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

HI-FI CHOICE

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Menu

Much has been said and written about 1992, the extensively touted entry point to what is billed as a single Europe. One aspect of this which I hadn't given much thought to until recently was the subject of hi-fi packaging.

The subject came up because I had an interesting discussion with Sennheiser's Ralph Martinke who recently visited the *Choice* offices to give us a sneak preview of the company's latest headphone range.

As well as all the technological advances, he was extremely keen to stress the fact that all the packaging has been changed. Out with the plastic blister packs and in with recyclable cardboard boxes which had been made as small as possible so as to prevent any unnecessary waste of materials. I'd visited the Sennheiser factory a couple of years back and had been impressed that even then the company was very 'hot' on recycling with the vast majority of waste material being collected and recycled.

Nice one Sennheiser, I thought. However, the story is actually a little more complicated than that.

Without wishing to impugn Sennheiser's altruistic motives I would however point out the fact that by 1992 manufacturers who wish to sell products in Germany will almost certainly be obliged to ensure that their products are packaged in recyclable material. So although Sennheiser's moves are to be applauded, they are also, to a certain extent, the result of impending legislation.

However, the Germans are planning to take things even further, as Panasonic's Product Safety Officer, John Sinclair explained: "This is an area that is still developing. All we know is that the German legislation on packaging is likely to be passed shortly and manufacturers will have to begin to address the need to bring recyclable products onto the market."

Just what the Germans mean by recyclable products remains to be seen, but presumably the intention is to bring hi-fi products in line with BMW's much touted recyclable car.

We'll have to wait and see what happens in this country, but anything that helps to reduce the mountains of packaging usually employed to enclose even the smallest hi-fi product has got to be welcomed - providing of course that the recyclable packaging proves to be as crunch resistant as its environmentally unfriendly brethren.

As for bio-degradable amplifiers, well, stranger things have happened.

Andy Benham



Cover photography
by Nik Milner.

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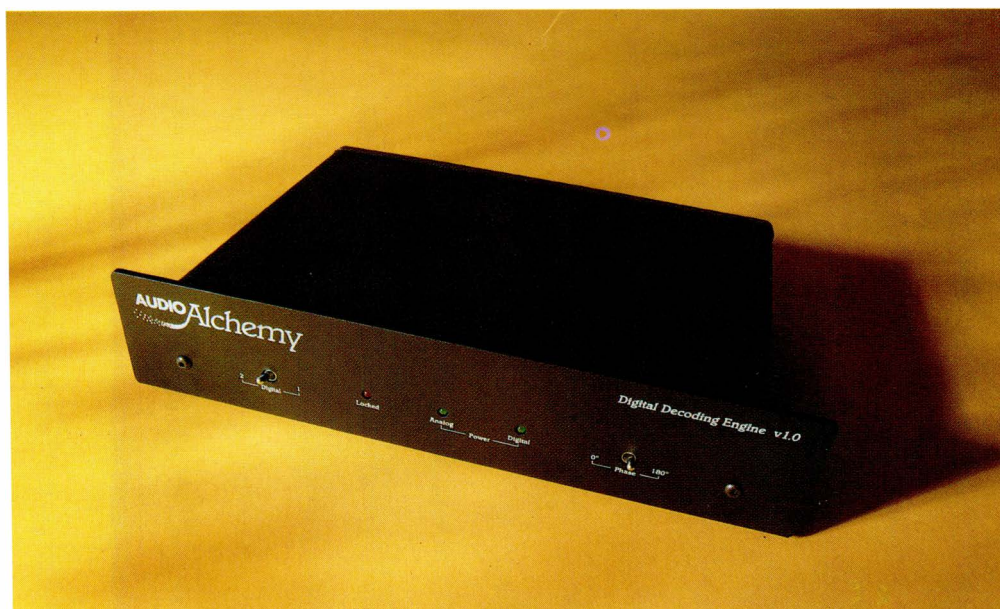
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Win nearly £4,000 worth of Monitor Audio loudspeakers, see page 36.



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THE CHOICE DIRECTORY

At a glance information including features, prices and comments on all the current products that we've tested in past issues of *Hi-Fi Choice*.

With well over a thousand entries, it even includes the results from this month's cassette and DAT tests. Beware of cheap imitations, this is the real thing; 30 pages of detailed information including comments on sound quality, compatibility and value for money.

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Update

PRODUCTS

Rotel adds a ton

Rotel has chosen this year's Penta Hi-Fi Show to unveil its 900 Series, a massive range of new products which will replace most of the models in Rotel's much acclaimed 800 Series.

The new range consists of no fewer than five amplifiers, two pre/power combinations, three tuners, three cassette decks and a pair of CD players.

Starting with the CD players, Rotel's range will now consist of the RCD-955AX at £260 and the RCD-965BX at £300. While the cheaper unit is based on the RCD-855 and employs the same 16-bit four times oversampling chipset, the more expensive machine is a new design based around Philips latest 7323 Bit Stream chip, although it shares some of the circuitry developed for its predecessor, the RCD-865. We've managed to get hold of the first RCD-955 to enter the country so watch out for a full review in next month's issue.

On the amplifier front Rotel's new range consists of the RA-920AX, RA-930AX, RA-940BX, RA-960BX and RA-980BX, with prices ranging from £130 to £400 and power outputs from 20 to 100watts per channel. The preamplifier side of things is now looked after by the RC-960BX and RC-980BX, costing



Rotel's Michi range sends the marque firmly up-market.

£150 and £260 respectively which are intended to be used with the new RB-860BX and RB-980BX, £180 buying you 60watts per channel while 120watts are on tap for £340.

The new amplifiers all feature beefed up power supplies. Slit film capacitors have been used wherever possible and Rotel reports that it spent considerable time auditioning the various components used in the amps before final decisions were taken on which resistors, capacitors and relays would be employed. Most of the circuit boards have been

redesigned and star earthing introduced at the top of the range.

Rotel's tuner line-up now consists of three digital models, the RT-930AX, RT-950BX and RT-970BX, although the bad news is that the much acclaimed analogue tuner, the RT-830AL, has had to be discontinued because Alps no longer makes the tuning mechanism.

On the cassette side the company has stuck with its twin head approach and the basic mechanism comes in one of three variants ranging in price from £150 to £230.

Although the 900 Series

follows on in the footsteps of the 800 Series the other new introduction to the Rotel range is quite a break with tradition. The Michi range consists of three up-market amplifier components - a power amplifier, a passive preamp and a phono stage - with the promise of a two box CD player and a tuner to come.

The massive dual mono power amplifier features star earthing and retails for £1,300 while the passive preamp will set you back a further £600. Vinyl users will have to shell out an extra £800 for the phono stage although

this does come equipped with its own pot so if vinyl is your only source you won't need the passive preamplifier as well. Watch out for a full review in a forthcoming issue.

Alpha goes to stage three

Arcam has launched what it bills as its 'best ever budget audiophile amplifier' - the Alpha 3.

The new model is considerably more powerful than its predecessor, being rated at 40watts per channel into an 8ohm load and features revised styling and a direct input facility, the latter bypassing the tone and balance controls and being effective on all five inputs. Another change is that the 3 comes fitted with eight chunky speaker terminals rather than sockets, one set of outputs being switched by means of the headphone socket.

Arcam's managing director, John Dawson, told *Choice*: 'We are delighted with the sound quality and appearance of the Alpha 3. We all feel that it is at least the equal of any of the recently touted oriental designs.'



Arcam is aiming to win back the amplifier high-ground with the launch of the Alpha 3.

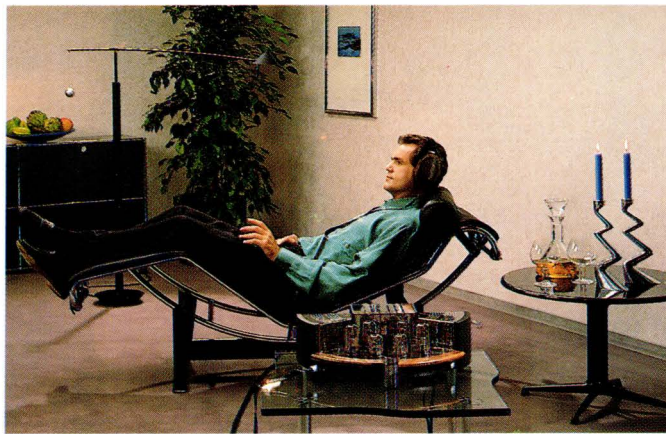
Moreover, the *Alpha 3* amplifier is designed and manufactured in the UK. This is in marked contrast to nearly all the other models in the price sector which, despite vast amounts of publicity about their British design input, are actually built in Taiwan or Japan.'

Philips goes for midi market

In what is billed as 'a major assault on the CD based midi system market' Philips has introduced the *Series 300*. As you may have already guessed, the new range consists of three midi systems, the 55watt *F310*, the 75watt *F320* and the 100watt *F330*.

All the new systems feature CD players employing the 16-bit four times oversampling chip set, digital tuners, twin full logic cassette decks, three-way speakers and motorized volume controls.

As is becoming increasingly common nowadays the *300 Series* features an 'intelligent' control system designed to allow the components to



The Sennheiser Orpheus and amplifier - A snip at £9,000.

speak to each other. Thus, selecting a preset on the tuner while a CD is playing will turn off the CD player and activate the tuner which will then tune to the required station.

Prices of the new systems are £420, £530 and £630 respectively, and as an added bonus (?) Philips will throw in a copy of Dire Straits' *Money For Nothing*.

Three way shelving

Ipswich based loudspeaker manufacturer Celestion looks set to buck some trends with the introduction of its latest models, the 9 and the 11.

Although both models are bookshelf units they are rather unusual in being three way designs, incorporating 25mm titanium dome tweeters and newly designed



Above: Celestions' latest entrant in the bookshelf stakes is a rather unusual three-way design.

Below: All this and a free copy of Money For Nothing, Philips could be onto a winner with the 300 Series.

mid and bass drivers.

Both cabinets are reflex loaded, the 9 containing 110mm and 150mm drivers in addition to the tweeter while the 11 uses a slightly larger 200mm bass driver. Both units are designed to be used either on a bookshelf or alternatively on 450mm loaded column stands situated close to the rear wall.

Both new speakers have a sensitivity of 89dB (2.83V/1m) and come in either oak or black ash simulated veneers, power handling capabilities are 100 and 120watts respectively. The 9 will you set you back £240 while the 11 is £40 more expensive.

Sennheiser's £9k cans

Sennheiser has introduced what it describes as 'the world's ultimate headphone'. For a mere £9,000 you can be the proud owner of the Sennheiser *Orpheus*, an open backed electrostatic headphone complete with its own valve powered amplifier/control unit.

The valve amp will accept normal line level inputs as well as both optical and coaxial digital inputs at any of the usual sampling frequencies.

Apart from the sampling frequency selection switch, the only other controls provided are volume and power on and off.

For the less solitary amongst you, the valve amp will drive two pairs of headphones and additional pairs can be obtained from Sennheiser in exchange for a sum not totally unrelated to £4,000, although the exact price has yet to be set.

The headphones themselves are made from a red oak laminate known as Pagholtz, which, Sennheiser informs us, has proved extremely popular in the aero industry where its combination of stiffness and low resonance makes it ideally suited to producing aircraft propellers!



Monitor Audio's new baby

Monitor Audio has announced a new addition to its family of loudspeakers. The new arrival is the *Monitor One*, also known as the junior, which is a diminutive two way reflex design. Inside the 12mm medite cabinet is an impregnated fibre pulp, long throw bass/mid driver complete with a rubber surround and a die-cast chassis, and a brand new 19mm gold dome tweeter.

Impedance is given as 8ohms and sensitivity as 88.5dB (2.83V/1m) while the new speaker measures just 240x160x152mm. The standard black finish will set you back £140 while the real wood veneer beauties shown on this page add an extra £40 to the price.

One result of the development of this new speaker is that the 19mm aluminium/magnesium gold anodised tweeter will be available to Monitor Audio users who have bought speakers which use the older 19mm design. The upgrade kit costs £65 including postage and packaging and is suitable for the 252, 100, 352, 7 and R300 models.

Technics powers ahead

Technics has introduced four new designs to its VX range of amplifiers. The new range consists of the 110watt *SU-VX800*, the 90watt *SU-VX700*, the 65watt *SU-VX600* and the



Technics' VX amp range is well suited to smaller speakers.



MA's new baby uses a new 19mm gold dome tweeter.

55watt *SU-VX500*, with prices ranging from £160 to £450.

All models feature two sets of speaker terminals to facilitate bi-wiring, and special attention has been paid to the power supplies of the new amps, which, with a peak current capability of over 20amps, are reported to be especially suitable for driving the small, reactive loudspeakers which are becoming increasingly common.

The top end model, the *SU-VX800* features Technics' Extended Direct Drive system and comes equipped with balanced inputs as well as the more conventional RCA phono sockets.

Sony ups the ICE ante

For little more than the discounted price of a Ford *Fiesta*, you too will soon be able to enjoy the ultimate in

in-car entertainment, Sony style. The *Mobile ES* system may cost a packet but it's also by far the most elaborate consumer application of DSP (digital signal processing) yet devised.

A-to-D conversion puts all signals into the digital domain, whereupon the *XES-P1* supplies acoustic synthesis, very flexible parametric equalisation and adjustable dynamic compression. Best stereo imaging settings can be stored for each individual seat in the car, for example, and individual preset configurations may even be assigned to specific discs via a Custom File type memory in the 10-disc boot-mount CD changer.

Equally important is the digital active filter, which provides 70dB/octave slopes plus individual time delay adjustment to compensate for the speaker positioning constraints imposed by the car environment.

There's an advanced double head diversity aerial tuner module too, but no means yet for replaying the humble cassette. However, extra units can be added at will, all interactively data-bus linked.

The end result is very clever indeed - or should be for those with the patience and skill to set it all up. Full details will follow in our next in-car supplement, which will be free with issue 103 (February 1992).

KEF latest reference

KEF has expanded its loudspeaker range with the introduction of the *Reference 103/4*. The new model is a three-way design, although it employs four drive units, and features KEF's latest Uni-Q technology.

Designed using KEF's dual coupled cavity woofer system, the *103/4* is reported to have an efficiency of 91dB (2.83V/1m) and to produce in-room peaks of 112dB.

The floor standing design is bi-wirable and available in black, walnut or rosewood veneer and is priced at £995.



KEF's latest floor stander - the Reference 103/4.

B&W/Nakamichi winners

Here's the moment you have all been waiting for - the results of the Nakamichi/B&W competition. The first name to emerge from our bulging post bag was Mr N Walls of Truro, Cornwall, unfortunately he had an incorrect answer to one of the questions, but we wish him

better luck next time.

The first correct answer to emerge came from Mr I Sutherland of Andover who wins a Nakamichi *CD Player 4, Cassette Deck 1, Receiver 3* and a pair of B&W 610 loudspeakers. The runners up are Mr D Dobson of Knutsford, Watfords' Adam Ryan and M Brever Weil of Hampstead who each receive a Nakamichi *Cassette Deck 2*. Well done to all the prize winners and commiserations to all those who entered and failed to come away with a prize, particularly the rather unfortunate Mr Walls.

Castle tumbles down

The Castle loudspeaker range has received a new bottom marker with the introduction of the £129 *Storm Grey Trent*. The *Trent* is a two-way reflex design and comes in an MDF cabinet, the whole being finished, not surprisingly, in storm grey.

Drive units comprise a 130mm paper pulp cone bass/midrange unit and a 30mm ferrofluid damped plastic cone tweeter, which together give a sensitivity of 89dB (2.83V/1m) and an impedance of 8ohms.

The new speaker is intended to be suitable for a wide variety of usages including shelf, wall or stand mounting.



Tablette II - the sequel, at a hi-fi shop near you from August.

Proac tweaks the Tablette

Proac Professional Acoustics of Borehamwood has announced a radically revised version of its *Tablette* miniature speaker featuring changes in most of its design and construction detail.

In particular Proac claims significant improvements in the £399 *Tablette II*'s soundstaging. This is attributed to the new drive unit layout which is intended to provide superior depth of image. The company also quotes improved bass extension and a 'more open revealing' midrange thanks to changes in the resistive port.

The reported improvements in tweeter detail and 'overall sweetness' are credited to fine tuning of the crossover network while improved construction and new design of the cabinets are said to have reduced coloration to 'inaudible' levels.

The *Tablette II* is on offer in teak, walnut or black ash.

Audiolab bridges the gap

Audiolab has announced the arrival of a mono version of its *8000P* power amplifier. Known as the *8000M*, the £595 monoblok has outputs for bi-wiring and comes complete with parallel line in/out phono connectors so that several units can be daisy chained together.

The new unit is rated at 125watts (rising to 200watts into a four ohm load) and comes fitted with an automatic electronic muting system.

The company is also reported to be working on both a tuner and a DAC, with the latter unit probably due for a Penta show debut. We'll try and get hold of some pictures and few more details in time for next month's issue.

In Brief

KJ West One has been appointed as UK distributor for the Finnish company Gradient Ltd. One of the first fruits of this collaboration is the *SW63*, a sub-woofer system intended for use with the *Quad ESL 63* loudspeaker.

The Quads are mounted on top of the £1,500 sub-woofers and an additional power amplifier is required to feed the bass units.

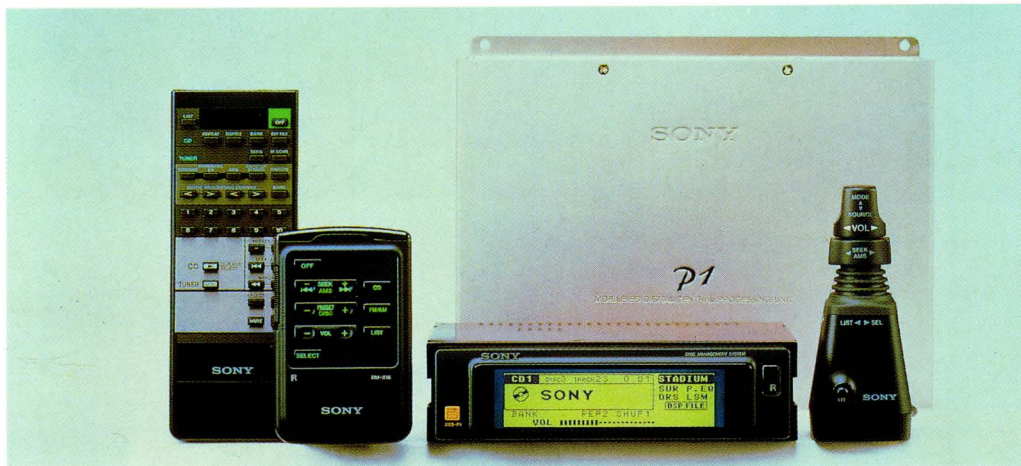
Exposure has added a new model to its amplifier range. Priced at £500 the *XX* is essentially a *XV* with both the phono stage and the record out function removed, the new amplifier being fitted with the same tape monitor facilities as the *X*.



According to the organisers, this year's National Sound & Vision show promises to be even larger than ever before.

The show, to be held at the Last Drop Village, Bolton, Greater Manchester, runs between Friday 27th September and Sunday 29th September. *Hi-Fi Choice* will be exhibiting at the show so come along and say hello.

QED has introduced the *Roomlink Starter Pack II*. The pack is the same as the first *Starter Pack* but with a rather clever new infra-red device which literally sticks on to part of your systems' infra-red window area, thus providing a very neat link into a multi-room set-up. Your remote control unit can then be used in any room fitted with a sensing 'eye'.



Sony's Mobile ES system, complete with display head, hideaway box, joystick and remotes.



The Pioneer A400 amplifier.

As recommended
by these
speakers.

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

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

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Packed with
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PLUS . . . 9 pages of valve amplifiers.

AND . . . a bumper crop of entertaining features to celebrate our 100th issue.

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HI-FI CHOICE

NOVEMBER ISSUE ON SALE
11th OCTOBER



Free with this
issue of

HI-FI CHOICE

A Sony Turbo
cassette tape!

Attached to the cover of this issue you will have found a free Sony Turbo tape. Specially designed for in-car use, although that's not to say you can't use them in the home as well, your Sony Turbo tape has a heat resistant cassette shell for maximum protection against the high temperatures likely to occur in cars during the summer. It also has a rigid welded shell to cut down on vibration, non-slip edges to help you keep a firm grip on it and a raised marker on the shell to make it easier to feel which side is up.

The tapes also feature special adhesive labels designed not to jam up your cassette player as they only peel off when you want them too.

The tapes themselves come in two varieties, C90s and C100s and which tape you get free with the issue depends on pot luck at your local newsagent as we have acquired quantities of both.

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7 Thackery Mall Fareham Shopping Centre Fareham		
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Lunch with the digital doctor

The Hi-Fi Choice in Japan series continues with Dan Houston reporting on a meeting with Dr Heitaro Nakajima - Sony's top digital audio pioneer and one of the men behind the birth of the Compact Disc format.

To begin with it felt like a power lunch with one of the stars from Dallas. Sony executives nervously shifted from one foot to another as they awaited the arrival of a company star who is every bit as luminary as JR Ewing.

Not that Dr Heitaro Nakajima is one of the deal makers at Sony. Far from it. The heads that turn and bow to the smiling 70 year old as he enters the restaurant do so in respect of his position of engineering genius within, and without, the company. He has a roving commission as Sony's Executive Technology Advisor and for most of the last decade has put his seal of approval on Sony's expansive range of products from Discmen to the High Definition Video System.

A world of media

Dr Nakajima was spending his lunch hour with us in a penthouse restaurant near Sony's famous permanent exhibition and techno-showcase - Media World. Because of its proximity to Sony's offices, many Sony employees use the restaurant, and are instantly recognisable in their short mushroom-coloured company coats. Nakajima eschews the company uniform in favour of a dark pinstripe suit, silk tie and starched shirt.

Ten minutes earlier he had breezed into the unreal atmosphere of Media World on the dot of his appointment. We were to photograph him next to his 'new' all-digital 48 track mixing console housed

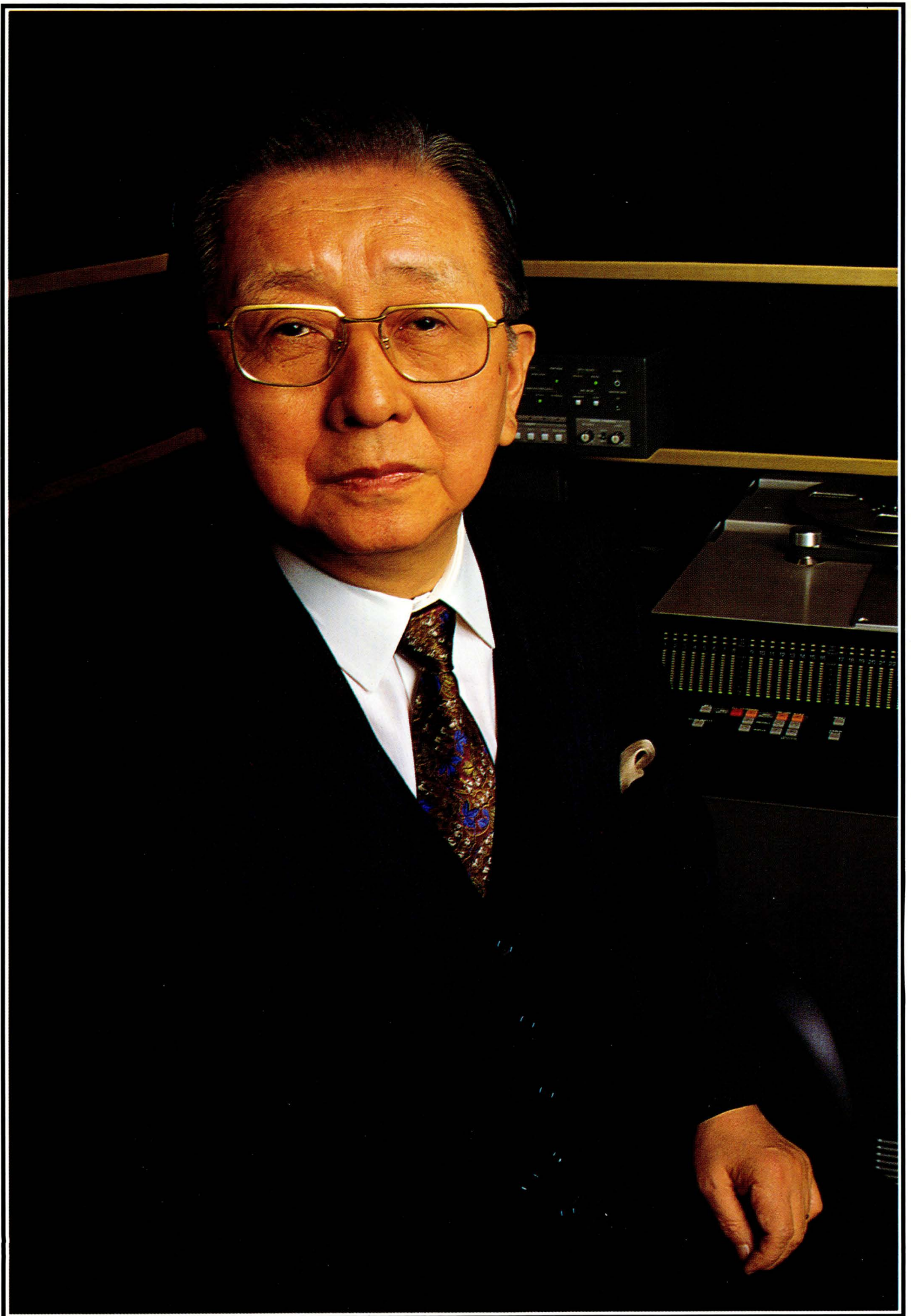
in the state of the art recording studio. He was able to sit still for 45 seconds while Chris took his portrait before it was time to eat. He carried a swirling retinue of other senior engineers with him and I imagined him mentally starting a stop clock: "You have an hour".

It's impossible to write about a legend in a lunchtime, especially when everyone was trying to get through a dish of lobster and steak. It seems as though Dr Nakajima has occupied just about every position in the Sony empire except tea boy - and that's probably only because he didn't join the corporation until he was fifty years old.

He's held many positions of leadership within the digital development field from being President of Start Labs - the Sony/Taiyo Yuden recordable CD joint venture - to Chairing the DAT conference between 1983 and 87. He's written numerous books, received various awards and is the deputy president of the respected Japan Audio Society.

The first half of his working life was spent with NHK - the Japanese equivalent of the BBC. As a manager and then director of the NHK science laboratories between 1965 and 1971, Nakajima was involved with the first use of digital PCM (pulse code modulation) in high fidelity recording - demonstrating a 12-bit helical scanning (cannibalised video) tape machine in 1967.

Nothing came of the breakthrough



because of the cost involved in producing such players; Nakajima joined Sony four years later as Director of the Audio Technology Centre and kept his digital star in front of him. Of his 40 research staff he was only able to assign two to digital audio even though their budget was higher than Sony was spending on conventional analogue development at the time. He himself was not just concerned with digital - his colleagues give him most of the praise for the development of Sony's APM loudspeaker range.

Encouraged by a management which didn't expect short term gains from the fledgling digital format, the team persevered, taking advantage of the advances in integrated circuit technology and memory capacity which occurred during the Seventies.

In 1977 a PCM processor was developed for commercial use, and although it was primarily intended for use in VCRs, it provided Sony with the springboard it needed to develop digital audio for the music lover.

A question of standards

Large Scale Integrated Circuits, or LSIs, were needed to cope with the digital signal processing and Sony would have to integrate all the 43,000 necessary transistors onto a single LSI before it could launch the system. With the monumental task achieved by the late Seventies, Sony realised the other key to success would be to standardise the format.

As everyone knows, in 1979 the corporation teamed up with Philips which was working on an optical disc system, to decide and develop the standard for what was to become Compact Disc.

"In the development of digital the meeting with Philips was a key point,"

Nakajima remembers. "They had the video disc technology and we had digital audio technology and so it was sensible to get together. Both companies had software operations (CBS-Sony as it was in Japan, and Philips' Polygram) and so we



The world's first CD player - the CDP101 - and friend.

could develop the recording technology as well. During the meetings neither company showed too much egotism. It was a gentlemanly job. In fact it was one of the rare occasions when gentlemanship was shown between companies."

It was indeed a rare occasion. Standardising formats is something that Philips has since achieved again in its deal with Matsushita on DCC - digital compact cassette - but in the normal run of events companies tend to sit on their various technological eggs, hoping they'll turn out golden.

Sony is now preparing to go it alone with Mini Disc, and the advent of high definition TV has been hampered by a plethora of different systems appearing around the world.

When I asked Nakajima whether he would like to see audio companies get together more often to establish stand-

ards he looked bemused. "The success of CD depended entirely on that partnership and it was a good example of how a standards authority could benefit everyone, but you would have to decide on the merits of each development, case by case."

It was an insight into the world of technological decision making. I had come to Japan expecting to find more evidence of friendship between corporations, believing Western gripes about the Japanese sharing technology so as to dominate a market. Sony, throwing the Betamax video experience to the wind, is still committed it seems, to letting the marketplace dictate the future standard for a digital recording medium, be it DCC or Mini Disc, despite the resulting consumer confusion as people try to avoid 'flash in the pan formats'.

An easy birth

One of the reasons that the birth of CD was so smooth was that the format was developed primarily for the consumer market in the first place. The stakes of stamping a new standard on the world are extremely high and, traditionally, technology of that kind has been a spin off from industrial or military research. With the arrival of Very Large Scale Integrated Circuits - VLSIs, and the development of U (ultra) LSIs there has been a reverse flow of technology to the non consumer fields. Dr Nakajima hopes that collaboration between his company and other non-consumer research firms will really open up the way to new technologies for the 21st century.

Since Sony produced the world's first CD player - the CDP 101 in October 1982 - the very word 'digital' has become synonymous with all things technically modern.

And yet many audiophiles still maintain that compact discs and players cannot deliver the true musical experience available from a good record-playing system. As the great analogue/digital debate nears its tenth anniversary, specialist all analogue recordings proliferate on virgin vinyl, while the die-hards like Linn and Naim hang up their boxing gloves and make CD players.

It was therefore very heartening to hear Dr Nakajima say he still uses vinyl LPs at home and tell me with some enthusiasm

about a friend of his who makes the ¥2 million (£8,000) *Teragaki* record player. But he joked that his love of vinyl may be due to his age; most CD players sell on their ease of use, he concedes, aided by the fact that software companies have gone over to digital in a big way, vinyl being virtually non-existent in Japan.

"Analogue still has its advantages," he said. "The problem with CD is that the source material, like music or a singer's voice, has a dynamic range of 130 to 150dB. And the CD standard, at 16-bit, only has a dynamic range of 98dB. It's true that in the era before CD the playback media itself had a greater dynamic range - both with analogue tapes and LPs. In fact they had a larger dynamic range than the source itself.

"CD is still quite young, and our task now is to bring that greater dynamic range of the source itself within the 98dB (software) standard. It's an area we're studying intensely and there are many possibilities."

The Doctor is naturally a little coy about letting any Sony cats out of the bag on how he intends to improve the track record of CD for audiophiles.

