA, Infinity, 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; 10.00-7.30 Thurs, Fri. Closed Mon.

CENTRAL RADIO, 30-32 Shudehill, Manchester M4 1 EY. Tel: (061) 834 6700. JBL, Mission, B&W, Wharfedale, Grundig, Harman-Kardon, Panasonic, Technics, sony, Bose, Aiwa, Trio Kenwood. Call for details.

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 12yr 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, Dual, Heybrook, Linn, Monitor Audio, Musical Fidelity, Quad, Rotel, Tannoy etc.

BADA

RIVERSIDE HI-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.

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

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. (021) 354 2311. Arcam, Audio Innovations, B&O, Carver, Castle, QED, Wharfedale, Yamaha, Cambridge Audio, Hafler. 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

AUDIO BY MAINWAY, Sharing Asda Car Park, High Street, Bloxwich, Walsall, W. Midlands. (0922) 473499./493499. Meridian, Kef Reference, Albery Arcam, Quad, Rogers, Musical Fidelity, TDL, System Dek, QED Elect, Ariston, Linn, Audio Technica, JPW, Van den hul etc. The Midlands most exclusive Hi-Fi Centre with private listening studio. Open evenings by appt. Home trial. Free install. Own service dept. Inst. credit. Chargecard. Interest free. Access, Barclaycard. Mon-Sat 9-5.30.

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

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, Tunes-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.

MUSICAL 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 Creditcharge. Mon-Sat 9-6.00

NORMAN H FIELD, 35-37 Hurst Str, Birmingham B5 4BJ. (021) 622 2323/3619. QAiwa, Celestion, Denon, Dual, Nad, Tannoy, Technics, Thorens, Wharfedale, Yamaha & more. Private listening rooms, service dept, Lombard Tricity. Access, Visa, Switch. Mon-Fri 9.15-6pm, Sat 9.00-6pm.

SUPERFI, 67 Smallbrook, Queensway, Birmingham B5 4HZ. (021) 631 2675. Specialist Hi-Fi stockists of: Audio Lab, Musical Fidelity, Quad, Pioneer, Yamaha, Rotel, Wharfedale, Tannoy, Celestion and many more. Single spker rooms by appt.

NORFOLK

BASICALLY SOUND, The Old School, School Rd, Bracon Ash, Norwich NR14 8HE. (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

MUSICAL PREFERENCE, Bunwell, Norfolk NR16 1NA. (0953) 789562. ATC, AVI, Basis turntables, Chord, Cogan Hall, Cables, Deltac, MFA, Pink Triangle, TDL, TEAC CD & more. Reference Imports specialist. Exclusive individual service with professional sound expertise, full warranty & backup. Home demo & trial, free install. Call any time for appointment. Access & Visa.

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

NORTHAMPTONSHIRE

CLASSIC HI-FI + VIDEO, School Lane, Kettering, Northants. (0536) 515766. 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.

CLASSICAL SOUNDS, 84E Watling St East. Towcaster NN12 7BS. Tel. 0327 359588, call for details.

The Choice Dealer Directory

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, Art Audio, Croft Acoustics, Kelvin Labs, and much more. 2 dem rooms. Home trial, free installation. Access, Visa & credit facilities and mail order. Mon-Fri 10am-4.30pm. Sat 9.30-5.30. Sun & evenings home dem by appt. Closed Weds
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.

AUDIO T, 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. Free tel. 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 Place, Oxford OX1 1JE. (0865) 790879. Oxford Acoustics, Audio Research, Krell, Magneplanar, Apogee, Aragon, Stax, Marantz, Wharfedale, Cambridge Audio. Home trial and free installation. Instant credit. Access, Amex, Visa. 10-6 Tues-Sat. Service dept.

WITNEY AUDIO 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-Sat 9-5.30. 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.

SHROPSHIRE HI-FI, St. Michael's St., Shrewsbury, Shropshire. (0743) 232065. Ariston, Audio Technica, Cambridge Audio, Deltac, Denon, Dual, Infinity, Kenwood, Mordaunt Short, Musical Fidelity, etc. Demo room, free parking, free installation, repairs.

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.

PAUL ROBERTS HI-FI, 32 North St., Taunton. (0823) 270000. For facilities see entry under Avon.

WATTS RADIO - the engineers, Jim Badman, 1 West Street, Somerton. (0458) 72440. Aiwa, Castle, Dual, Denon, KEF, Ortofon, Quad, Rogers, Tannoy, Thorens, Yamaha. Dem and home trial facilities. Mon-Sat 9-1, 2-5.30, Wed 9-1. Free installation. Credit to £1,000. Access, Visa. Service dept.

STAFFORDSHIRE

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

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 facs. Account and credit cards. Ring for opening times and free Fact Pack **BADA**

GRANGE HI-FI LTD, 153 Branson Road, Burton-on-Trent, Staffordshire DE14 3DQ. (0283) 336555. 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 Wednesday Closed for lunch 12.00-12.30.

HI-FI STUDIOS, 20-22 Lonsdale Str, Stoke-on-Trent, Staffordshire ST4 4DP. (0782) 47125, Fax (0782) 747331. Sony, Technics, Pioneer, JVC, Panasonic, B&W speakers, Castle speakers, Mitsubishi, Canon, Hitachi Mail order facility available. Free install, service department. Access & Visa. Open 6 days 9.30-6pm.

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.

THE STEREO SHOP, 94 Norwich Road, Ipswich, Suffolk. (0473) 233832. Linn, Exposure, Musical Fidelity, Creek, Epos, Monitor Audio, Mordaunt Short, Marantz, Rotel, Philips, NAD, 2 single speaker listening rooms. Multi rooms specialists. Free installations. Service dept. Plus 3 year guarantee. Access & Visa. Licensed credit broker. 10.00-6.00 Tue-Sat Thurs 10.00-8.00 (by appointment) **BADA**

SURREY

AUDIO INC, 44 Walton Road, East Molesey, Surrey KT8 0DQ. (081) 941 4234. Acoustic Energy, Conrad, Johnson, JA Michell, Proac, Croft, VPI, Thorens, Pink Triangle, Rotel, Luxman. Single speaker dem room. Home trial facilities. Free installation. Access, Visa. Interest Free Credit on some items, standard credit terms. 10-6 Mon-Sat. 10-8 Thurs. 10-4 Sun.

AUDIO SOUTH, 5 Mead Lane, Farnham, Surrey GU9 7DY. (0252) 714555. Audio Innovations, JPW, Luxman, Marantz, Ortofon, Rotel, Snell, Sugden, Teac, 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 install. 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 GU1 4RY. Tel: (0483) 504801. 9-6 Mon-Sat. Linn, Meridian, Creek, Arcam, Quad, Revox, Musical Fidelity, Rotel, NAD, Nakamichi, Marantz. **BADA**

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
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, Service dept. **BADA**

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. Marantz, Musical Fidelity, QED, Radford, Tannoy, TDL, Kelvin Labs, Gyrodec, Reference Imports, Acoustat, Basis Turntables, M.A.S., Rotel, Chord, KEF. Single speaker demo room. Appts not necessary, home trial facilities, free installation, service dept. Access, Visa, Mastercard. 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.

SUSSEX (EAST)

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

JEFFRIES HI-FI, 69 London Road, Brighton, East Sussex. (0273) 609431. 2 dem rooms, closed Mon, late night Wed. Parking, bus route. Credit facilities. **BADA**

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

LASER SOUND & VISION, 72 Terminus Road, Eastbourne, East Sussex BN21 3LX. (0323) 640911. Laserdisc specialists P.A.L. & N.T.S.C. (new & secondhand). Phone for free catalogue, mail order throughout UK, Visa, Access. 9-6pm Mon-Sat.

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) **BADA**

MALCOLM AUDIO, 12 South Street, Chichester, W. Sussex. (0243) 787562. Sony, Technics, Denon, Yamaha, Sherwood, Mordaunt Short, Wharfedale, Allison, Dual, NAD. Appointments necessary. Home trial facilities. Free installation. Service Dept. Access, Visa. 9.15-5, Mon-Sat.

TYNE & WEAR

BILL HUTCHINSON LTD, 87A Clayton Street, Newcastle-Upon-Tyne Tel: (091) 230 3600. A.R., Aiwa, Denon, Dual, JVC, Mission, Mordaunt Short, Omar, Technics, Yamaha, etc. Demonstration facilities. Free installation, service department. Instant credit. Access, Visa. Mon-Sat 10-6
RED RADIO SHOP AND HI-FI CENTRE, 11 Olive Street, (Off Park Lane), Sunderland. (091) 567 2087. Castle, Denon, Bose, JVC, Kenwood, Mordaunt Short, Michell, Teac, Tannoy, Shure. Dem room, large with comparator facility. Free install. Service dept. Interest free credit with no deposit interest free credit. 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 spker dem room, free del. and instal. **BADA**

PR SOUNDS, 58 Castle Str, Troutbridge BA14 8AU. (0225) 777799. Also at Melksham & Devizes. Pioneer. Technics, Kenwood, Denon, Marantz, B&W, Tannoy, JPW, Dual. Where music is a pleasure, personal service, no appt nec.

instalstions & much more. Access/Visa £1000 instant credit. Open 9-6 6 days

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

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The Choice Dealer Directory

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/Creditcharge/£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/Creditcharge/£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, Sony, Arcam, Mission, Denon, Rotel. 2 single speaker dem rooms. Appts. preferred. Home trial. Free installation. Service dept. Access, Visa. Instant free credit available. 10am-6pm Tues-Sat. Sony dealer. Award nominated '86, '87, '88.

TRC HI-FI, 3 Kings Cross St, Halifax HX1 2SH. 0422 366832. Full demonstration facilities at any time, no appts nec, free install, service dept. Access, Visa, Lombards credit charge available. 9-5.30 Mon-Fri, Closed Thur, 9-5 Sat 10-4.

VICKERS HI-FI, 24 Gillygate, York. (0904) 629659. Audiolab, 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)

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, 2 yr guarantee on all equipment. Service available. Access, Visa. 10-8pm 6 days. Phone for further info & FREE fact pack

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.

AUDIO VISION (BRIGHOUSE) LTD, 5 Bethel St, Brighouse, W. Yorks H6 1JR. (1 mile from junc. 25, M62). 0484 713996. Largest range of Technics hi-fi in Yorkshire. Stockist of the new Technics digital reference series. Aiwa hi-fi separates, Mordaunt-Short & Castle Acoustic speakers; Panasonic, Finlux & Mitsubishi Nicam Stereo TVs & hi-fi video recorders, Technics dolby surround sound systems, reproduction furniture. Excellent CD dems. using comparator facilities from a choice of over 1000 compact discs for sale. Please phone us, free expert install., in-store service dept. Visa, Access, Credit charge. Open Mon-Sat 9-5.30

CLEARTONE (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, licensed credit broker. Mon-Sat 9-5.30 (Tue 10-5.30)

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

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

IMAGE HI-FI, 17 The Springs, Wakefield, WF1 1QE. (0924) 200272. AR, Audio Lab, Denon, Linn, Marantz, Meridian, Mission, Monitor Audio, NAD, Quad.

T.R.C. HI-FI, 3 Kings Cross St, Halifax. (0422) 366832. Alphson, Castle, Denon, Harmon/Kardon, Kenwood, Quad, Rotel, Technics, Wharfedale. Free installation, Service dept, No Appt nec. 9.00-5.30, closed Thur

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

BELFAST

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

ZEUS AUDIO, 6 Hope Street, Belfast. (0232) 332522. Audio Innovations, Pink Triangle, Roksan, Marantz, Celestion, Linn, Meridian, Mission Cyrus, Ortofon, etc. Mon-Sat 10.00-5.30, Late night Thurs.

COUNTY DOWN

ASTON AUDIO, 17 Hillhead Road, Dundonald, Belfast. 0247 872431. Akai, Technics, JVC, Pioneer, Mitsubishi, Panasonic, Toshiba, Sharp, Sanyo. Demos available. No appts nec, service dept. Please phone for directions. Mon-Fri 2-8, Sat 10-4

LONDONDERRY

ZEUS AUDIO, 23a Kingsgate Str, Colraíne, BT52 4LB. (0265) 56634. Marantz, Mission Cyrus, Aiwa, Akia, Alphason, Sony, Pink Tri, Celestion, Rotel. Open Mon-Sat 10-5.30, Closed Thurs.

EIRE

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

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

RUSS ANDREWS HI-FI, 34 Northumberland St, Edinburgh, (031) 557 1672. Linn, Naim, Rega, Arcam, Rotel, Marantz, Nakamichi, Quad, MS, MA, Yamaha. Demos. 10-5.30 Mon-Fri, 10-5 Sat.

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

HI-FI CORNER, 52 Gordon Street, Glasgow (041) 248 2840. The best in unbiased sound advice. Open 10-5.30 Tues - Sat. Demo room etc.

HI-FI EXPERIENCE 145 Bath St, Glasgow. (041) 226 4268. Linn, Meridian, DNK, Celestian, Quad, Mission-Cyrus, Denon, Wharfedale, Ruark. 2 Demo Rooms. Tue-Sat 9.30-5.30. Contact James or Gordon.

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.

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.

ROSS-SHIRE

HIGHLAND ANALOGUE, 'Lismore', Avoch, Ross-shire IV9 8RF. (0381) 20655 Acoustat, Basis, Cary, CAT, Cogan-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. Technics, Pioneer, Rotel, QED, Castle, Celestion, Mordaunt Short, Wharfedale, Bose. 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.

ROBERT RITCHIE HI-FI, 102 Murray St, Montrose, Angus. (0674) 73765. Linn, Naim, Rega, Quad, A&R, Cambridge, Creek, Epos, Pioneer, Kenwood, Sony & Technics. 2 demo rooms (1 single speaker). Appts nec., home trial fac., free installation, service dept. Access, Visa, credit facilities. 9-5.30, except Wed 9-1pm.

WALES

CLWYD

ACTON GATE AUDIO, 4 Ruabon Road, Wrexham, Clwyd. (0978) 364500 Arcam, Cambridge, Celestion, NAD, Quad, Radford, Rotel, Semilink, Tannoy, Yamaha etc. Dem room, appts nec, free install, se5rvice dept. Access/Visa, Amex. 9-5.30 Mon-Sat, closed Wed

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. Audio Research, Krell, Linn, Naim, NAD, Yamaha, Quad, Arcam, Mission + lots more. Closed Mon

WEST GLAMORGAN

AUDIO EXCELLENCE, 9 High St, Swansea. (0792) 474608. Audio Research, Linn, Arcam, Mission, Quad, Naim, NAD, Yamaha, etc. Closed Mon.

GWENT

HI-FI WESTERN, 52 Canbrian Rd, Newport, Gwent. (0633) 262790. Also at 60 Arcade Cwmbrian. Pioneer, Technics, Denon, Yamaha, Rotel, B&W, JPW, Aiwa, Arcam, Rogers etc. Demo room, no appts nec, service dept Access/Visa, instant credit. Mon-Sat 9.30-5.30.

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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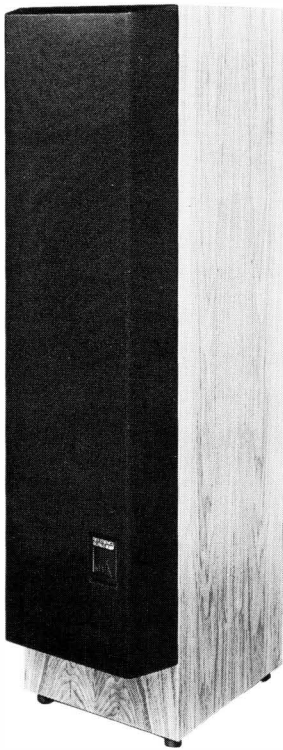
Music Matters are Audio specialists stocking only the finest equipment the market has to offer.

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Choice Offers

Welcome to our new mail order section, where along with old favourites such as the Furakawa interconnects you will now find a whole new range of goodies to improve the performance of your system. These pages are only the start of the service that we hope to provide and we will be sourcing a number of new and interesting products as the next few months go by which will be added to our offers pages as they become available.

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 almost any size - ie Medium, Large and Extra-Large.

Improve the sound of your system for a mere £15



Static Elimination Spray And Lubricant £8.99

200ml of specially formulated record cleaning and lubricating fluid, contained in a pump action fine spray bottle which affords a protection from static electricity. The fluid forms a fine, harmless, lubricating layer in the grooves of the disc which results in lower stylus drag, a cleaner, smoother high frequency sound delivery and prolonged record life when applied regularly.

Static Elimination Spray And Lubricant With Four Wet/Dry Record Cleaning pads £10.99

As above but with the addition of four wet and dry record cleaning pads.

Record Clamp £11.99

Damps vinyl resonance by clamping the record to the turntable's platter thus increasing the ability of the stylus to retrieve information from the disc's grooves without the disc's own inherent resonant frequencies interfering with the groove to stylus interface.

Will work with most popular turntables.