Planning for the future

"A significant point," he alludes, "is that when you listen to music the dynamic range you require is very different depending on your surroundings. So in your car or at home you will need different dynamic ranges to enjoy the music comfortably. One of the ways to improve that is to develop products where you can alter the dynamic range and also affect sound acoustically in the time domain. For certain listening environments you don't even need the 98dB range, so we are looking at appropriate combinations between the listening situation and the dynamic range required."

Sensing some hedging taking place I asked the Doctor how Sony and Philips had established the 98dB standard in the first place, and was gratified to hear that at first he had been pressing for an 18-bit standard.

"We did hearing tests on many people when we were developing CD and we discovered that 95 per cent of them couldn't hear outside the 20Hz to 20kHz audio range. Our tests were done with

headphones, and loudspeakers. So we put the upper limit from an economic point of view; many people tell us now that 14-bit would have been equally successful, but I thought that was too low, and Sony insisted on the 16-bit or 98dB

overseeing all of Sony's engineering activities."

Dr Nakajima's engineering hero is Masaru Ibuka - who founded Sony with Akio Morita in 1946. He candidly admitted that Ibuka (president of the Japan



One of Heitaro Nakajima's many babies, the APM22ES loudspeaker.

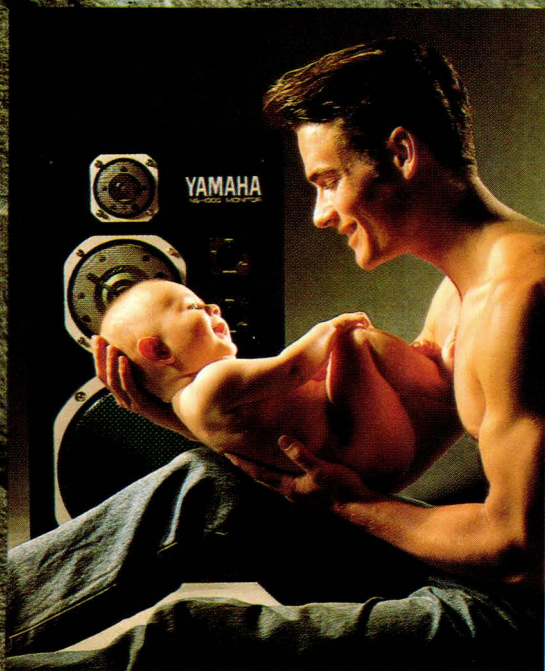
standard. Some people, the other five per cent, said they feel they are missing something, but I don't think it is the musicality of the instruments. It is more likely to be down to problems with mixing equipment, the digital filters or D/A converters. So we can improve that side of the things as well.

"Of course it's crazy that marketing men tell everyone that "this is the perfect medium" - it's still in its infancy, and really it's still under development. I don't think we have heard what a CD can do yet, and therefore we can't determine its exact sound. So it's too early to judge, from a hi-fidelity point of view, whether a CD is good enough. And I'm not sure how much time I have left (he laughs) but I certainly hope that during my lifetime we can develop the medium to its fullest potential. It still receives a lot of my time even though my folio of duties includes

Audio Society) had been against the development of digital audio, and had remained sceptical until recently. "By chance I met Mr Ibuka on the stairs just yesterday, and he praised the achievements we have made with Compact Disc," Dr Nakajima said.

It seemed as much a turning point for the Doctor as for Ibuka san. And it's likely to be linked to some of the new Sony products which have been developed with the aim of getting more out of the software than was previously possible. Expect these in the spring of 1992, Sony UK says. Dr Nakajima left the restaurant with the same brisk lack of fuss as he arrived. In the afternoon he might be dealing with queries from Sony's recording engineers, wrapping his mind around the impossible complexities of ULSIs or advising on how Sony's digital camera and image processor can be improved.

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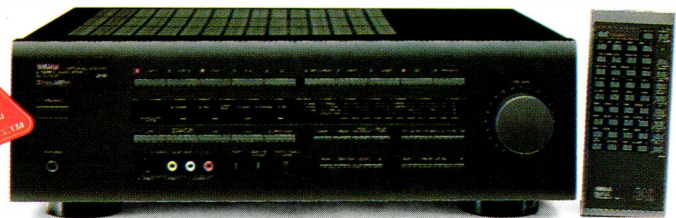
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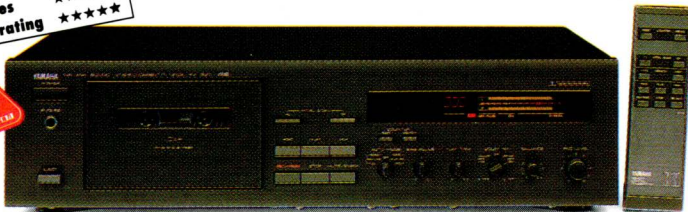
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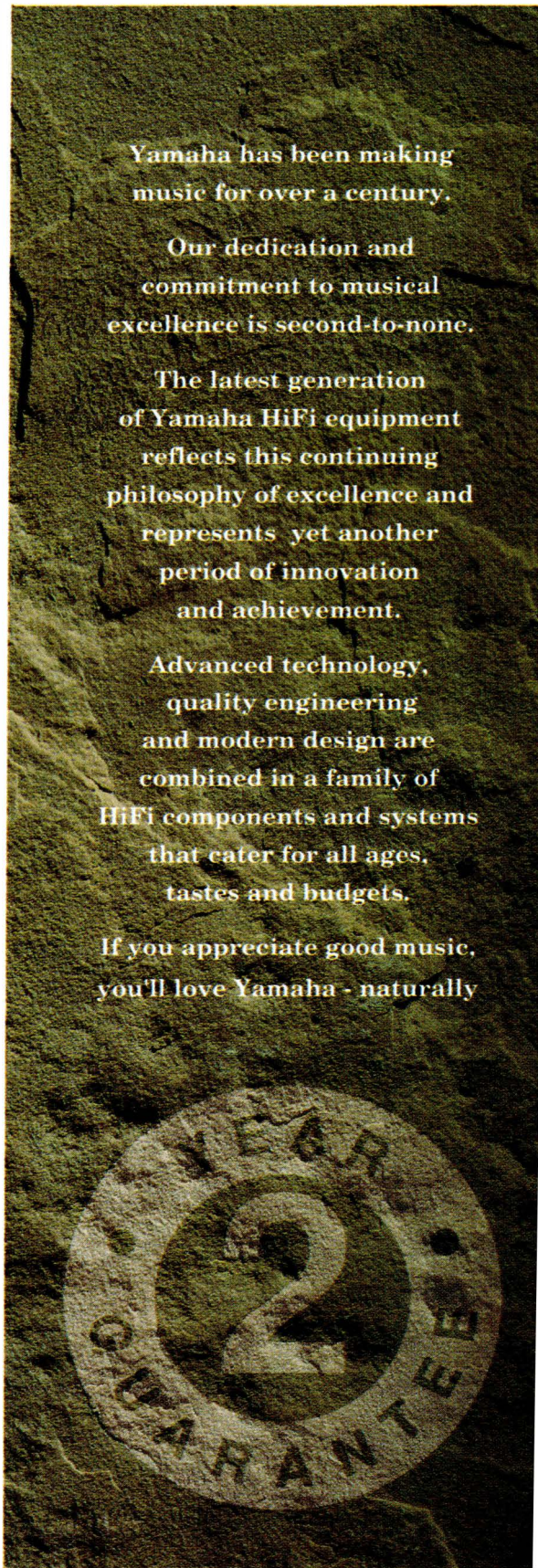
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This month's Aspirations is a bit of a busman's holiday as Dan Houston visits an enthusiast who is lucky enough to have combined his hobby and his job.

A referential SYSTEM



John's listening room also serves as his main living room.

in the house is the listening room, built as an extension onto the back of the property. It has a light airy atmosphere, with French and picture windows providing views across a wooded valley, and is spacious - measuring some 17 by 25 feet. One of the first things you notice are strategically placed rolls of cardboard covered in pink carpet, positioned so as to take care of standing waves and make the room less acoustically 'live'.

Although visually it looks dominated by hi-fi, with the massive Diamond Acoustic loudspeakers and Ray Lumley Class A valve monoblocks taking up a good deal of the floor space, it is also John and his wife's living room - and therefore a good deal less austere than some of the 'purely listening' rooms we have visited. It was originally designed as a billiards room, John told us. The shape is not classic for hi-fi reproduction; one listens across rather than down the room. And the acoustic is a little hard, though opening the windows helps this.

A diamond as big as the Ritz

However, it is a good room for using the sort of loudspeakers shown here, which demand space to perform well. The Diamond Acoustic is a comparatively new brand, and very controversial, but it already has its aficionados.

Veterans of the hi-fi industry will know John as the original boss of Jeffries Hi-Fi in Albert Parade, Eastbourne. His father had run a radio and electronics shop nearby and he started the hi-fi business in 1973 he remembers. But he sold out in 1978 and started making the *Nightingale* loudspeaker range. He claims that the *Nightingale* had a short life because it was ahead of its time, although he also admits that he spent too much on development and advertising. It flopped and he 'disappeared' from hi-fi view for the best part of a decade.

"By 1986 I had been out of the business for some years and I wanted a new pair of loudspeakers for myself," he says. "I had used *Nightingales* at home but I was amazed when I went out to listen to new speakers and found there wasn't anything better.

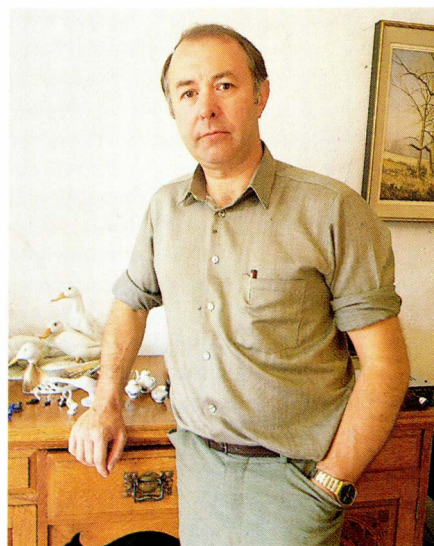
"I came home and decided to have another go. I started by sticking two pairs of *Nightingales* together which created a big stage-like sound, and basically I played

around with the concept. And they started to get quite good. My partner Peter Burfiend who is a technical engineer helped me to take the speaker forward although it was still purely for fun."

Over the period of a few years John says the speaker was refined and improved. By this time he was using the most esoteric amplification he could find with expensive source equipment. By 1989 he felt that he had a good enough product to sell on the market again and christened the loudspeaker the Diamond Acoustic.

The more the merrier

It's an eccentric loudspeaker to say the least. It has attracted attention to itself by merit of having no less than 15 drive units, with tweeters and midrange driv-



The man behind the system.

ers mounted on open flying baffles outside the bass and subwoofer enclosures. Jean Hiraga, in a recent report for *L'Audiophile* - the French high end magazine - described the design as the 'concoction of a genie' - but nevertheless praised the sound quality. Even now the speaker is being refined - with a Bandor mid-bass driver replacing the original KEF 139.

Because of the eccentricity of the *Reference 1s* John decided to develop a more down to earth range called the *Reference 2s* and in May this year produced the *Reference 3s*. These promise a similar character to the 1s with Audax tweeters, Bandor mid range units and Volt bass drivers. The baffle is also open on the 2s although the really clever bit is in designing the baffle to keep the array of tweeters in phase.

The visit to John Jeffries' house came about as the result of a recommendation made by recording engineer Dave Ruffell, who we visited for an *Aspirations* piece in issue 98. The person he urged us to see is John Jeffries, the man behind the Sussex based hi-fi company Reference Imports.

The ground floor space of John's Twenties house is devoted to hi-fi. He runs his business from here, and seems to be perpetually on the phone to his overseas suppliers or one of the 20 dealers who sell RI equipment in the UK.

"Things are busy," he says in a way which would please even a realistic Conservative MP. The most impressive room

Developing the loudspeaker range led to the other side of the business, according to John. He had several exotic valve amplifiers from the US and felt that he could distribute the largely unknown brands here. Asked why he preferred the American equipment, John is unequivocal. "I had been through every piece of British equipment I could get my hands on and I found that it wasn't good enough," he comments.

He has ended up with a range of equipment he regards as synergistic, comprising partly of British made, partly American kit. A typical Reference Imports front end might be an American Basis turntable, Graham tonearm and Shinon cartridge from Japan. Amplification would again be a multi-national affair, the American Convergent Audio Technology (CAT) *SL1* preamplifier (see issue 96) partnered to a pair of Lumley (Portsmouth based) valve monoblocks. Cable will be by Cogan Hall of Illinois and speakers are the home grown Diamond Acoustics. But the range is growing.

A double system

During our visit John was running in a pair of imposing Metaxas electrostatic loudspeakers with the gorgeous-looking Cary Audio *300M* valve power amplifiers. He is intending to run these products alongside those he already offers - which explains why he almost has a second hi-fi



The Diamond Acoustics have more drivers than your average Grand Prix!

system at the other end of his room!

While we were visiting John was not using a Basis turntable, but had a Townshend Rock *Reference* playing. "The Basis is my best line, I've just sold my last one," he explained. The Rock was playing into the CAT via a Tesseract step up transformer for a moving coil cartridge.

At a mere £1,995, the step up may seem just a trifle dear, but John says the component cost alone amounts to more than £500, and it's the best thing he's ever heard.

The two other sources in his system are the Arcam *Delta* CD player with a Wadia digital to analogue convertor, and an analogue tuner from Canada - the Dynalab *Etude*. Of the latter John is adamant that it is the most real sounding FM tuner in the world. Not surprisingly, this may well be the next addition to his range of imported brands.



The Basis Ovation - John had sold this one just before our visit.

An odd combination

The Wadia and Arcam *Delta* seem the system oddity. "I only listen to CD about two per cent of the time," John said. "And so I am not going to invest in a high end CD transport until Basis develops its own system, which is coming shortly. Expecting a dyed in the wool vinyl user, I was surprised to hear him say vinyl was not yet perfect, but would be "absolutely brilliant in a few years' time".

"The Basis turntables are streets ahead of most CD players," he adds, "and at the top end of the market you can still get more involvement with the music from a turntable. I feel that every time I listen to a CD player I am listening to a piece of equipment. And even though with a turntable you get the cracks and the pops in the background, you can still listen through them, to the music itself.

The supporting cast

Having said that, audiophiles do listen to the sound of their equipment, from the components to the very isolation furniture itself. John has developed his own clear perspex-legged isolation turntable for the Basis which he claims (a little predictably) is the most acoustically dead support available.

Elsewhere, his CD player combination is housed in a target stand which he has filled with lead shot - tapping the stand results in a deafening thud. The humble pellets had resulted in a 30 per cent increase in sound quality, he swears. He has tried other isolating supports, and was serving tea on a Mana Acoustics *Sound Table* - which I felt was a little scant of respect. The uncharted science of isolation makes a tremendous difference, he relates.

"I invited a few dealers round to listen to something I had discovered by accident. I put a curtain in front of the system so they could not see what I was doing. We played some records and I then merely changed the cones under the CAT - which has to be isolated on its Slate Audio stand anyway because it won't work on its own four feet. The difference in sound was incredible - and no-one would have believed it possible. I had been using Vecteur cones but I had substituted them for some Tip Toes, and that really opened everything up. Since then I have found that the Goldring *Audio Selection* cone also works well, but what was so incredible was how different types of similar-looking cones could make such a difference."



The CAT preamplifier takes pride of place next to the Wadia 3200 DAC, Arcam CD player and a Dynalab Etude tuner.

One of the older designs in the system is Raymond Lumley's class A monoblok - which John has dubbed *Reference 500* and is intending to relaunch for the designer. The amps aren't exactly the nicest things to look at, the tubes being hidden away behind the massive transformers. They're certainly not a patch on the pretty Cary Audio models at the other end of the room. But they have bags of power in reserve and after listening to them I found that they certainly had the ability to drive the Diamonds to their limit, although whether everyone will wish to do so remains open to question.

The vinyl experience

The first record John played was the excellent Harry Connick Junior album *We Are In Love* (only let down by the drippingly sticky title). Apart from the good brown tones of Harry's all American voice, the sounds to hold you are from Branford Marsalis' tenor saxophone, which were reproduced faithfully, if a little brightly here. The system certainly had an immediate appeal, proclaiming its high end status by projecting the recording situation into the listening room.

But with a UHQR Mobile Fidelity vinyl recording of Respighi's *Feste Romane*

it seemed to fall over itself somewhat with the speakers helplessly handing out distortion. "The record is distorted anyway," John claimed by way of excuse, and backed it up with a beautiful rendition of Shostakovitch *Symphony No 15* recorded on the eminent Russian Melodiya label. And a 1959 Decca SKL of Gilbert and Sullivan's *HMS Pinafore* by the D'Oyly Carte Opera Company put the seal on things, showing us a stage and empty theatre with astounding vocal clarity on both sung and spoken passages.

Certainly the vagaries of the recording situation are pulled off the vinyl and faithfully carried through to the speakers. I also felt that such a system, with its obvious character, would need time to attune to. "You should come and listen after 11.00 at night. I get a 15 or 20 per cent improvement as the power supply improves," John said.

A matter of image

The system is designed to be wide imaging; the tweeters and Bandor units are arrayed for directionality, but I felt most comfortable sitting on axis to the speakers - at which point the sound came out of the box, and spread across the stage as it were.

John says his own home system was always changing until recently - the mark of an audiophile questing for and then finding his sonic chalice. But in the last few months he says that, while he has tried different components, they have always come out of the system again. This is the surest sign that, for his ears, he has arrived at the best solution.

No system is for everyone, but this, and especially the quaint design of the loudspeakers, is bound to find firm friends.

The System:

Basis Debut Gold Standard	£6,500
Graham tonearm	£2,350
Shinon Red cartridge	£900
Reference Imports table	£950
Arcam Delta CD player	£620
Wadia 3200 D/A converter	£1,995
Dynalab Etude tuner	£995
The CAT SL1 preamplifier	£4,750
Lumley Reference 500 monobloks	£10,000 per pair
Diamond Acoustics Reference 1 loudspeakers	£6,000
Cogan Hall EM interconnect, Cogan Hall Fullrange and Alto speaker cable, Sonic Link mains cable	£1,500



PUT TOGETHER A TAILOR-MADE

A black and white photograph of two mannequins in a clothing store. They are wearing light-colored, wrinkled trousers. The mannequin on the left is holding a Technics cassette deck (RS-BX707) in its arms. The mannequin on the right is holding a Technics amplifier (SU-VX800) in its arms. The background is a textured, light-colored fabric, possibly a curtain or a wall. The lighting is dramatic, with strong shadows.

COLLECTION.

SEPARATES

Classic groups are made up of great individuals, and everyone has particular favourites.

From the melancholic tone of a cello to the deafening roar of a thrash metal drummer.

Each will benefit from a different type of hi-fi reproduction. And as you're doing the listening you should be the one putting together your system.

Our range of separates are designed to bring you an infinite repertoire of sound.

But however you put them together, all our remote controlled components can be operated by the SH-R500 remote. (In fact it's so versatile it'll control most makes of TV, video and satellite as well.)

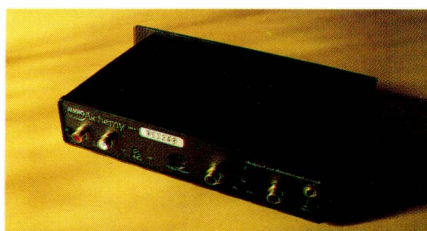
All in all this year's collection has been created to suit everyone, whichever models you choose.

Separates shown: SU-VX800 Amplifier. ST-G90L Tuner. RS-BX707 Quartz Direct Drive 3 Head Cassette Deck. SL-PS900 Programmable CD with MASH. SH-R500 Learning Remote Control for components with infra-red receivers.

Contact your nearest Technics dealer as listed in Yellow Pages & Thomsons Directories.

Technics
For Music Lovers.

Andy Benham offers advice on upgrading your existing CD player and auditions Carver's remote control tuner/preamplifier - the CT-6.



data stream, the inversion being handled in the digital domain. Phase inversion is quite a useful facility and often helps to sort out some of the early 'problem' CDs, their rather bass lightsound and shallow sound stage being a result of accidental phase inversion in the recording chain prior to the mastering of the CD. The LEDs give you peace of mind that both sides of the power supply are working OK, the third LED lighting up when the unit locks onto an incoming

Choice Sessions

To DAC or not to DAC

What's the best upgrade path for owners of older CD players who want to jump onto the bitstream bandwagon? Andy Benham examines the options for those facing the great CD upgrade dilemma.

If there is one topic that has come to dominate the *Hi-Fi Choice* postbag it is the question of DACs. Most of the queries we receive run along the lines of "I bought my CD player back in nineteen eighty something and at the time it was considered a very good performer. However I feel that the sound is a little harsh and bright and wonder whether I would be better off changing it completely or spending the money on an outboard DAC?".

To try and get an answer to this perennial problem I took home the Audio Alchemy *Digital Decoding Engine V1.0*, an outboard DAC which, as you've probably already guessed, comes from America. As my base CD player I exhumed a Marantz *CD85*, which, if memory serves, cost around £500 back in 1988 and was very well regarded at the time. To give me a more modern reference point, I also had a Meridian *200* drive to hand, for the simple reason that it proved to be one of the best drive units on the market when we explored this field back in issue 94.

Living with the *CD85* for a couple of weeks certainly brought home the point that CD player design has come a long way in the last few years. The *CD85* has tremendous bass with a real feeling of slam behind bass guitar notes for example, but the top end is a little bright and edgy and instrumental timbre leaves more than a little to be desired. Once I had got used to the *CD85* it was time to add the outboard DAC.

The heart of the engine

For those of you unfamiliar with the £370 Audio Alchemy unit, it is a tiny little thing

that comes in a cardboard box which looks incapable of holding a decent hardback novel, let alone a DAC. Open the carton and you find out that at least a third of the packaging is taken up by an external 12 volt transformer, the decoding engine's choice of power supply pointing to the fact that it is also aimed at the burgeoning American in-car market.

The decoding engine itself is a really neat little piece of kit. Inside you'll find the very latest Philips Bit Stream chip, the 7323, and a couple of power supplies, one for the digital side of things, the other for the analogue. Round the back are gold plated phono sockets for the analogue connections as well as digital input and output along with a Toslink socket for anyone who's into alternative comedy and likes to use optical connections.

The front panel has a couple of switches and three LEDs. One switch chooses between the digital inputs and the other inverts the phase of the incoming digital

The Digital Decoding Engine - a cost effective upgrade for aging CD players.

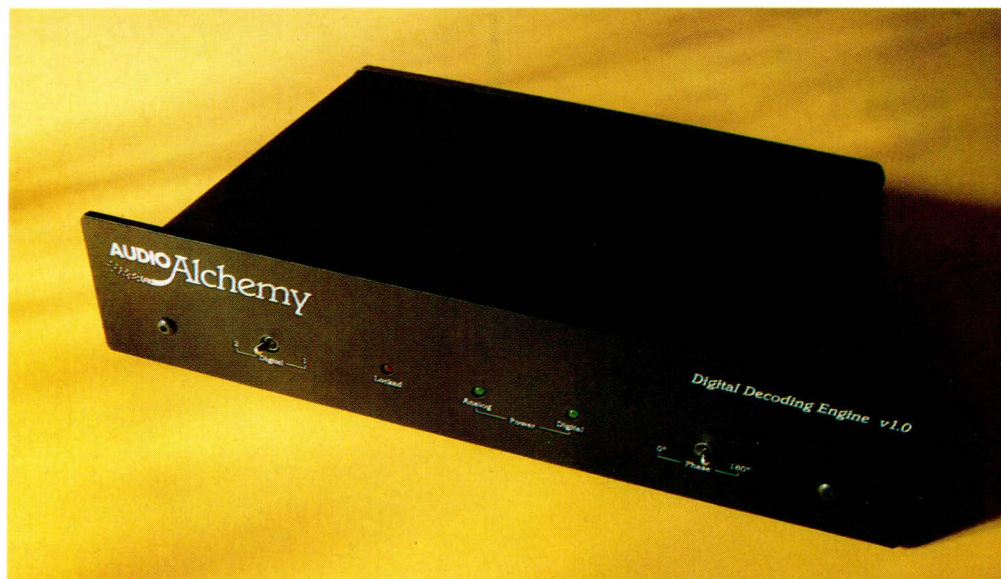
datastream.

Another nice feature of the *Engine* is a switchable socket marked *PS*, which supplies a buffered, demodulated digital output so that the unit can be connected directly to a device such as a DSP unit in the digital domain, alternatively this output could be used to provide an upgrade path to future developments in digital to analogue convertor technology.

The engine was duly coupled to the Marantz' digital output by means of Furukawa *FV11* and the combination left to 'cook' over the weekend.

Adding the extra box

The improvements brought about by the addition of the DAC proved to be nothing short of astonishing and the next day, and well into the early hours of the next morning, was spent re-exploring my CD collection. A disc which shows up the differences particularly well is that old favourite *So*. Tony Levin's glorious bass lines came across in a much more lifelike fashion via the *Engine* and decayed away much more naturally, although the lead-



ing edges of the notes had at least equal impact via the Marantz' internal 16x4chip set. Kate Bush's vocals on *Don't Give Up* were in a different class altogether with the outboard DAC, opening up and losing the slightly strident edge imposed by the Marantz.

Upgrading to the outboard DAC really brought about a massive improvement to the sound quality, the rewards being reaped on just about every disc I played. However, changing over to the Meridian 200 showed just how far the transport in the Marantz had been holding the *Engine* back. Although the improvements were not of the same order of magnitude as those achieved by the first change, the Meridian drive tightened things up still further, helping the *Engine* to achieve greater resolution of complex instrumental passages and speeding up the slight lag on transients that had been apparent with the Marantz drive.

Conclusion

As a result of playing around with these three units I would have to say that the sensible upgrade path for those of you sitting with a machine such as the Marantz is to add an outboard DAC rather than scrapping the machine and starting over. The improvements to be had by adding a decent DAC are literally massive and, provided the drive in your old CD player is up to the job, will transform the sound of your system. The increase in sound quality is, in my opinion, easily the equal of the result you will achieve by forking out £300 - £350 on a new player. However, by taking the DAC route you then have another upgrade path open when you can afford to complete the process by adding a decent drive such as the 200, the 200/*Engine* combination offering excellent value for money as well as near state of the art performance.

Miniature carvings

If you are strapped for space but need plenty of facilities along with remote control then the Carver CT-6 might provide at least some of the answers.

If you judge your hi-fi in terms of facilities per square inch then the Carver *CT-6* has got to be a sure fire winner. Housed within the 44mm high, rack mountable box you will find a full remote control preamp complete with its own tuner.

Although there are a couple of other preamp/tuners on the market it is hardly an everyday item, but combining these

units into a single box does make a lot of sense, at least in terms of saving much needed rack space for other units.

The remote control is definitely a real plus. As well as operating the motorised volume pot, it enables you to select from any one of four input sources (two tape loops are also provided although they cannot be selected via the remote control), choose one of the 20 tuner presets or even control other Carver units, a CD player for example.

Continuing on the plus side, the *CT-6* comes with one of the best written and most comprehensive manuals I have ever

into a tiny area. Thus using the unit from the front panel becomes something of an ergonomic nightmare, although most users will only resort to the front panel controls for those few operations which cannot be taken care of by means of the remote.

In terms of value for money, the Carver looks like a bit of a bargain, the tuner section is OK, and by my reckoning equates to the sort of performance you would expect from a decent standalone unit costing £100 - £120, while the remote control preamp is certainly a real pleasure to use, swapping sources and adjusting



Neat petite - Carver's well specified CT-6 remote control tuner/preamplifier.

seen, full of extremely useful advice presented in such a way that even a complete hi-fi novice will have no problem getting the unit up and running. Although the American coaxial socket on the back panel might lead to a bit of head scratching, as it doesn't take a standard UK fitting!

Motoring along

The motorised volume control on the unit is a real pleasure to use and with American high end gurus such as Krell introducing remote control preamps, it is surely only a matter of time before remote control becomes an accepted, and sought after feature, finally laying to rest its completely undeserved pariah status. And besides, as Bob Carver points out in the introduction to the manual, "the lighted inset in the motorized (sic) volume control looks absolutely cool in a darkened room."

The down side of the Carver is that because the front panel is so small the plethora of controls have to be packed

the volume without having to leave the comfort of the sofa being a definite plus point in my view.

However, as is nearly always the case, you pay a price for having all these facilities crammed into a single tiny box. First off, the Carver *CT-6* hates valve power amps. Trying to use the unit with my Audio Innovations sounded awful.

What the *CT-6* needs is a big and beefy transistor job, and in all honesty even then it isn't the most transparent preamp I have ever come across, the bottom end being slightly smeared and the top tending to be a little bright. If you partner it with a cheap power amp that also has these qualities then the results are likely to be a little disappointing to say the least. When partnered with a mellow sounding power amp with a decent bottom end, the Carver is capable of quite good results, particularly with vocal material, although the bottom end does tend to smear bass lines and leave a slightly muddled impression.

Revealed. The me Wide Imaging S

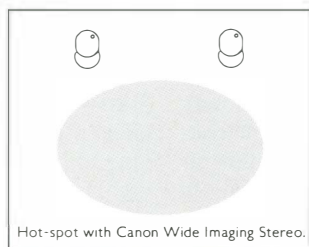
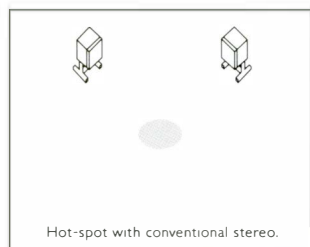
Meet our Mr Negishi and Mr Boothroyd. A bit of an unconventional pair, on the face of it.

But nowhere near as unconventional as the pair of Canon S-50's they are offering up for your scrutiny.

For the thing that's truly remarkable about these speakers is not so much the way they look, but the way they sound.

Connect a pair of S-50's to any existing hi-fi system, and they'll create stereo sound images in a way no speaker has achieved before.

Canon have called this new process 'Wide Imaging Stereo'.



And it's arguably the first real solution to a problem that has plagued stereo reproduction since its inception well over



half a century ago.

Most loudspeakers create a stereo image by beaming two highly directional streams of sound towards the listener.

The point at which these two streams intersect is known in hi-fi circles as the 'hot-spot'.

But it's only within this tightly defined area that the best stereo effect is created.

As the listener moves out

of the hot-spot (sometimes by a matter of a few inches) the stereo image is thrown dramatically off balance.

Move even further, and the sound progressively 'collapses' into the left or right hand speaker.

It was this problem that Hiro Negishi, Head of Canon Research Europe, set about tackling in the late 1980's.

Why, he mused, should speakers deliver stereo that effectively only one listener in the room could fully enjoy?

Would it not be possible to create lifelike stereo images over a far greater area of the room?

Producing a more 'sociable' hi-fi experience, in other words?

Mr Negishi literally shed light on this problem by bringing a little of Canon's unrivalled optical expertise into play.

Instead of a speaker firing outwards, he designed one that aimed downwards onto a cone

n behind Canon's tereo speakers.

shaped 'acoustic mirror'.

The sound was then bounced through ninety degrees and so dispersed far more evenly throughout the room.

(The difference, as it were, between a garden hose and a sprinkler.)

It was true that a very similar principle had been attempted before.

But what was new was the idea of off-setting the acoustic mirror from the

exact centre of the speakers by a carefully calculated amount.