Record Cleaning Pad And Stylus Cleaning Kit 1 £12.99

An entire record cleaning kit containing 50ml of static



elimination spray and lubricant, a Teak handled velvet applicator pad and 20ml of isopropyl alcohol based stylus cleaner and brush.

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Mk 10 Carbon Fibre Brush With Velvet Pad £9.99

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 cleaner after use.

System Cleaning Kit 1 £15.99

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 Compact Disc cleaner and cleaning fluid and a carbon fibre record cleaning brush.

System Cleaning Kit 2 £11.99

As above but for those of you who don't have a turntable to contend with. Contains auto reverse wet tape head cleaner and cleaning fluid, a manual CD cleaner and cleaning fluid.

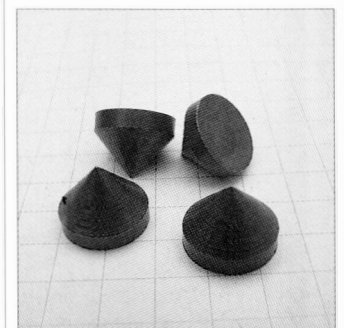
Monotrak Support Cones £8.00

Supplied in packs of four, these turned steel support cones are ideal for supporting just about any item of hi-fi, from sub-woofers through to amplifiers. The cones provide effective isolation and de-coupling at a bargain price.

Interconnects

We have a variety of interconnects on offer, all sourced from the respected Japanese specialist Furakawa.

The **FA21 Series balanced analogue interconnect cables** The FA21 Series of analogue interconnects is supplied in matched pairs employing the Furakawa all PCOCC RCA plug. The cables come with a flying earth or ground lead which is designed to be terminated to the ground tag of the source component for the purpose of transmitting a balanced signal with a totally separate ground path.



These interconnect cables are recommended for the connection of analogue devices where RCA sockets are provided, such as power amplifier to preamp and tape deck, turntable, step-up transformer etc. to a preamp or integrated amplifier. They can introduce a wide stereo image with good depth and height.

Choice Offers Order Form



Furukawa FA11S Series balanced analogue interconnect cables

The FA11S Series of analogue interconnects is supplied in matched pairs employing the Furukawa hermetically sealed all PCOCC RCA phono plug with a flying earth or ground lead.

These interconnect cables are recommended for the connection of high quality analogue devices.

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.

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 an appropriately larger occupation area for the skin effect, therefore bass is larger and treble is even sweeter.

Furukawa FS2T55F Evencap speaker cable

FS2T55F is a 5.5mm 2 rope lay cable of similar construction to the FS2T30F.

Furukawa Price Table

Please circle the cables you require.

Interconnects

	0.5m	1.0m	1.5m	2.0m
FV11 (each) RCA-RCA	42.50	45.50	52.50	57.50
FD11 (pair) RCA - RCA	75.00	85.00	95.00	NA
FA21 (pair) RCA-RCA	NA	95.00	105.00	NA
FD11S (pair) RCA-RCA	NA	220.00	NA	NA

Fibre optics

FO11 (each) TOSLINK	NA	37.50	42.50	NA
FO12 (each) TOSLINK	NA	90.00	100.00	NA
FO13 (each) TOSLINK	NA	105.00	120.00	NA

Speaker cables

Please state termination required, solderless, gold plated banana plugs, spades or pins or any combination. All prices are per pair.

	FS2T14	FS2FO9	FS2T20P	FS2T30F	FS2T35P	FS2T55P	FS2T15
1.0m	38.00	37.00	44.00	53.00	56.00	74.00	129.00
1.5m	42.50	41.00	51.50	65.00	69.50	96.50	179.00
2.0m	47.00	45.00	59.00	77.00	83.00	119.00	229.00
2.5m	51.50	49.00	66.50	89.00	96.50	141.50	279.00
3.0m	56.00	53.00	74.00	101.00	110.00	164.00	329.00
3.5m	60.50	57.00	81.50	113.00	123.50	186.50	379.00
4.0m	65.00	61.00	89.00	125.00	137.00	209.00	429.00
4.5m	69.50	65.00	96.50	137.00	150.50	231.50	479.00
5.0m	74.00	69.00	104.00	149.00	164.00	254.00	529.00
6.0m	83.00	77.00	119.00	173.00	191.00	299.00	629.00
7.0m	92.00	85.00	134.00	197.00	218.00	344.00	729.00
8.0m	101.00	93.00	149.00	221.00	245.00	389.00	829.00
9.0m	110.00	101.00	164.00	245.00	272.00	434.00	929.00
10.0m	119.00	109.00	179.00	269.00	299.00	479.00	1029.00

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Please indicate which items you require by ticking the appropriate box.

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| <input type="checkbox"/> A2 Static Elim. Spray & Lubricant & Cleaning Pads | £10.99 | <input type="checkbox"/> A9 System Hi-Fi Cleaning Kit 1 | £15.99 |
| <input type="checkbox"/> A3 Record Clamp | £11.99 | <input type="checkbox"/> A10 System Hi-Fi Cleaning Kit 2 | £11.99 |
| <input type="checkbox"/> A4 Record Cleaning Pad & Stylus Cleaning Kit 1 | £12.99 | <input type="checkbox"/> A12 Monotrac Support Cones | £8.00 |

- Yes! Please send me Hi-Fi Choice sweatshirts at a mere £14.99 each.**
Please tick size required Medium Large Benham (XL)

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HEAR "WHAT HI-FI?'S BEST BUYS"



PIONEER A 400 – Best Amplifier

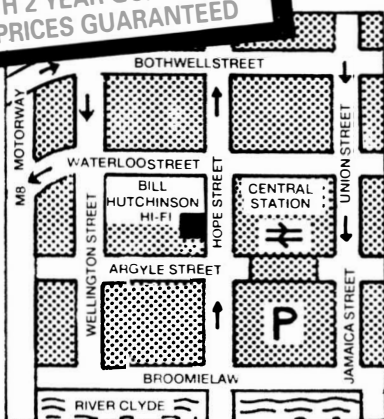
AUDIO TECHNICA AT 110E – Best Cartridge

WARFEDALE DIAMOND IV – Best Speakers

SYSTEMDEK IIX – Best Turntable

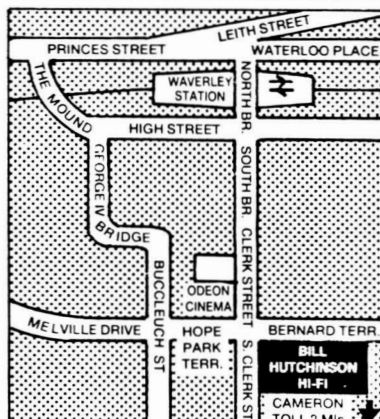
TECHNICS RS B465 – Best Cassette Deck

ROTEL RCD 865 – Best CD Player



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The Directory

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. The products are split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its retail price is placed in its respective category in alphabetical order. For instance, the Acoustic Research *EB101* is presently at the beginning of the Turntables and Tonearms section; however, the Ariston *Superior* heads the Motor Units section as it is solid and was reviewed as a separate component - requiring a separate arm. Where there are several products with the same name but different model numbers these are in price ascending order.

Then come the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests were not carried out. One important point to remember is

that they cannot be used to compare products from different categories - 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.

The next column varies from category to category but is usually either features or specifications, the former being facilities available on a cassette deck or amplifier or the type of drive system on a turntable.

Specifications vary with product type

but usually relate to suitability or capability, for instance in the case of arm matching, figures are given with the cartridges, which tie in with the mass figures for the tonearms themselves, making it easier to avoid compliance/mass mismatches.

Perhaps the most influential letters in the *Directory* are those found in the Value column, the Rs and BBs denoting the Recommended and Best Buy ratings that are appended to products we consider meritorious. The Best Buy tag means that a product not only offers good sound quality but is reasonably priced as well. With source components a price limit of approximately £300 is usually used as a guide. Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively that a good value standard is achieved but overall attainment falls short of Best Buy classification. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment

(especially the electromagnetic elements - that is to say the cartridge and the speakers), 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.

The *Hi-Fi Choice Directory* is constantly updated with the latest reviews and price changes as well as having any discontinued products removed. If a listed product is updated to a 'mark two' form and the alterations are purely cosmetic or not too extensive, we sometimes leave the product in with its current model number, together with an asterisk in order to denote that it has changed since our original review was published.

SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems to be as strong as ever, and certainly represents the route taken by those who place sound quality first.

Yet those who choose the separates route still have lingering doubts - usually completely unjustified - over the compatibility of components from different manufacturers. Gross incompatibilities are very rare nowadays, only likely to rear their heads amongst the most exotic components. Here the delicate art of 'supercompatibility' really takes over the major role and might be regarded as the key to 'real' hi-fi.

There are now three different prerecorded music media competing for the attention of the hi-fi user, and to go for all three will either cost a lot of money or involve substantial compromises in the sound quality of each. For this reason many separates purchasers may start with just one source, adding others or a tuner when funds permit.

There will always be controversy over the relative qualities of LP, CD and cassette. LP is still the choice for ultimate sound quality - particularly for those prepared to spend a substantial sum on a good quality turntable system.

Cassette has never really challenged vinyl's superior quality, but it is a multiple role format, offering 'go anywhere'

flexibility, a uniquely useful recording capability, plus a broad catalogue of 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 latest challenger to these two established media, using a digital instead of analogue storage format. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks, so it is probably fairest to say that CD is fine for most listeners, but may not suit everyone; certainly the lack of background noise, defects and deterioration are major strengths.

While there will always be arguments about the different music storage and transmission formats available to the hi-fi listener, there is also controversy over the relative importance of the different components which make up the system chain - by which is meant the source, the amplification, and the loudspeakers (and for the pedantic the room itself, though there's often little that can be done here).

For many years the 'weakest link' theory proposed that the loudspeakers needed the most attention, that amplifiers merely had to have sufficient power, and that turntables were pretty well perfect. However, this perspective has become steadily discredited by an alternative 'theory of precedence', which stresses that

no subsequent component can make up for the inadequacies of its predecessors - all it can do is supply its own additional degradations. In such a context it is not uncommon to find more than half the system budget allocated to the record player, with scrimping and saving made on amplifiers and loudspeakers.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Good turntables and loudspeakers both benefit to a surprising degree from proper support - from stands that enable them to give their best performance, whether floor-standing or wall mounted.

Siting of components within a room can play a significant role, as can the room itself. Some people may prefer an acoustically more 'live' room than others, but most will agree that the larger it is the better, because this tends to provide smoother and better extended bass reproduction. All rooms create reflections and standing waves, and the effects of these are more severe if all opposing walls are parallel, similar distances apart, and with hard reflective surfaces. Provided that the loudspeakers can be placed fairly symmetrically, slight asymmetry elsewhere in the room is usually helpful.

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a similar immediate acoustic environment, unencumbered by other furnishings and

structure, and a similar distance from each listener, nearby walls, and corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from being closely mechanically coupled via proper stands to the floor.

Mixing and matching the components of a record player to get optimum results can be something of a black art, over and beyond the fairly simple business of choosing a cartridge of roughly the right compliance to suit the arm effective mass. Certainly the combining of turntables and tonearms is not a simple matter, and this is where a good specialist dealer will come into his own, both in terms of recommending good combinations from the models he holds in stock, and then in correctly carrying out the sometimes tricky set up procedures which are often required to get the best results.

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrates some likely alternatives.

The *Directory* has been compiled so that it can be used by *Choice* readers as a buying guide. A guide in the sense that that you should use the information in it to make a shortlist of equipment suited to your needs and budget, and then audition it at a dealers' before taking the plunge. Because tastes inevitably differ it would be unwise to buy purely on the basis of our recommendation and dealers are the most experienced people around when it comes to making systems work as a whole.

The Directory

TURNTABLES & TONEARMS

The schizophrenic split between consumer electronics and 'real hi-fi' is most obvious amongst turntables. The former are supplied simply as a means of playing vinyl in a system context. Cheaply manufactured in the Far East, these are complete players with a variety of automatic facilities, sometimes tied into system remote control. But engineering compromises severely limit sound quality, cartridge choice may be P-mount restricted, and such machines are rarely stocked by specialist hi-fi dealers these days.

Specialist turntables offer big sound quality improvements, but lack so-called convenience features (that practised users often find irksome). Such turntables at the cheaper end of the market (sub-£350) tend to be supplied with matching tonearm, and often include a 'starter' cartridge. Still better quality is found at higher prices amongst the separate motor units and tonearms. Careful partnering and set-up is essential for these individual components, but 'naturally sympathetic' combinations do exist, and the good dealer can help.

Listed separately as integrated players and as turntable motor units and tonearms, our sound quality rating is based on results achieved using a high quality system – but in point of fact the turntable is usually the limiting factor soundwise in any system. Lab performance summarises the speed stability, vibration generation and environmental isolation of turntables, along with the friction, alignment and adjustment of tonearms. The tonearm's physical characteristics also define a range of compatible cartridges.

INTEGRATED TURNTABLES

■ 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 Solo/Xenon MCS £440/£320	Average Good	The deck is warm and euphonious with high levels of clarity. Wow artefacts occasionally just audible	Suspended motor unit, optional quartz PSU, 13g		67
Alphason Sonata/HR-100S MCS/Atlas £760/£500/£360	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
Alphason Super Nova £300	Good Good	Informative, easy to listen to and quite lively deck with good detail and occasionally uneven bass. Build quality of review sample not perfect	Subchassis, manual, belt drive, detachable arm, 12g	R	91
Ariston Forte £350	Average - Average	Heavy on engineering, short of soul? The Forte almost makes it, losing out only because of some residual pitch variations and a lack of bass power. The arm is modestly good	Manual 2-speed belt drive player and detachable arm, 10g		67
Ariston Icon £215	Good Good	A thoughtful and efficient design that offers good sound, excellent value and semi-automatic operation too! Good vibration isolation eases siting	Belt drive, suspended, semi-automatic, 10g	BB	79
Ariston Pro £180	Good Good	Remarkably clear and detailed for the price, very neutral. Benefits from cartridge upgrade	Manual, belt drive, 12g	BB	91
Ariston Q-Deck £165	Good Average +	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB	67
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 CS503-2 £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
Dual CS505-4 £170	Good - Good -	The old-time favourite which never gives up. Sound is enjoyable if not perfectly clear, all-round value is excellent	Semi-auto, belt drive	BB	91
Goldmund ST4 £4589	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard objective and subjective performance at £2,000 less, in a neatly integrated though bulky package	Solid subchassis, direct drive, parallel arm, detachable h/shell	R	60
Heybrook TT2 turntable & arm £424/£269	Average Good +	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, 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 £900/£699	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 LP12-Lingo/Ekos/Troika £1149/£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 £150	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
Omega Point Silver/Black £895/£295	Good Good +	An avowedly stripped down turntable that lacks even an on/off switch, the Omega Point Silver offers fine midrange clarity and good stereo, but some HF compression and a lack of 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Opus 3 Continuo/Decca London International (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 £155	Average + Good	A remarkable product at the price, surprisingly articulate and confident	Manual, 11.5g	BB	48
Rega Planar 3 £207	Good Good	A long time leader in its price category, the '3' (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Manual, 11.5g	BB	48
Revolver Rebel £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, prefitted cartridge		55
Rotel RP-855 £160	Good Good	Great sound for the money - detailed and clear with good bass and no irritating nasties	Belt drive, solid, speed adjust, 9g	BB	79
Systemdek IIX £248	Good Average +	Poised, clean sounding deck, forward and explicit in character. A good value deck under £250, and a relatively cheap and satisfactory suspended model	2 speed belt drive manual turntable and arm, 11g	R	67