The results were dramatic. Even in crude prototype form, balanced stereo images were produced over a far wider area than ever before achieved.

Wide Imaging Stereo wasn't far-fetched theory any more.

It was suddenly fact.

It was at this point that Canon Audio contacted Allen Boothroyd, one of Britain's most respected hi-fi designers.



Mr Allen Boothroyd.

Together, he and a team of acoustic engineers set about perfecting the final design of this remarkable new speaker.

Highly advanced composite materials were researched for the domed enclosure.

A special full range single drive unit was developed, capable of handling up to 50 watts power.

Whilst a massive zinc chassis was constructed, rigid enough to avoid sound colorations even at high volume levels.

Finally, in June this year, the Canon S-50 was ready to be unveiled.

Rapidly attracting more interest from the hi-fi press than any loudspeaker had a right to expect.

The S-50 is Canon's first foray into the British audio market. But by no means its last.

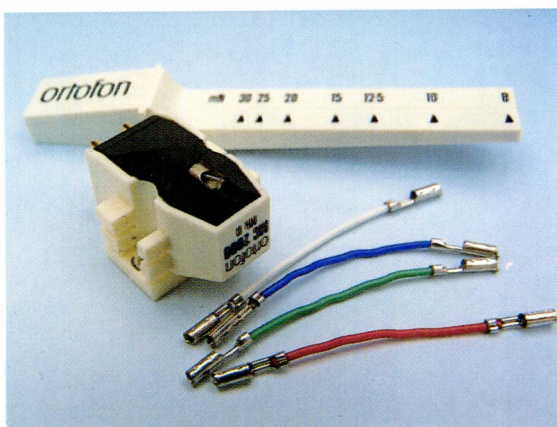
Already a larger S-70 model is being developed, incorporating a separate sub-woofer enclosure.

And at Canon's Research Centre in Guildford, Surrey, even more ambitious applications for the W.I.S. system are currently being investigated.

What sort of applications, exactly? And just how ambitious?

Well, that would be telling.

But if Mr Negishi and Mr Boothroyd have got anything to do with it, **Canon** we're all in **WIDE IMAGING STEREO** for a few surprises. LOUDSPEAKERS



Martin Colloms scales the new high end CD player from Technics while Jason Kennedy experiments with the Ortofon MC2000MkII cartridge and Roy Gregory rebuilds his house to accommodate the Kef 107 speakers.

Statements

The term 'high end' may conjure up visions of expense and luxury but in fact it's primarily concerned with performance - audio equipment is expected to come up to certain standards. In Japan these standards are pursued by small but well known specialists such as Stax, Audio Note and Koetsu. But there is also another high end enclave less familiar to Western audiophiles: almost all the major Japanese brands, including Hitachi, Sanyo and JVC, produce high end products for the home market. Indeed, the two largest operators, Sony and Technics, are big enough to distribute some of this high end equipment on a small scale in Europe. Hence the Technics SH-X1000, SL-Z1000 combo.

Taken from Technics' 'Digital Reference' series, this is a virtual cost-no-object machine which costs 10p less than £5,000. The transport and decoder boxed sections are linked by the SPDIF digital interface, which can be connected up with either optical or coaxial connectors.

This is not the place for a heavy technical story, so suffice it to say that state of the art signal to noise ratio, distortion and linearity are all achieved by a balanced differential, low bit conversion system incorporating a total of eight MASH D to A convertors.

While the transport is a nice piece of inert, low vibration design, the key aspect of the decoder is its low jitter receiving system which has the ability to recover digital signals with greater than usual accuracy. Three voltage controlled quartz crystals are used but the heart of the jitter reduction scheme involves clocking the data into a large 1.5Mbit memory, the data fully synchronised via a DSP controller. This directly addresses one of the known weaknesses of the SPDIF interface and, as such, is no gimmick.

The main listening system comprised a Krell KSP7B preamp driving a pair of KSA80B power amplifiers bi-amped to Apogee Duetta Signature loudspeakers. Reference CD systems included the Au-

dio Research DAC1 and Meridian 606, together with the 602 transport. Further comparisons were undertaken with B&W 805 speakers on Slate Audio stands.

First impressions of this CD player were of a unit of exceptional sonic precision, one obviously in the top rank of digital products and well removed from the common herd.

Clearly in the reference class, one element of its character was typical of Japanese esoterica; its striking purity. It is capable of sounding totally free from subjective distortion and exquisitely detailed, finely textured and well polished. Another element was the feeling of great weight and authority, the sound giving a reminder of its physical bulk and weight. Here the 1000 is reminiscent of top line Krell and Wadia digitals. It is unmistakably great hi fi, and can deliver wide, deep, and very well focused sound stages held stable over a wide dynamic range.

Bass hit

Bass goes deep, with a meaty, powerful effect which, though slightly overplayed by Krell standards, is still impressive. Through the mid range, it avoids the mild tendency to glare and also the presence range brashness evident with some multi-bit designs, while at the same time successfully avoiding the syrupy dynamic softness of some cheaper low bit designs. The mid is expressive, informative and un-fatiguing, despite a touch of forwardness in stereo presentation. The soloists are placed a bit further forward in the sonic picture than with the Audio Research and Meridian decoders.

With the Technics there is a slightly 'processed quality' in the treble, the sound lacking analogue master tape neutrality in timbral and harmonic terms, but high frequencies are nonetheless handled with great skill. Sibilance is beautifully controlled, the effect is crisp and well localised without undue emphasis.

By Linn Sondek standards, its ranking fell back in terms of pace and rhythm, its

performance more of an exercise in clean signal handling than a communication of a musical event. Thus the 1000 appealed more to the cerebral aspects of musical appreciation and less to the emotional side.

Nonetheless, its ability to skilfully portray all the other audio dimensions means that its use with fine recordings will generally carry the day.



Finally, the sound quality was explored with the player in 'jitter free' and 'normal' operational modes. In the latter case, the treble was more like that experienced with less sophisticated designs, with a touch of audible grain and blurring. Certainly 'jitter free' gave the clearest, cleanest and highest definition.

Despite its internal complexity, all the control circuits operated without fuss or limitation. The low jitter design has made a significant contribution to sound quality, while the Technics' overall performance is fully credible and similar to the standards set by comparably priced, highly rated audiophile gear imported from the USA. Longevity and pride of ownership play their part in purchases at this price level and the machine's flawless build quality and finish certainly provide that.

Let's see what's on the slab - the SH-X1000, SL-Z1000 combination is Technics' new high end, two box, CD player.

The term 'value for money' isn't really relevant here, perhaps the most important finding is that Technics does have the ability to lift its standards from the commonplace to the exceptional when it chooses to. The fact that Meridian can deliver such a standard for rather less money is not the point.

Martin Colloms

Having recently managed to wangle a Voyd on long term loan, I've been looking for a cartridge that is capable of doing both the deck and the SME IV tonearm attached to it some justice. The obvious choice was the Audio Note *Io* that is much favoured by Voyd users, amongst others, and was once imported by a closely associated company. However, at the time of writing, the supply of Japanese *Ios* had dried up and British production had yet to get off the ground. Obviously something else of suitable calibre was required. Asking around the tube freak fraternity I was advised to

try the Ortofon *MC2000MkII*, and as we hadn't actually reviewed that particular cartridge, I wasted no time in rounding one up and bolting it to the IV's headshell.

But before I ramble on about its sonic character, or lack thereof, it's worth mentioning a few of the technical features of this £600 cartridge. The original *MC2000* came out in 1983 and met with some degree of critical success, though nothing like that which greeted the subsequent *MC3000*. One of the *2000*'s problems was a ridiculously low output that required the finest of step-up transformers to drive most phono stages. This aspect has been significantly improved in the *MkII* version, which puts out 125µV (1kHz, 5cm/sec), a voltage that, although not as high as many other MCs, is far more workable than its predecessor. A step-up transformer, however, is still recommended.

Hard as ruby

The *MkII* also comes in a harder body made out of sintered aluminium oxide, which is a type of ceramic that's said to be as hard as ruby, and thus has a resonant frequency that's way above the audio spectrum. The stylus profile is also different, it's now a Fritz Gyger 90 which is a variation on the fineline shape that's said to be as close to the shape of a lacquer cutting stylus as it's safe to get.

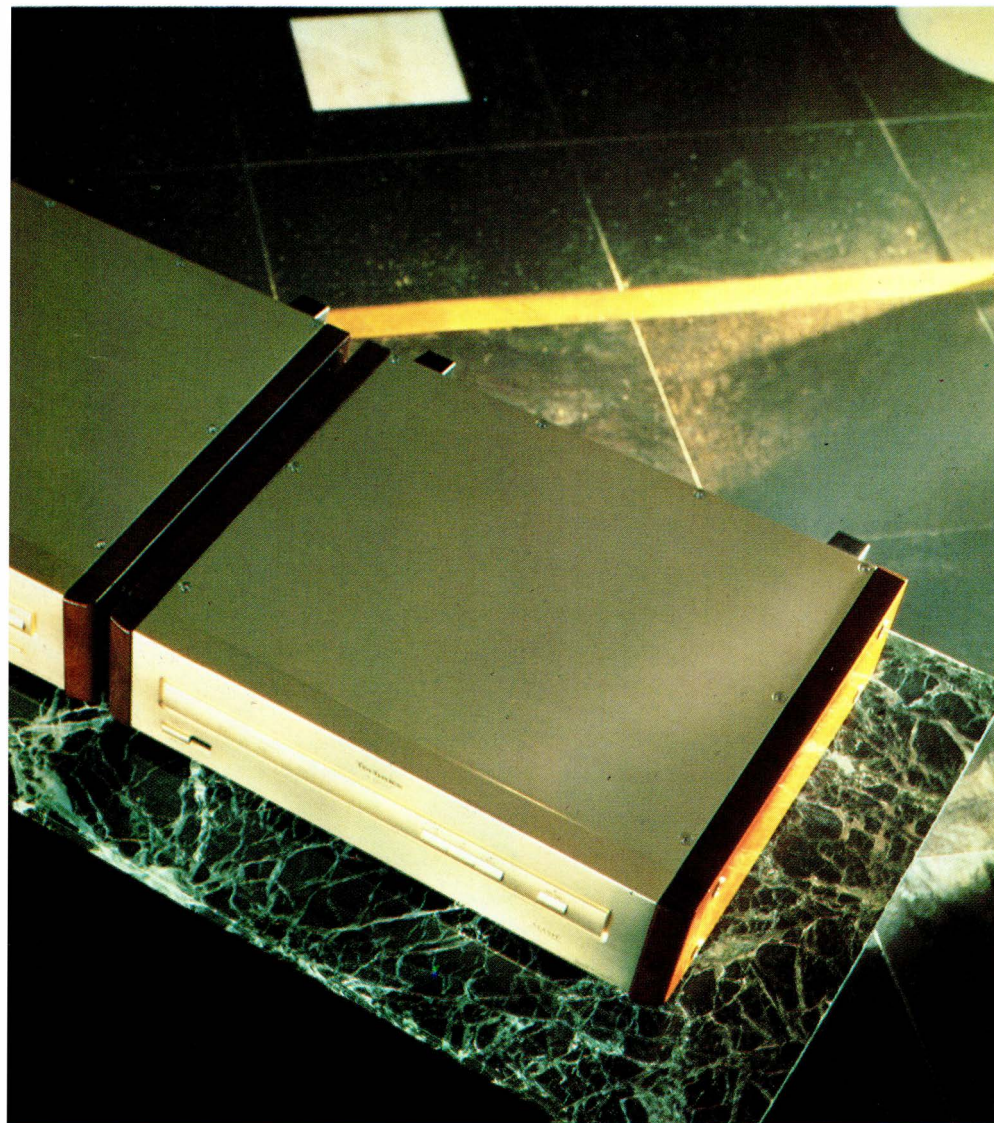
There is, of course, plenty more tekkie stuff which one could go into, but what ultimately counts is the product's performance. In this respect the *2000* turned out to be one of the best reasons for keeping the faith I've heard in quite a while.

Like its predecessor, this cartridge is a real detail fiend. It digs out the finest nuances of information, but unlike the original *2000* it presents them in a coherent and fluent fashion that emphasises musical structure rather than information content.

It also sounds very natural. One is convinced that the timbre of notes it retrieves from the grooves is spot on. Only comparison with considerably more expensive alternatives reveals that the *2000* is a touch lightweight in this respect. It is capable of rendering an image that is precise and deep with a very appealing shape to the various notes in the piece. The bass, although dry, is tactile and fast, as is the midrange.

Speed is not a characteristic that I place much emphasis on, but taking the Voyd up to Paul Messenger's place with this cartridge, I was surprised to hear him say that the *2000* had a faster midrange than his *Troika* - which if you've read his column a few times, you'll realise is quite an admission.

By now you've guessed it: I thoroughly



*"For us,
the realistic
reproduction
of music
is the essential
premise."*

SAUL B. MARANTZ

The critics agree.

"Marantz have engineered a very fine amplifier in this instance, one that offers a neutral, detailed and highly tactile sound without compromising its compatibility with a wide range of good hi-fi set-ups".

High Fidelity, April 1990.



PM-80 AUDIOPHILE AMPLIFIER

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PURE HIGH FIDELITY

enjoyed the *MC2000MkII*. It breathed life into my records and provided hours of great music. I suspect that it is particularly well suited to the virtually neutral nature of the Voyd and the slightly warm character of the *SME IV*, although the bass dryness probably wasn't helped by a similar characteristic in the Audio Note speakers that I use. With careful component matching, I can see no reason why this cartridge shouldn't sound as if it's got a virtually flat response.

If you can afford it, and don't forget you'll need a decent step-up or phono stage (of the *Iso* or *Equinox* standard), the Ortofon *MC2000MkII* will turn your records into serious musical events.

Jason Kennedy

W

hen it first appeared, the Kef Reference Model 107 was a true flagship product. It broke new ground by incorporating an adjustable active bass equaliser, the *Kube*, to ensure genuine full range performance. Unfortunately, while critics and public alike marvelled at the bass depth and dynamic range, other areas of the new speaker's performance were not of the same standard. The tweeter sounded exposed and coarse, while the bass, though excellent in itself, was detached and lagged behind the music. Moreover, the *Kube* equalisation unit was treated with the utmost suspicion. In many cases it was disregarded and so, consequently, was half the crossover.

Many of the ideas pioneered in the Kef 107 and earlier 104.2 were to reach fruition in the 105.3 and the success of that model dictated a hasty and thorough revision of its senior partner. The 107 has now officially reached *MkII* status, and while outwardly there is little change, the differences are in fact profound.

For a start, that tweeter has a superior driver, which is more refined and better integrated. The improvement in its manners means it no longer draws attention to itself in polite company. The speaker is also now bi-wirable and perhaps more importantly, bi-ampable, which brings us to the new *Kube*.

In the live room

The *Kube* supplied with the 107.2 is less versatile than the original, but it is also more useful. In place of the variable Q and low frequency extension, you now get a single bass contour which mimics the ef-

fect of boundary placement. In addition you get a treble contour to compensate for overly 'live' rooms, ie, those with a surfeit of reflective surfaces (or conversely, the odd padded cell).

One thing that hasn't changed, of course, is the 107's imposing bulk. This is a large speaker, especially if you use the hoods provided to cover the mid-treble 'dalek'. However, given the bass capabilities on offer, you'd be hard pressed to find anything comparable which is much smaller.



Kef's 107s - very nice, but are they worth digging up the floorboards for?

Aside from the danger of hernia, set-up is fairly straightforward. My one gripe concerns the spikes provided for the bass cabinet. These have an integral 'nut' which can't be adjusted on the spikes. As it is, I think decent adjustable spikes are the least you could expect on a product at this price. In fact, I think Kef may be supplying a more suitable spike in future. If they don't, I'd recommend replacing them anyway or, at a pinch, getting some nuts to fit.

Out of reach

Aside from this, you simply place the bass units, drop the 'heads' into place and adjust them for toe in. Again, it would be nice if they locked! The final thing to do is remove the mesh grilles which cover the mid and treble drivers. Not only do these detract from the sound, they're also quite unnecessary. By the time a child is tall enough to reach the drivers, it should know better than to poke holes in them. If not, I blame the parents . . .

In my 'live' room (no real damping above the three foot level) I had to back the treble off just a tad; bass I left flat. The 107s always went loud and the new model is no exception. My *JA30s* could drive them to worrying levels with absolutely no sense of strain from amp or speaker and I soon discovered that with this quantity of bass, entire turntables tended to dance along to the beat. The 107s finally forced me to get under the floorboards and sort them out, a job I've been putting off for far too long. Once I'd completed the structural alterations to the house (the turntables and electronics now enjoy their own separate floor and foundation), I settled down to enjoy the 107/II's. And enjoy them I certainly did.

In their latest guise, the 107s are far more serious contenders. Gone is the lack of integration, that detached chuggy bass which characterised the originals. Bi-wiring is a must. Once you do it, the sound of the speakers locks together. Bass becomes deep and powerful and the treble open and detailed. However, it is in the area of imaging where the new 107 really excels, and where it differs from the 105.

The cheaper speaker is certainly exceptional when it comes to the coherent presentation of information, and in this important respect it actually surpasses the 107. But the 107 is a definite winner in its ability to present a believable acoustic, with clearly defined side and rear walls. It's also a very rich and forgiving speaker, whereas the 105 can be almost brutally revealing. This excellent combination of a mellower temper and a complete sense of performance makes the 107 very musically satisfying.

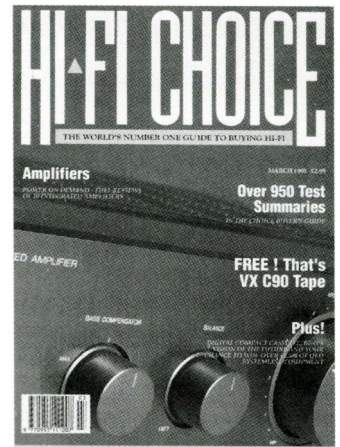
The 105s will undoubtedly tell you more about the music, the players and how the recording was made, but the 107s dwell more on the sense of occasion, unrolling the performance with a feeling of sumptuous ease. The 105s make you sit up whereas the 107s let you sit back, and the two models will appeal to different people for different reasons.

The 107.2s go loud without falling apart and they're essentially neutral. If they do stray it's to the warmer side and they're exceptional when it comes to the portrayal of scale. They're more about easy charm than brute force and as a result they can handle smaller works and solo instruments with equal confidence. It's nice to be able to welcome the 107.2 into the role for which it was originally designed. As a flagship product, it has finally come of age.

Roy Gregory

Back Issues

All the issues you wish you'd never missed. Here's how to order back numbers and binders for your copies of Hi-Fi Choice.



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HOW TO CHANGE FROM ONE FUNCTION TO ANOTHER ON THE PHILIPS F330 CD SYSTEM.

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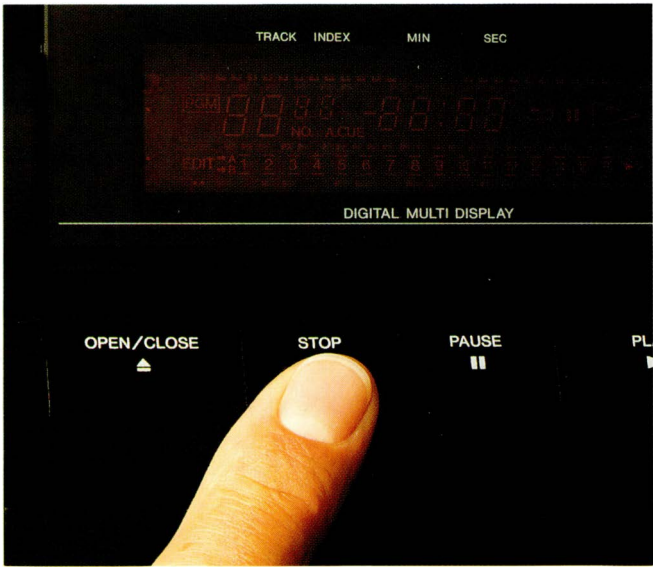
No more press this, press that and press the other. Just sit back, relax and enjoy the performance of the CD player, digital tuner, two tape decks (with Dolby* B Noise Reduction) or the semi automatic turntable. What could be simpler?

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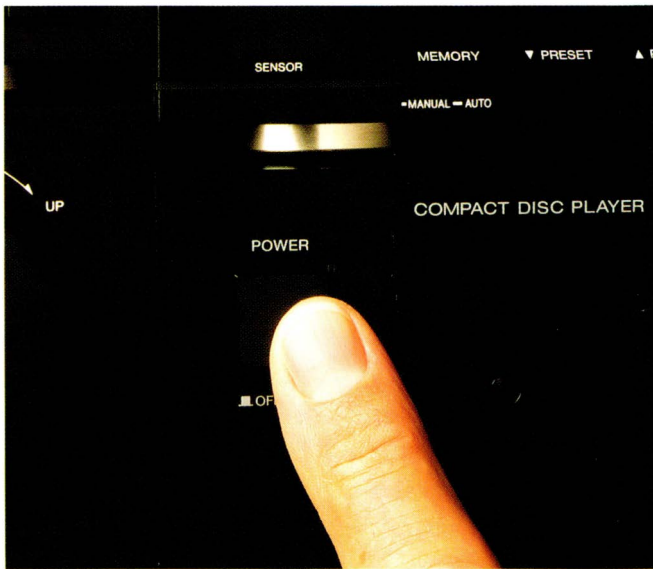
If you've ever thought stereo systems were a hassle you'll change your mind when you see the Philips F330 CD Hifi System. And, no doubt, your system. For more information and your local dealer call the Philips Customer Care Line: 081 665 6350.



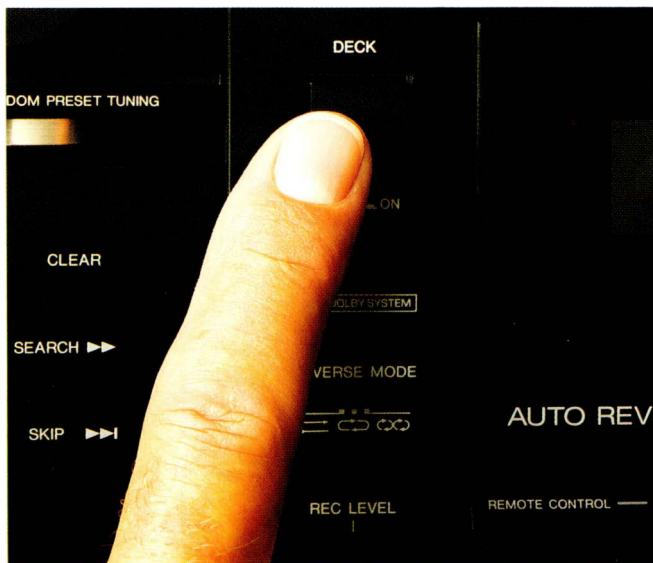
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STOP CD PLAYER.

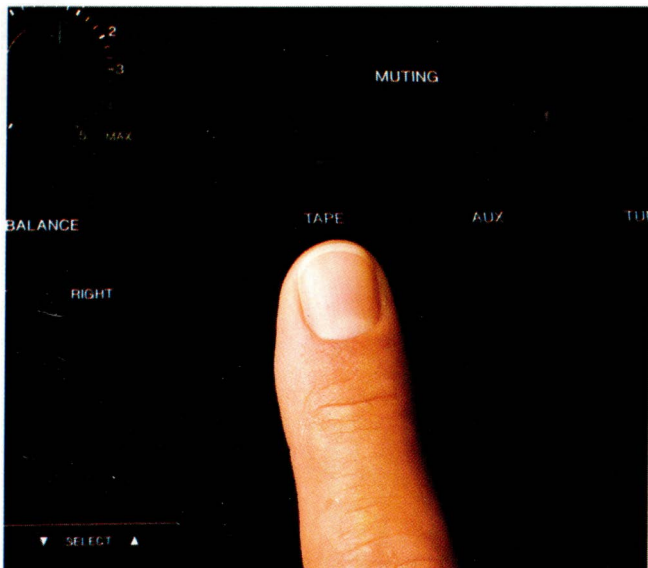


SWITCH CD PLAYER OFF.

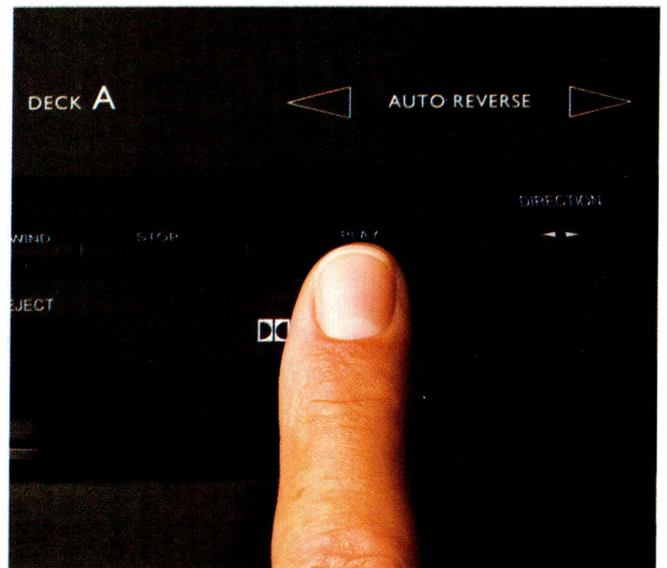


SWITCH ON TAPE DECK.

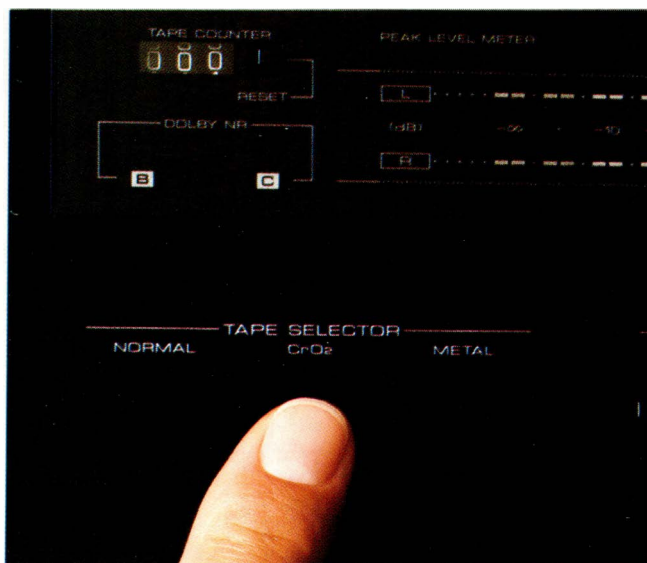
AND HOW TO DO IT ON OTHER SYSTEMS.



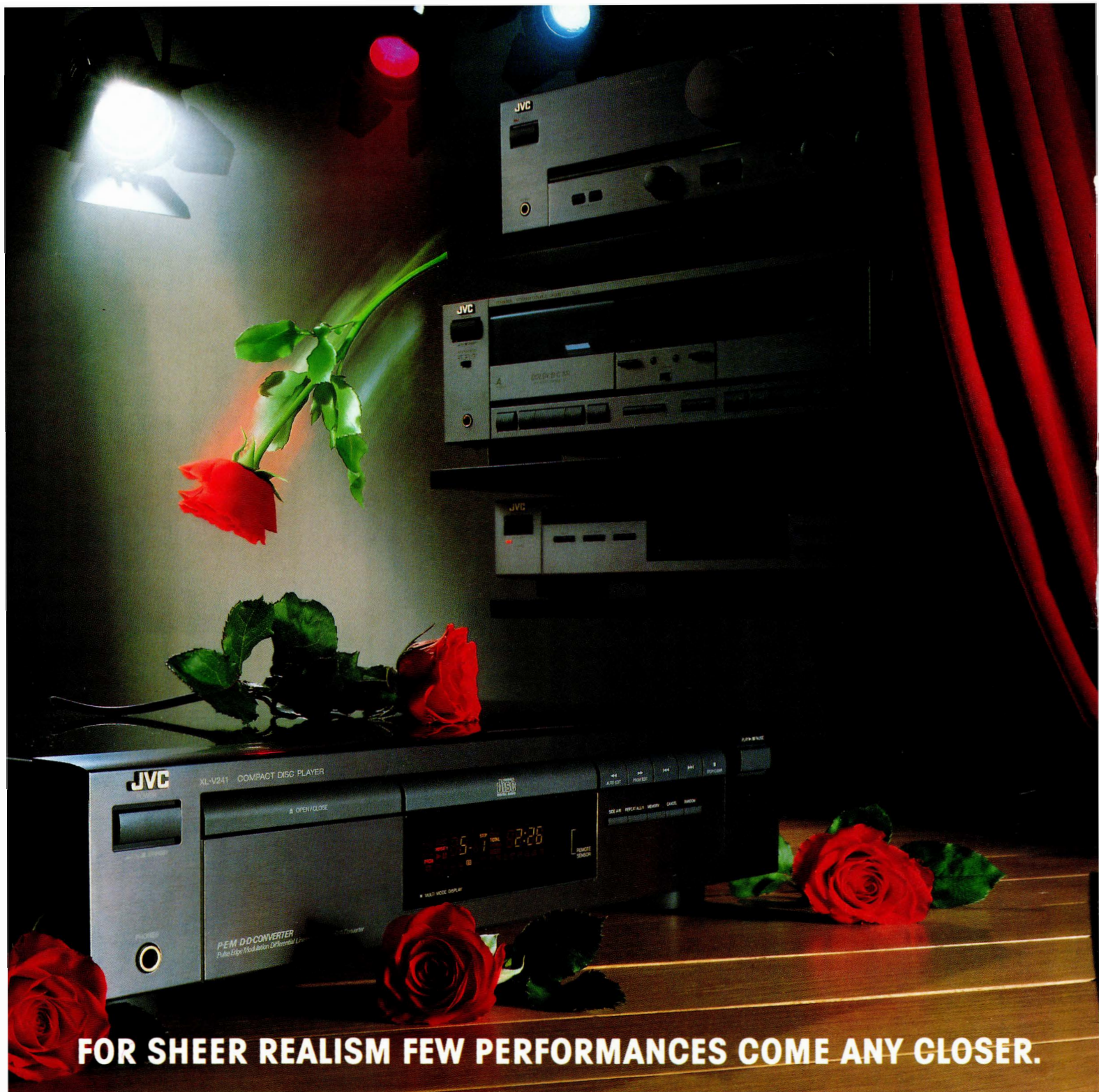
SELECT TAPE MODE.



PRESS PLAY.



SELECT TAPE TYPE.



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.