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INTEGRATED TURNTABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	ISSUE
Technics SL-DD33 £110	Average Average	As with the QD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
Technics SL-L20 £115	Poor Average -	A rather lightweight parallel tracker achieving a poor overall rating, with little to recommend it unless you dig facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £140	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Technics SLBD-22 £90	Average - Average -	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi automatic, solid plinth, electronic, 6g P-mount	R	48
Thorens TD 166 Mk V £200	Good Good	Classic suspended-subchassis deck with clear, stable sound of no particular character. Unlikely to make enemies	Belt drive, suspended, 12g	BB	79
Thorens TD 280 Mk II £180	Good - Good -	Legendary Thorens build quality on the cheap - slightly unsuitable sound but eminently liveable-with and very good value	Belt drive, solid, electronic PSU, 12g	BB	79
Thorens TD 316 Mk II £220	Good Good -	Very solid deck with neat split-chassis construction. Sound is a bit insecure in the bass, but it could suit classical music lovers well	Belt drive, suspended, electronic PSU, 12g	R	79
Thorens TD2001 £630	Good Good -	Similar to TD320 but much dearer - why? Sound is comfortable but not very detailed	Semi-auto, belt drive, subchassis 15g		91
Thorens TD320 Mk II £350	Good Good	Good, consistent sounding deck with much improved (but not ideal) arm. A little expensive for performance offered	Semi-auto two speed belt drive, 14g		67
Townshend Rock Reference/Excalibur £1995/£695	Excellent Excellent	Overall the closest reproduction to master tape we've yet heard, with stunning real bass and excellent neutrality. Front end damping trough improves LF detail significantly	Belt drive, suspended, electronic PSU, front-end damping, 12g	R	79
Voyd Reference/Helios Cyalene £5299/£1066	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 SA 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
Ariston Superior £598	Good + Good	Good but slightly damped sound quality, with powerful and stable bass. The pro quo is a certain lack of pace, energy and resolution	Belt drive, subchassis, electronic		55
CEC ST930 £599	Good 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 Synco £265	Good Good	A happy blend of qualities endows the Synco 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 Alexandria Mk III £1195	Very Good Very Good	One of the most beautifully presented players made, and fully supported by superb separation, dynamics and a euphonious style of delivery.	Manual 2-speed belt drive	R	67
Oracle Paris £595	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 IIXE £248	Good Very Good	Fine, honestly specified and well built player which easily betters its closest stablemate, the IIX. Frankly, at the price it's a sonic bargain	Manual 2-speed, external PSU	R	67
Systemdek IV £495	Good Very Good	The level of wow is a theoretical concern at least, but elsewhere this player shines, combining euphony, information and imaging in a polished, untemperamental package	Two-speed manual belt drive	R	67
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, so we've dubbed it The Voyd Plus. Superb build	Belt drive, 3 motors, subchassis, outboard PSU	R	72
Voyd Valdi £868	Good - Very Good	Recent power supply upgrade has resulted in allround improvements. This Perspex plattered, two motor deck is remarkably competent, revealing and neutral	Belt drive, suspended subchassis, electronic PSU		79
VPI HW-19Mk3 £1500	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

TONEARMS

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 £190	Good Average +	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48

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TONEARMS

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFF, MAS	VALUE	ISSUE
Alphason HR100S £440	Very Good Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	Coll. '86
Alphason Opal £130	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Xenon £260	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
Ariston Enigma £99	Average Average +	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1130 £186	Good Good	Well suited to most cartridges including high compliance ones, the AT is smooth and tonally neutral, if slightly lacking in 'balls'	8.5g	R	67
Decca London International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48 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
Helius Orion 2 £490	Very Good Very Good	Excellent engineering with rigid bearings, free from slack. It remains expensive but the level of performance deserves Recommendation	12g	R	48
Kuzma Stogi Reference £699	Very Good Very Good	A large, solid and well-made arm that holds the cartridge firmly, giving exceptionally clear sound with just a hint of brightness	12g	R	79
Linn Ekos £1097	Very Good Very Good	Superb, state of the art design which builds significantly on Ittok's strengths	9g	R	67
Moth Arm £78	Good Good +	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	60
Naim Aro £699	Good Good -	Designed for use on the Linn LP12, the Aro is a little bright and congested.	10.5g		91
Rega RB300 £115	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 £669	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 £495	Very Good Very Good	Beautifully made, finished and presented, this arm is fully and easily adjustable and a highly neutral performer	10g	R	79
SME Series IV £810	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1247	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

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.

MODEL PRICE	LAB SOUND	COMMENTS	ARM 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 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 AT95E £19	Average - Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audionote I02VDH £895	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity', needs a transformer	8-18g Very low, MC	R	43
Audioquest 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

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CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	ISSUE
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 +	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 DL 103 £99	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low, MC	R	48
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
Dynavector 17D2 £280	Very Good Very Good	Clear, detailed, neutral and generally very informative - excellent	6-18g L ow, 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
Dynavector DV10X IV £125	Average Average +	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g N 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-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 L 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 £40	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 £60	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 £85	Good + Good	Not terribly subtle, and not such good value alongside 1012 and 1022. Quite lively, though	7-12g Normal, MM		91
Goldring Elan £16	Average + Average	A lightweight and frisky-sounding MM that appears to be based upon the same body as the Nagaoka mm4	7-15g Normal, MM	R	67
Goldring Epic II £26	Average Average +	An excellent budget choice though the limitations of the stylus are rather obvious at higher frequencies	5-12g Normal, MM	R	67
Goldring Eroica £100	Good Good -	More confused and coloured than its low-output sibling - high output less of an issue in these days of cheap MC-compatible amplifiers	8-15g Normal, MC		84
Goldring Eroica LX £115	Good + Good	Not the most subtle cartridge in the world; can sound edgy at times, but lively and informative	8-14g Low, MC	R	84
Goldring Excel £500	Average + Good	Goldring's most expensive cartridge to date errs on the warm and heavy side of neutral. Strong bass lines are its forte though its ability to resolve subtle treble details is weaker	6-13g Low, MC		72
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 (damp) Normal, MM		67
London Super Gold £300	Poor Average -	Immediate and (in the midrange at least) detailed, but very coloured, very nonlinear and questionable effect on records. Devotees swear by it	9-15g, damp Normal, fixed stylus MM		84

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CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	ISSUE
Militek Aurora £249	Good + Good +	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	Coll. '86
Militek Olympia £349	Average + Good +	Warm and detailed sound - packs the punch of the best MCs with high output as a bonus	12-20g, (damping) Normal, MC	R	54
Nagaoka MM4 £9	Average - Average -	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £18	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48
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
Nagaoka Stilton TS10 £50	Good - Good	Stilton-designed solid body (with three-point mounting) certainly gives remarkably resonance-free sound, but tip and generator are less good - a little rough at times.	5-10g Normal, MM	R	85
Nagaoka Stilton TS11 £70	Good - Good	Differs from TS10 in having Vital stylus with better tracing but still some high frequency harshness.	5-10g Normal, MM		85
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 unforgivin	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 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 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
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
Stilton/AT-F3 £110	Good + Good +	At a premium of some £40 this modified AT-F3 offers a startlingly refined performance and is strongly recommended	8-18g Low, MC	R	67
van den Hul 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 £800	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 £499	Good Good +	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60

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-005 £130	Good + Average -	A technically competent amp with big, friendly but not overly engrossing sound quality	61W, MM 5 line inputs, source-direct		80
Aiwa XA-006 £130	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-52 £230	Average + Average -	Basically equipped, this amplifier offers a comfortable but hardly over-detailed sound	95W, MM/MC disc, 5 line inputs, loudness		74
Akai AM-65B £299	Good Average	On-board 18-Bit DAC's actually give better sound than standard CD inputs! Punchy via MM disc	101W, MM, 6 line, digital inputs		80
Akai AM-93 £550	Average Average -	Unfortunately Akai's on-board D/A converters were less successful than its conventional analogue CD input.	112W, coax and optical dig inputs. MM/MC		68
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 2 £195	Good Good +	Very confident, convincingly musical and punchy sound that sets the standard for other budget amps	41W, 4 line and MM inputs	BB	68
Arcam Delta 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 + 4 line inputs + coax/opt digital input.	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
Ariston Amp £219	Average Average +	Slightly veiled and thin sound but proved suitably attractive in the listening tests	32W, full logic control, MM and 4 line inputs	R	68
Audio Innovations Series 1000/2nd Audio Amplifier	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 300 £499	Poor Very Good	Something of an anomaly, the 300 is an integrated valve amp that looks awful in the lab but sounds remarkable in a system - now in mk II guise	10W, MM, 6 inputs	BB	63
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 £29,950	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 8000A £350	Very Good Good +	Exceptionally detailed, tactile and transparent via CD but slightly more clouded via disc. A stalwart design	72W, MM/MC, 4 line and full record out selection	R	74
Audiolab 8000C £325	Excellent Good	A well established preamp with a highly controlled sound, though it could do with more life and depth	MM/MC, 5 inputs, hdph, tone controls	R	62
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
Audiolab 8000P £495	Excellent Good +	A dynamic powerhouse, load tolerant and sonically reliable	100W	R	62
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 506 £1195	Good + Good +	A versatile valve preamp – the bass sounded lively if a touch softened, while the treble was detailed but lacked a little sparkle and air.	4 inputs MM/MC		50
Beard 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

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AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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	a 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 of 'naturalness'	56W, 4 line inputs + MM/MC + tone		85
Carver CM-1090 £495	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		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
Conrad-Johnson Motif MC-8 £1995	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/MC	R	50
Conrad-Johnson Premier 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
Conrad-Johnson PV-10 £1100	Excellent Excellent	Pricey, yes, but a fabulous preamplifier which confirms C-J's high reputation in the States. Beautiful imaging, superb detail, plenty of gain on the phono stage — classy build quality	MM plus 4 line inputs	R	78
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
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
Cyclone Catalyst £1995	Good + Very Good	Exceptionally load tolerant and very refined in delivery. Extra options available in future	74W, external MM or MC stages, 3 line inputs	R	80
Deltec 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

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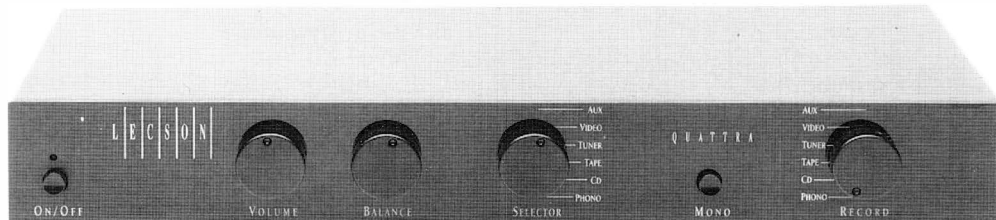
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AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Denon DAP-2500/PDA-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 brilliant!	172W, monoblocks Opt/Coax dig + 2 tape, 4 line and MM/MC inputs		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 PDA-6600 £1000 pr	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
DNM 3A From £1000	Good + Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/MC twin vol controls	R	44
Dual CV-5670 £250	Very Good Good	Magnificent build and prodigious output to its credit, the CV-5670 still fails to capture the delicacy and enthusiasm of its cheaper companion	128W, 5 line, 2 tape and MM/MC inputs + loudness and CD Direct		97
Dual CV5600 £160	Good+ Very Good	Made by Rotel and possessing the highly articulate vocal/string quality of their best budget amps. Very communicative, especially with a good CD player.	57W, 3 line, 2 tape and one MM input. CD direct	BB	92
E.A.R. 549 £3628 pr	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	200W monoblok, bias setting		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.		92
Exposure VI/VII*/VIII £320/£500	Good Very Good	An established company like Exposure could do more to improve the 'look' of these amps which, nevertheless, sounded confident, dry and musical. Dual version no longer available	63W, Super mod. 4 line and 2 disc inputs with full rec-out switching	R	68
Exposure VII/VIII £430/£470	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/MC, 3 inputs, straight line		62
Exposure XI/XII/VIII Super £1600	Good Very Good	New preamp and improved power amp led to a smooth and refined sound, MM/MC less transparent than CD	61W, MM/MC, 5 line inputs	R	80
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		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
Hafler DH120 assembled £360	Very Good Average	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
Hafler DH120 kit form £295	n/a Average	Er, we didn't build one; see assembled version below	60W		44
Hafler SE-100/SE-120 £365-375/£375	Good + Good +	The smallest of Hafler'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
Hafler XL-600 £1145	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 record out		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		97
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		97
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 £400/£500	Average + Average -	There's a chance our power amp was a dud for the combo sounded very disappointing on the whole - glassy and uncouth	138W with plenty of current. Passive line inputs		85
Jadis JP30/JA30 £4145/£4200	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/Model 7	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	448W monoblok MM/MC with loading options. Balanced topology	R	72
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/ps. CD DiRT and 'Bass Compensator'	R	92

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AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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/£595pr.	Good + Average +	Latest versions of the M30 offers a true 30W Class A and a slightly muddled but very comfortable sound. MC preamp is a very linear design	33W monoblok MC only + 4 line inputs. Separate L/R balance	R	74
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-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
Lecson 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
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 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		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
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-30SE £180	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 £250	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
Marantz PM-95 £2000	Very Good Average +	Beautifully constructed, this amp was less convincing via its digital input than via line Class A option best suited to sensitive speakers. Costly	151W with 30W available in Class A. Opt + coax inputs		74
Meridian 201/205 £695/£500 each	Very Good Good +	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/MC 6 line inputs remoteR/-capable straight line		62
Mission 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
Mission 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. R No tone controls	R	92
Mission 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
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 monitor	50W, MM/MC, 5 line inputs, tape	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 pair	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
Naim Separates £750 plus	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
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
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. Onboard 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 compnts.		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
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 FA890 £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
Philips FA960 MkII £300	Good + Average	The MkII '960 still failed to grasp our listeners' attention, but it remains a competent amp nonetheless	122W, 6 line & 2 disc inputs + tone controls		68
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 £230	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

The Directory

AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
QED A240 CD II £199	Good + Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line BB		62
QED A240 SA II £259	Very Good Good +	Redesigned 240SA has significant improvements over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/MC 5 line inputs straight BB line		62
QED A270 £299	Good - Good +	Building on the strengths of the '240, the '270 sounds weighty, fast and dynamic. A bit 'lumpy' via MC	51W, 5 line and 2 disc inputs, pre-out	R	68
QED A270CD/PA £300/£400	Good Good +	Recent updates have bolstered the output of the A270 without adding to its colourations. The PA option is now looking a touch expensive	61W, 2 tape, 3 line + MM or MM/MC from PA board	R/-	97
QED C300/P300 £300/£300	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 pr	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
Sansui AU-X111 £120	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-F630ESD £350	Good Average	Based on the '530 but equipped with PDM D/A convertor. Amp is competent but DAC sounds truly magnificent!	130W, as above + opt. and coax digital inputs	R	74
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
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 in Pure 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-V900 £511	Very Good Good+	Massively built but with a light, fresh and essentially very neutral sound. Bulk notwithstanding it's not particularly suited to life with a difficult speaker.	125W, 5 line and both MM/MC inputs. Tone controls + power amp.		92
Threshold FET 10e system/Stasis SA-4 £5824/£6028	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. '90
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-550 £240	Very Good Good	Beautifully built and offering the flexibility of remote control, the AX-550 sounds tidy and neutral yet lacks the ability to involve on an emotional level	131W, 5 line + MM/MC. Pure Direct + remote control		97
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/£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

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
Acoustic Energy AE1 £764	Good Very Good	To the author's knowledge, the most awesomely dynamic and articulate miniature ever made	29.5 x 18 x 25cm semi-open space	88dB/w 60Hz	R	59
Acoustic Energy AE2 £916	Good Very Good	Dynamic, solid and lively, a great allrounder if a bit small considering the price. AE proves that metal cone/dome drivers really work	39 x 23.5 x 29.5cm heavy stands, free	88.5dB/w 45Hz	R	66
Acoustic Energy AE3 £1650	Very Good Very Good	Solid, authoritative and impressively accurate – if a shade ponderous and slow – AE's latest 'big one' is a much better bet than the earlier '4, combining	63 x 26.5 x 37cm low stands in free space	85dB/w 23Hz (in room)	R	86
Acoustic Research AR-112 £125	Average Average -	Nicely presented and engineered, but sounds a bit small and boxy without true coherence	36 x 19 x 18.5cm stands near rear wall	87dB/w 75Hz		66

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Acoustic Research AR-122 £150	Average Average	Despite a promising enough list of ingredients, the 122 failed to excite real enthusiasm amongst the listening panel	38.5 x 19 x 22cm stands near rear wall	87dB/w 68Hz		68
Acoustic Research AR-132 £200	Average + Average -	Good presentation and detail engineering was not sufficient to counter bass heavy balance problems on auditioning	44.5 x 23 x 25.5cm stands 1ft from rear	87dB/w 50Hz		66
Acoustic Research AR-152 £373	Good Good-	Large bookshelf size model with luxury finish has a slightly thin overall balance, but fine coherence and agility makes it well worth considering	44 x 23.5 x 28cm stand 1-2ft wall	87dB 25Hz in room		98
Acoustic Research Red Box £100	Average Average	Lively and balanced if a bit crude and uneven, this econobox succeeds partly because of its simplicity, and works well with some rear wall assistance	32 x 19.5 x 17cm close to rear wall	87dB/w 85Hz	R	74
Alexander SE11 £299 (stands £69)	Good Good	Clearly better than its cheaper stablemates, the metal jacket delivers a different – and in some respects superior – sound than the wood-based	52 x 14 x 17.5cm stands close to wall	86dB/w 25Hz (in room)	R	82
Alexander SE5 £199	Average Average	Particularly well suited to surround sound A/V applications, the SE5 can give any miniature a run for its money on bass performance; hardness and coloration	40.5 x 12 x 15cm ALS stands near wall	82dB/w 50Hz (in room)		78
Allison AL100 £120	Average- Average	Loud and lively budget wall-mount is bigger and beefier than most of the competition, if lacking some subtlety and refinement	33.5 x 24 x 21.5cm stands against wall	87dB/W 30Hz (in room)	BB	94
Allison AL105 £150	Average Average -	Pretty enough in appearance, sonically the AL105 doesn't really make the grade at the £150 asking price	37 x 24 x 21cm high stands against wall	87dB/w 45Hz (in room)		78
Allison AL120 £429	Good Average	Cleverly engineered compact floorstander is pretty well balanced if slightly mid forward, but sound quality is a little disappointing for the price	63 x 28 x 27cm floor, clear of walls	88dB 30Hz (in room)		98
Allison CD6 £290	Average Good -	An unusual cube-shaped model designed for wall mounting gives exceptional bass extension from a small box, though it's also a bit heavy, coloured and slow	28.5 x 28.5 x 28.5cm stands against rear	88dB/w 45Hz	R	71
Alphason Amphion £680	Good Good	This fine-sounding, nicely finished compact wall-mount is just a little too expensive for formal Recommendation, but is a good performer for all that	44 x 23 x 27.5cm high stands against wall	88dB/w 47Hz (in room)		78
Alphason Artemis £299	Average Average+	Pretty little miniature sounds nicely unboxy but is also a bit short of punch and balanced rather too bright.	27 x 17.5 x 22cm stands 1ft from wall	86dB/W 50Hz (in room)		94
Alphason Orpheus £1000	Good Good +	Large hi-tech two-way features unusual, sweet-sounding isodynamic tweeter; well engineered and balanced if a shade odd in appearance	65.5 x 28 x 34cm stands near rear wall	87dB/w 43Hz	R	71
Apogee Caliper Signature £3350	Good + Very Good	Pretty but power hungry full range panels have remarkable transparency and delicacy, though loudness and bass 'grunt' are both a bit lacking	122 x 59-70 x 6.5-28cm floor, free space	81dB/w 30Hz (in room)	R	81
Arcam Alpha £200	Good Good	It has its own colorations to be sure, but delivers a fine room balance with unusually good dynamics, timing and 'life', and is fine material value	46 x 26.5 x 26cm stands close to wall	89dB/w 30Hz (in room)	BB	82
Arcam Delta Two £340	Average+ Good	Pretty luxury compact sounds a shade forward and coloured but has dynamic and lively bass for its size	37.5 x 22.5 x 27.5cm stands 1-2ft from wall	87dB/W 40Hz (in room)	R	94
Ariston Image £180	Average - Average -	Despite a sweet treble character, the Image fails to impress with a 'lumpy' over-rich balance that has room integration problems	42 x 22 x 27.5cm stands in free space	89dB/w 28Hz (in room)		82
Ariston Q £395	Average + Average	The prettily shaped Q delivers a good impression of scale from a small box, but a rather laid back, ponderous and over-rich overall sound	35 x 16.5-25 x 20-27cm high stands in free	85dB/w 30Hz (in room)		86
ATC SCM20 £1320	Very Good Good +	Massively built to no-compromise Pro monitoring standards, the SCM20 is invariably informative but the rather forward presentation can be uncomfortable	44 x 24 x 31cm stands close to rear wall	82dB/w 28Hz (in room)		86
Audio Electronics TC10 II £599	Good - Good +	Oddball appearance is rescued by a respectable technical performance, interesting and impressive engineering and fine sound quality	70 x 33.5 x 33.5cm low stands in free space	87.5dB/w 40Hz	R	68
Audioplan Kontrapunkt £799	Good Good +	Cute little German miniature sounds as sweet as it looks, dressed expensively in real wood with matching stands. Not for bass or loudness freaks	31 x 24 x 13cm free space, matching stands	83dB/w 48Hz (in room)	R	86
B&W 620 £299	Good Good	Good value floorstander has well balanced, laid back and slightly lazy sound that is pleasantly easy on the ears; could do with its own spikes	74 x 23.5 x 30cm floor, free space	89dB/w 25Hz (in room)	BB	94
B&W CM1 £400	Good Average	Cleverly thought out luxury design package is also fundamentally well engineered, if a shade pricey on 'sound for pound' basis	24.5 x 16 x 22cm close to rear wall	84dB/w 90Hz		74
B&W DM550 £149	Good + Average -	Beautifully presented, well engineered near-miniature with precise sound but a distinct lack of 'wellie'. Ideal for considerate flat dwellers	35 x 20.5 x 22.5cm stands in free space	86dB/w 70Hz		71
B&W DM560 £199	Average + Average -	Fine cosmetic presentation and good engineering for the price; overload protection may be handy but listening panel was underwhelmed	49 x 23.5 x 30cm stands in free space	88dB/w 55Hz		66
B&W DM600 £150	Good+ Average+	Attractive hi-tech appearance and clever engineering makes for an impressively smooth overall balance, but sound is a touch bland with it	35 x 20.5 x 25cm stands 1-2ft from wall	85dB 30Hz (in room)	R	98
B&W Matrix 801 £3295	Good + Good +	Lacks the transparency of the best panels, and the drama of the best dynamics, but is something of an acoustic tour de force, with low coloration and fine imaging	77/99 x 56 x 43cm floor or stands, free	86dB/w <20Hz (in room)	R	81
B&W Matrix 805 £915	Very Good Good	A genuine compact monitor, stylish, with remarkable imaging properties, good balance and low coloration, though less successful at communicating musical	42(max) x 26 x 22.5cm Slate stands in free	87dB 30Hz (in room)		98
B&W Vision DS1 £120	Average Average -	Although significantly hampered by upper bass cabinet coloration, the DS1 cleverly combines high sensitivity with a rich and generous soundstage	36 x 21 x 19cm stands quite close to wall	91dB/w 40Hz (in room)	R	82
B&W Vision DS2 £180	Average Average -	Although the box is generous for the price, the DS2 is a rather uneven performer, both on the measurement and listening	50 x 24 x 25cm stands in free space	89dB/w 43Hz (in room)		86
Bose 305 £350	Average Good -	A bit of an oddball, fine dynamic liveliness and a good room match more than make up for the strange stereo imaging and treble	28 x 45 x 23cm high stands near wall	88dB/w 40Hz (in room)	R	78
Bose 901 MK6 £1600	Good Average	Still controversial after all these years, the pre-equalised multi-driver 901 is cleverly engineered to deliver exceptional loudness.	33 x 54 x 32cm rigid stands in free space	(92dB/w midband) 28Hz (in room)		86
Bose Interaudio 3000XL £150	Average Average -	Lots of perceived value and well enough balanced, but low cost cabinet and driver engineering results in a crude and unsuitable sound	46.5 x 29 x 23cm stands in free space	89dB/w 45Hz		71
Boston A120 £349	Average + Good -	Ugly but cleverly engineered, the 120 combines a tiny main driver with much larger ABR to give a generous, bighearted and lively sound despite little bass	62.5 x 31.5 x 25cm stands in free space	89dB/w 48Hz	R	86
Boston A40II £120	Average Average -	Competent performance for size and price but below average relative to the UK competition	34 X 21 x 20cm on stands near wall	88.5dB/W 63Hz		41
Boston Acoustics T830 £399	Good Good	A lot of speaker for the money, the T830 is a smooth and accomplished performer with a big and easy - or alternatively a lazy and laid back - sound	82.5 x 25.5 x 24cm floor, away from walls	87dB/w 30Hz (in room)	R	82
Cambridge SoundWorks Ambiance £179 (mail order only)	Average Poor	Attractively styled sub-miniature sacrifices sensitivity in the interests of bass extension, but manages to lose dynamics along the way too	28 x 18 x 14cm close to wall	83dB/W 45Hz (in room)		94
Castle Chester £599	Good Very Good	A brilliant throwback, using horn-type approach to provide startling midrange dynamics and coherence.	94 x 23 x 27cm floor, experiment	87dB 45Hz	BB	98
Castle Durham £259	Average + Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/w 67Hz	R	46
Castle Pembroke £379	Good Average +	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/w 46Hz	R	31
Castle Warwick £229	Good Average -	Excellent presentation and fine engineering with overload protection, but a sonic disappointment in bass and dynamic qualities	46.5 x 25 x 23cm stands 1ft from rear	88dB/w 50Hz		66
Castle Winchester £1400	Very Good Very Good	This unconventional and beautifully crafted model is physically large for its bass extension but is engagingly agile and sounds attractively open and airy	114 x 24 x 47cm in free space	87dB/w 25Hz	R	90

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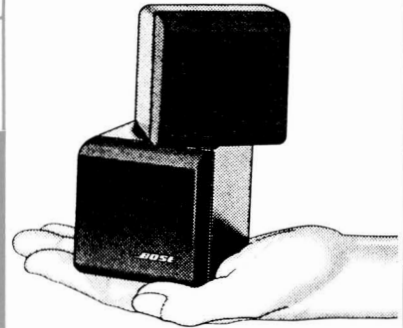
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The Directory

LOUDSPEAKERS

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
Celef CF2 Nimbus £230	Good - Good -	Nicely balanced overall but a little uneven with it, this lively and dynamic largebookshelf model came close recommendation	46 x 25.5 x 24cm stands in free space	88dB/w 55Hz		71
Celef Cirrus £180	Average Good	It's nice to see Celef back in the UK, with this decent sounding small reflex box that seems unusually tolerant of siting	39 x 20.5 x 23cm stands in free space	84dB/w 60Hz	R	66
Celestion 3 £109	Average + Average	This attractive little wall-mount gives good balance and stereo imagery, with a character which leans more towards inoffensiveness than excitement	31 x 18.5 x 21cm high stands against wall	86dB/w 55Hz (in room)	R	78
Celestion 5 £149	Good Average	Cunningly conceived and balanced, the 5 may be a little slow for some tastes, but is well suited to CD-oriented budget systems	35 x 20.5 x 26cm heavy stands close to wall	89dB/w 30Hz		90
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system – with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/w	R	60
Celestion 7 £200	Average Average+	Good value, good looking large bookshelf size wall-mount has lively up front presentation. Can sound a bit coarse and stand selection is critical.	45 x 24.5 x 32cm heavy stands close to wall	87dB 30Hz (in room)	R	98
Celestion DL6 Series II £179	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/w 65Hz		59
Celestion DL8 Series II £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/w 60Hz	R	59
Celestion SL12Si £599	Average Average	Careful setting up does reveal elements of fine sound quality, but this 'grown up' SL6 variation has a lumpy response alongside its improved power handling	53 x 20 x 27cm matching stands clear	85dB/w 50Hz		66
Celestion SL600Si £799	Good + Good	This Aerolam high tech miniature has certain remarkable qualities that some will find irresistible, but needs careful system and room matching	27 x 20 x 23cm free air on tall stands	82dB/w 52Hz		68
Celestion SL6Si £399	Average+ Average+	This stereotype luxury compact can sound a bit dull and congested, but really opens up on Slate Audio stands; favours CD	37.5 x 20 x 25cm stands 1-2ft from wall	86dB/W 30Hz (in room)		94
Creek CLS20 £200	Good Average -	Looks good material value, but sound is distinctly over-rich and thick in the mid-bass region; maybe the box is a little too large.	49 x 24.5 x 24cm open frame stands, free	88dB/W 30Hz		90
Dahlquist DQ8 £850	Good Good	Large floorstander uses out-of-box tweeter to give delightfully out-of-box presence and treble; bass is much less impressive	100.5 x 36 x 28cm floor, free space	88dB/W 52Hz (in room)	R	94
Dali 700 £600	Very Good Average	Good material value and fine bass extension for size and price, but overall sound is disappointing, perhaps due to complexity of driver array	110 x 28 x 35cm clear of walls	88dB/w 20Hz		90
DCM Timeframe TF250 £350	Average + Average	Neat and unusual floorstanding presentation, marred by indifferent build and cuddly but rather coloured sound, especially on spoken word	86 x 32 x 16cm close to rear wall	88dB/w 45Hz		90
Doxa 5 - 2 £900	Average Good	The high sensitivity and seductive midband makes an obvious partner for valve amplifiers, though obtaining a good room match may prove a little tricky	98 x 21 x 28cm floor well away from walls	91dB/w 30Hz (in room)	R	82
Duntech PCL1000 Crown Prince £6120	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 £3998	n/a Very Good	Better value for money than the Crown Prince - and arguably more dynamic, with real bass 'siam' 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 wall	85dB 25Hz (in room)	R	98
Equation 0 £1290	Average + Very Good	Expensive but most attractive floorstanding miniature. Bass is limited and mid tends to shout but sound is fast and lively with fine dynamics and timing	85 x 20 x 35.5cm floor, c1ft from wall	85dB/w 45Hz	R	90
Faraday Siren £330 (direct sale)	Average- Average-	Interesting if ugly high mass concrete cabinet is let down by imbalance of ageing driver combination	46 x 27 x 27cm stands, free space	87dB/W 48Hz (in room)		94
Goodmans B-Max/Maxim 2 £100/£90	Poor Average -	Stick with the Maxims on their own until you can afford some real grown up loudspeakers	60 x 21 x 26 see above, suck and see	89dB/w 55Hz (in room)		78
Goodmans HIM 440 £350	Good Average -	Amazing perceived value, sensitivity and good bass extension, marred by serious cabinet coloration, a nasty tweeter and a difficult amplifier load	87 x 38 x 40cm low stands clear of walls	94dB/w 24Hz		90
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 85Hz (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 2 £90	Average + Average	More wham-bam-thank-you-mam sound that imitates much bigger speakers when you let these babies yell. (A well-controlled yell)	26 x 17 x 19cm near wall on shelf or stand	86dB/w 85Hz	BB	59
Harbeth HL Compact From £539	Very Good Average	The clean and neutral sound lacks resolution and gives rather unsubtle though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high	87.5dB/w 65Hz		59
Harbeth LS3/5A £343	Good Average	Still a classic miniature, though not to every taste, and none the better for the recent update under our listening conditions. Limited dynamic range	30.5 x 19 x 16cm stands in free space	81dB/w 60Hz		66
Heco Interior 120 £169	Good Average	Drab appearance belies a lively enough character, though the balance is altogether a bit bright for UK tastes	32 x 23 x 23cm high stands against wall	88dB/w 50Hz (in room)		78
Heco Interior 430 £429	Good Good -	This tall floorstanding enclosure delivers an impressively even sound balance with good bass extension, if not the lively dynamics to satisfy enthusiasts	85 x 24 x 27.5cm free space	88dB/w 43Hz	R	71
Heco Interior 90 £159	Good Average -	Neatly finished and engineered miniature, but the disappointingly 'lifeless' sound left the listening panel decidedly underwhelmed	27 x 18 x 16cm on high stands	87.5dB/w 90Hz		74
Heco Interior Plus 404 £400	Average+ Average+	Odd shape and size; twin main driver arrangement creates a slight 'boom'n'tizz' effect, but mid focuses well and bass extension is impressive	58 x 26 x 31cm low stands free space	88dB/W 25Hz (in room)		94
Heco 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 HB1 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