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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

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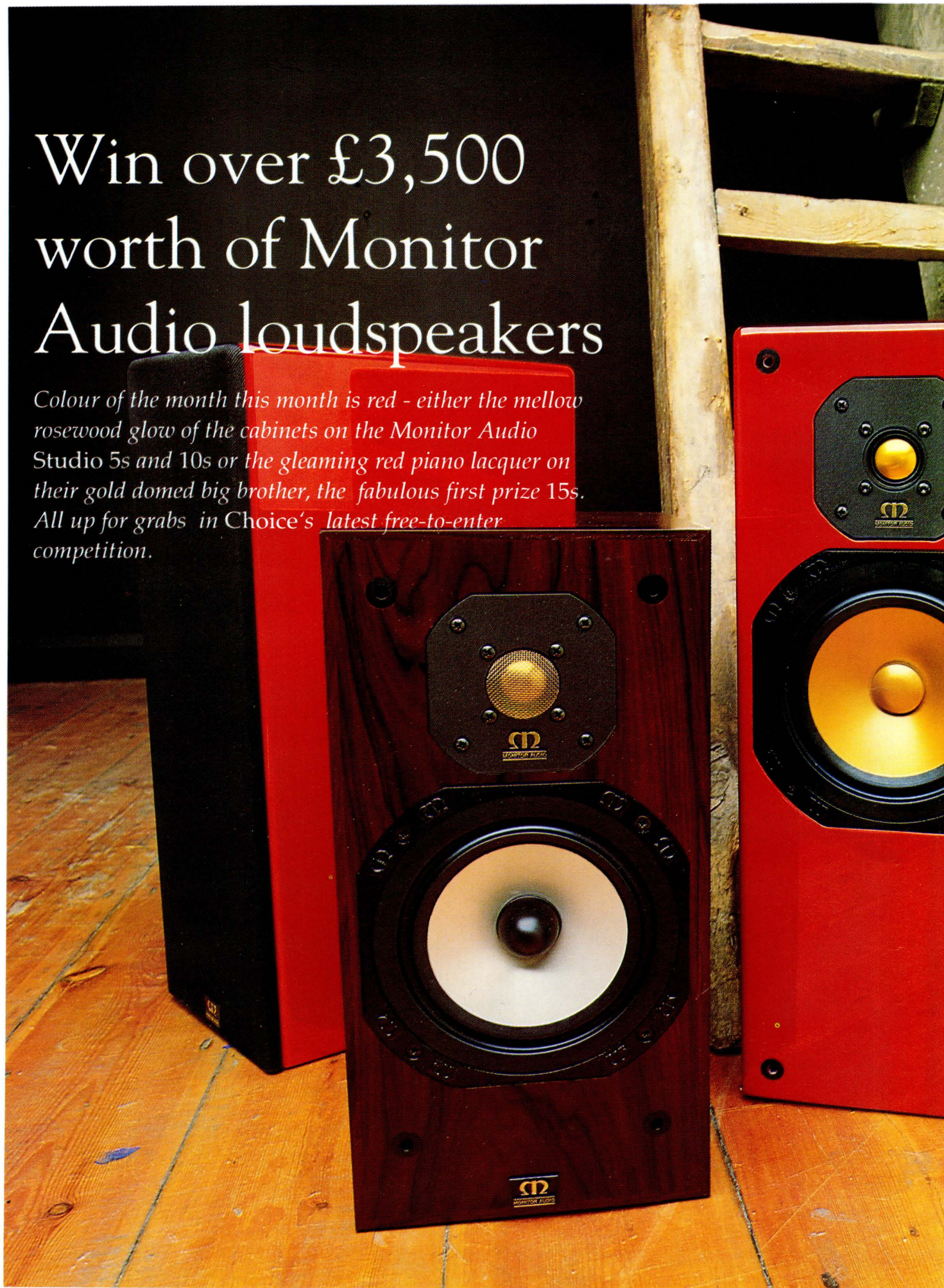
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HFC 10/91

Win over £3,500 worth of Monitor Audio loudspeakers

Colour of the month this month is red - either the mellow rosewood glow of the cabinets on the Monitor Audio Studio 5s and 10s or the gleaming red piano lacquer on their gold domed big brother, the fabulous first prize 15s. All up for grabs in Choice's latest free-to-enter competition.



How To Enter

Our simple hi-fi quiz requires six answers which must be written on the entry form provided. Fill in the form, remembering to include your name and address and send it to the address shown in bold type at the bottom of the form. Mark your envelope **Monitor Audio Competition**.

The Prizes

The first correct entry drawn from our mailbag after the closing date will win the piano lacquer Monitor Audio *Studio 15* speakers (£2,200). The second correct entry will win a pair of rosewood *Studio 10s* (£1,100). The third correct entry will win a pair of rosewood *Studio 5s* (£650).

The Questions

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

1. Which hi-fi reviewer recently got under his floorboards?
2. How many DAT recorders are included in this month's cassette deck roundup?
3. What is the diameter of the latest tweeters to receive Monitor Audio's gold dome treatment?
4. What was the world's first CD player called?
5. What is the name of Monitor Audio's new baby?
6. Which speakers was John Jeffries running in during *Choice's* visit?



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Readers Write

CHOICE ANSWERS

Alternative opinion

Recently I decided to change my CD player and on the strength of your review decided that the Aiwa XC-700 would suit rather well. On trying to purchase one, however, it seemed I was not alone in thinking so as every shop was out of stock and some even had waiting lists!

After much phoning around I found a shop that was having one delivered the next day and without even seeing, let alone hearing it, I went ahead and ordered.

Next day I eagerly unpacked it, but first impressions were not good, it being one of the most plasticky boxes I have seen, but no worry - the sound would make that insignificant. Or so I thought.

However, to use one of your reviewing expressions 'it really bombed!'

It was a smoother sound than my old multibit Philips but in just about every other respect the Philips walked it. Luckily the dealer agreed to allow me to exchange it and after some careful listening I settled on the Philips CD-850.

Some days later I heard that another local dealer had opened up an XC-700 and found that it didn't contain the SAA7350 DAC at all!

Maybe the reason for my vastly worse opinion of the machine was because we effectively listened to different machines.

Richard Jones, Cambridge.

I'm surprised you didn't like the XC-700, the Choice panel thoroughly enjoyed it, but admittedly there are things that a good multi-bit player can do that inexpensive bitstream machines have trouble reproducing. Therefore, if things like timing and bass weight are your bag then your preference is less surprising.

On the other hand, it comes as no revelation that you vastly preferred the CD-850, presum-

Even £170 CD players can't please all the listeners all the time, the XC-700 is stirring things up.

ably in its MkII guise, after all, it costs more than twice as much as the Aiwa!

The fact that another dealer opened up an XC-700 and couldn't find the Philips 7350 DAC is probably because the chip is located underneath the main PCB and is not visible without removing the board. The design of a CD player is down to a lot more than just the chip, and chips cannot be swapped in the same way that resistors or capacitors can be changed. Perhaps the local dealer in question is best avoided until he learns a little more about the products he sells.

Which knob?

Could you please explain why the recording level knobs on cassette decks are consistently larger, smoother and more attractive than the volume knobs on amplifiers. Is it because cassette deck designers feel they have to make up for not having as many controls to play with as amp designers? This problem has been worrying me for

of the designers who create these things.

Beginners luck

Being new to the world of hi-fi separates, I would appreciate your assistance. I wish to build a £700 system comprising CD player, amplifier and appropriate speakers.

On the CD player front, I am split between Rotel's RCD865 and 855 players. But



some time and it would be a load off my mind to find out. J.Wagstaff, Woking, Surrey.

Er, size isn't everything! But seriously, I think if you look back through past issues of Choice you will see that quite a few amplifiers are also very well endowed in this respect, especially the less 'hi-fi' Oriental models.

Basically it comes down to fashion and to an extent practicality, cost probably coming into the equation somewhere as well. To answer your question, there is no reason beyond the aesthetic judgement

what of Pioneer's new range of CD players with the stable platter mechanism?

Also, which speakers will combine best with the Pioneer A400 amplifier out of my shortlist of the Mission 761, Heybrook Solo, NAD 8225 and KEF C25?

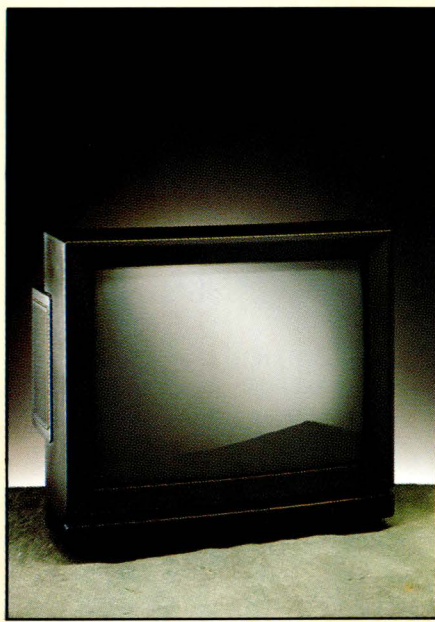
Please bear in mind that I have wide musical taste but listen mainly to rock, and am looking for a lively but controlled sound. Simon Jones, Carmarthen, Dyfed.

It looks as though you're on the right track so far, Simon. But it's worth bearing in mind that Rotel is replacing the two players you mention (see page 4). Next month we will be reviewing one of them along with a truck load of other new models including two of the stable platter Pioneers and the latest from both Philips and Marantz. Hang on for the November issue if you can, but if not, go and do some auditioning yourself.

As for loudspeakers, I would be inclined to spend as much of your budget as is possible, a £50 differences in price between loudspeakers is worth a lot more than the same difference between CD players. However, assuming



Here's proof that even amplifiers can have large, smooth rotary appendages.



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you spend about £200-£250 on the CD player that leaves you with £220-£270 for speakers and stands. I would recommend you listen to some or all of the following, Wharfedale 505.2, Cyrus 781, JBL LX33 (floorstanding), Heybrook HB1s3, Celestion 7 and Arcam Alpha. They are all good loudspeakers that will be compatible with the A400. And you can use the Directory and your ears to narrow down the selection.

Matters hi-fidelical

I have been reading your magazine for the last five issues and I must say it's brilliant (*what a perceptive man - Reviews ed*). Only my ignorance of matters hi-fidelical spoils my total enjoyment of it. I read about such things as bi-amping/wiring, separate phono stages, moving magnets/coils etc, but I lack the basic knowledge, fundamentals if you like, to fully appreciate what is being discussed.

At present I'm disinclined to visit dealers because I'm afraid to show myself up when faced with a lot of terms I don't understand. Perhaps you can recommend a book, a sort of hi-fi primer, or even consider featuring a monthly idiot's guide. Neil Miller, Colchester, Essex

You're right, it would be a good idea to run a glossary and we'll start working on it straight away. In the mean time see if you can find The Bluffer's Guide to Hi-fi by Sue Hudson and ex Hi-fi News editor John Crabbe, published by Ravette London. It will arm you with all you need to converse in the dem room with confidence. Not that you should need to know anything to buy the stuff, but I know what you mean.

More comprehensive tomes you might want on your reading list include Beginners Guide to Hi-fi by Ian Sinclair (pub. Newnes Technical) and Audio and Hi-fi Engineer's Pocket Book by Vivian Capel (pub. Heinemann Newnes).



Heybrook HB1s3; one of several very competitive £200ish options available to Simon Jones.

Roksan Interconnect Winner

Barking up the wrong woofer

After a recent shake up my current system consists of a Pandora'd, Gyropowered MkII Gyrodek/RB300/AT-F5 and a Pandora'd CD850 on an Isoplat. Both are connected with the supplied leads. Amplification is courtesy of a Pioneer A400 which drives an ageing pair of Wharfedale Laser 150 loudspeakers with Audioquest cable. The Wharfedales are on spiked stands but, because of space problems, are only six inches from the rear wall. The equipment is supported on spiked and sand filled Alphason tables.

I am fairly happy with the sound from the turntable, but I find that CDs sound a bit harsh and sibilant in comparison. At high volumes both sources sound very tizzy, and CD becomes quite fatiguing.

My query is, with about £1,000 available to upgrade the system, how would I effect the greatest improvement for my money? I listen mainly to rock and heavy metal at mid to high volume. I had considered a pair of

Tannoy DC3000s (or the latest equivalent) and a Michell Iso phono stage. Is this wise or am I barking up the wrong woofer? RG Stevenson, Croydon, Surrey.

The speakers have got to go. It sounds as though the Laser 150s are exaggerating your treble sibilance problems. Replace them and you'll be

(£700) might be a good place to start, but we haven't tested it as yet so it's an unknown quantity. And more importantly, it will probably sound overblown with only six inches behind it. A smaller stand mounted speaker such as the Audio Note Model K will work well in this sort of space and can really make the most of the signal fed to it. It costs £500 and needs a heavy stand which is likely to set you back another £100 at least, but is almost essential for a tight dynamic sound.

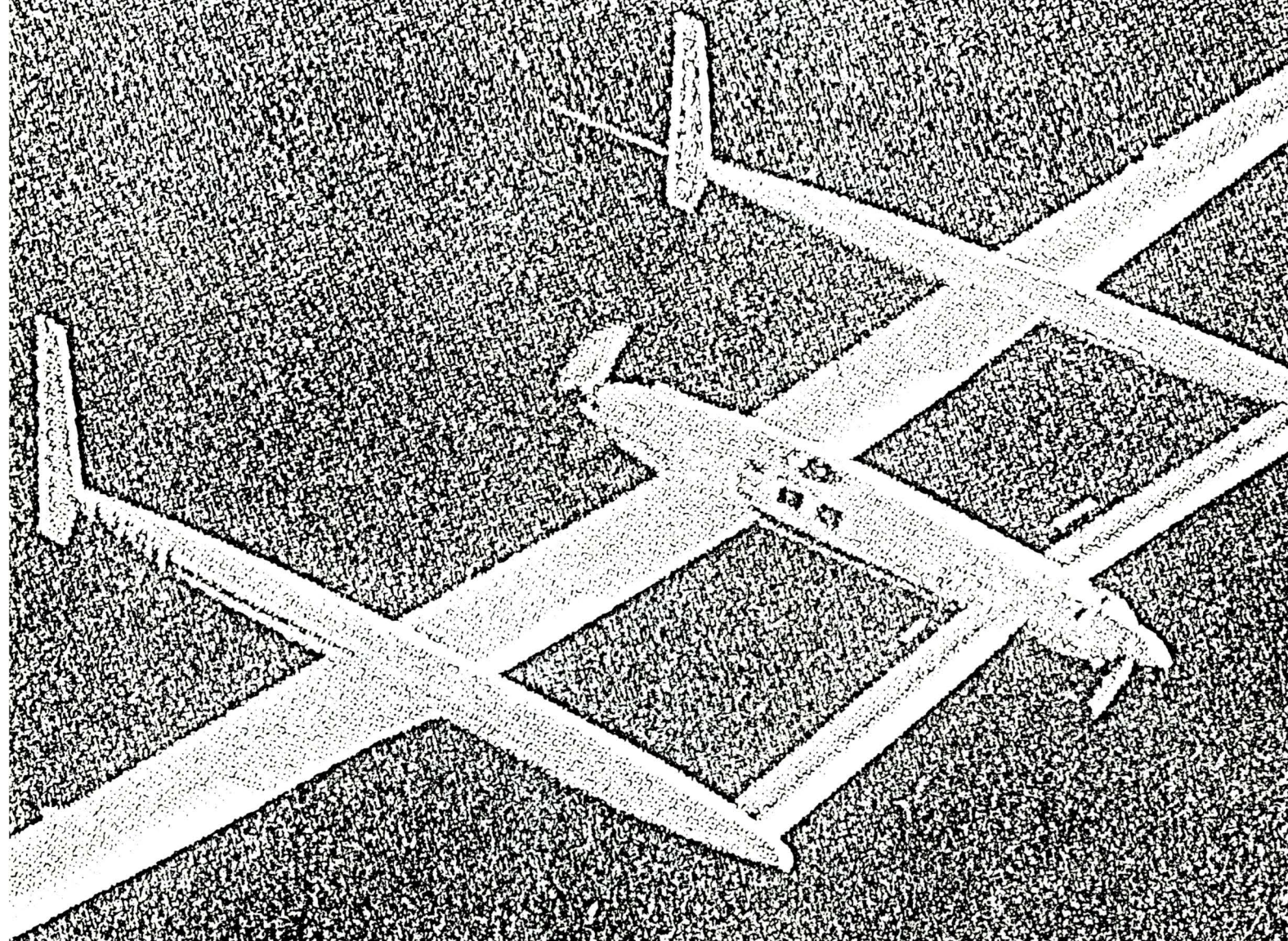
All of which leaves you about £400 to sort out your sources. Basically the record player needs a more civilised cartridge and the CD player a good outboard DAC. But you will be hard pressed to get both of these and stay in budget. The best inexpensive DAC we have tried is the Audio Alchemy Digital Decoding Engine (see Sessions) which costs about £370. Needless to say you'd have to be pretty darn good at haggling to improve on the AT-F5 for £30. The least you are likely to be able to get away with is £110 for a Roksan Corus Black, or if you can stretch to it £173 for a Shure VST-V. Hope you like the interconnect.



Roksan's Corus Black should improve on an AT-F5 at HF.

halfway there. Deciding what to replace them with is, of course, another matter given the limited output of the A400. It would pay to stick to efficient designs and considering your musical tastes, a bit of dynamics wouldn't go amiss. Accepting these points I reckon that the DC3000's replacement, the hexagonal, floorstanding 615

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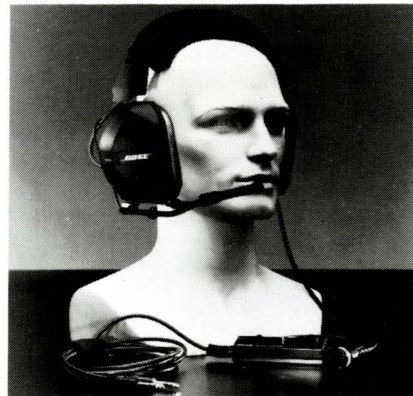
Firstly, his disappointment at the sound produced by conventional speaker systems, and also by his belief that it must be possible to create speakers that would make the listener feel as if he or she were on stage or in the studio with the musicians.

In order to fully understand how the human ear (and the human brain) interpret sound, Dr. Bose instigated a massive research programme to explore every aspect of how we hear what we hear. The resulting science of

Psycho-Acoustics dictates the principles upon which all Bose loudspeakers are designed.

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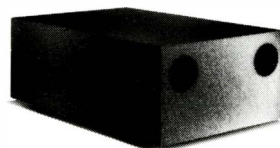


The Bose noise-cancelling aviation headset.

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So you won't have to fly around the world to discover that the company that understands silence truly understands sound.

Paul Messenger explores the future of high fidelity television in the shape of the Philips/Bose Home Cinema Sound system and the monster sized 2080 television set.

Stand and deliver

Despite the sporadic efforts of one brand or another, television sound quality is one of the more embarrassing areas of consumer electronics. Filed neatly between odour-eaters and *Neighbours*, it's a conversation topic that is better avoided, especially if the vicar is calling for tea.

The reasons are several. One problem lies in the television set itself. A large plastic box a couple of feet wide is a most unlikely basis for generating high quality sound, in mono or stereo. But the attitudes of customers and manufacturers play an equally important part, and both have hitherto seemed happy enough to accept less than second best in the interests of saving a few quid.

The enlightened will already have made sure that their TV sound goes through a proper hi-fi system, with real loudspeakers using decent enclosures that are sensibly positioned and supported. But that's not necessarily ideal, or perhaps more importantly, convenient.

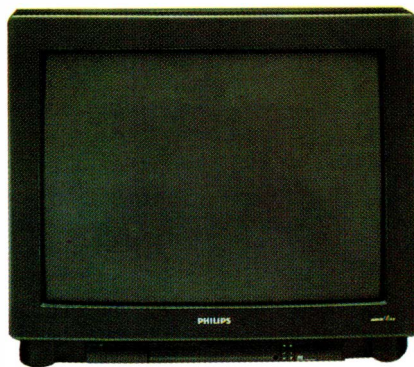
A key feature of the television set is that it is (or was) a relatively self contained and hence compact package. It may take up a big chunk of space in the lounge, but at least there aren't too many wires trailing everywhere, it can usually be moved on castors for cleaning, and everything works from the one remote control.

The trailing wire syndrome

Video recorders, satellite tuners and decoders are all trying to subvert this simplicity and turn the TV into just the video display component of a complex A/V system. But the placing together, the visual and mechanical integration of the various bits of hardware, remains a crucial element in establishing domestic acceptance.

For example, detachable TV loudspeakers make a great deal of sense from the sonic point of view. But instead of realis-

ing their potential for proper stereo separation, improved mechanical isolation and a comparatively decent acoustic environment, the trailing wire syndrome in fact leaves the majority of detachable boxes clipped permanently to the sides of the TV enclosures (at least until such time as someone accidentally snaps one off).



The 2080 comes complete with a pair of detachable speakers, although the HCS costs £600 extra.

If the sound side of TV continues to give designers and consumers grief, most of the new extra electronic gubbins like video cassette recorders and satellite receivers can be slotted into the stand which comes supplied with the modern TVs. If things should start to get out of hand there are various aftermarket accessory plinths that might do a rather neater and stronger job.

But if you're going to put the telly on a stand of some sort, why not design and engineer something rather more than a stand? Something which will make a positive contribution to the performance of the whole, while also helping out the cosmetics and the convenience of the package.

That was the logic that led to the creation of the Philips AV1340, also known as the *Home Cinema Sound* system. There's

nothing startlingly original about building loudspeakers into TV plinths - Hitachi marketed something called *Le Console* with a built in subwoofer a couple of years back. But this Philips device is certainly the most serious attempt I've yet come across to try and counter the inherent inadequacies of TV sound within a remarkably neat and ergonomically clever package.

One particularly nice touch is the way the acoustic enclosures have been combined to leave room for two additional electronics units such as VCRs to be sited behind a glass screen.

Philips isn't the only name on the front of this unit. Bose, and specifically its Home Cinema division, takes a share in the acoustic design credits, as consultant rather than manufacturer.

The whole thing is very stoutly built, exemplified by a substantial all-up weight of 40kg (essential in view of the giant 70kg 2080 television set it may be called upon to support). The enclosure itself is seriously solid, while the unit allegedly also incorporates five drive units and four power amplifiers.

Mass market television

At £600, the AV1340 is rather expensive compared to the average mass market television, but then it's not an item that will benefit from the economies of scale enjoyed by mass market products. And material value for money certainly looks reasonable enough by the standards of specialist hi-fi products.

It's also refreshingly simple to set up and use. Simply plonk the television set on the top, connect the supplied cable from its external speaker outputs to the 1340's inputs, add mains power and you're away. As soon as you turn on the telly, the HCS unit comes on automatically.

You can use it with virtually any telly, provided the TV is fitted with external speaker terminals. However to really get

the best from the unit you will also need some means of turning off the set's internal speakers. The reason they have to be turned off is that the AV1340 doesn't have its own remote volume control and you have to use the remote volume facility on your TV to alter the volume coming from the HCS.

An input sensitivity potentiometer is provided on the AV1340 but this is only to ensure that the output of the TV is matched to the input of the 1340.

Get the picture

I duly set up the unit with the accompanying 2080 television, a top-of-the-line direct view model with huge 78cm/32inch screen size, and a £2,000 pricetag. Luckily the set had already been pretuned to the Crystal Palace transmitter which I normally use.

The Matchline 2080 is a rather impressive performer, if somewhat Teutonic in styling and undoubtedly monstrous in size. Placed on top of the sound box it does rather dominate the room, the whole caboodle standing an imposing 1.2 metres high.

This puts the screen at eye level with those seated in arm-chairs, which I suppose is as it should be, though I must say I prefer to look down on a set rather than have it looming over me.

These giant CPTs (colour picture tubes) are imposing and impressive in their own way, and this Philips Matchline series example is certainly state of the art in terms of contrast ratio, combining a low thermal expansion Invar mask with high voltage tube drive to give plenty of brightness from an impressively dark faceplate of roughly average reflectivity.

Colour balance is also particularly good, reflecting Philips' mastery of North European flesh tones.

On the down side it certainly looks rather more bulbous than smaller screen sizes, the size itself somehow making one more conscious of the inevitable geometrical aberrations. It also tends to make one more aware of other inherent deficiencies, such as poor quality signals.

Resolution of off-air signals is a little disappointing, the picture via the internal tuner being a little soft focused for my

taste, and could be significantly improved by driving the tube at baseband from a good quality (S-VHS) VCR tuner.

Register now

Some minor registration errors were visible at the edge of the screen. And as one who has become accustomed to the delights of 100Hz flicker-free scanning, the reappearance of the large area flicker that is always present on conventional 50Hz sets, and is more obvious the larger the screen size, was less than welcome.

Ironically, Philips is about to introduce 100Hz tube drive on several of its next generation of sets, due to reach the shops soon and at a reasonable price, thus undermining the market credibility of the 2080.

Auditioning the 1340 sound plinth also gave rather mixed results. It goes satisfyingly loud when so required, and the

tached, slow and boomy. What sounds initially impressive, helping to make up for the lack of sub-50Hz extension, soon palls, adding a chestiness to voices that somehow lack proper body, for example.

Philips' Home Cinema Sound plinth offers a thoroughly worthwhile improvement over conventional TV sound whilst deftly avoiding the trailing wire syndrome. But it doesn't really stand a chance of delivering sound quality comparable to £600 worth of specialist hi-fi amplifier, speakers and stands, which is the more logical audiophile alternative route to decent TV sound.

The plus points

The 2080 television does most things very well indeed, and is only really undermined by Philips' own imminent application of 100Hz scanning technology at affordable prices. Though the faceplate



The Home Cinema Sound integrated plinth, courtesy of Philips and Bose.

sideways-facing drivers do help widen the stereo image to a worthwhile degree beyond the basically too narrow confines of a TV plinth.

Somewhat reminiscent of the famous (or notorious) Bose 901, the balance mid to treble is basically pretty good, albeit with sufficient local unevenness to introduce a measure of nasal and spitchy coloration.

But the sound lacks any genuine transparency at the top end of its range, while the midbass (there is no low bass) is de-

curvature is rather obtrusive and tuner resolution could be better, the big scale, good contrast image is its own reward.

Despite these few niggles that leave it a little short of the state of the art, there's no denying that this overall package makes a thoroughly satisfying televisual experience.

It's especially well suited to larger rooms which won't be too dominated by the considerable bulk, and where the big screen and sound will be most appreciated.

THE LISTENER

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21st Century Fox

Traffic jams and jogging created a resurgence of interest in radio. After all, it is impractical to watch television on the move.

However, Sony hoped to create a new lifestyle with the *Video Walkman*, a combined portable 8mm video cassette player, small colour screen and headphones. Commuters would watch video movies and taped TV programmes on planes and trains.

However, just as Sony was bringing the price of *Video Walkmen* down, Nintendo, Atari and others were pushing a new generation of relatively low price pocket video computer games.

The people who used to read, chat or listen to good music from a personal stereo on trains and boats and planes now pull out a *Game Boy* or some such gadget and zap aliens on a tiddly screen while listening to horrid sounds on ear plugs.

All the signs now are that Sony will re-vamp the *Video Walkman* so that it becomes a portable interactive CD player. Sony has already produced *Data Discman*, a portable CD-ROM player which translates text with the help of dictionaries on non-standard 3inch CD-ROM discs.

An interactive CD games machine with colour LCD TV screen and music quality sound might create a market for non-games software, like enclopaedias, dictionaries of music, illustrated travel guides, and interactive language tuition. On the other hand, it might just give games addicts the opportunity to waste even more time.

But before anything happens, the industry will have to fight what looks like being the most bloody standards battle ever.

There are already around half a dozen interactive 'multimedia' systems, either on sale or being readied for sale. Another half dozen are in the pipeline. All are, or could be, suitable for games and all could be made portable.

Needless to say, they are all incompatible. As just one example Sony and Philips

Barry Fox is quite determined not to get interactive with the new portable computer games machines - even if they do double as CD players.

have struck conflicting deals with Nintendo.

The bright side is that most of these portable systems will probably play audio CDs as well as their own particular brand of multimedia software. With disc drive, amplifier and headphones there already, it will cost next to nothing to add a CD audio decoder. So expect a drop in the price of straight audio CD portables as the multimedia players battle for a share of the games market.

Would you dare install a CD player in a car that you have to leave overnight on the city streets?

No. Which is why car CD player sales are slow. Now comes news of a really simple gadget which foils the thieves - and the government wants to stop us using it.

Pioneer is currently running full page colour advertisements in glossy magazines which promise anyone with a VHF stereo car radio that they can hear CDs played through their existing in-car system 'in under two minutes', and without the need to install a CD player in a place where it attracts thieves.

Pioneer's system relies on an FM modulator which functions as a miniature radio transmitter. It connects to the output of a portable CD player and imposes the audio signal on a radio wave with a frequency that falls within the VHF band used for FM stereo broadcasting. So any VHF FM car radio can tune to the transmitted CD signal. The modulator is tuned to a switchable choice of frequencies at the bottom end of the band, around 88 MHz, where there are unlikely to be any

conventional broadcasts.

Pioneer's dealers have a small holdall which contains the portable CD player with three connecting leads. One plugs temporarily into the car's cigarette lighter socket, to provide a 12volt DC power supply for the player. Another clips temporarily to the car's radio aerial. The third has a remote control at the end which lets the driver

But the new in-car CD transmitters cannot cause interference, even to other cars, because the power of the modulator is so low that it must be directly connected to the car radio aerial. The DTI and RA have leeway to grant licence exemptions for very low power devices. But they say they must first draft a technical standard for the general type of device, examine any device before sale for 'type approval' and then issue an exemption licence for anything which passes the type-approval tests. So far there is no standard so there can be no type approval and no licence



Let's get interactive: CD-I killed the Video Watchman.

select music from a choice of six CDs stored in a cartridge loaded into the player before a journey. Sound quality is as good as the radio permits.

If drivers like the system, they pay £300 for it to be permanently installed, with the player hidden out of sight under a seat or in the boot and the wires run under the carpet. Alternatively, anyone who already owns a portable CD player can pay between £50 and £100 pounds for the modulator alone. Other firms make modulators, too. But they keep quite about it.

The DTI and its Radiocommunications Agency police the airwaves. They use the Wireless Telegraphy Acts to stop anyone transmitting on frequencies bands used for entertainment broadcasting. The aim is stop interference.

exemption. The DTI thus regards the devices on sale as illegal, even though there is no evidence of their causing any nuisance.

By neat and happy chance this puts the DTI in a very awkward position. If it bans the new in-car gadgets, it will also have to ban almost identical devices which the BBC has already supplied to schools. These receive Radio 5 on the medium wave and re-transmit it on FM at the bottom end of the VHF band.

What's more, every domestic video recorder also has a low powered modulator which enables it to connect with a TV set by the aerial socket. So if the DTI bans car CD modulators, it will also have to ban BBC schools receivers and the video recorders now used in 70 per cent of British homes.

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Choosing and Using . . . Headphones

Jason Kennedy offers hints and tips for anyone looking to invest in a pair of headphones.

Back in the spring we scheduled a batch of a dozen headphone reviews for this issue. Had yours truly known just how humid the summer was going to be we might have postponed it until more temperate weather arrived. But as it turned out I learned the hard way about which headphones make the best ear muffs.

The important factors to consider when buying headphones are primarily sound quality and comfort, though the latter is perhaps the more important. A pair of 'phones may sound great on first impression but if they become uncomfortable after a short while one is unlikely to carry on wearing them.

To a large extent comfort is related to the size of your head and ears. There are quite a few ostensibly circumaural headphones, ie, with ear pads that rest on the side of the head (such as the more expensive Sennheisers or Quarts) that aren't really large enough to avoid pressing on some part of the ear, especially if your shell-like ain't so shell like.

Some circumaurals create problems with pressure but this is more obvious with supra-aural designs, those which press on the ear itself and which are more predominant at the budget end of the market.