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Heybrook Point 5 S2 £179	Good Good	Lively, revealing and enjoyable wall-mount can sound unruly with multi-strand but comes dramatically into focus with solid core cable	37.5 x 23 x 24.5cm HBS1s against wall	85dB/W 28Hz (in room)	BB	94
Heybrook Point 7 £185	Average Average	Physically an attractive package, but not entirely convincing in lab or listening panel test; interesting for all that	40.5 x 23 x 23cm stands against rear	85dB/w 60Hz		68
Heybrook Solo £159	Average + Average +	Discreetly styled wallmount sounds a little untidy in both bass and treble but handles complex rhythmic material much better than most	36 x 23 x 22cm HBS1 stands close to wall	87dB/w 28Hz	R	90
Infinity Kappa 6 £795	Good Good	Interestingly styled US loudspeaker has unusual high tech drivers and good neutrality, but the sound seriously lacks excitement	63 x 38 x 24cm stands, free space	85dB/w 35Hz		66
Infinity Kappa 8 £1850	n/a Very Good	Very nicely made and unobtrusive but large four-way speakers which have a tendency to sound bass heavy unless used with solid core cables	118 x 51.5 x 17.5cm floor standing, open	89dB/w 33Hz		72
Infinity Modulus £695	Good Average +	Luxury high-tech miniature, carefully conceived and beautifully built. Undeniably attractive in the mid and treble, it failed to handle the bass as successfully	30 x 18 x 26cm high stands 1ft from wall	84dB/w 45Hz (in room)		86
Infinity Reference 10 £149	Average Average	Follows the Infinity tradition in providing an engaging and lively sound from a prettily finished and substantial small bookshelf size model	36 x 23 x 23cm stands in free space	87dB 50Hz (in room)	R	98
Infinity Reference 50 £499	Average Average-	Despite hi-tech drivers, attractive presentation, good bass extension and sensitivity, this three-way floorstander suffers from a forward, coloured sound	86 x 26.5 x 25cm floor in free space	89dB 25Hz (in room)		98
Infinity RS2001 £180	Average Average +	A little coloured and unruly in the treble, the 2001 nevertheless retains the lively dynamic bounce of its predecessor; pity the price has gone up	36.5 x 22.5 x 20cm lightweight stands	87dB/w 50Hz (in room)	R	78
Jamo Concert II £250	Good Average -	A thoroughly respectable 'bookshelf' performer that needs free space siting but includes attractive cabinetwork and a neat grille	41 x 24 x 25cm stands in free space	85dB/w 48Hz		66
Jamo Concert VII £650	Average+ Average	Beautifully built large floorstander uses unusual double reflex bass system, unsuccessfully as far as low frequency resolution is concerned	96 x 28 x 31.5cm floor, free standing	87dB/W 25Hz (in room)		94
Jamo Cornet 40 £100	Average- Average	Pretty little Danish-built miniature with respectable rather than exceptional sound quality for the price	32 x 20 x 22cm stands 1-2ft from wall	86dB 48Hz (in room)		98
JBL Control 1 Plus £229	Average Average	Sub-miniature with forward midrange and no real bass; highish price partly justified by cute, near-indestructible Pro styling and build	23 x 15.5 x 14cm close to rear wall	89dB/w 50Hz		90
JBL L20T3 £249	Average- Average-	Compact bookshelf model delivers bouncy miniature-type sound when free space mounted; pleasant enough but uneven and undistinguished	39 x 23 x 20.5cm stands free space	87dB/W 48Hz (in room)		94
JBL LX33 £259	Average + Good	A bit of a cheat, but a lot of speaker for the money, which manages a better room balance than many 'large bookshelf' rivals, and delivers a fine acoustic	80 x 25 x 21cm floor, 1ft from wall	89dB/w 48Hz	R	82
JBL LX44 £339	Good - Average	This generously built model offers good power handling, bass extension and dynamic range, but suffers from the 'three-way syndrome', with middle muddle	58.5 x 30 x 29cm stands in free space	89dB/w 40Hz		71
JBL TLX12 £149	Good - Average	This smart near-miniature has a 'boppy', lively bottom end, but beware of the fizz in its top	37 x 23 x 23cm stands 0.5m from rear wall	87dB/w 55Hz	R	71
JBL XE2 £149	Average- Average-	Budget Danish-built 'bookshelf' model has anomalous 'laid back' balance and lacks the genuine JBL spirit	38 x 23 x 23cm stands in free space	88dB 48Hz (in room)		98
JBL XPL 90 £699	Good Average +	Though undoubtedly pretty and very expensively engineered, this elaborate near-miniature didn't really convince our listeners.	39.5 x 24 x 24cm stands in free space	85dB/w 45Hz (in room)		86
JPW AP2 £175	Good Good	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm	89dB/w 65Hz	R	53
JPW AP3 £225	Good Average +	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/w 57Hz	R	46
JPW Minim £85	Average + Average -	Very civilised but dynamically limited, the Minim is well suited to the smaller room and where limited loudness is acceptable	27.5 x 18 x 19.5cm stands against wall	85dB/w 28Hz (in room)	R	82
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 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 (stands £100)	Average + Good +	A most auspicious Choice debut for relative newcomers JRT. A fair share of cosmetic deficiencies do little to spoil the impressive coherence and timing	59.5 x 28 x 36cm own stands close to rear	86dB/w 28Hz (in room)	R	86
JRT AD1 Micro £389	Average 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
Kammerzelt Reference Mini Monitor £545	Average+ Good	Lovely miniature has a beguilingly sweet sound with good pace and drive, but scale is restricted and presence a little dulled considering the high price	stands 1-2ft from wall 85dB/W	50Hz (in room)		94
KEF 104/2 £1,295	Very Good Very Good	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound level	90 x 28 x 41.5cm floor standing in free space	92dB/w 50Hz	R	60
Lindley New Age £1100	Average - Average +	Attractively different presentation with classy finish, this tall cylindrical floorstander has fine bass extension but a rather uneven overall balance	105 x 23 x 23cm clear of walls	86dB/w 25Hz		90
Linn Index II/KuStone £235/£109	Good Good	Combination of stand and speaker looks and sounds very good for the price, with good bass extension and control, fine dynamic range. Clean, clear if a shade slow	44 x 21 x 23.5cm (box only) close to rear	86dB/w 28Hz	BB	90
Linn Kaber LS500 £1098	Average Good +	Discreet wall-mount package trades sensitivity for fine bass extension and midbass performance; can be a little relentless but has prodigious dynamic capabilities	93 x 19 x 28cm floor against rear wall	86dB/w 28Hz (in room)	R	82
Linn Kan II £439	Average + Average +	A niche product for those prepared to tolerate its strong character for the sake of its fine bass performance and near invisibility	30.5 x 18.5 x 16.5cm Kan stands against	82dB/w 35Hz (in room)		78
Linn Nexus LS250 £458	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall	89dB/w 60Hz		59
Magneplanar MG1.4 £1190	Good + Good +	Replaces the stalwart MG1c with a revised panel layout. Offers a very crisp and articulate sound, particularly revealing of upper mid vocal details	155 x 8 x 57cm open space	88dB/w 40Hz	R	72
Magneplanar MG2.5R £1998	Good Good	Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/w 35Hz	R	60
Magneplanar MGIIa £2700	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/w 35Hz	R	46
Magneplanar SMGa £675	Average - Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/w 56Hz		46
Marantz LD-50DMS £230	Very Good Good	Well behaved larger two-way has fine balance, stereo and integration with good bass extension, albeit with mild boxy, chesty and fizzy effects	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)	R	71
Martin Logan CLS II £3998	n/a Very Good	Much improved high resolution design, fussy about system set-up and demanding of ancillaries and software alike. It rewards the efforts though	60 x 28 x 7.5cm open space	86dB/w 45Hz	R	72
Meridian Argent 1 £1,200	Good+ Good+	Beautifully built, finished and shaped but pricey compact has fine bass extension and virtual absence of 'boxiness'; needs a big amplifier	33 x 27(max) x 27(max)cm Slate stands	83dB 28Hz (in room)		98
Meridian Argent 2 £995	Good+ Good	This beautiful but pricey high-tech 'large compact' delivers an extended, smooth and neutral sound with fair speed. Slate Audio stands are almost essential	48.5 x 21 x 29.5cm stands free space	85dB/W 23Hz (in room)		94

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■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
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 761 £140	Average Good	One helluva speaker for the price, if a shade small and short of subtlety and refinement – should prove a worthy successor to the 70 and 700	38 x 21 x 21cm stands near rear wall	87dB/w 60Hz	BB	66
Mission 762 £200	Average Average -	Mission's 'bookshelf middleweight' offers high sensitivity and loudness capability, but at the expense of a somewhat untidy and rather 'heavy' sound	50 x 25 x 27cm stand, experiment advised	91dB/w 55Hz		66
Mission 763 £300	Average + Average +	A very artful combination of generous volume and good bass extension at a modest price. Works well in the listening room despite a few rough edges	77 x 25 x 32cm near rear wall	86dB/w 40Hz	BB	68
Mission 764i £480	Good Average	Despite improvements, this large floorstander still lacks low frequency authority, which is probably a function of its comparatively modest price	1ft from wall, freestanding 87dB/W	below 20Hz		94
Mission 767 £2500	Very Good Very Good	Magnificent and massive part-active monoliths have fine acoustic subtlety and impressive loudness capability, ultimately limited by partnering (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 (stands £80)	Good - Good -	Lively, articulate and beautifully finished, this compact wall-mount model with twin main drivers has good integration but a rather rich, 'Loudness' balance	50 x 25 x 32.5cm Cyrus stands near wall	90dB/w 50Hz		71
Monitor Audio MA1200 £900	Average Average +	This smooth and civilised slimline floorstanding loudspeaker is well built and nicely presented. But it is also expensive	94 x 20 x 26cm in free space	85dB/w 48Hz		68
Monitor Audio MA1800 £1400	Good Average +	Attractive and beautifully finished, even when ballasted with lead shot the 1800 inclines towards upper bass richness and lacks genuine extension	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)		81
Monitor Audio Monitor 11 £330	Average Good	This tall and slim and attractive free space compact has an extra driver to help out in the bass, giving extra urge at some price in delicacy	52 x 20 x 24cm stands free space	87dB/W 48Hz (in room)	R	94
Monitor Audio Monitor 14 £400	Average Average	Floorstanding version of M11 suffers from excess upper bass, giving a thick, chesty coloration beneath a quite lively and well focused mid and treble	78 x 20 x 24cm floor well clear of walls	86dB 30Hz (in room)		98
Monitor Audio Monitor 7 £180	Average - Average	This lively and punchy near-miniature looks pretty enough and is good value but is let down by an unruly and indifferently integrated tweeter	34 x 16.5 x 17cm stands 1ft from wall	84dB/w 70Hz		74
Monitor Audio Monitor 9 £220	Good Average	Despite a much better treble balance than the 7, the Monitor 9 is less engaging and lively at low frequencies than its smaller sibling	37 x 20 x 21cm high stands near wall	85dB/w 30Hz		78
Monitor Audio Studio 10 £1200	Average Average +	Expensive, luxury build/finish and all-metal driver diaphragms provide engagingly transparent midrange and treble, spoilt by over-strong mid-bass.	40 x 20 x 25cm heavy stands clear of walls	87dB/w 45Hz		90
Monitor Audio Studio 5 £500	Average + Average +	All metal diaphragm luxury miniature has splendid presence coherence but sound can be aggressive and lacks welly.	32 x 18 x 20cm stands close to wall	83dB 28Hz (in room)		98
Mordaunt-Short MS 3.10 £110	Average Average +	Probably the liveliest and most communicative miniature around, this beautifully presented design is probably better suited to budget 'real hi-fi'	28.5 x 17.5 x 20cm	88.5dB/w 48Hz	BB	78
Mordaunt-Short MS 3.20 £140	Average Average +	All the charm of its BB-rated £99 baby 3.10 brother, plus a smidgeon more bass for those in a suggestible frame of mind	35.5 x 18 x 20cm open stands against wall	85dB/w 50Hz (in room)	R	82
Mordaunt-Short MS 3.30 £200	Average Average +	A little too mid-forward for neutrality or formal recommendation, this attractive, good-sized model nevertheless has more than enough appealing	46 x 23.5 x 27cm high stands 1-2ft from wall	87dB/w 30Hz (in room)		78
Mordaunt-Short MS 3.40 £260	Average + Average	It looks pretty and sounds civilised, but the 3.40 failed to ignite any degree of enthusiasm amongst our listeners. Low frequency stand and room matching is	57 x 23.5 x 27.5cm stands in free space	87dB/w 30Hz (in room)		86
NAD 8100 £269	Average + Average +	Floorstanding variation on attractive 8225 miniature adds some half convincing extra bass thump and saves the price of stands - very cost effective	75 x 20 x 25cm floor clear of walls	88dB 25Hz (in room)	R	98
NAD 8225 £150	Good Average +	Notwithstanding lacklustre styling and an unprepossessing appearance, this NAD miniature has a smooth and even midband plus an appealing overall jauntiness.	34 x 20 x 18cm stands close to wall	87dB/w 45Hz (in room)	R	86
Naim NA IBL £798	Average + Good	This tiny and elaborately engineered floorstanding wall mount delivers outstanding dynamics, speed and detail, marred by pronounced upper mid forwardness	wall, freestanding 84dB/W	30Hz (in room)		94
NVA Cube 1 £600 (stands £200)	Good - Good +	Attractive, cube-shaped semi-omni is very sturdily built, and gives an idiosyncratic but unusually open, spacious and informative sound	33 x 32 x 32cm own stands c0.5m from wall	85dB/w 52Hz	R	71
NVA Cube 2 £380	Average Good	A rude but exciting miniature, with unusually accomplished bass capabilities for its size	28.5 x 27 x 28.5cm NVA stands against wall	85dB/w 48Hz (in room)	R	82
NVA Cubix £1100	Average Good	Too idiosyncratic for formal recommendation, the Cubix possesses remarkable bass extension for its size, but is tricky to optimise	60 x 32.5 x 32.5cm	84dB/w 28Hz (in room)		78
Opus 3 Capella £599	Good Good	The sound of this Scandinavian curiosity certainly benefits from the crushed marble enclosure, though presentation is strictly DIY	32 x 40.5 x 26(ave)cm amongst books in	86.5dB/w 45Hz		66
Opus 3 Credo £399	Average Average	Credo's odd-shaped silicate-based cabinet confers good box and bass performance, but the sound could be more neutral for the price	32 x 28 x 32cm stands in free space	88dB/w 65Hz		74
Pearl & Oakley Victoria 200 £1099	Average - Average -	Extraordinary – and to many very attractive – 'ginger jar' presentation in Staffordshire ceramics, but let down by need for further acoustic development	93 x 33 x 33cm on floor in free space	87dB/w 30Hz (in room)		78
Philips FB815 £250	Average Average	An impressively – indeed imposing – physical package for the price, clever engineering gives a very competent if slightly hard and brittle sound quality	63 x 27 x 27cm low stands in free space	85dB/w 30Hz		86
Philips FB820 £450	Good Average	Big-but-less-than-beautiful three-way is well enough balanced but lacks communication skills in the time domain	86 x 27 x 35cm floor clear of walls	87dB 28Hz (in room)		98
Philips FB825 £650	Good Good	Generous sounding and impressively uncongested for the type, loudness and bass extension don't quite match the large and rather plasticky box	110 x 29 x 41cm on cones clear of walls	88dB/w 25Hz	R	90
QLN Model One £700	Good Average	Similar to Signature at two thirds the price, Model One exaggerates the latter's rich and heavy midbass and lacks its velvet smoothness	35 x (16-25) x (21-27)cm pillar	85dB/w 28Hz (in room)		82
QLN Signature £1100	Good Good	Beautiful but expensive luxury compact has a rather laid back and 'heavy' sound, but coloration is low and stereo imaging very good	37 x 18 x 36cm heavy stands in free space	83dB/w 30Hz (in room)		78
Quad ESL-63 £2072	Good + Very Good	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without	92 x 66 x 27cm open stand well clear of	84dB/w 34Hz	R	60
RAM Hermes £425	Average - Average +	Slim small floorstander is a bit tall for its footprint. Good sensitivity is combined with an attractively lively sound, but it's uneven and not truly coherent	70 x 21.5 x 23cm floor, freestanding	91dB/W 45Hz (in room)		94
Richard Allan CD5 £184	Average - Average -	This neatly presented small reflex design can sound engagingly communicative, but is flawed sonically and technically and quite expensive too	38 x 19 x 23cm on rigid stands	88dB/w 80Hz		68
Rogers LS2a £193	Average Average	Provides very good engineering and stereo performance for the price, alongside some 'boxiness' and certain dynamic constraints	36 x 23 x 21cm low stands 1ft from wall	88dB/w 50Hz (in room)		82
Rogers LS4a £255	Good Good -	This artfully voiced and well balanced compact gives a fair flavour of the classical 'BBC sound' at a very reasonable price	43 x 25.5 x 24.5cm stands 1ft from wall	87dB/w 32Hz (in room)	R	78
Rogers LS6a £316	Good Good	Stereotypical model with impressively even balance, prospective purchasers will have to weigh the midband naturalness against slightly lazy dynamics and timing	51 x 27.5 x 28cm stands in free space	86dB/w 25Hz (in room)	R	86

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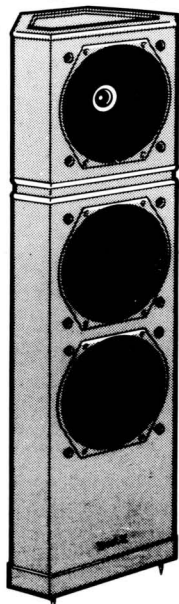
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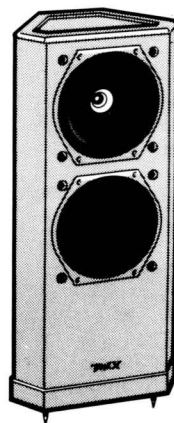