However, if your head is of average or more width many supra-aurals tend to press rather hard and prove ear bending after little more than five minutes.

The comfort crew

Our comfort ratings are based on the collected opinions of the *Hi-fi Choice* comfort crew, made up of both sexes and a good variety of ear sizes - the higher rated 'phones being those that felt good on everyone. There was definitely a difference of opinion on some models though, so make sure you try before you

buy even if you can't listen.

As far as sound quality is concerned, the headphones were auditioned at the end of a reference system which this time around consisted of three different types of drive. Because impedance mismatches between 'phones and headphone amplifiers can lead to alterations in frequency response, I needed a low output impedance drive to give each model a chance of performing optimally.

Paul Miller suggested the Deltec preamps (in this case an old style *DSP-50S*) which have a 10ohms output impedance, and this proved to be perfect for the job. All that was needed was a home brewed phono plug to jack socket adaptor.

However, not content with just one reference output I managed to find another quite different one in the shape of the *Can Opener*. This hooks up to the outputs of your power amp and has sufficient attenuation to give a workable volume range with most headphones.

However, when hooked up to all the amps I could lay my hands on it proved noisy with high sensitivity models, although the *AKG K340* used as a reference sounded superb.

The third option consisted of the headphone amp on a *QED A270* integrated amp, which is probably more representative of the average listening situation.

Sensitivity

When matching headphones to an amplifier or CD player consider the sensitivity of the 'phone and how it relates to the gain range available. Some 'Walkman' oriented models proved very sensitive

to the hum on the headphone sockets of several amplifiers.

At the opposite extreme some cassette decks have quite low outputs at their headphone sockets which may prove a minor problem with some inefficient models. As ever, the rule is to try before you buy, which will take a bit of dealer persuading but dealers are there to help you after all.

The sources used for the listening tests consisted of a Voyd turntable fitted with an *SME IV* arm and Audio Note

On silver disc a copy of Frank Zappa's largely live *The best band you never heard in your life* was used as well as several Stax dummy head recordings, a series of CDs recorded specifically for headphone listening. The ones we had to hand included the *Weird Space Sound* CD as well as more natural sounds in the form of Baroque concertos.

A trend which has been evolving in the headphone market is the fitting of dual sized jack plugs, a 3.5mm



Serious ear-goggular audio gratification ahoy!

To feeding an Audio Innovations *Series 1000* with equalisation/preamplification from a prototype preamp from the same manufacturer.

The digital source was a *NAD 5425* and power amplification a pair of *Marantz MA-22* monoblocks, interconnects. Speaker cables were mainly Audio Note silver.

What we heard

Source material on vinyl included Abdullah Ibrahim's excellent *Ekaya*, Lou Reed's intricate and involving *New York* and a 1954 gem from Thelonius Monk and Sonny Rollins.

plug fitted to the cable with a standard 6.3mm plug screwing or pushing over the top. In this bunch they were almost universal, a result no doubt of the increasing popularity of better quality personal stereos and portable CD players.

Another area of development that follows in the footsteps of domestic audio is the use of better quality cables - virtually all the Japanese 'phones encountered had adopted oxygen free copper cables. This undoubtedly has something to do with the above average standards that they managed to achieve.

AKG K44

AKG ACOUSTICS LTD, VIENNA COURT, LAMMAS ROAD, GODALMING, SURREY, GU7 1JG.
TEL: 0483 425 702



The £40 AKG *K44* is one of two new personal stereo oriented phones from the Austrian headphone and microphone company. Forty pounds might seem like a lot to ask for a Walkman headphone but if you take into account the price of serious personal cassette and CD players it doesn't seem out of place at all.

The *K44* is a lightweight supra-aural headphone that, to be frank, doesn't really look like £40 worth. However, the main reasons for this lack of substance are advantageous to the outdoor user. After all, you'd feel a tad conspicuous wearing a pair of full gumbo circumaurals on the tube.

Although small, it's a clever design and like all AKGs, the height of the phones is regulated by elastic cords so you don't have to adjust them as such, just pull the little foam pads onto your lugs. The headband is padded with a soft plastic covered foam strip that's backed with sprung steel for strength, and despite appearances I suspect that the *K44* is a reasonably strong headphone. It's also very comfortable.

The *K44*'s sound quality

varied with the drive system quite dramatically. Far better results were achieved with the Deltec preamp than with the QED integrated, this probably being a result of its low-ish 50ohm impedance.

Through the QED the sound was dark and ponderous, not to mention tonally unconvincing but when I swapped over to the Deltec with a home made phono to jack adaptor a crack appeared in the clouds. Although apparently lightweight in balance, bass extension is not lacking by comparison with other similarly priced cans, and information content is up there too. Presentation was a touch cramped; bigger phones sounded more spacious but no more communicative.

If you want a small, comfortable headphone this is close to as good as they come, but beware high output impedances.

GENERAL DATA

Type	supra-aural, open-back, dynamic
Mass	90g
Size rating	small
Impedance	50ohm
Comfort rating	good+
Sound quality rating	average
Price	£40

AKG K1000

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TEL: 0483 425 702



The AKG *K1000* is a really different headphone. Not only are the earphones completely free standing but they can be swung out to alter the sound. And that's not all; each earpiece is basically a frame surrounding a drive unit that's supported by four webs. These silver mesh covered frames are held away from your head by fairly hard leather upholstered pads that sit on your temples. There are no earpads as such.

The drive unit is what AKG calls a ventilated linear dynamic magnet system. It incorporates an aluminium coil former and a varnished, multilayered diaphragm.

Despite its unusual design and high-ish weight, the *K1000* is a comfortable headphone, the leather headband and two point pads being all that touch your head. Half the problem with long term headphone listening is the sweatiness caused by earpads, so a design that doesn't have any is more likely to be comfortable.

As if all this wasn't enough AKG, being necessarily wary of the standard of most headphone outputs, designed the *K1000* to be connected di-

rectly to the speaker outputs of the amplifier. AKG recommends an amplifier of the class A variety. So do I.

Sonically, of course, this totally open approach means that external sound gets into your ears and music gets out into the room, thus defeating the object of cans in some respects. But we're talking esoterica here. Forget practicality.

Altering the angles of the capsules increases or decreases the degree to which sound seems to be out in the room and deciding what angle to have them at is a matter of taste. There's not enough space here to list all the *K1000*'s strengths but in the context of this group, nothing came close in terms of bass extension, spaciousness, transparency, etc.

Expensive, but if you want a state of the art moving coil headphone there's very little serious competition.

GENERAL DATA

Type	extra-aural, open-back, dynamic
Mass	270g
Size rating	very large
Impedance	120ohm
Comfort rating	very good
Sound quality rating	excellent
Price	£500

Audio-Technica ATH-609

AUDIO-TECHNICA, TECHNICA HOUSE, LOCKWOOD CLOSE, LEEDS LS11 5UU. TEL: (0532) 771 441



For £31 the Audio-Technica ATH-609 is a lot of headphone. Its big fluffy earpads and chunky adjustable headstrap give it a considerable head start in the perceived value stakes and it's enough to make you wonder what the extra £20 on the price of the ATH-611 is all about. The 609 is a large warm headphone, the warmth being provided by the almost furry acrylic covering on the circumaural pads, with a large plastic head strap that sits inside a polypropylene frame. The whole thing is well built and pretty robust.

The packaging of the 609 is printed with some gems of anglo-oriental translation, one particular favourite being "The extra large earpads are designed for cool comfort and hour (sic) of listening pleasure."

The 609, unlike the majority of contemporary headphones, is fitted with a full size 6mm jack at the end of its three metre lead. There's no minijack hidden underneath it, so in the unlikely event that you should want to listen to a portable or personal, an adaptor will have to be found.

The 609 was one of the few headphones in this group that worked quietly with the *Can Opener*/Marantz MA22 combination, thus throwing out of the window my theory about low impedance cans being unsuitable for this particular device. In the context of its price the 609 made some good noises, sounding detailed and revealing. It made the most of the higher fi source material, both analogue and digital, but wasn't able to make lesser stuff as appealing as more expensive phones.

By the standards of the reference the 609s could have been more relaxed and open in their musical presentation, the sound being more reminiscent of a closed back headphone. But given the low price the ATH-609 seems to be pretty good value for money. Recommended.

GENERAL DATA

Type	circumaural, open-back, dynamic
Mass	250g
Size rating	large
Impedance	32ohm
Comfort rating	average+
Sound quality rating	average-
Price	£31

Audio-Technica ATH-611

AUDIO-TECHNICA, TECHNICA HOUSE, LOCKWOOD CLOSE, LEEDS LS11 5UU. TEL: (0532) 771 441



The Audio-Technica ATH-611 costs £51 and is the most expensive model in A-T's new 600 series but outwardly doesn't seem to vary from the other headphones in the range.

The removable earpads are covered in a furry acrylic type material that's warm to the ear, too warm in fact for hot weather listening. That aside, though, this headphone is reasonably comfortable. It doesn't feel as heavy as it looks and it doesn't press too hard on your head.

From what can be gleaned from the rather sparse information that is given about the ATH-611, the only significant difference between the 611 and the £20 cheaper 609 lies in the diaphragm. In the more expensive phone this is nine microns thinner and 4mm bigger in diameter, which, along with a presumably different sized samarium cobalt magnet, accounts for the higher sensitivity (96dB) and impedance. Otherwise the two models seem to be the same.

For the most part I listened to the 611 via the Deltac preamp and a homemade phono socket to jack adaptor, but a brief stint

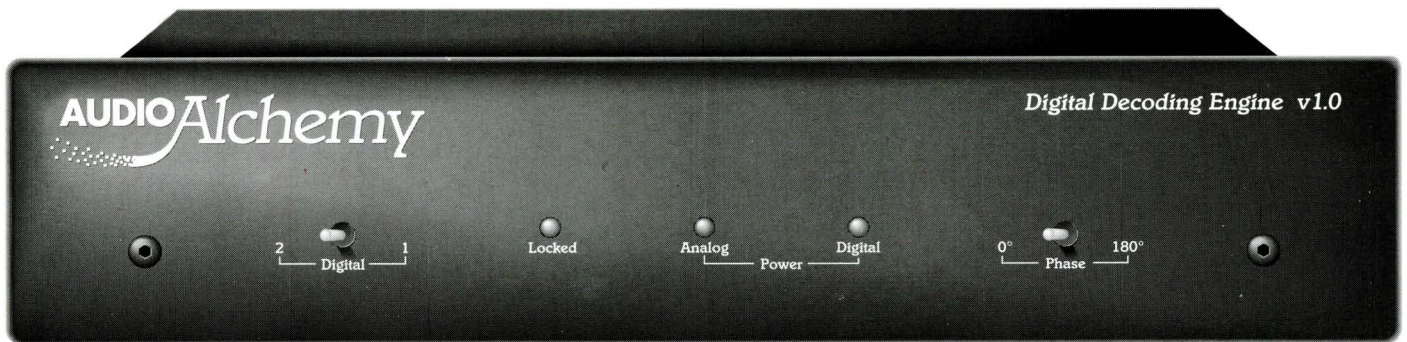
with the *Can Opener* proved worthwhile, it was a little noisy but sonically quite enticing. With the Deltac the sound was characterised by a slight darkness, high frequencies were played down and bass notes emphasised. Not surprisingly this gave the 611 a relaxed though not an uninformative mien. Compared with some of the alternatives it lacks spaciousness and clarity, sounding much like it feels; cosy.

Via the output of a QED A270 the sound got more bass heavy and lost low level detail. The reference managed to make a much better job here, but at over twice the price this shouldn't be a surprise. So avoid soggy sounding drives/sources. The 611 isn't a bad headphone for the price but the standards set by other oriental competition make it seem less of a bargain.

GENERAL DATA

Type	circumaural, open-back, dynamic
Mass	270g
Size rating	large
Impedance	40ohm
Comfort rating	average
Sound quality rating	good
Price	£51

Listen to This!!!



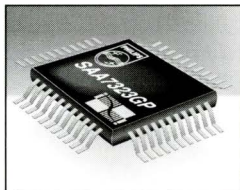
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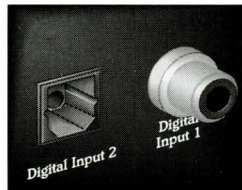
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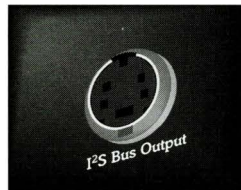
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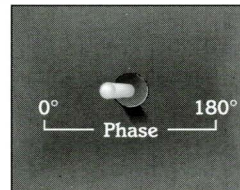
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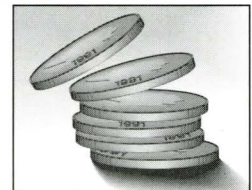
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Quart Phone 30 X

HAYDEN LABS LTD, HAYDEN HOUE, CHILTERN HILL, CHALFONT ST. PETER, BUCKS SL9 9EW.
TEL: (0753) 888447



The £40 *Phone 30 X* is a largely polypropylene creation, very similar to the mid priced Sennheisers in construction in that it has foam supra-aural earpads sitting on 80mm diameter open-backed earphones. The top of your head is comforted by a nylon webbing strap and height adjustment is a simple matter of sliding the phone shells up and down guides in the headband, so nothing too sophisticated or flowery here. But that said the earphones are able to move freely in both horizontal and vertical planes, so it sits comfortably on your ear.

In common with the AKGs only one phone has channel identification so you have to remember that the unmarked side is the left channel.

The cable is fixed into both earphones and terminates after about three metres of lead in a dual sized plug. A quarter inch, or 6mm if you prefer, jack sits over a 3.5mm minijack. There's even a plastic holder for the larger jack attached to the lead which should stop it from getting lost.

The *Phone 30 X* didn't prove to be well matched to the *Can*

Opener, the noise level, though not as bad as some, was such that prolonged listening was far from encouraged. Better results were achieved with the Deltac and QED drives but the overall sonic trend was basically the same. The *30 X*'s basic characteristic was a certain darkness that resulted from an emphasis on the lower registers. It also displayed a slight forwardness in the upper mid-range that could make some of the less forgiving material a bit hard going.

But on the other hand these same characteristics could on occasion be described as good bass weight and liveliness; it was really a question of what was being played.

Not a great hit, then, but probably suited to much contemporary pop music where bass weight carries a lot of credence, it needs a bit of refinement for full hi-fi status.

GENERAL DATA

Type	supra-aural, open-back,	dynamic
Mass		160g
Size rating		medium
Impedance		80ohm
Comfort rating		good
Sound quality rating		average
Price		£40

Quart Phone 95 X

HAYDEN LABS LTD, HAYDEN HOUE, CHILTERN HILL, CHALFONT ST. PETER, BUCKS SL9 9EW.
TEL: (0753) 888447



The £100 *Quart 95 X* incorporates the usual polypropylene headband with an internal, adjustable pad style of construction, but it has an earphone suspension that is peculiar to the brand, and has a peculiar name to boot; Cardamatic. The headband is attached to hoops which suspend the phones with elastic cord thus allowing them freedom of movement. In practise this works very effectively giving a snug fit with very little pressure, and but for the slightly rough material inside the earpads, this would make it one of the the most comfortable in the bunch. The earpads themselves are covered in velvet on the outside and can be removed for washing.

Other features include braille markings, neodymium magnets and a coiled, rubber insulated lead that terminates in a standard 6mm jack plug. Portable users will have to buy an adaptor.

The *Quart 95 X* was another headphone that didn't seem well disposed to the *Can Opener/MA-22* drive system, above the noise the sound quality was pretty vibrant but quiet music wasn't particularly liste-

nable. With the low output impedance Deltac preamp, the *95X* made some pretty convincing noises, it sounded even handed, open and relaxed. Retrieval of low level detail was particularly good and the reference did manage to reveal a bit more in the way of harmonics but wasn't able to create the same sense of openness as the *Quart*.

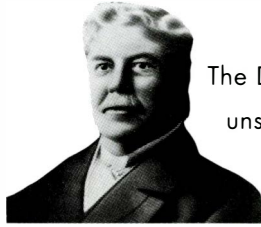
Results with the QED amp were less appealing but still close to the reference in many respects except for a tendency to forwardness and HF unnaturalness. I felt no desire to turn the volume up, but this was probably a result of the headphone's transparency rather than an inherent characteristic.

The *Quart 95 X* is a pretty good headphone but given changes in character brought about by different drive systems I'd try before you buy. A Recommendation is in order.

GENERAL DATA

Type	circumaural, open-back,	dynamic
Mass		215g
Size rating		large
Impedance		300ohm
Comfort rating		good+
Sound quality rating		good+
Price		£100

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Sennheiser HD450II

SENNHEISER UK LTD, B2 KNAVES BEECH BUSINESS CENTRE, LOUDWATER, HIGH WYCOMBE, BUCKS, HP10 9QY. TEL: (0628) 850811



The *HD450 MkII* is not dramatically different from the original design, but the new red plastic ear shells certainly make it look a little more jolly.

The only important technical change concerns the cable that connects the new dual size plug to the two pin plugs that connect up to the earphones. All Sennheisers feature removable, and thus upgradable, or length changeable, leads. Up until this season these leads have utilised steel wire mainly for strength and durability, but now the conductor has been changed to kevlar insulated OFC copper. This is not only as strong and durable but a lot more flexible and a lot less microphonic than its predecessor, never mind the potential advantages for sound quality.

Sennheiser has also made an effort to improve the comfort of the *450* by covering the supra-aural, foam earpads with a 'skin friendly' cloth.

The *450II* at £40 is one of Sennheiser's cheapest domestically oriented (as opposed to personal stereo) headphones. It has 80mm diameter open backed shells and a nigh on indestructible polypropylene

headband that is fitted with a padded strip for improved top of the head comfort.

Listening to various types of music through a least three different outputs this headphone made a very good impression. It managed to reproduce music in a relaxed and open fashion to a standard that is pretty well commensurate with the price. Cheaper Sony models sounded more open and the more expensive reference more relaxed, but the overall picture was very competent. The only major criticism was a lack of high frequency extension which gave the impression of a loss of clarity.

The *HD450II* seems to have benefited from its new cable; personally I prefer circumaural headphones for their comfort and spaciousness but that aside the *450II* is a pleasant earphone that will work comfortably with most sources.

GENERAL DATA

Type	supra-aural, open-back, dynamic
Mass	135g
Size rating	medium
Impedance	60ohm
Comfort rating	good+
Sound quality rating	good
Price	£40

Sennheiser HD480II

SENNHEISER UK LTD, B2 KNAVES BEECH BUSINESS CENTRE, LOUDWATER, HIGH WYCOMBE, BUCKS, HP10 9QY. TEL: (0628) 850811



I reviewed the original *HD480* back in issue 63, since then despite no obvious changes in appearance, the *HD480* has not only become a *MkII* but a *Classic* as well. A process that brings it in line for re-evaluation.

The *480 Classic II* is virtually exactly like the *450* in construction but it costs £20 more and is finished in plain black. So what's the deal? The fundamental difference is in the voice coil. In the *450* this is made of traditional copper, but in an effort to save weight and thus stop and start the diaphragm more quickly, the coil in each of the *480's* drivers is made of aluminium. This wire is apparently very difficult to produce because it's very thin and aluminium is brittle stuff.

The other internal difference between the two is the presence of extra damping in the shells of the *480*, which should result in lower coloration due to shell resonance.

Like the *450* this model features a slinky new kevlar insulated copper lead (available separately as a replacement/upgrade for £6, by the way and definitely well worth it) and cloth covered foam ear pads

for long term comfort.

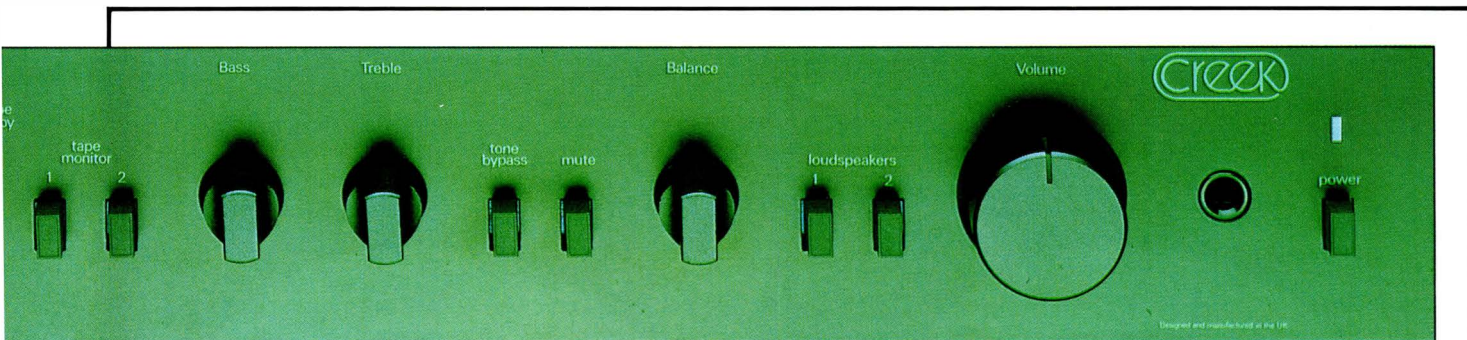
Sonically the *480* shared some characteristics with the *450*. It didn't create a very spacious sound and high frequencies tended to be a tad muted, which gives the impression of reduced clarity. That said, though, this model is quite revealing and natural sounding, with appealing low frequency drive and a relaxing presentation that encourages prolonged listening.

Plugging it into the socket on the *A270*, the sound was distinctly more open and lively than that encountered with the *450* which was merely pleasant by comparison.

The Sennheiser *HD480 Classic II* is comfortable and enjoyable. It does lack the openness that circumaurals can provide, but on the other hand it is a very well built and natural sounding headphone, which deserves recommendation.

GENERAL DATA

Type	supra-aural, open-back, dynamic
Mass	135g
Size rating	medium
Impedance	60ohm
Comfort rating	good+
Sound quality rating	good
Price	£60



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Sennheiser HD560II

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The new *HD560 Ovation* looks virtually identical to its predecessor, only the badging has changed, the attractive gun metal finish and grey velvet ear pads are still being used to good effect.

But under the skin there have been a few modifications. Like the other two models in this review, the *560* has had a change of connection lead from steel wire to kevlar coated copper which gives flexibility and sonic advantages. The voice coils in the *560* are aluminium, a material that is lighter and therefore easier to control than copper, but more difficult to terminate reliably. This latter state of affairs inspired Sennheiser to design a neat gold plated peg and tube system, which, though mechanical, proved to be very effective.

The only other technical detail that really matters on this top of the range £120 dynamic is that it uses neodymium magnets - which have also appeared in Audio-Technica's new OC cartridges, and Sony's latest headphones this year.

Sitting down to listen to the *560II* for the first time I was surprised to find that sound

was emanating from only one channel, swapping leads didn't help and I eventually had to request a second sample. Not a good start, but judging from the state that the lead was in someone/thing had given it a really hard time.

Sonically this turned out to be a detailed and open headphone with the ability to recreate the power and depth in a piece of music. By the standards of the marginally more expensive reference it lacked high frequency naturalness. Violins weren't all that plausible sounding; they sounded digital in fact, which some might consider a compliment, I guess, but not me.

Given the price I had expected better sound quality, but the *HD560 Ovation II* is a comfortable and nicely styled headphone that works reasonably well with the *Can Opener* and suits electronic music.

GENERAL DATA

Type	circumaural, open-back, dynamic
Mass	210g
Size rating	large
Impedance	300ohm
Comfort rating	very good
Sound quality rating	good+
Price	£120

Sony MDR-CD350

SONY UK LTD, SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX. TEL: (0784) 467000



At £32 the *MDR-CD350* is nearly the cheapest model in Sony's new range of headphones. The Digital Reference Series as it's known in Sonyland features a few unusual design concepts and some of these have been incorporated into the *CD350*. One is the way the drive units are angled to be parallel with the ears rather than being closer to the back of the ear than the front. It also has fully circumaural ear pads which is pretty rare amongst sub-£50 headphones let alone those that cost £32.

Constructionally too it's pretty good value, the height of the phones is easily adjustable and the phones are supported by yokes that allow plenty of movement, though whether they are as robust as some of the German alternatives is debatable. Concealed within each ceramic composite shell is a neodymium magnet, which ain't exactly common in this price territory, and a 30mm plastic diaphragm. Each phone is connected to a gold plated, dual diameter jack plug with three metres of OFC cable.

The *350*, along with the other two inexpensive MDR series

phones, has a very low 24ohm impedance and high sensitivity, rendering it virtually unusable with a *Can Opener* that's being driven by a pair of Marantz MA-22s. With alternative drive systems the *350* made some very impressive noises for an essentially cheap headphone. It had a spaciousness and depth that one normally associates with open backed phones costing twice the price. If anything it's a tad lightweight in balance but made up for it with remarkable transparency. The *350* could, of course, be a bit more relaxed but at the price it's a lot to ask of a headphone that makes a serious attempt at clarity. And what's more, given a good source and drive system, long term listening becomes a distinct possibility, which isn't something I often say about budget cans. A Best Buy is in order methinks.

GENERAL DATA

Type	circumaural, closed-back, dynamic
Mass	200g
Size rating	large
Impedance	24ohm
Comfort rating	good+
Sound quality rating	good
Price	£32

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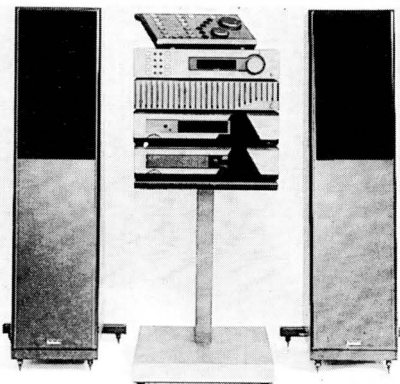
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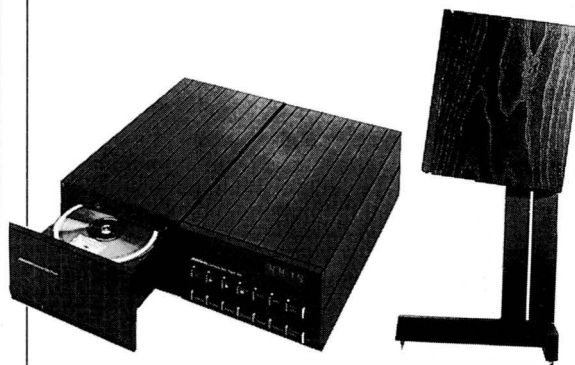
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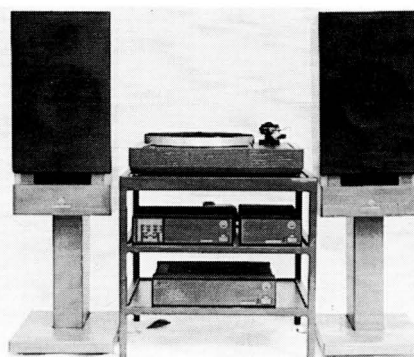
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Sony MDR-CD550

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TEL: (0784) 467000



The Sony *MDR-CD550* is the £50 model in Sony's new eight strong range of headphones, and superficially it resembles the other models in the range.

What differentiates this model from the *CD350* is a ten millimeter increase in diaphragm diameter to 40mm, but otherwise they are much the same.

Both have neodymium magnets, ceramic composite housing (which seems to be a hard plastic), and an OFC cord. In true 'earconscious' design fashion the drive units are angled to sit parallel to your ears and the circumaural pads are big enough to avoid crushing even my un-shell likes.

Like the other Sony cans in this group the *CD550* proved to be incompatible with the *Can Opener*, basically it proved too susceptible to noise that was emanating from the Marantz *MA-22* power amps, which is a pity because this proved to be a very good drive system with other phones.

Most of the listening was carried out with the Deltac preamp and adaptor, with this set-up and some fine recordings the *550* made some quite

acceptable sounds, reproducing much of the detail and sense of space that it was being fed. Bass extension could have been greater, but partly as a result bass tactility was more prominent than usual. It also proved to be quite a natural sounding headphone, which favoured the easy transparency of the analogue source over the digital alternative.

It could, like virtually all 'dynamic' headphones, be more dynamic and one felt the necessity to up the volume in order to bring some life and drama into certain material.

But over all the Sony *MDR-CD550* is a very competent headphone for the price, it creates a remarkable sense of space for a closed back design and it manages to sound natural with it. Looking at other headphones of the same price I can't find one that betters it, therefore a Best Buy is in order.

GENERAL DATA

Type	circumaural, closed-back, dynamic
Mass	260g
Size rating	large
Impedance	32ohm
Comfort rating	good+
Sound quality rating	good+
Price	£50

Sony MDR-CD3000

SONY UK LTD, SONY HOUSE, SOUTH STREET,
STAINES, MIDDLESEX.
TEL: (0784) 467000



At £300 the Sony *MDR-CD3000* is the most expensive headphone in the new *Prince* range, and uses technology developed for the cost-no-object *MDR-R10 King*. Unlike the other phones in the range however, the *CD3000* comes a lot closer to the role model, being the only model to use a biocellulose diaphragm, albeit a lower density version than that found in the *King*. This material is said to have the acoustic velocity of aluminium but the sonic naturalness of a paper diaphragm.

The shells are made of a vegetable fibre composite, which feels like hard plastic, but is claimed to be highly resistant to resonance. Which presumably means it resonates at frequencies that are higher than those created by the drive units. The shells are also decoupled from the earpads and headband to avoid the transmission of resonance between phones.

There is of course no shortage of other features, including the 'free adjust' headband which means that the support band is elasticated. More interesting perhaps is the use of a composite collagen material on

the earpads. This material feels like very soft leather, but unfortunately it doesn't have the same breathability characteristics. Other goodies included are a hard box, neodymium magnets and 6N OFC, single sided cord.

The Sony is a fairly serious headphone, it is very informative and has impressive bandwidth and potentially a similar degree of transparency to the AKG. I say potentially because, through the Deltac, a degree of warmth held back absolute clarity and dynamic resolution. I'm pretty sure that there's a very musical and listenable headphone trying to get out of the *CD3000*, all you've got to do is find a drive system that's up to the job.

The Sony *MDR-CD3000* is better than most of the headphone amplifiers available to drive it, but that's no reason to criticise it. Recommended.

GENERAL DATA

Type	circumaural, closed-back, dynamic
Mass	400g
Size rating	very large
Impedance	32ohm
Comfort rating	very good
Sound quality rating	very good
Price	£300

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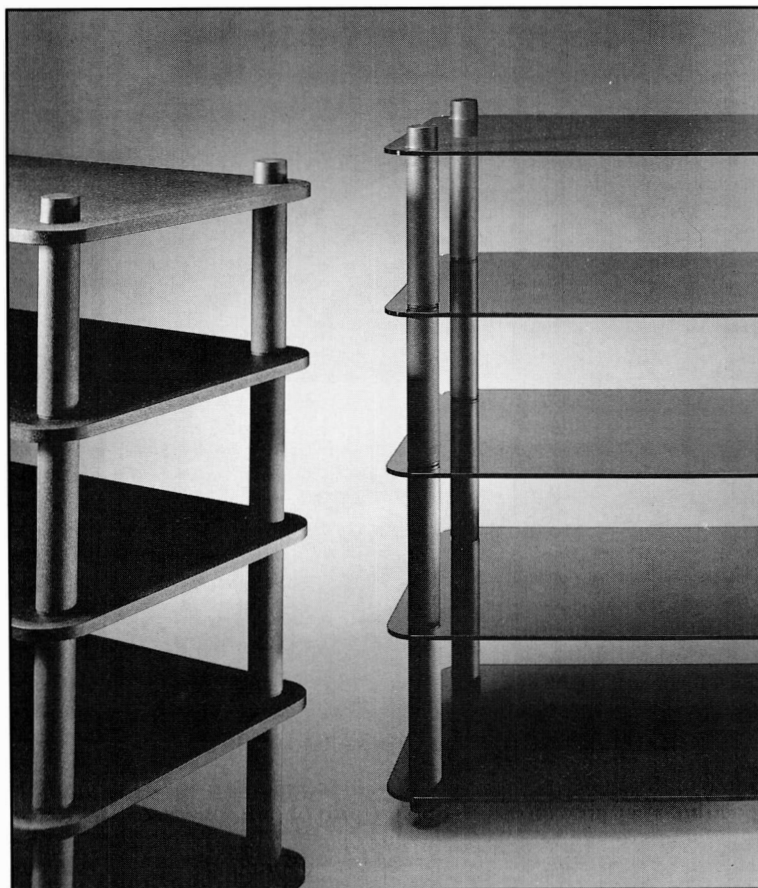
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Choosing and Using . . . Cassette Decks

*What factors should you take into account when purchasing a cassette deck?
Alvin Gold offers advice.*

According to the predictions of some industry pundits a few years ago, compact cassette should by now have been consigned to the great dustbin in the sky. As CDs are in the process of replacing records, DAT was to have usurped cassettes, but that has yet to happen, and probably never will.

Although DAT appears to be getting another marketing push now that the SCMS system has been agreed on (this system allows a DAT recorder to copy a CD in the digital domain - but will *not* allow you to make a copy of the copy), the message is that the humble cassette trundles into a new decade, consolidating rather than loosening its grip on the market. However, the imminent appearance of two new recording formats, Mini Disc and DCC looks likely to upset the market. If either gets significantly backed by record companies (and it looks as though DCC will) we could all be using a digital recording system before the end of the next decade.

Potential buyers should take into account the introduction of a new noise reduction process called Dolby S, which is both extremely powerful and yet is claimed to provide a degree of compatibility with Dolby B. That last claim should perhaps be taken with a pinch of salt, remembering that Dolby Labs said much the same of Dolby C. But it is also claimed that a Dolby S deck will perform comparably to digital media with respect to noise.

You can buy Dolby S cassette decks from Harman Kardon and Pioneer so far. Anybody buying an expensive cassette deck should at least take it into account.

What other factors should you take into account? Obviously sound quality is a primary attribute, and is discussed fully in the reviews. Suffice it to say here

that a good budget price deck (with the emphasis on 'good') costing say £100-£150, will be able to make recordings free of obvious problems like excessive noise, instability or varying pitch, at least when listening reasonably casually. However, something better will be needed for intensive use in a high resolution system, and you'll find ample rewards for paying extra, the point of diminishing returns becomes a factor only well into the several hundred pounds territory.

Types of tape

One advantage of better quality cassette decks is that they make more of the tapes you feed them. Ultra-quiet Type IIs, for example, can often be used to record even quite wide range music without Dolby noise reduction, yet without obvious signs of hiss at normal volume levels, given an inherently quiet deck with good heads. It's surprising how noise free a sympathetically chosen deck and tape combination can be, and omitting noise reduction processing generally adds clarity and articulation to the sound which is, literally and metaphorically, less manipulated. Dolby HX Pro assists here, since it helps prop up flagging high frequency dynamics on musical passages recorded at high level, keeping compression at bay a crucial few decibels more than otherwise would be the case.

Metal tapes tend to be noisier (as well as being more expensive of course), and consequently it's harder to dispense with Dolby noise reduction. Nevertheless, metal tapes remain the best option for capturing music's solidity and dynamics since the nature of the recording process with metals is inherently less prone to compression. At the same time, metals need high bias and record currents which makes the task of the cassette deck considerably more complicated.

Three independent heads -

erase, record, play - are also part of the territory with expensive cassette decks. Reviewers love three head decks because they make testing a less complicated task, but they do very frequently sound better, especially where other decks are at their weakest, at high frequencies and high levels. Dual capstan transports are often used in three head decks, and generally this leads to improvements in wow and flutter, and in output stability. In other words, you get what you pay for, as usual.

The features offered by modern cassette decks haven't increased over the last couple of years, but more decks have soft-touch logic controlled transports, effective intro-search and track search options, memory counters, and so on.

Electronics are being used for more and more functions of course, but sometimes this backfires on the user, who should beware that not all logic decks can be left in record standby using an outboard timer (this facility is intrinsic to decks featuring mechanically latching transport controls) as the tests that follow demonstrate. In one or two cases, even Dolby switching is

defeated when the player is turned off, leading to the near certainty of frequent operating errors.

Different decks

Several of the more sophisticated features found on some decks add considerably to convenience and utility but to the almost inevitable detriment of performance standards. Dual transport decks - which allow tape-to-tape dubbing and sequential play - are predominantly low in price and don't even pretend to offer high standards of sound quality. Auto-reverse decks which certainly aren't restricted to any particular price bracket, involve considerable complication to transport design and almost guaranteed qualitative losses if not in normal use, then certainly when the tape is running in the reverse sense.

Technological fixes are available to bring auto reverse standards into line with unidirectional standards, but they don't come cheaply and these days are rarely employed against a background of an apparently diminishing interest in the breed. I wonder if deck manufacturers are reading the right messages from this diminishing interest?



All hands on decks: all these and more are reviewed this month.

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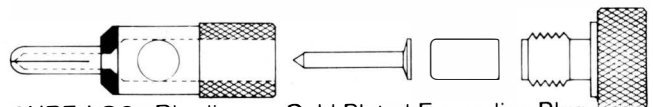
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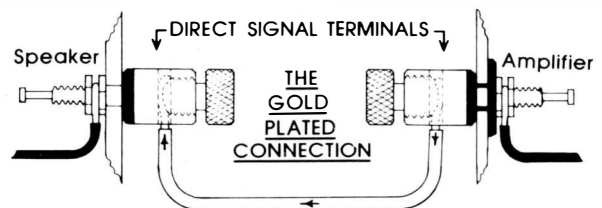
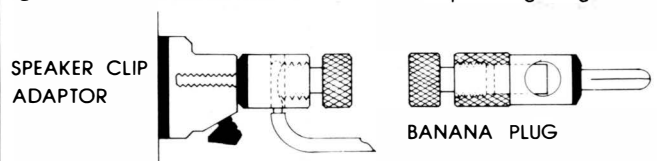


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To all intents and purposes, this new model appears to be much the same as the AD-F500 (issue 93). The only obvious material difference is that the AD-F410 lacks the 500's record sensitivity adjustment, which helps eliminate the subtle errors due to Dolby mistracking. The only other substantive difference is that whilst the AD-F500 costs a perfectly reasonable £150, the AD-F410 is pitched at a bargain base-ment £99.99.

The Aiwa offers all the usual mod cons, including full soft-touch logic controls, auto tape type sensing, timer standby and Dolby B, C and HX Pro. Dolby HX Pro is quite a coup at this price level, of course. A fine bias adjuster is also included. Tape search aids include track search and audible cueing as well as a mechanical tape counter. The record level meters cover a 30dB range in seven steps, but have rather sluggish ballistics which can lead to distortion on transients with dynamic material unless care is taken not to over-record. Headphones can be connected, but driven at fixed level only.

Test report

Surprisingly, on the constructional side, not too many corners have been cut, at least not where it counts, though the front panel is all too obviously a plastic moulding. The record/replay head, for example, uses 5N high purity copper PC-OCC windings, and is profiled to reduce low frequency ripple, whilst the knee of the response curve is placed at a highly creditable 50Hz.

The midband record/replay responses are all flat, and the slightly rising treble output at the standard bias settings is well within the scope of the bias control. The only weaknesses in this general area concerns Dolby C which manipulates the EHF region quite strongly, and the prerecorded response which falls through the midband, treble output being an average 3dB lower than the bass.

The transport has an AMTS (anti modulation tape stabiliser) cassette shell damper built into the tape loading door whose main claimed effect is to reduce modulation noise. Basic signal/noise figures are very creditable, and slightly better overall than the AD-F500 sample reviewed previously. Pitch integrity, however, ranks as barely satisfactory due to some quite prominent flutter sidebands - see the spectrum analysis.

Sound quality

Assessed 'raw' - that is without noise reduction - deep bass is a little slow and over-blown, but it has a striking and very unusual strength and power, which might even be described as authority.

The mid/treble and treble itself are very well presented and quite finely detailed, investing the Aiwa with an unusual liveliness and clarity at this price level, especially (but not exclusively) with female vocal and piano. Some of the apparent clarity is in fact a result of lost information.

A considerable amount of fine detail - for example acoustic guitar action noise and odd ambient details from Mary Blacks *No Frontiers* album - is eliminated from the source material, an effect analogous to the way a television invariably loses picture information, no matter how sharp and clear the picture appears. Pitch stability is fair, with no noticeable programme wow.

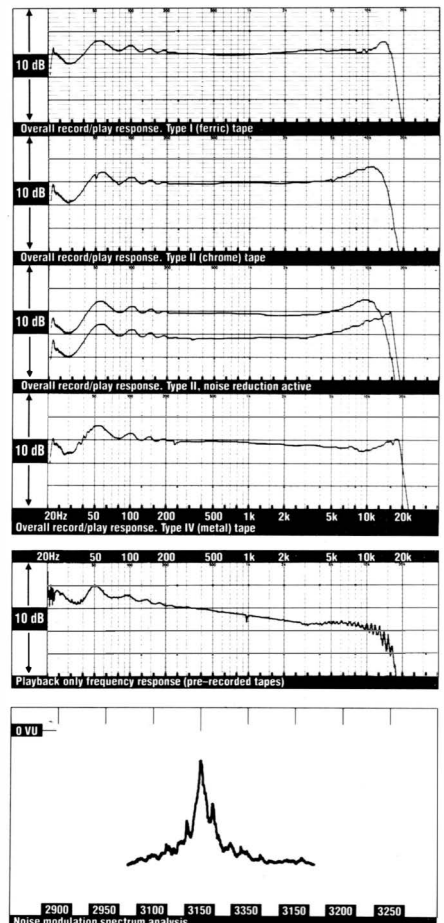
Dolby processing imposes its usual losses. With Dolby C in particular music is clearly compressed and lacking in top end liveliness (in reality these are two aspects of the same thing). The deck is quiet enough to be used without noise reduction for some material, but where noise is intrusive (which inevitably it will be at times), Dolby B represents the nearest to an optimum compromise. Prerecorded material was handled well, with good presence.

Conclusion

The performance of a £150 deck for £100 - what more of a commendation do you want? An excellent all rounder, and the definitive starter deck - this week at least.

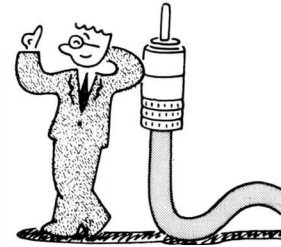
TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	20Hz - 17kHz
IEC Type II	20Hz - 21kHz
IEC Type IV	20Hz - 21kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.16%/0.21%
Wow/Flutter - Peak DIN wtd	0.07%/0.28%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	50dB 1.6%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB 1.4%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB 1.6%
Noise Figure of Merit (Dolby level/noise Type II)	58.5dB
Line input sensitivity/overload	78mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	570mV/3.0V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	2.5%
Azimuth check R-L phase at 10kHz	60 degrees
Dimensions (wxhxd)	43x14x26cm
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Average wind/rewind time (C90)	2min 14sec
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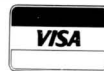
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Jointly with the Sony TC-K570, the Aiwa AD-F810 is the lowest cost three head cassette deck in our test. But this implementation includes automatically controlled source/tape switching so that operationally there is little to choose between this deck and any two header.

The AD-F810 also has a dual capstan transport, a refinement the Sony can't match. There is no direct causal relationship between performance and the number of capstans of course, but even when they don't improve wow and flutter levels, dual capstans will usually help alleviate tape modulation noise, leading to a clearer, sharper sound. A tape shell stabiliser, described by Aiwa as an anti-modulation tape stabiliser, is also part of a strong mechanical package.

Record sensitivity and bias can be adjusted, which makes it possible to match almost any tape type to the deck, ensuring at least a reasonably accurate frequency response and a reduced chance of Dolby mistracking. This is a manual adjustment which can be made quite easily and in a few seconds by switching repeatedly between source and tape whilst twiddling the knobs.

Track location is facilitated by a track search feature and by audible cueing (only just audible as it happens - the level has been set rather low) and by a standard track search feature invoked by hitting fast forward or rewind from play mode. The time counter also has a 'return to zero' feature. Dolby HX Pro is included, and the MPX filter can be defeated. The Aiwa even has a volume control for headphones and support for an outboard timer. Last and certainly not least, a display switch can blank the entire display or just the record level meter.

Test report

The AD-F810 produced a near textbook set of results on the test bench. The frequency responses are all well extended

and accurately presented; pitch integrity is a positive strength. IEC 0dB is set at +4VU, yet no apologies need be made for the signal/noise figures even when referred to the usual 0VU. Some remarkable MOLs are possible, up to +9.5VU for three per cent THD (400Hz) with metal tapes for example and +6.5VU for the Type II setting, which outshines most decks in this price area.

Sound quality

There were times during the test when the Sony TC-K570 sounded sharper and more Technicolorishly colourful than the Aiwa, whose key failing is that it can tend to sound a little grey. But little is the operative word here: it can be genuinely hard to distinguish before from after with this deck - the cheapest of the 20 odd of which this can be said - even in the context of a high resolution system. Much of the credit for this lies with the dual capstan transport which has given this deck less of the usual tell-tale signs of modulation noise than any other deck in the same general price band. Lack of modulation noise means such things as a dynamic way of responding to transients, firm, uncluttered bass lines and a precise, detailed treble without obvious 'squash' or compression.

The deck was electrically quiet enough, and had enough headroom to manage with a wide range of material. Taking the plunge in this way adds a sparkle to the sound and increases tonal and dynamic contrasts still further, and has a particular advantage in increasing the sense of presence during quiet passages. But the two Dolby circuits are clearly well aligned, and the losses they impose are small and generally manageable.

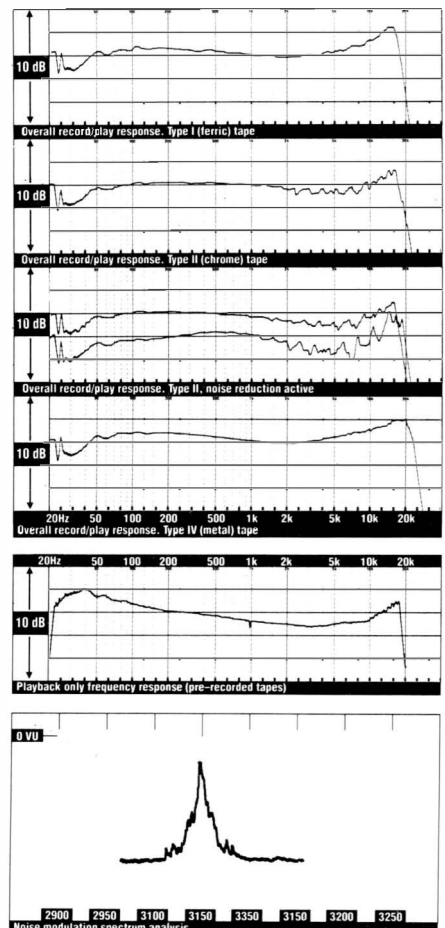
Conclusion

Although this deck isn't as slick to handle as the equivalent Sony model, the redis-

tribution of resources in favour of the parts that affect sound quality most has paid ample dividends. This is an accomplished recorder at a giveaway price, and classic Best Buy material.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 19kHz
IEC Type II	<20Hz - 20kHz
IEC Type IV	<20Hz - 22kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.094%/0.052%
Wow/Flutter - Peak DIN wtd	0.06%/0.052%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	49.5dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	54.6dB
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	52.5dB
Noise Figure of Merit (Dolby level/noise Type II)	57.5dB
Line input sensitivity/overload	90mV/13.0V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	713mV/3.84V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	2.82%
Azimuth check R-L phase at 10kHz	10 degrees
VU indication at IEC 0dB	+4dB
Dimensions (wxhxd)	43x13.9x29.5cm
Average wind/rewind time (C90)	2 min 37 sec/t
Typical Retail Price	£200



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Aiwa XD-S260

AIWA (UK) LTD, UNIT 5, HEATHROW SUMMIT CENTRE, SKYPORT DRIVE, WEST DRAYTON, MIDDLESEX UB7 0LY. TEL: (081) 897 7000



Both Aiwa DAT recorders submitted for review were supplied from early sample stock and fitted with 110V power supplies. Thus performance standards of UK players may well be better than was achieved here.

This is the first DAT recorder designed to be stacked with mini components as it measures 26cm wide. It is also attractively priced by DAT standards, undercutting the previous cheapest - the Sony DT-55ES - by a full £50.

SCMS is present as usual to inhibit multi-generation copying in the digital domain, the XD-S260 is otherwise quite simply equipped. Support for long play recording is limited to 32kHz digital sources. Analogue, coaxial and optical digital inputs are provided, but there is only one digital output, which is optical. A proprietary system control socket is also fitted, which allows automatically synchronised dubbing etc.

A timer switch is included, plus convenience features such as track skip and programming. Omissions include a lack of skip IDs, no input balance control (see the test report), and the fact that there is no headphone socket.

The Aiwa is adequately built, but not without some peculiar grunting noises as the transport modes are engaged. The only other (minor) problems arose as a result of reflections from the front surface of the curved Perspex display cover, and the white display labelling that showed up poorly against the matt grey fascia.

Test report

At least in part, the secret of the Aiwa's low pricing is to be found in a comparatively simple transport which uses just three motors (some use as many as six!). The ADC and DAC are respectively 64 times and 256 times oversampling, 1-bit circuits, but the digital to analogue linearity curve has an interesting kink which by rights should not have been there. The

curve begins to go seriously non-linear well above -80dB, and the resolution figure therefore is a poor 14 bits. Electrical noise is -80dB CCIR/ARM weighted, and effective dynamic range is 95dB (-70dB THD+N+dither).

The measured frequency response is flat through the LF and MF area, and 0.5dB down at 20kHz. Note the channel imbalance, which is in excess of 0.5dB over the whole band, and which, in the absence of a balance control, cannot be corrected.

Sound quality

It would be as well to take account of the cost of this unit when evaluating its performance, as it was decidedly below expectations. Strings on a Mozart piano concerto CD used as source sounded shut in and the structure of the space around the performers was simply absent. There was little real presence in the midband, and the bass too sounded more than a little thin.

The Kenwood DX-7030, which is far from being the best DAT recorder around, sounds positively luxurious compared to the Aiwa, though in one respect - their lack of fine detail - they compete on a more or less level playing field. Incidentally, the coaxial input sounded cleaner and more dynamic than the optical one.

Transcribing CD based material through the analogue input showed the real strength of the Aiwa: its analogue to digital convertor is a good one, which is indicated by the small additional losses incurred when recording this way. Even so, there was some further slackening of dynamics and presence.

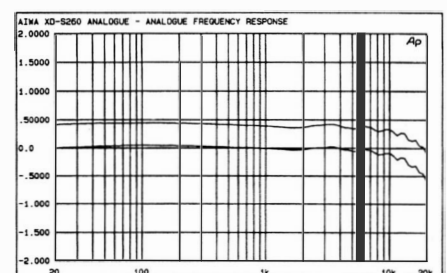
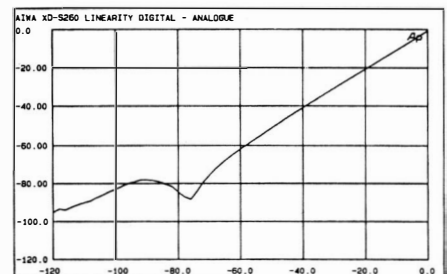
By cassette deck standards this is still an impressively taut and clean sounding machine, but we are, I think, entitled to judge by the standards set by CD players whose basic coding technologies are similar. By any such measure the Aiwa has to be found wanting.

Conclusion

Though sound quality is disappointing in the ways described, the Aiwa is presently the least expensive domestic DAT recorder on the market, and although an outright recommendation is not strictly in order, a 'worth considering' verdict seems appropriate. In the context of the kind of surroundings in which it is meant to shine, typically a high grade mini system, the Aiwa is clearly more than good enough, and good value too.

TEST RESULTS

Test resolution	14bits
Output level, dB rel 2V, Source 2.33V, 1.33dB, 930ohm (digital in)	
Line input sensitivity/overload	225mV/>13V
Level meter indication at full level (digital in)	0dB
Effective dynamic range (-70dB thd + N + dither)	95dB
Pure harmonic distortion	20Hz 1kHz 20kHz
(a) at full level ref 0dB	-88dB, -84dB, -90dB
(20kHz in-band products only)	0.00398% 0.00631%, 0.00316%
at-70dB encode + dither	-20dB or 10%
Stereo separation	91dB, 75dB, 50dB
Stereo balance L/R	0.63dB, 0.65dB, 0.58dB
Frequency response (ref 1kHz) 20Hz - 20kHz +/-0.06dB	
Audible high frequency intermodulation	-90dB or 0.00316%
Audible electrical noise (CCIR, ARM wtd, 1kHz)	-80dB
Audible mechanical noise	low
Ultrasonic noise	-95/88dB
Deemphasis	+/-0.2dB at 5kHz
White noise overload test	OK
Dimensions (wxhxd)	26x10.5x32cm
Typical Retail Price	£500
Tested with analogue in/analogue out unless otherwise stated	



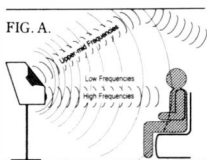
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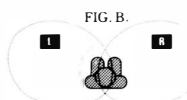


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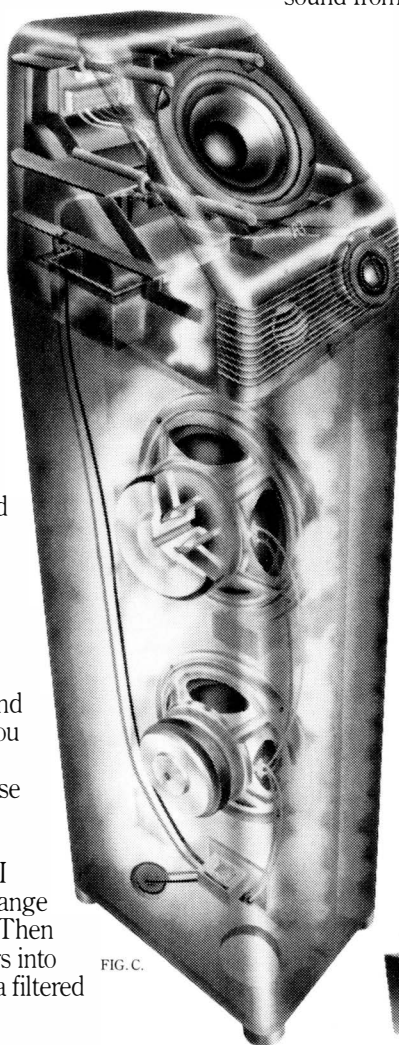
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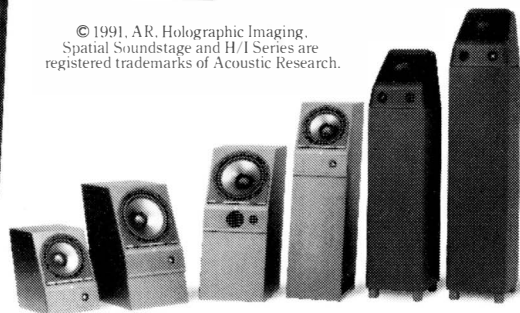
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Aiwa XD-S1100

AIWA (UK) LTD, UNIT 5, HEATHROW SUMMIT CENTRE, SKYPORT DRIVE, WEST DRAYTON, MIDDLESEX UB7 0LY. TEL: (081) 897 7000



This test covers an early 110V sample of the XD-S1100 which is not necessarily fully representative of UK production.

The high tech but old-fashioned and heavily engineered appearance of the XD-S1100 gives a clue to its origins as a derivative of Aiwa's first DAT recorder, the Excelia XD-001, which was also the first DAT of any kind to go on sale in the UK. Although the fascia design can hardly claim to be the last word in user friendliness, it does offer real flexibility, though not to the extent of recording in LP mode from an analogue source.

Naturally, the Aiwa is equipped with SCMS (see XD-S260 review). Input and output choices are maximised with optical and electrical outputs as well as inputs, plus the usual analogue connections. Variable level headphone monitoring is also available. Track skip and counter memory functions help find your way around the tape, and a numeric keypad for track selection is fitted to the main unit as well as to the remote control handset. Various programming and repeat options are fitted.

Test report

The transport is Aiwa's latest three motor design featuring direct drive capstan and head drum motors and a DC servo motor for hub drive, loading and so on. The chassis is heavily constructed, reinforced as well as being prettified by high gloss wood side cheeks.

The measurement programme yielded a set of numbers and plots that were in close agreement with those of the XD-S260, though there were disparities: a higher level of ultrasonic noise on the 1100 for example (-80dB, though it is difficult to predict what audible consequence this will have, if any) and improved -70dB distortion (ditto).

The main trends, however, are vaguely disappointing. Resolution is just 14 bits, electrical noise is at -80dB and effective

dynamic range (as defined in the table below) is 95dB, which of course is well into noise and analogue/digital non-linearity. The latter shows as a sharp kink in the transfer characteristic (see linearity plot). Like the XD-S260, there is a significant channel imbalance amounting to a tad under 0.5dB wideband.

Sound quality

Using the Mozart test track, the Aiwa lopped the leading edges from piano transients, lending the rather cramped soundstage a slowed and wooden quality. The tenor in Finzi's *Cantata for High Voice*, a recording of real grace and poise, suffered from poor vocal articulation, which is very far from what the original recording sounded like. Similar observations arose with other material, including the album *No Frontiers* from Mary Black, which came across as somewhat unexpressive and wooden next to the original (in this case the CD). Compared to the XD-S260 however, the 1100 did at least offer a more acceptable balance, the bass in particular sounding warm, clear and in control, which helped provide a sense of power to large scale music, and a feeling of scale and body to Mary Black's accompaniment. This ability was outside the compass of the less expensive Aiwa machine.

The XD-S1100 proved adept as a recorder, in this respect also paralleling the story of the XD-S260, presumably because the two decks have similar input circuits.

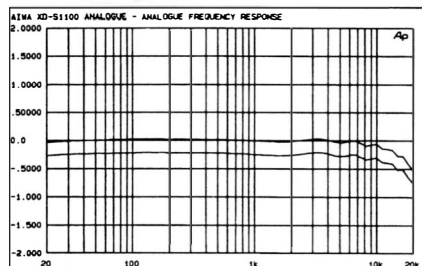
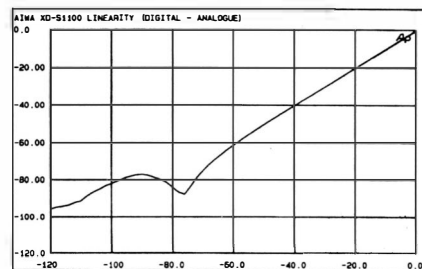
Conclusion

Although an improvement on the XD-S260, the XD-S1100 is less than impressive in the areas that count, namely the ability to play back a recording of a source with an adequate representation of the original in terms of imagery, dynamics, clarity and so on. The Aiwa is more than good enough to sustain casual listening, and it beats most cassette decks into a

cocked hat, but it is a long way from sounding as engaging or as informative as the Sony DTC-55ES, which continues to set standards in this price area. The controls are also messy and in some cases (for example, the fast wind controls) downright obstructive.