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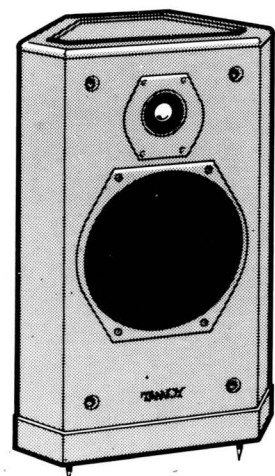
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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY	VALUE	ISSUE
Rogers LS7t £449	Good + Good +	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/w 48Hz	R	59
Rogers Studio 1a £612	Very Good Good -	The classic BBC monitor style sound sensitively updated – transparent and natural with fine stereo, but a touch 'heavy' in balance	63.5 x 30.5 x 30.5cm stands in free space	87dB/w 36Hz	R	66
Roksan Darius £1569 (£389 integral stand)	Good Very Good	Now totally realigned, the current Darius provides an exceptionally impressive combination of transparency and delicacy with fine information retrieval and speed	47 x 27 x 40cm own stands angled in space	82dB/w 20Hz	R	86
Royd A14 II £199	Average Good	Not the smoothest or prettiest around, this is still an informative if sometimes aggressive large bookshelf model, with plenty of welly for the price	40 x 26 x 23cm stands 1ft from wall	87dB/W 30Hz (in room)	R	94
Royd A7 Series 11 £115	Average + Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near	86dB/w 75Hz	R	53
Royd Apex £485	Average + Good	Not the smoothest sound around, it more than compensates with an impressively communicative and informative musical presentation	85.5 x 20 x 30cm on floor close to wall	87dB/w 33Hz (in room)	R	78
Royd Eden £235	Average Average +	Delightful mid/treble speed and transparency but determinedly bass light, this oddball miniature threatens cult status but could use a sweeter tweeter	31 x 20.5 x 18.5cm stands close to wall	87dB/w 85Hz	R	66
Royd Sapphire £200	Average+ Good-	Neat little miniature sounds a touch cold and thin but unusual main driver delivers remarkable speed and coherence for such a reasonably priced model	30.5 x 20.5 x 21cm frame stands 1ft from	88dB 28Hz (in room)	R	98
Royd Sintra £330	Average + Good	Balance is bass light and a little bright, but superb dynamics, speed and timing make this luxury miniature musically very informative and satisfying	30.5 x 20.5 x 19cm stands close to wall	88dB/w 50Hz	R	90
Ruark Swordsman £219	Good Average	Very attractively styled and finished, the Swordsman is a well built 'small bookshelf' model that delivered better test than listening results	38.5 x 20 x 27.5cm stands 0.5m from wall	84dB/w 50Hz		71
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 wall	86dB/w 30Hz	R	90
SD Acoustics OBS £845	Average Good	Recent changes have added some refinement to a seductive midrange, good timing and fine sensitivity, though bass extension is limited and coloration obvious	102 x 35 x 25cm floor, angled, away from	92dB/w 30Hz (in room)	R	82
SD Acoustics Ribbon £2150	Average Good +	Entertaining but a little underdeveloped and rather amplifier sensitive, the Ribbon is a lively and loud hybrid marred by some colorations; some like it, others don't	152 x 30 x (15-30)cm floor, angled, away	91dB/w 30Hz (in room)		81
SD Acoustics SD1 £1350	Average Very Good	A large scale, airy and unusually detailed system with excellent dynamics. Current model has more civilised top-end and warmer balance than original model	123.5 x 38.2 x 31.9cm free space	90dB/w 50Hz	R	60
SD Acoustics SD3 £379	Average Good	Neither cheap nor perfect, this near miniature sounds unusually lively and dynamic within inevitable physical constraints. Both engaging and entertaining!	38 x 19 x 29cm stands 10cm from wall	83dB/w	R	86
Seventh Veil System IV £1290 (£340 integral stand)	Average Good +	Lacks welly and loudness but delivers astonishing results with female vocals in particular. Antithesis of the 'good allrounder'	72 x 44 x 21 x 29cm own-stands close to	84dB/w 28Hz (in room)	R	86
Shan Shinna £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
Snell Type C £2350	n/a Very Good	Pricey, yes, but an extremely capable loudspeaker. Musical and transparent; excellent bass extension which improves with the addition of a Pirate plinth	112 x 38 x 33cm free standing, free space	90dB/w 35Hz	R	65
Sony APM-101ES £100	Good Average	Big hearted sound from small bookshelf successor to BB '10ES, sounds a little untidy at frequency extremes, so suits CD better than vinyl	39.5 x 22.5 x 23.5cm stands, 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
Sony APM-66ES £700	Average + Average +	Powerful heavyweight sound with a brilliant midband - clear articulate and transparent. But bass is on the boomy side and the treble can sound grainy	66 x 38 x 36.5cm low stands, free space	89dB/w 40Hz		59
Spendor SP1 £800	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands, free space	87dB/w 41Hz	R	60
Spendor SP2/2* £500	Very Good Good +	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm stands, free space	87dB/w 45Hz	R	59
Spica Angelus £1295	Good Average	A little bass shy and soft in the bass and lower mid, the free standing Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm away from walls	86.5dB/w 50Hz		60
Spica TC50 £599	Good - Good	This triangular-profile 'grown up' miniature is a shade boxy and laid back but has good rhythmic and musical integrity	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Spica TC50SE £799	Good - Good	A heavily UK-modified TC50, the SE sounds less boxy and more spacious, but lacks some of the urgency of the standard model	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Studio Power DMS100 £249	Average + Average +	Close to a BB rating, and in many respects remarkable value for money. Delivers an impressively smooth and large sound, but sheer ugliness will limit its appeal	51 x 26 x 32cm open stands 1ft from wall	86dB/w 25Hz (in room)	R	82
Tannoy E11 £140	Average Average -	Fundamentally turgid and slow, thanks to leaden upper bass and 'shut in' treble, though stereo images are convincing, as are the reasonably uncoloured vocals	39 x 21 x 22cm stands, free space	87dB/w 45Hz (in room)		82
Tannoy J95 £520	Good Good	Substantial cabinet engineering explains the unusually authoritative bass delivered by this big, good value floorstander, though the upper range is a bit dull and shut in	93 x 26 x 32cm floor, freestanding	90dB/W 30Hz (in room)	R	94
Tannoy M15 £190	Good Average +	Somehow lacking the magic of its predecessors, the M15 remains a fine value compact that needs careful set-up to give optimum results	50 x 25 x 21cm Blu-tack to stands	88dB/w 40Hz (in room)	R	78
Tannoy M20 £260	Good Good	Alongside fine build and presentation, the M20 provides an unusually clever combination of the 'traditional' virtues of transparency and low coloration	50 x 25 x 22cm stands in free space	87dB/w 25Hz (in room)	R	86
Tannoy Westminster £3600	n/a Good +	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from	96dB/w (manuf.)	R	Coll '87
TDL Monitor £1799	Very Good Very Good	Fine solidity and good accuracy, with enough bass extension to satisfy even organ freaks. Needs a big room and can sound a bit lazy and a shade tinkly	118.5 x 30 x 47cm 0.5m from walls	85dB/w 28Hz	R	66
TDL Studio 0.5 £399	Average Good	This tiny floorstanding transmission line has good agility but doesn't provide the coherence or even balance of the slightly bigger Studio 1	55 x 20 x 30cm own stand, free space	85dB/W 40Hz (in room)		94
TDL Studio 1 £599	Average + Good	Delivering genuinely extended bass from a compact floorstanding enclosure, the Studio is very detailed but a shade clinical and detached in presentation	76 x 23 x 33cm	84dB/w 25Hz (in room)	R	78
Technics SB-CS5 £70	Average Average	Clearly fine material value for money, the CS5 nevertheless betrays its midi system heritage, the quest for size for its own sake compromising the performance of both enclosure and main driver	42.5 x 25 x 24cm Stands in free space	86dB/w 48Hz	R	86
Technics SB-EX2 £179	Average- Average	Nicely presented, well built and decent size enclosure sounds solid but somewhat dull, thanks presumably to rather ordinary, low cost drivers	48 x 23.5 x 27cm stands clear of walls	86dB 20Hz (in room)		98
Technics SB-RX50 £600	Very Good Average +	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/w 40Hz	R	46

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY	VALUE	ISSUE
Technics SBC 250 £140	Average + Average -	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/w 60Hz		46
Toshiba SS33-M £100	Average Average	Providing a benchmark for budget loudspeakers, this Toshiba-inspired but UK designed and manufactured model is a lot of loudspeaker for the money	40 x 26 x 21.5cm stands in free space	86dB/w 55Hz	BB	68
Townshend Glastonbury IIS* £1700	n/a Very Good	What? No bass? Actually, like the KEF 107, Glastonbury II goes down so low you might not notice how good it is. A truly remarkable performer. Superb	91.5 x 28 x 4.6 free standing in room	88dB 27Hz	R	65
Townshend Glastonbury Tor £1495	Average - Very Good	Prodigious bass extension, stunning stereo focus and low cabinet coloration, but limited loudness from low sensitivity and power handling	99 x 26.5 x 33cm well clear of walls	82dB/w below 20Hz	R	90
Vandersteen Model One £1000	Average + Average +	This compact American floorstander's elegant staggered baffle arrangement contributes to a refreshing freedom from boxiness, but the price is quite high	100 x 30.7 x 25.6cm floor clear of walls	87dB/w 23Hz (in room)		86
Vecteur Premiere £695	Average Good	Expensive for its material content, this pretty French compact nevertheless has a beguiling sound quality that indicates painstaking development	34 x 19.5 x 25cm light stands clear of walls	88dB 48Hz (in room)		98
Videotone Minimax 2 £80	Poor Average -	Cheap in build and QC as well as price, but cheerful (if coarse) with it - if a little too cheerful after extended listening	27.5 x 17 x 20cm near rear wall	84dB/w 90Hz	R	74
Visonik David 6001 £173	Average - Poor	Sharp styling a classy looking miniature makes, but the complex grillework worsens a sound which starts off with too much top and not enough bottom	20 x 12 x 13cm against rear wall	87dB/w 130Hz		74
Wharfedale 410 £130	Good Average-	One step up from the Diamond, this attractive and sensitive small bookshelf model sounds smoother but is also rather bland and uninvolving	34.5 x 22 x 22.5cm stand against wall	89dB/W 45Hz (in room)		94
Wharfedale 505.2M £260	Average+ Good-	Luxury red mahogany finish version of 505.2, confirms that this well balanced design remains fully competitive nearly three years after the original	44 x 25.5 x 25.5cm stands in free space	87dB 45Hz (in room)	R	98
Wharfedale 505/2 £190	Average Good	This lively Wharfedale provides plenty of speaker with unusual refinement for the money, and should be fairly tolerant of room siting	44 x 25.5 x 24cm stands 1ft from wall	86dB/w 55Hz	BB	66
Wharfedale Coleridge £499	Average Good	Compact, beautifully finished and extravagantly engineered box sacrifices bass extension in the cause of high midband sensitivity; communicative	48 x 26 x 26.5cm stands 1ft from wall	91dB/w 48Hz (in room)	R	82
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 uis good	38 x 22 x 17cm stands close to wall	88dB 48Hz (in room)	BB	98
Wharfedale Diamond IV £109	Good Average +	Thanks to a new metal dome tweeter, the new Diamond is much more civilised than its predecessors, with an attractive lively bounce but some boxiness	27 x 18 x 18.5cm stands close to wall	86dB/w 48Hz	R	90
Yamaha NS 1000M £900	Good Good +	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/w 40Hz	R	46

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-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 adjust	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 hdpd	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		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
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 ungimmicky 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-95 £400	Good Very Good	Well designed and finished cassette deck with features well judged to please the audiophile - especially switchable Dolby HX Pro and switchable panel display. Sounds great	Dolby B/C/HX Pro, 3 head, manual tape set-up	R	69
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 (switchable)	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, track search		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	R	99
Denon DRM-700A £230	Very Good Very Good	Simple but adequate features, lacks only timer standby. Musically this deck equals the best at this price level despite some clouding of transients with Dolby B.	Dolby B/C/HX Pro, fine bias, 3 heads, record return	BB	93
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. Sound quality is generally workmanlike - good value	Twin transport, Dolby B/C/HX Pro	R	93

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CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Dual 5850RC £230	Poor Average	Average-to-middling deck which does most things well and skates over the more subtle things. Control system is uninspired but easy to master. Overpriced	Dolby C/HX Pro, bias adjust		87
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-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
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-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 SD-40 £170	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 SD-50 £220	Good Very Good	Fine, exacting all-rounder offering good stereo, precision and focus. Good with prerecorded tapes too.	Dolby B/C/HX Pro, track & intro search, variable bias etc	R	81
Marantz SD-60 £350	Good Very Good	A first rate, highly capable deck offering energetic yet refined sound largely due to good electronic design	3-head, Dolby B/C/HX Pro, variable bias & sensitivity	R	81
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 input		93
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, Dolby HX Pro		93
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 1 £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 Two £300	Very Good Very Good	Not completely neutral, this deck is assured, dynamic and quick, with abundant detail and some coarseness. Stable transport but only rudimentary features accompany fine engineering	Dolby B/C, manual tape type selection, bias adjust	R	93
Nakamichi RX-202E £545	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-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 tape alignment		99
Pioneer CT-91a £560	Very Good Very Good	Superb, near state of the art recorder with an excellent dual capstan transport and very capable electronics. At the price, this one is a mould breaker	3-head, tape calibration, Dolby B/C/HX Pro	R	75
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
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
Rotel RD-855 £180	Average Good	The transport is OK and the various frequency responses are erratic, but good basic electronics help the Rotel deliver. Coherent, enjoyable and informative	Dolby C memory stop & repeat, track search	R	87
Rotel RD-865 £230	Good Very Good	Fine, architecturally solid sound quality in a package with a low gimmick count and strong audiophile appeal	Dolby B/C/HX Pro, fine bias	BB	75
SAE C102 £549	Average Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dolby B & C		52
Sansui D-X211HX £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 (WMD6C) Pro Walkman £249	Good Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket	Dolby B, & C	BB	60
Sony 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, 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-270C £89	Average Average	Not quite cheap enough to compete solely on price, the V-270C is a rather messy and unstable sounding deck	Dolby B & C, bias adjust		63
Teac V-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 Pro		99
Technics RS-B965 £350	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
Yamaha KX-250 £150	Good Good	Excellent if somewhat fiddly deck with all mod cons. Play trim helps bring recalcitrant 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

The Directory

DAT

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

TheDAT 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 converter, with some portables these have to be purchased separately and increase the price considerably.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa HD-S1 £600	n/a Average	The first DAT recorder, and already looking expensive and a little under endowed. Nevertheless, good build, controls and display help, and sound quality is adequate.	DAT recorder with separate A/D converter/battery unit. SP only, mic/line i/p	94	Supp.
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 and 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 record/play, LP analogue play	R	93
Kenwood DX-7 £500/£150	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	AC powered recorder, no analogue LP mode. Optional accessory packs adds battery/ADC & case	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	SCMS Remote control, stand-alone DAC facility, analogue/optical/coaxial in/out	99	
Luxman KD-117 £1499	Good Good	Slightly soggy, earth-bound sound quality, this model trails the other DAT decks tested so far	Two analogue inputs, remote twin address	63	
Sony DTC-1000ES £1299	Very Good Very Good	Only available from professional outlets. Fine, consistent performer with accomplished tape handling and good build quality	Standard track ID and search, remote	R	63
Sony DTC-55ES £550	Very Good Good	Broadly comparable to a middle ranking CD player sonically, the Sony is particularly well equipped and well priced.	DAT with all record modes, inc LP (analogue) record	R	93
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	Compact, well equipped, easy to use and excellent sound, it undercuts rivals by a clear £100. 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.

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	
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-333 £149	Average - Average	Looks costly, well featured, well balanced technical performance and sound for money	multi bit, keypad remote, hdph (fixed)	R	88
Aiwa XC-700 £170	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 £209	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-62 £330	Average Very Good	Looks, build quality and the technical specification are right up to date. As it stands it sounds very good but if indifferent lab performance could be improved, it would probably sound even better	Remote, programme, hdph, comprehensive display etc	BB	70
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)	62	
Akai 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	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 Black Box 1 £210	n/a Very Good	This rich, powerful and articulate sounding DAC transforms the majority of medium price CD players	Needs D-out CD players	R	60
Arcam Black Box 2 £260	Very Good Very Good	An addition to the BB 1, it also offers improved sound and more inputs	Optical and wired input digital decoder	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, optical & coax	R	88
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	

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Arcam Delta 70.3 £699	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 digital outputs. 7350 PDM DAC		95
Ariston CD1 £345	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 £500	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 of graininess through the treble	Remote control, coax digital output. 16bit 4x chipset.		95
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
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-3100 £340	Average Average -	The sound quality did not live up to the excellent fascia. Carver's DTL did not aid the indifferent sound	DTL sound shaping, usual facilities, remote, memory		76
Carver TL-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 £695	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
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
Deltec POM-One £500	Average Very Good	A no frills audiophile bitstream converter at an affordable price	Coax-in, special cable and mains filter options	R	83
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 their 'Power' mains filter.	Coaxial and optical inputs, SAA7350 Bit Stream DAC		101
Deltec PDM2 £2000	Excellent Excellent	State-of-the-art technical performance with a pristine sound to match. Repertoire includes a solid, thunderous bass allied to a transparent midband and sparkling treble. The tops!	Coaxial and optical inputs, phase invert, two-box DAC7	R	101
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 and tape edit features, opt/coax digital output, 20bit 16x.		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, 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, hdp, keypad, well featured		88
Dual CD5150 £300	Very Good Good +	In a real sense cloned from the rave Rotel RCD-855, this is also a great value all rounder: multi bit rules OK!	keypad remote, hdp (fixed), Philips based	BB	88
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 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 undermines the 'roots' of the player	Remote control but no headphone socket. MASH/PWM bitstream DAC.		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 youthful enthusiasm.	Remote, variable, digital and headphone outputs, MASH/PWM DAC	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, hdp (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 old K2 technology with PEM bitstream to deliver a full, beefy and engagingly dynamic sound	Remote control, variable and digital outputs, PEM bitstream DAC	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	Remote operation, motorised volume + tape edit. PEM bitstream DAC		95
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, disc file. Sony PLM DAC.	R	100
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 DAC	R	95
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
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, hdp, well equipped		88
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, switchable dig outputs. SAA7350 PDM DAC	BB	100
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-80 £550	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
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
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 200 £800	Very Good Very Good	Broadly compatible with most DACs and offering a light, fresh and very bubbly sound that is both natural, engaging and unflattering	CD transport, optical + coax outputs, Class 1	R	96
Meridian 203 £495	Very Good Excellent	Exceptionally lucid, transparent and solid sound 'bitstream' converter. Always tidy and easy on the ear, but doesn't bulldoze the craggy bits	Stand alone converter, 32-48kHz, optical/electrical i/p	BB	87

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Meridian 206B £970	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 208 £1,600	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		83
Meridian 602 £1,630	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
Meridian 203 DAC7 £560	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 a stage further Meridian has also tempered its vibrancy and 'life'	Two coaxial and optical inputs, phase invert, DAC7 chipset		101
Micro Seiki CDM100 £3850	Very Good Good	One of the hernia inducing bricks of hi-fi, the Micro is extravagantly styled, finished and built. The good lab performance led to an 'only good' sonic display when the price demanded excellent	Balanced output, remote, display blanking		72
Micromega Duo BS £499	Good Excellent	With a good transport it delivers a sweet musical sound at a high quality level	Bitstream D/A convertor, auto input switching	R	88
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
Micromega Optic BS £695	Average Good +	A bitstream rebuild of a Philips chassis, this player shows promise for the future	Bitstream, remote, hdph (fixed)		88
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
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 you perch on the edge of your seat	Remote with direct track access, variable output, MASH/PWM DAC	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 tracks rather than complex classical works which seem to lack focus and secure soundstaging	Remote with track access, headphone, coax dig. output. 18bit 8x		95
Nakamichi DMS-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.		51
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 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 DAC	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

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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 still lacks the lucidity and conviction of the best at this price.	Remote, FTS + Title + personal programming. SAA7321 Bit Stream	R	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 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	R	96
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 smart + digital out etc	R	76
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 £899	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 £1400	Very Good Good+	The extremely civil, understated feel of its music contrasts markedly with the over-engineered construction of this player. It won't offend anyone but then neither will it spark much excitement	Remote with fader and index facilities. Two dig o/p's. 20bit 8x	R	95
Proton AC-120 £180	Average Average -	Fine styling, low price but barely average performance	15 track memory, simple design, remote, hdph	R	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	R	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	R	76
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	Remote (inc volume), skip, scan etc.	R	58
Sansui CD-X211 £200	Good+ Good+	A new cheapie based on Philips' successful CD582 technology with a bold orange display and an equally bold, invigorating sound that is mercifully free of brightness or grittiness	Simple remote, programming and shuffle play. 16bit 4x	BB	95
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-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	R	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	R	70
Sonographe SD1 (by CJ) £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player	Full search programme and timing	R	Coll. '87
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	R	100
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	R	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 DACs.	R	100
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, this sample was well-used from demonstration stock...	Remote, everything but Custom File titling. Complementary PLM DAC	R	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
Stax DAC-Talent £1400	Excellent Good +	Natural, refined and never over-zealous, the DAC-Talent is also capable of sounding very spicy and dynamic. A little expensive but capable of wielding a maturing influence over a light or bright-sounding system	Coaxial and optical inputs, phase invert, mute, 20-bit DACs	R	101
Teac CD-P3000 £169	Good+ Average	A new budget bitstreamer though one that fails to match the success of recent NAD and Kenwood players. Pleasantly open and airy sounding but lacks guts and solidity. Too wishy-washy	Most facilities moved to remote. Midship drive. MASH/PWM DAC	R	95
Teac CD-P4000 £299	Good+ Average-	An updated version of the CD-P400 but one that seems less successful with its rather thin and scratchy sound. Very poor bass resolution dilutes the impact of all recordings.	Most features on remote, two parallel outputs on player. MASH/PWM	R	95
Teac CDP-400 £249	Good Average	Fine in the lab, but good build quality is not reflected in the rather average sound	Low bit, keypad remote, hdph, versatile prgm'ing	R	88
TEAC P-10 £1400	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	R	96
TEAC P-2 £2750	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	R	96
TEAC P-500 £600	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	R	88
Technics SL-PG200A £160	Good+ Good+	This season's version of last season's favourite (the SL-P277A) offers extra features and a punchy, dynamic and up-beat sound. All this plus uncommon poise makes for a Best Buy	Remote control, random play, variable out, MASH/PWM bitstream DAC	BB	100
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, comprehensive function manager MASH/PWM DAC	R	100
Wadia WT-2000/Digimaster 2000 £5614/£6641	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	R	Coll. '90
Wadia WT2000 £5614	Very Good Good +	Based on TEAC's P-2 with outboard mains transformers, active digital output and solid alloy casework. Its dynamic and crisp sound is best realised with Wadia DACs, otherwise it's less impressive	CD transport, AT&T opt + direct-coupled coax outputs, Class 1	R	96
Wadia WT3200 £2100	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
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	R	101
Wadia DigiMaster X-64.4 £5000	Average Good*	Our (demonstration) sample had not been thoroughly checked before dispatch, leaving us to identify various technical faults. Once redressed, 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	R	101

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Woodside DAC1 £895	Good Good	Fine but slightly dated and costly package in performance terms — but flexible, musical and well built	DAC with 2 electrical + optical i/p, tape out		87
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 4x chipset.		95
Woodside DAC2 £510	Good Good +	Based on Woodside's earlier 16-bit CD player and offering a similarly sharp and dynamic sound. Its music is captivating for its lack of graininess and 'tizz'. A cost-effective upgrade	BNC coaxial input (no optical), 16-bit 4x	R	101
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 at this price it's worth a try	Remote control, track access, variable out. 18-bit hybrid DAC	R	100
Yamaha CDX-530E £180	Average + Average	A well balanced example using established DAC technology - worthy of consideration if not recommendation	Multi bit, keypad remote, hdph (fixed)		88
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 busier, more complex passages	Remote control, variable and digital out, LC display. PDM DAC		100

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier

cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually)

acrossthe bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories. (The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa XT-003 £100	Average Average-	Economically designed and built in the UK, but trade-offs have a marked influence on FM and AM sound quality.	FM/AM digital, 30 presets, no signal strength meters.		93 Supp
Akai AT-52L £150	Very Good Very Good	Holds its own on FM against many much more expensive tuners, but AM is very poor	All bands	BB	65
Akai AT-93L £250	Good + Good +	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	65
Arcam Alpha 2 £185	Good Average+	Re-styled to blend in with the Alpha system, Arcam's cheapest tuner makes up for its lack of features with a sensitive front-end and mellow sound.	FM/AM analogue, no presets, manual tuning + AFC	R	93 Supp
Arcam Delta 80 £340	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder	6AM, 6FM presets. FM/MW/ LW display, manual tune	BB	55
Creek T40s3 £220	Average+ Average	Creek's FM-only analogue tuner is now in series 3 form, though the aesthetics remain unchanged. Our sample had an obvious bass 'hump' though production units are said to be cured	FM-only analogue, no presets, manual tuning + AFC		93 Supp
Denon TU-260L £100	Very Good Good+	A new cheapie from Denon with the bare minimum of features. Careful designwork promises a surprisingly open and vivacious sound, so don't overlook it!	FM/AM digital, 20 presets, manual and auto tuning.	BB	93 Supp
Harman Kardon Citation 23 £600	Good Very Good	Fine performance, interesting features and ease of use are this tuner's forté, and the sound quality is top notch	FM/AM seek/manual adjustment muting 16 presets remote control	R	60
Harman Kardon TU9400 £250	Good Very Good	Striking in appearance and with a sound to match, this new digital tuner comfortably exceeded our expectations. On stereo FM it's HK's best yet.	FM/AM digital, 24 presets, auto-tuning + hi-blend + signal str. meter.	R	93 Supp.
Linx Theta £475	Good Very Good	A Magnum Dynalab on the cheap with the hallmark styling of this small British newcomer. Some of the best midrange from any tuner	Manual analogue tuning, no presets, signal strength meter	R	72
Magnum Dynalab FT101 £599	Good Very Good	Although expensive for its fairly minimum set of facilities, its excellent sound makes up for what it lacks elsewhere	Analogue manual tuning, no presets, signal strength meter	R	72
Marantz ST-40L £130	Average + Good	A little slow to tune but once accomplished it provides a meaty and dynamic sound on FM. AM too has a little extra bite to its performance	FM/AM digital, 30 presets, manual/auto tuning	R	93 Supp.
Meridian 204 £595	Good + Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, timer		55
Naim NAT 01 £1294	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 F-447L £130	Average+ Average+	Equipped with a various IC-controlled servo and tuning aids, great fun to play with but of little practical benefit. Sounds OK but, on past form, we would expect more from Pioneer.	FM/AM digital, 36 presets, CCTS + R SS + manual/auto seek tuning	R	93 Supp
Pioneer F91 £350	Excellent Good +	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/AM 24 presets	R	60
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
Rotel RT-830AL 55	Good + £110	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	
Rotel RT-850AL £180	Good + Good +	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/AM, digital	BB	50
Rotel RT-870L £230	Very Good Very Good	Rotel's top tuner is ruggedly built and includes plenty of sophisticated electronics. It's a very slick machine to use with a sound that's equally confident and refined.	FM/AM digital, 16 presets, IF/RF + RF attenuation + signal readout.	R	93Supp
SAE T-102 £449	Good + Good +	Expensive for all the radio you get, but sounds interesting. AM - poor	FM/MW only	R	65
Sony ST-S530ES £200	Good+ Good	The cheaper version of Sony's revered '730 certainly looks and feels the part but its sound is, well, less startling. Civilised, yes, but lacks much enthusiasm.	FM/AM digital, 30 presets, hi-blend + Cal tone + manual/auto tuning.		93 Supp
Technics ST-G70L £200	Good+ Good+	Another very polite and refined-sounding tuner but one that does retain just enough sparkle to keep your interest. Plenty of widgets to play with too... facility, decent signal strength meter.	FM/AM digital, 39 presets, selectable RF/IF + fine tuning	R	93 Supp

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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-V99 £50	Good - Average +	Horn loaded in-ear miniatures with plenty of guts but not enough transparency or bass to compete with the headbanded competition	Intra-aural, closed-back, dynamic		75
Aiwa HP-X30 £30	Good Good -	A flashy personal stereo phone which alternatively could be used at home. A slight LF tonal preference slightly colours the response, but it ain't a bad can	Supra-aural, closed-back, dynamic		75
Aiwa HP-X80 £50	Good Good	A headphone that's highly suited to non acoustic music and portable sources, nicely made and slickly finished. Sound quality doesn't quite match the price	Supra-aural, closed-back, dynamic		75
Aiwa HPEX-200 £90	Good Good	Modern looking and well finished, the Excelias, as they are dubbed, had meaty bass and sounded reasonably open for the type	Circumaural, closed-back, dynamic		63
AKG 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
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
Realistic Pro-X £25	Poor Average -	Robust, unanimously uncomfortable and heavily veiled in sonic terms - not a great success	Supra-aural, closed-back, dynamic		75
Ross RE-2760 £35	Poor Average	Stylish white cans from the only British firm in the business. Unfortunately sound quality is not up to par in this price range	Supra-aural, closed-back, dynamic		63
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 CO £25	Good Average +	If you're not too fussy about quality of finish and don't have an elfin head then these British phones warrant attention. Sound could be smoother	Supra-aural, semi-open, dynamic		75

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HEADPHONES

MODEL PRICE	FIT SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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		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 Adaptor) £100	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price	Circumaural, open back, electrostatic	R	55
Stax SR Lambda Pro/SRD-7SB II 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 Energiiser £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

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 still relatively expensive, although prices have come down a lot, and don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Rechargeable batteries are extremely useful and increasingly popular, some can now be recharged within the unit and charge capacities are also being increased.

Most models come with a mains adaptor, which in some cases doubles as a battery charger and some include a wired remote control. A few are now appearing with infra-red remote control although this is more applicable to CD players.

Sound quality on the cassette front seems to

have a proportional relationship to price and integrity of construction – wow and flutter being quite obvious on the cheaper models.

CD players become less noisy as they get dearer and also reduce in size; one drawback of the latter seems to be that immunity to shock suffers as a consequence, although newer models are starting to buck this trend. Cassette players do, on the whole, seem better suited to the outdoor life than their digital counterparts, as does the software.

Bear in mind that the sound and lab ratings given below cannot realistically be compared to those in other categories or between cassette and CD personals

PERSONAL CASSETTES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa HS-PL300 £110	n/a Average	Good looking, simply laid out player with a sensible selection of features and reasonable sound quality for a small player of this price	Dolby NR, chrome/metal eq, remote		78
Aiwa HS-PX303 £150	n/a Good	Chunky and macho styling combines with comprehensive features and a half decent transport to make a powerful personal	Dolby BC, chrome/metal EQ, remote	R	78
Panasonic RQ-P505 £100	n/a Poor	Very attractive and neat little player with nicely designed controls and XBS bass boost, but sonically it's limited by distinct wow and flutter	Dolby, chrome/metal eq, remote		78
Panasonic RQ-P525 £120	n/a Average +	Fitted with what is effectively a bass only tone control and harbouring all the necessary features, the 525 also has a knack with tape replay	Dolby B & C, chrome/metal eq, remote	R	78
Saisho PS90R £40	Poor Poor	A bit of a jumble of features and gadgets, the PS90R has on-board speakers, an extending aerial and even records, but sound quality is dubious	Graphic EQ, types I, II & IV, AM/fm, recorder		56
Sharp JC-270E £130	n/a Average -	Slightly old fashioned design combines with a basic feature count and mediocre sound quality to make an apparently uncompetitive player	Dolby, chrome/metal eq, remote		78

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PERSONAL CASSETTES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Sony Walkman Pro £249	Good + Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56
Sony WM-701C £200	n/a Good -	Beautiful little machine with all the necessary buttons'n'switches and a fundamentally exceptional sound quality, marred unfortunately by wow and flutter	Dolby B & C, chrome/metal eq, remote, folding phones		78
Sony WM-BF65 £90	n/a Average +	Regular size radio/clock/cassette player with a bright even open balance and Sony's forward facing phones. Not as glamorous as slightly more expensive models but sonically not bad	Dolby, chrome/metal eq, radio, alarm clock	R	78
Toshiba KT-4549 £80	n/a Poor	Fully equipped with 10 preset radio and alarm clock, the KT-4549 is a bit aggressive on the sonic side and the bass boost system lacks balls	Dolby, chrome/metal eq, radio, alarm clock		78

PERSONAL CDS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa DX-P50 £150	n/a Average -	A tad aggressive both through earphones and domestic systems, not very walkable but it has got two stage bass enhancement	Digital output, mains adaptor, remote		94 Supp.
Denon DCP-100 £250	n/a Good	Solidly constructed and nicely finished in the slightly impractical Velvex, almost walkable, competent if uninspiring sound quality	Remote, mains adaptor, no earphones, rechargeable batts		94 Supp.
Denon DCP-50 £180	n/a Average +	Not very walkable, but lightweight and nicely finished in a nextel like grey. Sound through a system is a tad unexciting but not too bad	No headphones, remote, mains adaptor		94 Supp.
Goodmans GCD-10 £120	Average - Poor	Cheap, flashy and not short on accessories, the GCD-10 is a rather noisy player that left a lot to be desired on the sound quality front	13.5 x 3.7 x 18cm, 478g, mains adaptor		66
Kenwood DPC-41 £150	n/a Average -	Lightweight, not very walkable but nice control layout. Sound through the phones is on the thin side, through the line output it's pretty average for a portable	Mains adaptor, rechargeable batts		94 Supp.
Kenwood DPC-77 £270	Good + Very Good	Very chunky and well made, the DPC-77 is the only player to include a digital output and sounds very good through its analogue output - a suitable domestic alternative	12.8 x 3.5 x 14.5cm, 750g, digital output, mains & in-car adaptors	R	66
Kenwood DPC-81 £200	n/a Good +	Chunky metal cased player that makes pretty confident sounds through a system but sounds dry via earphones and ain't exactly walkable	Remote control, mains adaptor/charger and batts, digital output		94 Supp.
Philips AZ6897 £150	n/a Good +	Unusually designed and equipped with a radio the Philips is almost joggable, it sounds remarkably good via a system and a little cautious through the phones	Mains adaptor with built in plug, wired remote, clock	BB	94 Supp.
Sanyo CP-12 £260	Average Good +	Sonically amongst the more enjoyable personal CD players and capable of revealing the musical aspects of a disc in an interesting and entertaining fashion	12.5 x 2 x 12.7cm, 380g, wired remote, mains adaptor	R	66
Sony D-350 £300	n/a Good	More buttons and widgets than any of the others but not the sound quality or walkability to go with it	Mains adaptor, clock, comprehensive facilities		94 Supp.
Sony D-66 £180	n/a Average +	One of the few walkable CD players on the market, sound quality is a little muddled but not offensive	Mains adaptor, rechargeable battery pack	R	94 Supp.
Technics SL-XP1 £130	n/a Good +	Remarkably competent and enjoyable player that you can actually use on the move and sounds enthusiastic through a domestic system	Rechargeable batts, mains adaptor/charger	BB	94 Supp.