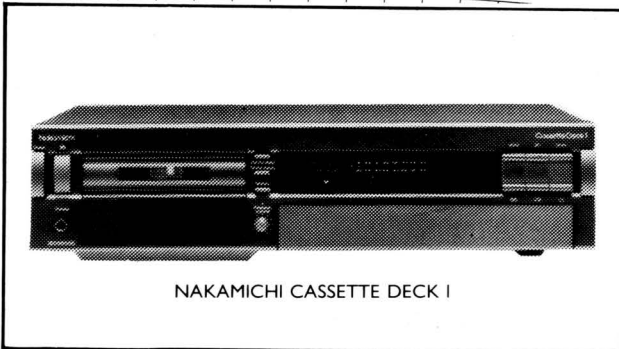
TEST RESULTS

Test resolution	14bits
Output level, dB rel 2V, Source 2.27V, 1.07dB, 920ohm (digital in)	
Line input sensitivity/overload	.221mV/>13V
Level meter indication at full level (digital in)	0dB
Effective dynamic range (-70dB thd + N + dither)	95dB
Pure harmonic distortion	20Hz 1kHz 20kHz
(a) at full level ref 0dB	-83dB, -88/80dB, -88dB
(20kHz in-band products only)	0.0071% 0.00398/0.010%, 0.00398%
at-70dB encode + dither	-36dB or 1.58%
Stereo separation	93dB, 77dB, 51dB
Stereo balance L/R	0.5dB, 0.44dB, 0.49dB
Frequency response (ref 1kHz) 20Hz - 20kHz	+/-0.5B
Audible high frequency intermodulation	-88/82dB or 0.00398/0.00794%
Audible electrical noise (CCIR, ARM wrtd, 1kHz)	-80dB
Audible mechanical noise	low
Ultrasonic noise	-80dB
Deemphasis	+/-0.2dB at 5kHz
White noise overload test	OK
Dimensions (wxhxd)	46.7x10.7x47cm
Typical Retail Price	£550
Tested with analogue in/analogue out unless otherwise stated	

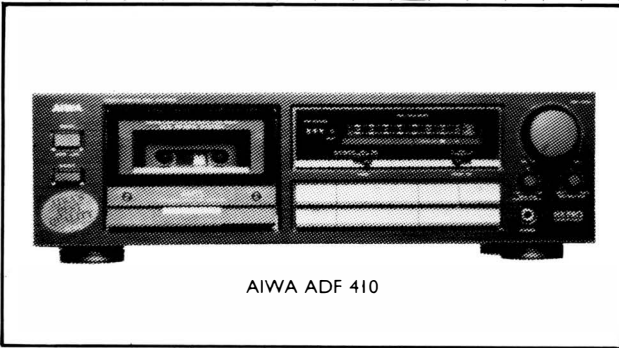


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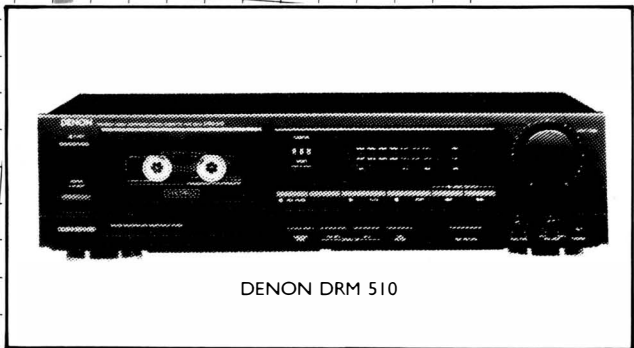
Music



NAKAMICHI CASSETTE DECK I



AIWA ADF 410



DENON DRM 510

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Marantz PM40	386.95	403.95	420.95	437.95	454.95	471.95	518.95
Marantz PM40SE	412.95	429.95	446.95	463.95	480.95	497.95	544.95
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NAD 3240PE	378.95	395.95	412.95	429.95	446.95	463.95	510.95
NAD7020I	386.95	403.95	420.95	437.95	454.95	471.95	518.95
Rotel RA920AX	310.95	327.95	344.95	361.95	378.95	395.95	442.95
Rotel RA930AX	344.95	361.95	378.95	395.95	412.95	429.95	476.95
Rotel TAF440	378.95	395.95	412.95	429.95	446.95	463.95	510.95
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IMPROVED TURNTABLES (INC. CARTRIDGE)

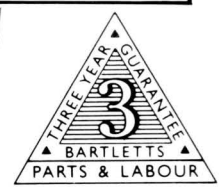
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Marantz CD52 add	£47.00	Pioneer PD7700 add	£90.00	Technics SLPG 200 add	£13.00
Marantz CD62 add	£132.00	Pioneer PD8700 add	£132.00	Technics SLPG 500 add	£47.00
NAD 5420 add	£30.00	Rotel RCD955 add	£98.00	Yamaha CDX 450E add	£23.00
NAD 5425 add	£47.00	Rotel RCD865 add	£132.00	Yamaha CDX 550E add	£47.00
				Yamaha CDX 750E add	£90.00

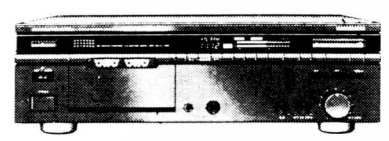
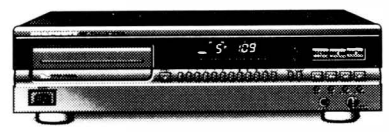
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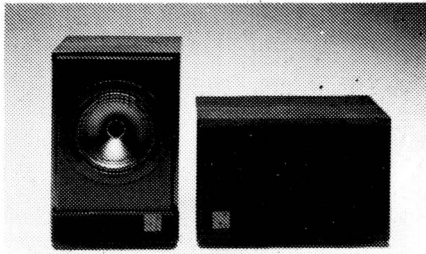
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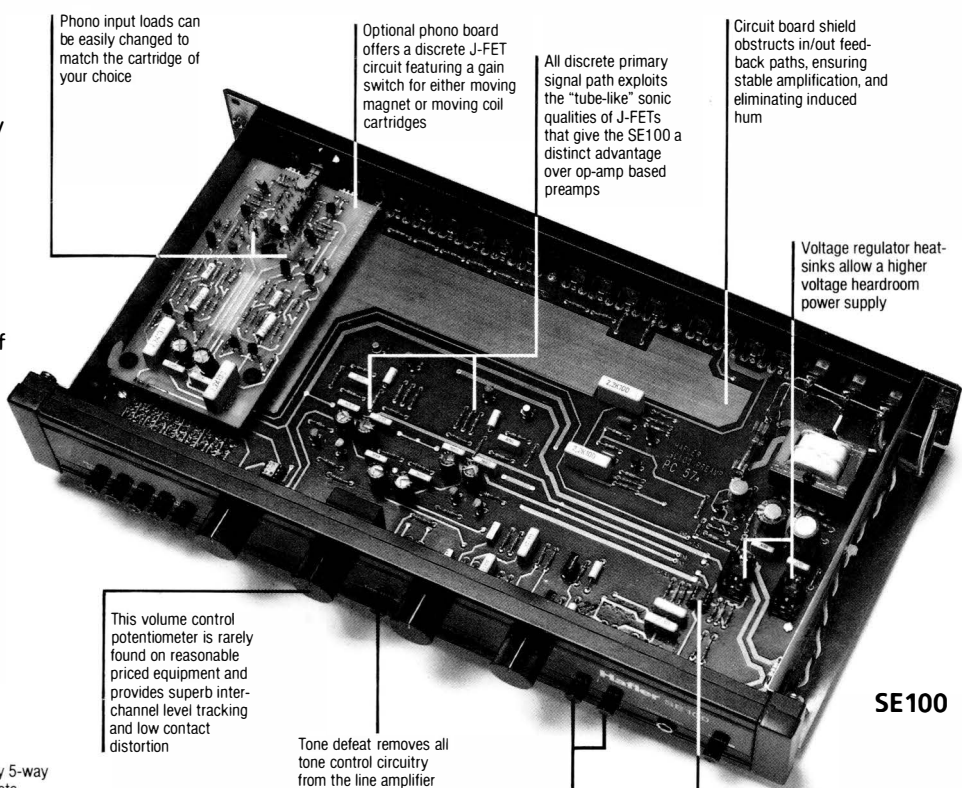
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All discrete primary signal path exploits the "tube-like" sonic qualities of J-FETs that give the SE100 a distinct advantage over op-amp based preamps

Circuit board shield obstructs in/out feedback paths, ensuring stable amplification, and eliminating induced hum

Voltage regulator heat-sinks allow a higher voltage headroom power supply

This volume control potentiometer is rarely found on reasonable priced equipment and provides superb inter-channel level tracking and low contact distortion

Tone defeat removes all tone control circuitry from the line amplifier

Independent dual line output selectors for driving two stereo power amplifiers offer unusual system flexibility

Headphones are driven by a high quality power amplifier – isolated to prevent hard driven headphones from distorting tape or line outputs

SE100

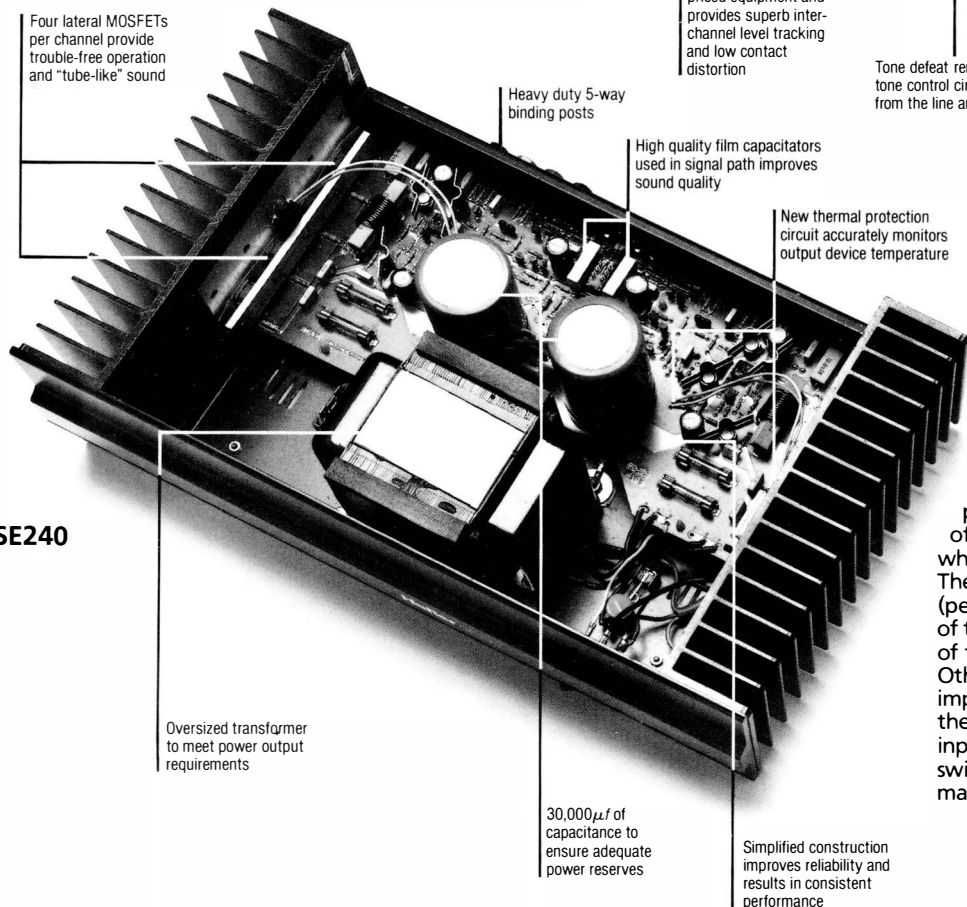
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Akai GX-R35

AKAI (UK) LTD, UNIT 12 HASLEMERE HEATHROW ESTATE, THE PARKWAY, HOUNSLOW, MIDDLESEX TW4 6NQ. TEL: (081) 897 6388



Akai describes this model as, and I quote, a 'quality auto-reverse deck with features suited to those who wish for ease of use over out and out sound quality.'

And so it is. To reduce the recording gap at the end of side as the tape reverses direction, an infra red detector locates the join between leader and tape. The Akai also has a wide range of operational features designed to appeal to the hands-on recordist. When setting up a recording, record levels can be set manually in the usual way, or by using a feature called CRLP. As long as a suitable passage is used when setting up, this circuit gives all the advantages of auto-level control without the disadvantages, the main one being music modulated compression. A further circuit will trigger a fade out and in just before and after the end of the tape (the machine will first search the tape to find out where the end is). A remote control handset doubles up on the key functions, record and playback.

Other features are much as you'd expect: 16 track search, intro scan, Dolby B/C/HX Pro, variable bias and so on. There are also some minor but useful refinements, such as separate CD and line inputs, MPX filter switching, a cassette shell damper, timer support (for making unattended recordings) and a headphone volume control. The display is a thoroughly modern affair with 33dB record level meters.

Test report

The weighted wow and flutter figure - usually a make or break point on an auto-reverse mechanism - is quite good, but the spectrum analysis reveals the presence of some high level flutter energy which is also seen in the unweighted raw flutter figures and in the composite unweighted wow and flutter figure. This then is a case where although a simple reading of the wow and flutter meter tells the truth, it fails to tell the whole truth.

The low frequency response shapes are extremely good, but all three tape groups look a little underbiased at the standard bias setting when using tapes conforming to IEC norms. The noise and distortion results are very good however; the electronics giving every indication of having been well designed.

Sound quality

A point that is hammered home with each successive test of cassette decks is that the measurements alone will not tell you whether you have a good cassette deck on your hands, but they can certainly tell you when things have gone wrong. It seems there is no gainsaying poor mechanical behaviour, especially wow and flutter. It's not that every deck with high wow and flutter has a weaving sense of pitch to match. This can happen of course, but is not the issue in this case or some others. Where the Akai does suffer is in flatness of image and in a loss of detail that seems to be the inevitable consequence of high measured flutter levels. High level, low frequency signals - the bass accompaniment to the opening track of Tracy Chapman's first album is a good example - sounded curiously grainy and distorted, as though they had been recorded at a grossly excessive level, which was not the case of course.

The Akai sounds significantly better with Dolby B than with Dolby C, which can only be described as a black hole for detail. Even with Dolby B however the deck tended to sound shallow and lossy. There was no perceptible advantage to be gained by using Type IV metal tapes, either.

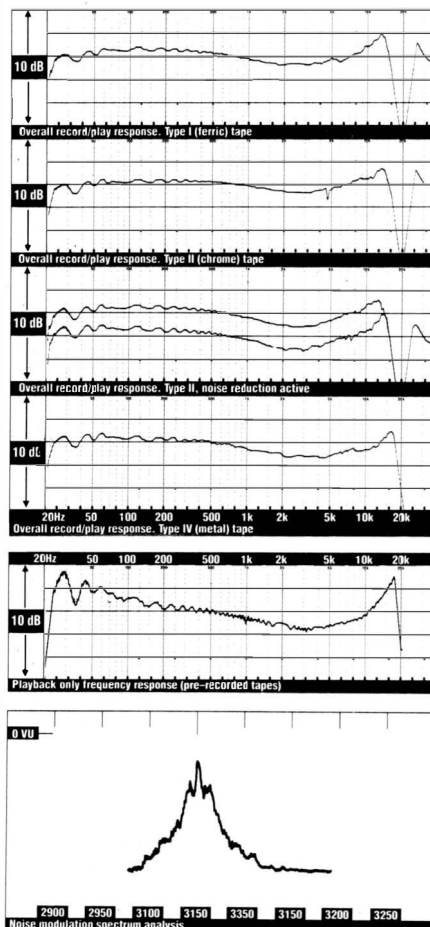
Conclusion

No formal Recommendation is possible for this deck, which is a pity since in many ways it appears to be quite well engineered. It is also well equipped and a genuine pleasure to handle, and therefore

ranks as 'worth considering' if the auto-reverse facility is genuinely important. If you can do without the latter though, you will be better off elsewhere.

TEST RESULTS

Dolby Level reading on deck's meters	+2dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	20Hz - 16kHz
IEC Type II	20Hz - 17kHz
IEC Type IV	20Hz - 19kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.10/0.12%/0.70/0.76% (fwd/rev)
Wow/Flutter - Peak DIN wtd	0.11/0.07%/0.44/0.60% (fwd/rev)
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48.5dB 0.60%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	54.5dB 0.48%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB 0.46%
Noise Figure of Merit (Dolby level/noise Type II)	56.5dB
Line input sensitivity/overload	107mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	609mV/3.75V
IM distortion 10kHz/1kHz 0dB peak, 1kHz product	0.32%
Azimuth check R-L phase at 10kHz	100 (fwd) 100 (rev) degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	42.5x13.7x35.3cm
Average wind/rewind time (C90)	1 min 41 sec
Typical Retail Price	£199



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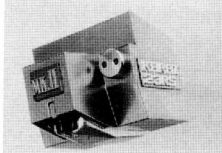
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Akai GX-95II

AKAI (UK) LTD, UNIT 12 HASLEMERE HEATHROW ESTATE, THE PARKWAY, HOUNSLOW, MIDDLESEX TW4 6NQ. TEL (081) 897 6388

Recommended



The predecessor of this model was the GX-95, which was reviewed in issue 69 of *Choice*, which by cassette deck standards has given it a substantial lifetime. The MkII GX-95, which, like its predecessor, is the flagship of Akai cassette deck range, has no external changes whatever. Those differences that exist are found only after removing the lid, and are principally aimed at improving sound quality.

A three head deck with off tape real time monitoring (automatically controlled with manual override), the GX-95II also boasts manual tape bias and sensitivity alignment using a dedicated display mode. Dolby B and C are both included, as is Dolby HX Pro, which can be defeated. Welcome additional features include the full logic transport, a powered loading door, remote control and a display off key.

The GX-95II is fairly brimming with other goodies which, on the whole, don't get in the way of the Akai's good ergonomics. Examples include excellent high resolution metering, A-B repeat track search (+/-16 tracks) and variable level headphone monitoring. Two sets of inputs are provided.

Test report

Although the quality of many of the components is only adequate, attention to isolating various parts of the circuit from others borders on the fastidious. The internal screening also performs a structural role. The transport includes a cassette clamp, and is of the closed loop, dual capstan type, in which the trailing capstan/pinch wheel turns slightly slower than the leading set, producing a calculated tension across the heads, and isolating this loop of tape from external effects. The capstans are driven by a direct drive motor, and the result is exceptionally low wow and flutter levels, and an equally impressive spectrum analysis free of dominant artefacts.

Improvements to the original GX-95 concern the heads and replay amplifiers. The old siamesed record/playback head has been replaced by discrete heads and an improved design of replay amp provides a number of benefits, says Akai, including an improved rec/replay frequency response, reduced crosstalk and improved head alignment. The measurement programme confirmed some of these points. Note especially the exceptionally accurate frequency responses, all run after alignment using the controls provided. The only slightly disappointing feature is an operating dynamic range a little narrower than the best: 59.5dB was measured (Type IV tape, three per cent THD, 400Hz).

Sound quality

The noise reduction circuits are almost completely transparent: that is, they have little effect other than to reduce hiss, though Dolby B remains preferable to Dolby C on critical material (Mary Black, Cowboy Junkies, Mitsko Uchida playing Debussy, etc). Type II tapes give good results, but Type IVs offer a stronger, more open sound when pressed and were preferred overall. Bypassing the Dolby HX Pro circuits when recording onto Type IV tapes improves musical dynamism and stereo focus still further.

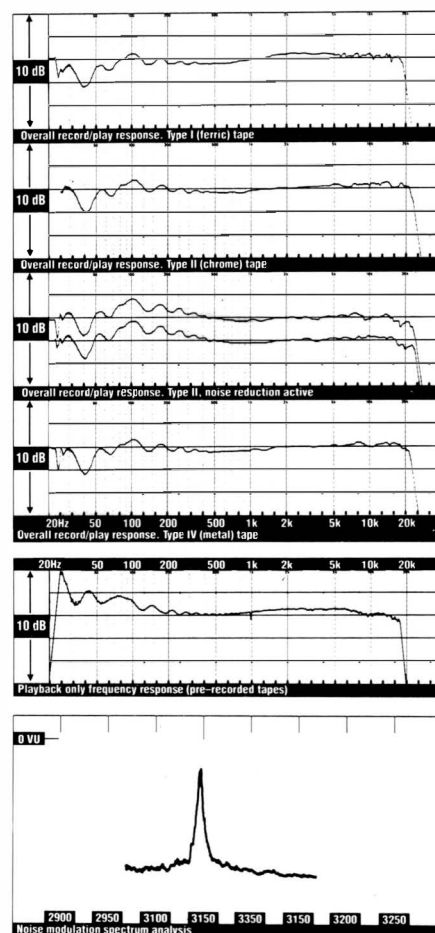
These points aside, the Akai turned out some remarkable results. Sometimes it was hard to believe from the nature of the music it made that this was a cassette deck at all. The bass and treble sounded very firm and in command, whilst the midband was layered naturally and offered excellent resolution. Powerful pre-recorded material like *Talkin' about a Revolution* from the first Tracy Chapman album - an excellent test track, this - was reproduced without noticeable loss of energy or holding back, an observation not repeated by the other comparably priced decks.

Conclusion

The Mk II GX-95 builds on the considerable strengths of the original, and earns a strong and unequivocal Recommendation.

TEST RESULTS

Dolby Level reading on deck's meters	-2dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 20kHz
IEC Type II	<20Hz - 22kHz
IEC Type IV	<20Hz - 22kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.05%/0.032%
Wow/Flutter - Peak DIN wtd	0.05%/0.096%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	51dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	56dB
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	54dB
Noise Figure of Merit (Dolby level/noise Type II)	54dB
Line input sensitivity/overload	119mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	660mV/3.9V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.22%
Azimuth check R-L phase at 10kHz	20 degrees
VU indication at IEC 0dB	1dB
Dimensions (wxhxd)	46x15.5x35cm
Average wind/rewind time (C90)	2 min 4 sec
Typical Retail Price	£399



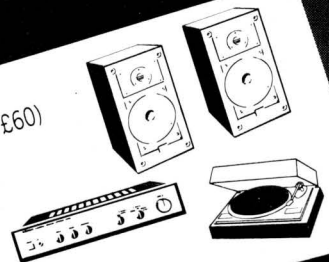


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Rotel RA820AX	289.95	299.95	319.95	339.95	369.95	379.95	419.95
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QED A240CD II	339.95	269.95	359.95	379.95	419.95	439.95	479.95
Yamaha AX330	249.95	349.95	389.95	399.95	429.95	439.95	459.95
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Nad 3225PE	289.95	289.95	309.95	309.95	389.95	379.95	409.95
Nad 3020 i	279.95	329.95	329.95	349.95	369.95	369.95	369.95
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OPTIONS

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- Denon DCD660
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- Marantz CD40
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- Marantz CD50SE
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MINI/MIDI SYSTEMS. Sony, Technics, Kenwood, Yamaha. Special offers on selected models typically from £300-£1000

Denon DRM-510

Recommended

HAYDEN LABORATORIES LTD, HAYDEN HOUSE, CHILTERN HILL,
CHALFONT ST. PETER, BUCKS SL9 9UG. TEL: (0753) 888447



Denon's new budget baby is very much in the style of its predecessors. Headline features include Dolby HX Pro, in addition to the usual Dolby B and C, fine bias adjust and some simple search features. These include a mechanical tape counter, memory stop (independent of the counter) and record return which puts the tape back to the start point of the current recording. Headphone monitoring is available, but only at a fixed volume level.

Some long term nuisances and omissions have been perpetuated in this new model. In the former category is the Dolby switching which forgets its setting every time the deck is switched off. There is also a general criticism to be made of the status indicators and the record level meters which need to be peered at closely to yield any information. The 26dB range bicolour record level meters are adequate in price context, apart from the poor scaling.

Arguably the most important omission is timer standby, which means that the deck cannot be left to record unattended.

Test report

In common with other new Denon models, the DRM-510 has a new, more highly integrated Dolby IC which has an on-board HF skewing network, a circuit that used to be handled externally. Greater stability at high frequencies and a 1-2dB improvement in signal/noise are the claimed benefits.

Not for the first time, Denon has excelled itself with a transport which outperforms most comers, at least in this price area. The weighted wow and flutter figure is little short of remarkable in context, and whilst this aggregate figure conceals a certain amount of flutter energy, the clean peak in the spectrum analysis shows that the deck keeps a basically steady pitch.

The Denon is capable of favourable frequency responses, but seemed some-

what wayward in its alignment to different tapes which underlines the benefits of experimentation with the bias pot. The Type II response is well matched to the characteristics of TDK SA, and the Dolby circuits line up well too. Prerecorded tapes are handled near perfectly from a technical standpoint, but look out for some brightness at normal bias settings with many Type Is and IVs.

Sound quality

The measured brightness turned into an insistent edge with female vocal material or close miked percussion at the standard settings with Type I and (to a lesser extent) Type IV tapes. On the other hand Type IIs, which demonstrated ideal alignment, were tonally neutral, and in any case delivered everything that metals were able to provide. This is not a deck that benefits from the extra dynamic range that metals, with suitable support from the hardware, can provide.

Driving a good Type II, with Dolby B and C alike, the Denon worked very well, with a consistency over a range of music that's unusual at this price level. Nor was there much to choose between Dolby B and C. On the whole, Dolby B sounded a little more open and spacious, but the difference was fairly small and was often safe to ignore.

Recording without noise reduction provided a livelier sound and much better stereo positioning, but wide ranging, dynamic material tended to be rather noise bound during quiet spells, and this option is not really feasible in normal day to day use.

With all these matters taken care of, the Denon proved impressive. Plucked bass had a tactile quality and the requisite fatness without blur or compression, at least compared to other low cost decks, whilst the treble was sharp and clear, with good differentiation of cymbals, massed vocals and so on. Prerecorded

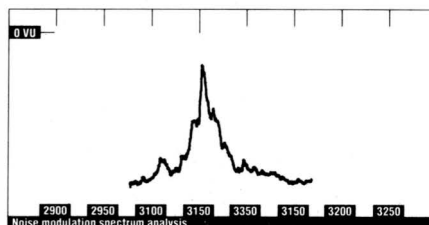
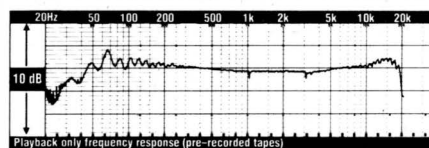
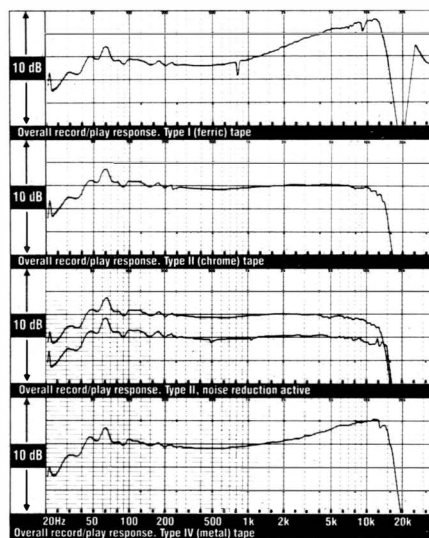
tapes were extremely well exploited by this deck.

Conclusion

Musically ahead of its class, the Denon is a good basic cassette deck, let down only by penny pinching which inhibits usability in a presumed attempt at enhancing Denon's competitiveness. A mandatory Recommendation.

TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	22Hz - 16kHz
IEC Type II	22Hz - 15kHz
IEC Type IV	22Hz - 18kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.10%/0.22%
Wow/Flutter - Peak DIN wtd	0.064%/0.21%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	0.95%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	58dB
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	2.1%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB
Noise Figure of Merit (Dolby level/noise Type II)	1.9%
Line input sensitivity/overload	58dB
Mic input sensitivity/overload	103mV/>13V
Line output for 0dB/maximum	n/a
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	872mV/2.27V
Azimuth check R-L phase at 10kHz	1.0%
VU indication at IEC 0dB	50 degrees
Dimensions (wxhxd)	0dB
Average wind/rewind time (C90)	43.5x12.4x27.5cm
Typical Retail Price	2 min 36 sec
	£140



Denon DRW-750A

HAYDEN LABORATORIES LTD, HAYDEN HOUSE, CHILTERN HILL,
CHALFONT ST. PETER, BUCKS SL9 9UG. TEL: (0753) 888447

Recommended



The 'A' suffix indicates a package deal of improvements which Denon aptly describes as a 'mid-life upgrade', though the measures concerned are comparatively modest. They consist mainly of an improved wrap around cover (still no great shakes) for reduced vibration, a ceramics composite based cassette shell stabiliser and an improved Dolby IC which conjures up an extra dB or so for the signal/noise ratio. There has been one other improvement: electronic switching of Dolby B and C has been replaced by a real switch which remembers how it was set. No more setting Dolby one day and finding it unset the next.

The two transports are unidirectional mechanisms, and only one of them is capable of recording. Rather than have a set of controls for each transport, Denon has fitted just one set, plus a key that assigns them in turn to one transport or the other. This makes for a minimum of controls, but can render operation a little clumsy.

Dolby HX Pro headroom extension is included, alongside Dolby B and C, while bias can be fine tuned to the requirements of individual tape formulations. The memory stop tape counter has an electronic readout of the currently selected transport. A next/last track search device is also fitted.

Dubbing betwixt one transport and t'other can be performed at normal or double speed, and sequential play is also possible. Recording levels are set using short but high resolution bicolour 30dB meters.

Test report

The DRW-750 is not fitted with one of Denon's finest transport mechanisms. The wow and flutter levels will cause little envy among Denon's legion of competitors, whilst the spectrum analysis plot shows some obvious flutter band artefacts. There is at least real consistency

between the two transports, though a proportion of any variation that exists is shown in the numbers as the test tape was recorded using the record capable transport.

There is nothing important wrong with the frequency responses, though alignment to the IEC test tapes is erratic and suggests some rebiasing will often be necessary, and some response modification is apparent under the Dolby B regime too. The LF response shape is well optimised, and compatibility with prerecorded material is of a high order. Note that metal tape offers a somewhat limited signal/noise performance (as usual), but that this cannot be compensated by raising the recording level since the tape is well on the route to saturation even at 0VU.

Sound quality

Barring a certain (and programme dependent) frazzled quality in the extreme treble, this is a pretty good sounding deck. Typical of the prerecorded test tapes, the Tracy Chapman song *Mountains O' Things* sounded close and tactile, with vowel sounds clearly enunciated, though some of the consonants sounded hard or spitty. The maracas were miraculously transported forward in the mix almost to be point where it appeared to be happening inside the outer ear!

The Denon was equally effective as a recorder, though with all tape groups the sound appeared to sail very close to the wind, verging consistently on the brink of sounding edgy, if not actually distorted. The amount of information culled off tape was quite impressive however and the bass end was also of good quality, with adequate depth and tunefulness. Both noise reduction processes worked in more or less comparably unobtrusive ways.

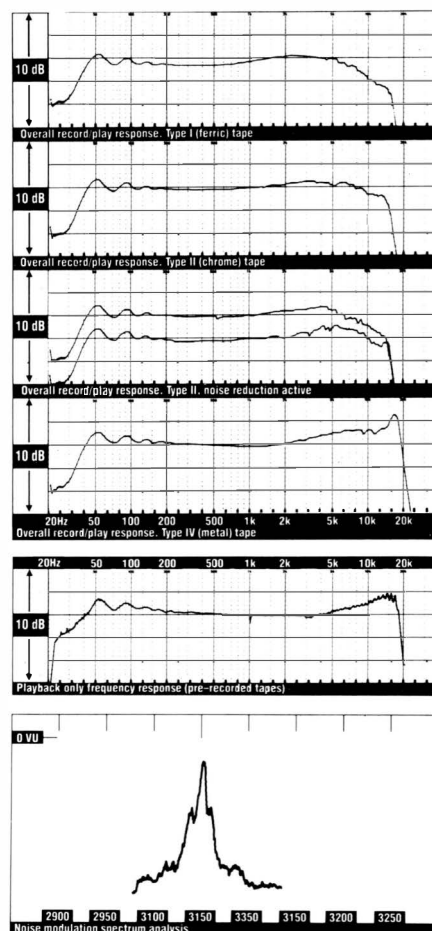
Conclusion

This relatively expensive dual transport model has a conservative specification

which has enabled Denon to do the job properly. You can get still better at this price from a single transport model, but the gap isn't huge, and a Recommendation is in order.

TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	33Hz - 15kHz
IEC Type II	31Hz - 16kHz
IEC Type IV	31Hz - 21kHz
Wow & Flutter - Peak DIN wtd/unweighted	A 0.22%/B 0.29%
	0.24%/A 0.24%/B 0.29%
Wow/Flutter - Peak DIN wtd	A 0.12/B 0.15%/A 0.24% B 0.25%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB 0.75%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	56dB 1.2%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB 2.1%
Noise Figure of Merit (Dolby level/noise Type II)	56dB
Line input sensitivity/overload	99mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	885mV/3.7V
IM distortion 10kHz/1kHz 0dB peak, 1kHz product	0.14%
Azimuth check R-L phase at 10kHz	A=20 degrees, B=30degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43.4x12.5x27.5cm
Average wind/rewind time (C90)	2 min 32 sec
Typical Retail Price	£249



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JVC TD-R431

JVC (UK) LTD, ELDONWALL TRADING ESTATE, 12 PRIESTLEY WAY, STAPLES CORNER, LONDON NW2 7BA. TEL: (081) 450 3282



The TD-R431 is among the most affordable auto-reverse decks on the market. It's a better class of auto-reverse too: an infra-red detector identifies the join between tape and leader, which means that only a second or so of silence interrupts the music when recording over the side break.

The transport is logic operated but rattly when changing modes and noisy in modes other than record and play. Record levels are set using good quality meters with a 30dB operating range, but other indicators are somewhat less legible.

Naturally, Dolby B and C noise reduction circuits are fitted, and so is Dolby HX Pro which helps improve high frequency linearity with low bias tapes. Adjustable bias is available to help tapes for which the standard bias setting doesn't quite work.

Although a headphone socket is fitted, it operates at fixed level only. Timer controlled operation is not possible, an omission all the less welcome given that this is one of the few decks capable of making long duration uninterrupted recordings off air, which is surely one of the best reasons for taking the auto-reverse route in the first place.

The other popular *raison d'être* - dubbing from Compact Discs - is much better supported, to the extent that the TD-R431 includes a facility to automatically set recording levels and then proceed to make recordings from CD, if the CD player in question is a compatible JVC model, that is.