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-DFC - linear crystal oxygen free copper.

INTERCONNECT CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Audio Technica AT6115 £40	Very Good Average	This cable sounds somewhat 'quieter' than the original LC-DFC interconnect, but is also less transparent and three dimensional	PC-OCC copper coaxial		59
Audionote 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
Audionote 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
Audionote Silver ANV £154	Poor Excellent	Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle	21 strand silver Litz		59
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
Budget OFC Circa £7	Average Average	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads	OFC		59
Budget Patch Cords (see text)	Average Poor	As thrown in gratis with cassette decks and the like - frequency extremes were restricted and performances were veiled	Thin coaxial		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.

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INTERCONNECT CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Deltec Black Slink £152	Excellent	Inherently neutral, the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of tactility	8 silver plated OFC strands PTFE dielectric	R	59
Deltec Gortex Black Slink £152	Very Good Excellent	A true reference quality cable providing an exceptionally detailed and transparent sound	Symmetrical, 8-conductors, Gore-tex ins.	R	83 Supp.
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
Denon LC-OFC N/A separately	Very Good Average	Supplied with Denon's dearer CD players, this cable introduced a peculiar 'twangy' coloration at high frequencies, and a slightly soft bass	LC-OFC, non-magnetic gold plated plugs		59
DNM Solid-core £23	Average Good	Transparent in the midband and full of sparkling detail in the treble, low bass was slightly curtailed (unterminated price £2.30 per m.)	Single strand nickel-plated copper. Unshielded	R	59
Isoda Electric HC-05-PSR £54	Good Good	A pleasantly lively and fluid sounding cable though softens some subtle, midband detail	Aluminium + brass multistrand cable	R	83 Supp.
Kimber Kable 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 £24	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 £34	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 GP1 Gold £18.95	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 £15.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight	OFHC, gold plated Deltron plugs	BB	59
Sterling £250	Average Good	Possessing a neutral if faintly rich overall balance, it supplies a pleasantly open and transparent perspective. (Reviewed in pre-production form.)	2 silver strands per conductor		59
Supra EFF-1 £60/0.75m	Average Average	A new, costly and mildly disappointing addition to the range. Edgy, smeared sound	Screened, symmetrical dir. cable		83 Supp.
Thorens SAC 100 £50	Good Average	Performance is undermined by a slightly coarse and splashy treble, not necessarily bright, simply rather confused - and fine detail lacks resolution	Silver-plated OFC, coaxial		59
van den Hul MC-D300II £45	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF	Silver plated single strand VdH plugs	R	59
van den Hul MC-Gold £250	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-1021II £69	Good Good	Possessing the same endearing qualities as the D300, it presented open and transparent soundstages and improved timbral resolution	Twin axial silver plated copper	R	59
van den Hul Thunderline £150	Good Average	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'lizzy' coarseness, bass is tight and dry	Silver plated 'matched copper'		59
Yfere LC-OFC Quad £85	Very Good Very Good	New cable with a very refined sound. Very transparent with good sense of focus and space	Symmetrical, star-quad with screening	R	83 Supp.

LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	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 Technica AT6120 £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
Audionote AN-SP £100 per metre	Average - Excellent	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent	15 silver strands, polyethylene dielectric		64
Audioquest Livewire Black £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green	OFHC, surface only - foam core construction	R	64
Audiospec Latitude L4 £3 per metre	Average + Average +	Warm, ruddy but also mildly muddy sound with some slight emphasis of bass notes	Fig.-of-eight multi-strand, PVC diel.	R	83 Supp.
Bellwire 12p per metre	Poor Average -	Broadly speaking it delivered a bright and tizzy sounding treble with a fairly open and detailed mid with little or no bass resolution	0.5mm single strand, PVC dielectric		64
Deltec 8S £144 - 5m pair	Good Good +	The unerring transparency and detail resolution of 8S throughout the midband makes it a 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.
DNM Solid core £3 per metre	Average Average	A good general-purpose solid-core, though too bandwidth limited for high-end applications. Sounds great in some systems	0.65mm single strand, webbed PVC dielectric		64
Exposure £2.50 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs	56 OFC strands, webbed PVC dielectric	R	64
Furukawa FS-2F09 £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 unflagging treble with slightly rich but suitably weighty bass	OF copper, PTFE dielectric	R	64

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LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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
Marantz ML-55S £30 - 10m	Average Average	Subjectively, this cable offered a loose and splashy treble which, though not overtly bright, did compromise both tonal and timbral accuracy	30 OFC strands, 3 conductors PVC diel.		64
Mission Cyrus £2.50 per metre	Average + Good	Because of its impedance characteristic this cable will deliver a smooth and unfatiguing treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	64
Monitor PC Silverline PC4 £5.75 per metre	Good Average	Sonically, it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables	2072 x 0.07mm silver plated copper strands		64
Monster 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
Origin Live Soli-Core Ordinary £1.80 per metre	Good Average +	Subjectively it bettered the performance of the costlier Super version, affording a pleasantly detailed and spacious soundstage with firm bass but slightly coarse treble	1.8mm and 0.5mm single strands	R	64
QED 79-Strand £1 per metre	Good 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, unfatiguing treble	1,036 OFC strands, webbed PVC dielectric	R	64
Solid core lighting cable 36p per metre	Average + Good	It enjoys much of the smooth treble and articulate midrange usually associated with the better solid core derivatives. Lean but taut and rhythmically coherent	1.5mm square, 3 cores, PVC dielectric	BB	64
Sterling £99 per metre	Average Average	This pre-production sample possessed a strangely muddled and reserved sound quality. It suffered from a progressive instrument modulation	Pure Silver, PTFE dielectric		64
Townshend Isolda £400 - 5m pair	Average + Good	Isolda possessed a truly dark background out of which rose a very solid and extended bass together with an excellent sense of transparency through the upper octaves	8 coax cables per conductor - very thick	R	64
van den Hul CS-122 £5.95 per metre	Average + Good - treble	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, webbed rubberised	R	64
van den Hul CS-352 £12.95 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 £29.95 per linear metre	Good + Good +	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different gauges, PTFE dielectric	R	64
van den Hul SCS-2 £99.95 per linear metre	Good + Good +	Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair	665 silver plated matched crystal copper strands, PTFE dielectric	R	64
Vecteur R-CV30 £5.40 per metre	Average Good	Subjectively the better of Vecteur's cable line-up offering a neutral overall perspective but slight loss of detail resolution at both frequency extremes	4 x 0.8mm LC-OFc PTFE insulated BB strands	BB	64

STANDS AND SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two broad schools of design. The most common

is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be.

The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses spikes at the base but Blu-

tack or the like for coupling with the cabinet

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

LOUDSPEAKER STANDS

MODEL PRICE	LAB SOUND	COMMENTS	TOP PLATE SIZE, HEIGHT	VALUE	ISSUE
Appollo 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
Appollo 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
Audio Dimensions Classic 2 £110	4 leg Average	Built in the heavyweight tradition and damped with chalk. Solid, stable, tactile sound	20.3 x 20.3 x 52cm	R	83 Supp.
Foundation Fred £70	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation 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

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LOUDSPEAKER STANDS

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ TOP PLATE SIZE, HEIGHT	■ VALUE	■ ISSUE
Foundation Sir Fred £80	2 leg Good	Upgraded 'Fred' with special in-fills. Sweet sound but one that also lacks bite and edge	19 x 19 x 46.5cm		83 Supp.
Golding 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
Monotrak Engineering M1 £58	1 leg Good	The M1 gave the mid and treble a commendably smooth and detailed presentation but bass sounded rather lacklustre and muddy.	19 x 18.5cm 48cm		58
Monotrak Engineering M4 £58	4 leg Very Good	Begging comparison with Heybrook's HBS1 the M4 maintained much of the openness and forthright detail of that model.	23 x 21.5cm 53cm	R	58
Monotrak Engineering M4S £58	4 leg Very Good	Its stature and stability would seem to mark it out as most suitable for smaller, lighter cabinets. The M4S possessed an open midband and clear treble.	20 x 17.5cm 53cm		58
Origin Live Advanced £145	3 leg Good	One of three related tripod-like stands. Stable sound with good sense of depth and power	22 x 20.6 44cm		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
Partington PP4 £60	1 leg Good	The PP4 offers a rather mixed performance, though when damped with sand infill it was less ready to embellish the overall sound and low frequencies became tauter and quicker.	18 x 16.5cm 48cm		83 Supp.
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 infill 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.

EQUIPMENT SUPPORTS

■ 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
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 Z022 £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

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TELEVISIONS

The standalone television set is rapidly evolving into a key component in integrated home entertainment systems.

NICAM digital stereo sound is now being broadcast for many hours every week, although you will have to check to see what is available in your area. The IBA are quite open about it, but the BBC tend to be more secretive.

Most up-market stereo CTVs are now equipped with NICAM decoding and rather more attention is being paid to the built-in amplifier

and speakers.

NICAM is also available on Hi-fi stereo videorecorders (see above), and this is usually the more practical route for hi-fi system integration, as well as allowing favourite musical events to be saved on tape. To both watch and record with stereo sound will require NICAM on each of course, but the decision to update one or the other first will probably have as much to do with the age of the respective components than the convenience of the interconnections.

The ten CTVs tested so far are all luxury stereo models with 'flatter squarer' 59cms tubes of various kinds. Best suited to a viewing distance of about 7ft, these are one size up from the most popular 51cms size sets and take about 23 per cent of the top 30 per cent of the market.

All have remote control as well as Fastext (enhanced teletext), and many have on-screen graphics and flexible in/out socketry.

MODEL PRICE	LAB SOUND	COMMENTS	SCREEN SIZE, FEATURES	VALUE	ISSUE
Ferguson 51L5 £499	Average Good	This nicely (monitor) styled set delivers a fine all round performance at a very competitive price. Ergonomics are better than most thanks to good on-screen graphics	51cm MP FST, NICAM, Fastext, OSG	R	86 Supp.
Grundig ST-63-460TT £649	Average - Average +	Bulky set's shape resembles a square-rigged sail; screen tilts back slightly, so might suit floor mounting, though beware room reflections. Picture quality is good, if a touch bland, but ergonomics are fairly impenetrable - no on-screen graphics either. Halfway respectable sound quality is over-enriched by cabinet drone.	59cm FST, NICAM, Fastext		76
ITT Nokia £629	Average + Average -	Bulky square-rigged shape helps deliver a respectable standalone sound quality at a modest enough price. A versatile set with good handset but no on-screen graphics, the picture quality of our sample lacked fine detail resolution, lending a 'soft focus' effect	59cm FST, NICAM, Fastext		76
JVC AVS250 £500	Average + Average -	This compact and delightfully versatile non-NICAM set has respectable on-board stereo sound and lovely screen graphics, along with an infernal handset. Our sample suffered a tuner problem which marred a picture quality which was pretty good when monitoring baseband signals off tape	59cm FST, Fastext, o/s graphics		76
Panasonic Prism TK-24 W1 £699	Average + Average -	Handsome but bulky set delivers serious standalone sound quality. Lovely ergonomics but off-air picture quality marred by tuner section noise on our sample (works fine as a monitor.) Good NICAM (SCART) output.	59cm FST, NICAM, Fastext, o/s graphics		76
Philips 9752 £500	Average Average +	Detachable speakers ought to be an asset, but those supplied are too cheap'n'cheerful. Picture quality is nicely balanced, if a shade 'soft', the handset is nice, but the on-screen graphics are a bad joke	51cm FST, NICAM, Fastext, OSG, S-VHS socket		86 Supp.
Pioneer SD-21AV1 £599	Average + Good +	The set that can do anything if you've the patience to find out how to drive it: fine picture, decent sound and good flexibility in a neat compact monitor package, plus a handset that deserves its own instruction manual	51cm FST, NICAM, Fastext, OSG/LED	R	86 Supp
Sony KVX 2132U £530	Average - Average +	This is an attractive, ergonomic and competitive package, trading picture resolution in favour of stability. The on-set sound is naff, so Trinitron fanciers should use it as a monitor alongside a hi-fi system	51cm Trinitron FST, NICAM, Fastext, OSG	R	86 Supp.
Toshiba 217D9B £480	Average Average -	A superficially impressive looking package for the price, picture quality was disappointing on our sample	51cm FST, NICAM, text, OSG		86 Supp.

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.

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 titling & 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
Panasonic NV-FS1 £1000	Poor Good	The control system is poorly organised, with cramped legends and some strange machine logic. Bar code programming is hardly a great achievement either. Picture and sound quality are good, but not state of the art	S-VHS, Hi-fi, NICAM, bar code programming	R	71
Philips VR-6585 £500	Average Average	Fine middle-ranking deck with full LP operation and easy controls and displays	Hi-fi, NICAM, transmitter LCD remote, LP/SP		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.

Personal Messages

Against all manner of odds, a couple of days spent tramping the corridors of the Penta show this Autumn did manage to dispel a little of my gloom and pessimism over the future of hi-fi that hung heavily over last month's column.

Gloom remained etched on the faces of many retailers; Penta's concrete rooms are certainly no place for those in search of a peak hi-fi experience; and the hotel itself makes a strong case for reclassifying jet lag as an infectious disease. But the sheer number of exhibitors was itself enervating. This event is very much a showcase for specialist hi-fi. The hotel room format acts as a real leveller between companies of very different sizes, so that some of hi-fi's most creative one-man-bands have the opportunity to strut their stuff alongside multinationals like Sony and Pioneer.

Paul Messenger puts Penta paper to discuss a couple of the systems that really impressed him at the Autumn show.

There were plenty of rooms I either didn't find or have time to visit, and I don't plan to turn this month's column into another show report. But I did come across a number of interesting demonstrations, and have sufficient space to discuss two here.

I was intrigued to find a whole new range of speakers under the Jordan Watts banner, the couple of pairs that I heard making some very nice sounds indeed. It was also a privilege to meet Ted Jordan for the first time, and discover that the man whose seminal analyses of loudspeaker behaviour back in the Fifties had so taxed my adolescent grey matter, was human after all.

Getting to the promised land

For more than two decades Ted has ploughed a very lonely furrow, refining his near full range drivers with their then unique metal-diaphragms. Now metal diaphragms have become ever so fashionable, so maybe it's high time to reassess the work of this pioneer, which is something I hope to do shortly.

The tall floorstanding models are beautifully piano-lacquered and attractively shaped so that the line source driver array is directed to cross well in front of the listener. The end result — CD and Naim driven in the dem — was delightfully free of boxiness and impressively transparent, making for an altogether relaxing as well as highly informative experience.

Hi-fi stereotyping is always dangerous ground, but in my experience Jordan's metal diaphragm drivers do seem to possess an uncanny coherence and an ability to provide exceptional focus. The line-source approach using broad overlap between wide bandwidth bass and treble drivers does seem to ease system integration, and certainly promotes both sensitivity and power handling. The only snag is the cost. The *JH 10K* uses a total of thirteen hand built drivers (four for bass/mid duties alongside nine

tweeters) in each of the enclosures, which accounts for a pricetag that's regrettably on the wrong side of £7,000.

But that's small beer in comparison to the system that Russ Andrews had brought down to do battle with one of Penta's smaller rooms. Barflys were quoting anything from 50 to 80 grand as the total price of a system that cropped up in virtually every conversation, and which impressed a great many people.

This torlyte tour de force took up nearly a third of the tiny dem room, huge leather-trimmed three-way speakers with 15inch main drivers and ribbon tweeters flanking box upon bulky box of active drive electronics. The whole thing, including speaker and amplifier internals, was wired throughout with silver Kimber cable, which is one of the reasons for the high cost.

The speakers are particularly interesting, combining considerable original thought with influences from various elsewhere to create a unique blend. Both the 15inch main driver and the spike-decoupled separate box approach are somewhat reminiscent of the Naim *DBL*, while Linn *Isobarik* influence is apparent in the use of twin drivers for bass and midrange, one hidden inside the box behind the visible unit, and in the twinned and mutually perpendicular tweeters. But most of the serious work here is being done by an unusual midrange driver which has been developed alongside engineers working in the PA field. It uses



Dancing room only: Russ Andrews' system at Penta.

a 10inch paper cone with non-reactive cloth surround to give high sensitivity and 'speed', and operates across a full five octave bandwidth from 200Hz up to 6kHz.

The Russ hour

Perhaps the most impressive thing about Russ' system was the way it managed to combine subjective qualities that often seem perversely and infuriatingly mutually exclusive. Here was a system with all the speed, dynamics, headroom and loudness capability necessary to put boogie into the boots, yet which also delivered the sort of transparent delicacy that can bring a tear to the eye or a lump to the throat. Like any system however expensive there are nits waiting to be picked, but this one comes much closer than most to being all things to all men — and as such serves to undermine the sort of either/or factionalism that so frequently weakens the credibility of high end hi-fi.



Michi

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