Test report

The hoary old truism about auto-reverse tape mechanisms being inferior to their unidirectional counterparts is given a dusting down and a new airing in this model.

The wow and flutter figures are almost an order of magnitude worse than the best of the unidirectional world (admittedly at much higher prices). The spectrum

analysis shows some severe wow and flutter artefacts, and the area under the curve illustrates graphically how much of this misdirected energy is involved. There is also a significant deterioration when playing in reverse gear - the one you'd have to turn the tape over for with non-auto reverse cassette decks.

The record/replay frequency responses are quite respectable on the whole except that there is a significant overall loss of low frequency output (probably not a bad thing), and the play only response shape is quite sharply dished.

Signal/noise and distortion figures are satisfactory, but the intermodulation test results show that the amplifiers are beginning to go non-linear at high but not - please note - outrageous levels.

Sound quality

It should not be a surprise to find that the story here is not altogether a happy one. The lack of pitch integrity could be heard distinctly, for example, in an uncertainty in the intonation of woodwind instruments and piano. At other times this particular characteristic passed unnoticed, but the same cannot be said of another and ultimately fatal sonic flaw: a severe lack of low level dynamics and instrumental separation.

Fine matters of orchestral detail in complex recordings were heard as though through a thin blanket, with many of the more subtle nuances filtered out at source. Musical expression tended to be flattened, and any real sense of musical articulation and dynamics sounded neutered, an effect which tended to call for increased playback volume levels - always a bad sign.

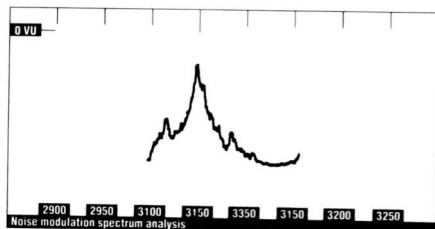
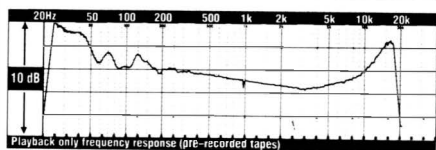
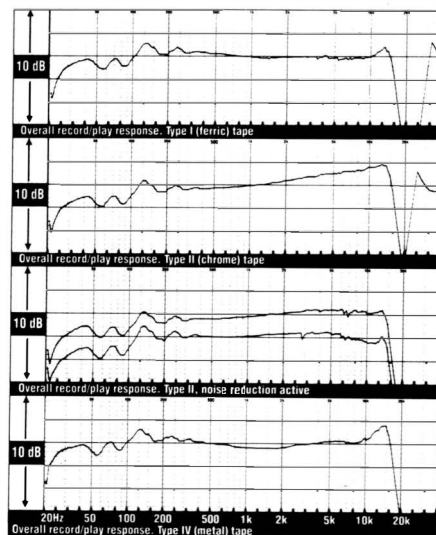
The findings were repeated in a somewhat watered down form with pre-recorded material. 'Weak' is an adjective that appeared more than once in the listening notes.

Conclusion

This model demonstrates once again that the task of auto-reverse transport design is fraught with pitfalls unless a lot of money and effort is thrown at the problem, the bill for which is ultimately reflected in a higher ticket price than the TD-R431 bears.

TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	22Hz - 16kHz
IEC Type II	22Hz - 17kHz
IEC Type IV	22Hz - 18kHz
Wow & Flutter - Peak DIN wtd/unweighted	fwd 0.30%/rev 0.38%/fwd 0.32 % rev 0.46%
Wow/Flutter - Peak DIN wtd	fwd 0.42%/rev 0.50%/rev 0.48%/rev 0.52%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	50.5dB 0.75%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	56.0dB 1.0%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	54dB 0.3%
Noise Figure of Merit (Dolby level/noise Type II)	56dB
Line input sensitivity/overload	156mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	550mV/3.12V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	7.9%
Azimuth check R-L phase at 10kHz	30 (fwd) 60 (rev) degrees
VU indication at IEC 0dB	4dB
Dimensions (wxhxd)	43.5x11.4x28cm
Average wind/rewind time (C90)	2 min 17 sec
Typical Retail Price	£170



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My recommendation must have brought out his impulsive side: he said he'd take it straight away. Later that day he phoned.

"That Yamaha cassette player I bought from you - it's not making a sound. My son's an expert on hi-fi, and he can't hear anything either!"

"I'm very sorry to hear that, sir - are you sure the loudspeakers are properly connected?"

"Well, all I know is that the cassette player isn't working..."

"How about the amplifier - is that properly wired up?"

He sounded confused by my question. I tried another one.

"Sir, you do have an amplifier and speakers, don't you?"

"Er, no - would that make a difference?"

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Jason Moran - Audio T, 173-175 Station Road, Edgware, Middlesex. Tel: 081 952 5535



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JVC TD-V531

JVC (UK) LTD, ELDONWALL TRADING ESTATE, 12 PRIESTLEY WAY, STAPLES CORNER, LONDON NW2 7BA. TEL: (081) 450 3282



A low cost (£260) three head cassette deck, the TD-V531 follows a recent trend towards businesslike designs with a strong commitment to the kind of features that will attract the buyer who puts sound quality first.

The ability to switch between on and off tape feeds at will, for example, exposes most classes of shortcoming in a very obvious way, and most manufacturers take care to ensure it doesn't rebound on them. Two sets of line inputs are provided, one of which bypasses the input balance control. Dolby HX Pro headroom extension circuitry is included alongside Dolby B and C, manually adjustable bias, and peak hold record level meters which cover an adequate 28dB dynamic range.

JVC hasn't gone overboard with convenience features; the counter is a simple electronic rolling number display, but the company has fitted a track search feature which looks for the start of the current or the next track. Unattended recordings are possible.

The JVC front panel makes much of a feature called DDRP, an acronym for dynamics detection recording processor, as I'm sure you all guessed (the garish label on the cassette door peels off). It works in conjunction with JVC brand CD players and sets the record level after scanning the CD for the highest peak levels. The form in which this feature is presented may be unique, but variations of the same idea are available from several other sources.

Test report

The dual capstan transport is a refinement that pays off handsomely with a textbook spectrum analysis plot and some very low numbers from a clearly impressed wow and flutter meter. The frequency responses, however, are less happy, and not fully correctable by merely varying record bias. Type I tapes, the least affected by the response errors, are tilted

up sharply into the treble registering an eventual +3dB peak (referred to 1kHz), and even this understates the true position since output below 1kHz tilts further downwards. Type II and IV tapes show similar errors, with considerable exaggeration through the Dolby circuits - Dolby C especially - as a result of mistracking errors. There are indications that Dolby C may be incorrectly aligned even without taking the response errors into account.

In this context it's also worth knowing that the bias adjust feature has very little overall effect on metal (Type IV) tapes. Other test results, however, are satisfactory, with an ultimate best case signal/noise figure of 61.5dB, measured with metal tapes and for three per cent THD at 400Hz.

Sound quality

Most of the prerecorded test tapes sounded pretty fair, the only counter indication being a somewhat muted and distant sounding midband. Resolution of fine detail was good however, and Dolby tracking appeared good.

Recording quality was dominated by the frequency responses which favoured the treble over the bass. The deck sounded impressively detailed but lacking in bass and lower midband energy which reduced the weight and sapped colour from the tonal renderings of familiar music. That the JVC was able to sustain such errors without sounding edgy, frazzled or distorted is a tribute to its inherent quality under the skin. But this is not enough to turn the tables on a disappointing set of auditioning results.

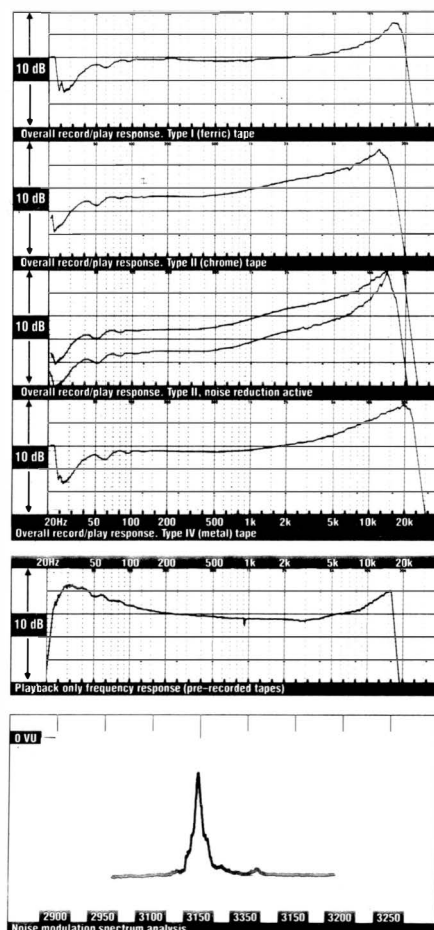
The one thing that does help is to zap tapes with as much bias signal as the bias control can manage. This was enough to restore something like an accurate overall balance, but the JVC still sounded coloured with acoustic material, vocal and instrumental alike.

Conclusion

The lack of clear signposting of the main operating modes can be excused on a budget deck but was unexpected at this level. The real problem here, however, is the tonal balance which is light and bright. The underlying quality appears to be good, but not good enough to excuse the shoddy setting up standards as received.

TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	25Hz - 21kHz
IEC Type II	25Hz - 18kHz
IEC Type IV	25Hz - 23kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.09%/0.12%
Wow/Flutter - Peak DIN wtd	0.07%/0.10%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	46.5dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	50dB
Noise Figure of Merit (Dolby level/noise Type II)	0.50%
Line input sensitivity/overload	n/a
Mic input sensitivity/overload	149mV/>13V
Line output for 0dB/maximum	n/a
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	538mV/3.05V
Azimuth check R-L phase at 10kHz	2.2%
VU indication at IEC 0dB	40 degrees
Dimensions (wxhxd)	-4dB
Average wind/rewind time (C90)	43.5x13.3x28.8cm
Typical Retail Price	2 min 21 sec
	£260



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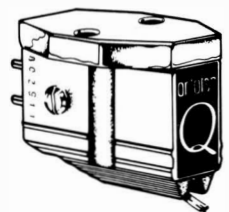
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Kenwood KX-5030

TRIO KENWOOD UK LTD, KENWOOD HOUSE, DWIGHT ROAD, WATFORD, HERTS, WD1 8EB. TEL: (0923) 816444



The KX-5030 is a standard issue two head deck with Dolby B, C, HX Pro and an MPX filter switch. Up to 16 tracks can be skipped in either direction, and an intro search feature allows the first few seconds of each track to be located. Other trick play modes include track or A-B repeat, and a counter zero memory. For reasons not easy to decipher, Kenwood has given some strange titles to some of the features. What do you make of 'index scan' or 'dash and play' for example?

One really noteworthy feature is found in a key labelled 'auto bias' which automatically adjusts the bias setting for a flat frequency response, and, if required, stores one such setting for each tape group (Type I, II and IV) which can then be swapped for the default setting as required. The KX-5030 also allows the display to be switched off, though the tape counter always remains lit.

Styling is attractive in a low key, rather sombre way, but the minor switching may prove daunting to some. The transport controls are somewhat stiff and unresponsive, and the transport is noisy when running. It is only fair to point out, however, that few of these things are surprising or out of line in a £200 design.

Test report

There's little to complain of in the frequency responses, apart from a 2dB rise in the HF with the prerecorded test tape, and a significant reshaping of the treble region in the case of signals processed with Dolby C. The low frequency end of the spectrum is especially cleanly handled with well extended and accurate bass and a bare minimum of ringing due to effects related to head geometry.

Wow and flutter testing gave a pretty fair set of results. The figures are low though not outrageously so, and the spectrum analysis plot was clean, though there are hints of some discrete wow and

flutter artefacts. Ditto for the signal/noise and distortion results, which are on the median line for decks in this price area. The Kenwood KX-5030 then, is a deck that does not yield its secrets easily on the test bench, but it appears to be a mostly competent design, with a question mark over the behaviour of Dolby C.

Sound quality

This deck turned out to be a great success with prerecorded music. Compared to the Aiwa AD-F810, which costs the same and is highly competitive in every other way, the Kenwood is tonally more varied and interesting. It has a warmth and communicativeness that almost left the Aiwa sounding grey and synthetic, though the bright quality noted in the measurement was mirrored by a breathiness to vocals and a false, edgy quality elsewhere.

The Kenwood also worked exceptionally well as a recorder with Dolby B and with Type I and II tapes - the lower bias types. Here the Kenwood demonstrated a tactile and vivid quality that brought the source material close and made listening an engaging and illuminating experience. Pitch stability was not a problem even with the most pitch sensitive material. On the negative side, it was not always easy to tweak the deck (using the bias control) for an accurate tonal representation of the source. This said, metal tapes sounded uneven and lumpy with or without Dolby, and Dolby C processing resulted in the strange internal dynamic and tonal shifts that indicate mistracking. Tonal values were also altered in unpredictable ways and quite a lot of subtle information apparent in other modes of use simply went down the tubes.

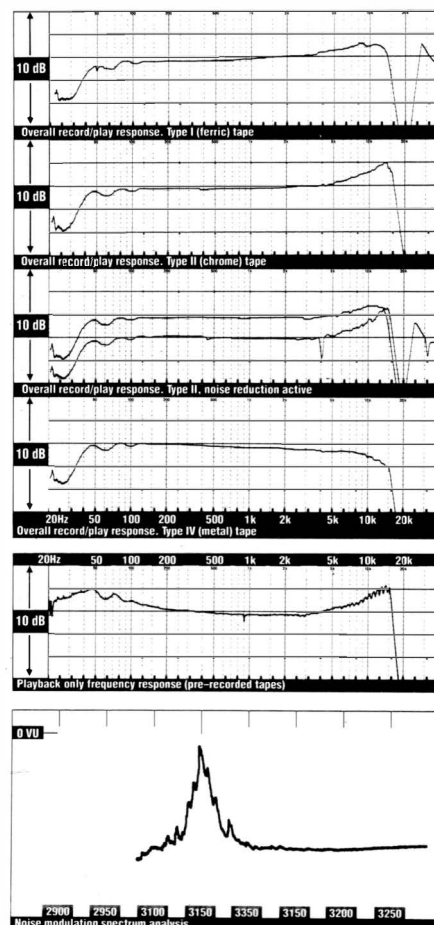
Conclusion

The electronics are basically of good design and are sonically transparent. The

KX-5030 has a number of other points in its favour too, but in the final analysis was marked down due to problems handling metal tapes and Dolby C.

TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	35Hz - 16kHz
IEC Type II	35Hz - 17kHz
IEC Type IV	35Hz - 16kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.09%/0.18%
Wow/Flutter - Peak DIN wtd	0.06%/0.17%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	50.0dB 0.6%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	54.5dB 0.7%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB 1.4%
Noise Figure of Merit (Dolby level/noise Type II)	n/a
Line input sensitivity/overload	120mV/-13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	878mV/4.0V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	1.41%
Azimuth check R-L phase at 10kHz	90 degrees
VU indication at IEC 0dB	+5dB
Dimensions (wxhxd)	44x12.7x27.4cm
Average wind/rewind time (C90)	2 min 8 sec
Typical Retail Price	£200



Kenwood KX-7030

TRIO KENWOOD UK LTD, KENWOOD HOUSE, DWIGHT ROAD, WATFORD, HERTS, WD1 8EB. TEL: (0923) 816444



This design will appeal to the audiophile on a budget. The *KX-7030* features three heads and a closed loop, dual capstan transport, and off tape monitoring is automatically controlled with a manual override as necessary.

Less commonly used gadgets are handled by a row of small but well spaced switches, and include Dolby B/C switching plus Dolby HX Pro, index scan (née intro scan) and A-B repeat. Various similar transport related automatic functions such as dash and play (in which the deck skips past long unrecorded sections of tape on replay), single tune repeat, zero stop, etc are available by appropriate (and inevitably difficult to memorise) combinations of main transport keys. The Kenwood will also skip up to sixteen tracks in either direction.

More interesting still is a half-way house but still extremely useful auto biasing function (there's no equivalent sensitivity adjustment). Only one button press and about fifteen seconds are required for this circuit to set record bias for your tape, another button press memorises the setting for each of the three tape types - ferric, chrome and metal.

The transport section is handled by a well designed and laid out set of transport keys, and is free of solenoid induced clicks, though the deck still feels somewhat clonky changing modes, and tape rewind is not the quietest. Headphone monitoring levels can be adjusted, and timer standby operation is permitted. Although there is no direct remote control facility, data link sockets are fitted for linked system operation with other Kenwood components.

Test report

The dual capstan transport offers a performance standard that is on a par with the better offerings in this price band. Wow and flutter, severally and together, are decently restrained, and the spectrum

analysis looks reasonably clean, though it is not the cleanest. The various frequency responses are well tailored at the low frequency end of the audio frequency band, though each of the tape groups is about 2dB proud at the top end of the passband. Ordinarily this wouldn't matter a great deal because it could be sorted out, at least approximately, by adjusting the fine bias control that most manufacturers thoughtfully provide to cover up the inadequacies of their decks and the cassette tapes themselves. Not so here; the plots shown were produced by the deck after auto-biasing had taken place, no further tweaking is possible.

The noise and distortion numbers are satisfactory, with a full 59.5dB ultimate signal/noise available from metal tapes (three per cent THD, 400Hz) and only half a decibel less, 59dB, with Type II.

Sound quality

The *KX-7030* was a success on audition. The electronics sounded transparent when auditioned with the deck in the 'source monitor' position, and turning to tape made a gratifyingly small difference. Tonal colours were fairly accurate or just perceptibly lightened in most cases, slightly contradicting the measured results.

I was particularly impressed by the Kenwood's performance at the frequency extremes. It sounded taut and clean, with plenty of grip in the bass and an abundance of detail in the treble. Indeed for abundance you could read super-abundance; the Kenwood can sound a little lacking in the organic strengths, it's a little too dry, and the detail seems almost highlighted. It is this which separates it from the best.

The *KX-7030* was good enough to profit from the use of metal tapes, which gave a more positive and solid sound than Type IIs. As so often, Dolby B offered the nearest to an optimum compromise between

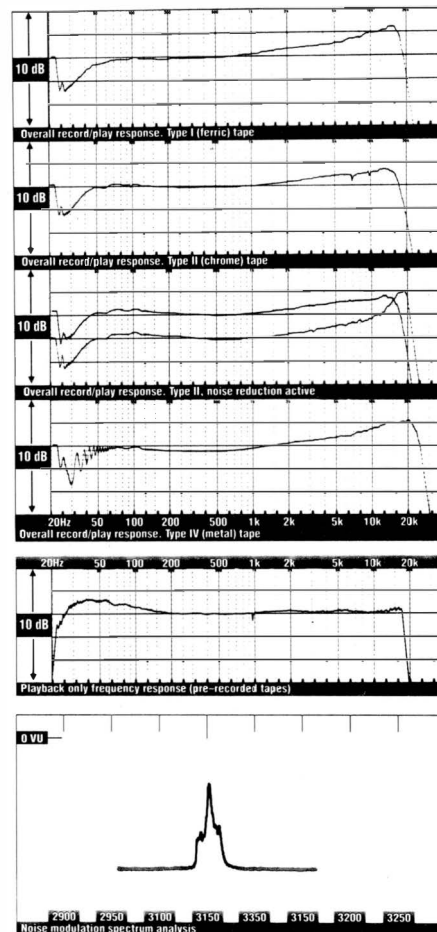
transparency and background hiss with most music, though densely scored material was often satisfactory without noise reduction altogether.

Conclusion

An excellent £260's worth. The Kenwood can sometimes sound almost like a caricature of itself, but its fine stability and clarity carry it through. Recommended.

TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	25Hz - 20kHz
IEC Type II	25Hz - 20kHz
IEC Type IV	25Hz - 24kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.10%/0.15%
Wow/Flutter - Peak DIN wtd	0.06%/0.14%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48dB 0.8%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB 0.8%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	51.5dB 0.65%
Noise Figure of Merit (Dolby level/noise Type II)	n/a
Line input sensitivity/overload	127mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	925mV/4.1V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.32%
Azimuth check R-L phase at 10kHz	0 degrees
VU indication at IEC 0dB	+5dB
Dimensions (wxhxd)	44x12.7x32.4cm
Average wind/rewind time (C90)	1 min 38 sec
Typical Retail Price	£260



Kenwood DX-7030

TRIO KENWOOD UK LTD, KENWOOD HOUSE, DWIGHT ROAD, WATFORD, HERTS, WD1 8EB. TEL: (0923) 816444



The DX-7030 DAT deck is immaculately presented and heavily built in a way that suggests the designer was not out to cut corners or take chances.

There is no long play analogue record mode with this deck, though it will record in LP mode if presented with a digital signal with a 32kHz sampling frequency such as is used for satellite FM broadcasting in Japan. The Kenwood has a full range of editing features including full support for start, skip and end IDs, the ability to erase IDs and record ID codes manually if required. Individual tracks delineated with these ID codes can be selected at random using a numeric keypad on the remote control.

Track skip and audible cueing are also available, which, combined with a highly informative and well laid out display, mean this is a good deck from the tape handling viewpoint. This said, the Kenwood failed to correctly renumber a recording made on another deck which consisted of two separate sets of tracks which had not been numbered continuously.

A front panel selector switches between coaxial, optical or analogue inputs. Outputs of all three types are fitted, along with a headphone socket (with volume control). SCMS coding allows CDs to be dubbed, but marks the tapes that result so that they cannot be subsequently dubbed digitally. A 'through' switch allows the Kenwood to be used as a stand-alone digital convertor, for example in conjunction with a CD transport. Timer support is included.

Test report

The technology is a pot pourri of ideas familiar from other Kenwood products. The transport has six motors (and you wonder why DAT is so expensive), mounted amidstships (the head drum is at the unit's centre of gravity) and is built with an eye to resonance suppression.

Separate quartz crystal oscillators for the three sampling frequencies (32kHz, 44.1kHz, 48kHz) work with Kenwood's DPAC (digital pulse axis control) circuit to minimise clock jitter, a problem exaggerated by the high clock speeds used in 1-bit conversion. The ADC is a PWM design with 64 times oversampling and fourth order noise shaping, whilst the DAC is a 1-bit pulse type with 1,024 times oversampling and third order noise shaping.

The DX-7030 has 15-bit resolution on test and a 105dB effective dynamic range, the linearity curve going off the straight and narrow below -90dB. Electrical noise is held down to -104dB and the other measurements are satisfactory or better, with the exception of de-emphasis which registers 0.35dB adrift at 5kHz.

Sound quality

This deck proved a little disappointing on test. Though no worse than average for a DAT recorder, by Compact Disc standards the Kenwood is a little messy and lacking in clarity, reminiscent of early CD players and well behind most current ones, except, that is, for some of the poorer 1-bit offerings which display similar characteristics. Digital domain recordings of Mozart piano concertos (eg the sparse 2nd movement of No 27 with Andras Schiff and Sandor Vegh) sounded close and dry, with little of the airiness of the original. The solo soprano in a recording featuring Mady Mesplé of Villa-Lobos *Bachiana Brasileira No 5*, (again dubbed digitally) gave her voice an unaccustomed, tight, edgy quality. Recording the same material in the analogue domain detracted further from the clarity of the tapes, though not to any great degree.

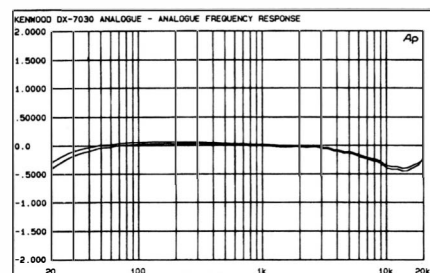
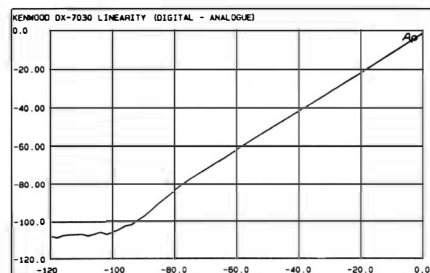
Conclusion

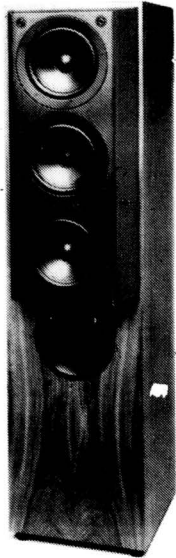
This is Kenwood's standard desktop DAT recorder, and therefore a direct functional equivalent of Sony's DTC-55ES. Kenwood

can normally be relied on to price its wares pretty sharply. The fact that it patently hasn't done so on this occasion doesn't reflect any surfeit of operating facilities or special audiophile build; it simply shows that Kenwood is not in a position to benefit from the economies of scale enjoyed by Sony and perhaps also Aiwa. This is a competent enough DAT recorder, but significantly behind prevailing standards of Compact Disc replay.

TEST RESULTS

Test resolution	15 bits
Output level, dB rel 2V, Source (digital in)	2.06V, 0.22dB, 1kohm
Line input sensitivity/overload	553mV/8.4V
Level meter indication at full level (digital in)	0dB
Effective dynamic range (-70dB thd + N + dither)	105dB
Pure harmonic distortion (a) at full level ref 0dB (20kHz in-band products only)	20Hz 1kHz 20kHz -85dB, -88dB, -90dB
at-70dB encode + dither	0.0056%, 0.00398%, 0.00316%* -33dB or 2.24%
Stereo separation	96dB, 76dB, 48dB
Stereo balance L/R	0.67dB, 0.60dB, 0.58dB *
Frequency response (ref 1kHz) 20Hz - 20kHz +/-0.55dB	
Audible high frequency intermodulation	-92dB or 0.0025%
Audible electrical noise (CCIR, ARM wtd, 1kHz)	-84dB
Audible mechanical noise	low
Ultrasonic noise	-104dB
Deemphasis	+/-0.35dB at 5kHz
White noise overload test	OK
Dimensions (wxhxd)	44x13x37cm
Typical Retail Price	£700
* Tested with analogue in/analogue out unless otherwise stated	
* Balance control @ centre position	





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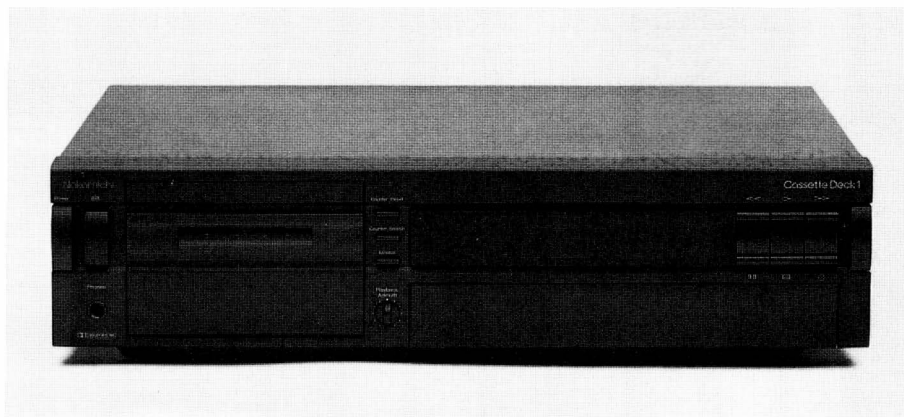
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Nakamichi Cassette Deck 1

NAKAMICHI B&W (UK) LTD, MARLBOROUGH ROAD, CHURCHILL INDUSTRIAL ESTATE, LANCING, WEST SUSSEX. TEL: (0903) 750750



This model is basically a three head variant of *Cassette Deck 2*, somewhat more exotically engineered and similarly more elaborately specified. As always with this marque, the fundamental engineering is hard to fault. It is also an attractive deck, and in most respects it is logically laid out, yet it has a peculiarly archaic quality stemming from the manual tape type selectors (in 1991!) and generally Seventies-ish blend of features. But don't be deceived.

Most of the minor controls are fitted behind a flap, including the manual tape type selectors, a fine bias adjust control, an output level control (why?) and some simple timer and search facilities. The counter is a simple numerical type with an electronic readout which is built into an excellent display whose main feature is a high resolution record level meter. As usual with Nakamichi, although Dolby B and C are included, Dolby HX Pro is not.

Test report

The *Cassette Deck 1* is equipped with a version of Nakamichi's superb diffused resonance dual capstan transport one of whose features (in common with other Nakamichis) is that it lifts the tape pressure pad away from the tape. Unusually, the deck has a discrete three head block. Others use siamesed record/replay head blocks which eliminate any possibility of azimuth drift, but the Nakamichi scheme has the benefit of reducing bias flux leakage into the play head when recording. Making a virtue from a near necessity, Nakamichi also allows replay head azimuth to be adjusted by ear with a front panel control. In this way the best can be had from tapes recorded elsewhere.

Surprisingly, given Nakamichi's reputation, some of the test results look somewhat wayward. True, the ultimate signal/noise (Type IV, three per cent THD,

400Hz) is extremely fine at 63.5dB. But although the spectrum analysis of wow and flutter is exceptionally clean, the actual level of wow and flutter is soundly bettered by some of the competition. The frequency responses also look a little ragged in some cases, and cannot be completely ironed out with the bias control.

Sound quality

This machine gets high marks, yet not entirely without equivocation. The *1* lacks the glitz and glitter of other decks in this area, and can sound positively laid back, with an apparent lack of treble presence and bass weight which came as a surprise. Yet there is an utter consistency about the Nakamichi which can separate singers from their accompanists, or individual performers in a group in a way that knows few peers. The *1* has the most un-hi-fi presentation, even compared to other Nakamichis, yet experience has shown that it can stand its own ground on matters of inherent musical value. It has the ability to display pitch and timing convincingly as well as the quality of separation and analysis, and combine it with the best of cassette or DAT machines for that matter. There are decks around that offer a sharper, cleaner presentation, but the Nakamichi's inherently excellent electronics simply allow greater access to the music.

Prerecorded tapes can be tuned to sound as good as you'll hear them using the azimuth control.

Conclusion

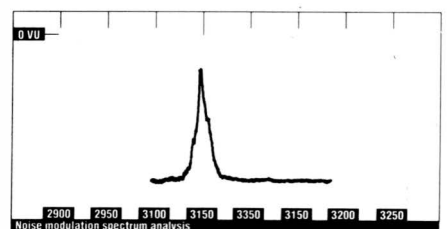
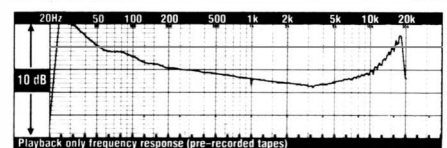
Recommended of course. Perhaps it is the very ordinary appearance of this deck that highlights just what an oddball it is. There can be no sound reason for manual tape switching: Nakamichi's explanation that it avoids the need for a complex

multiway switch ignores mechanical actuation of separate switches which is effectively what happens anyway. The line out level control is as unnecessary as it is unfortunate. All this speaks of a company that is a little too fond of doing things the way it has always done them. And yet...

TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 18kHz
IEC Type II	<20Hz - 14kHz
IEC Type IV	<20Hz - 20kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.09%/0.10%
Wow/Flutter - Peak DIN wtd	0.025%/0.07%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	50.5dB/0.75%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	57dB/0.85%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	54dB/0.45%
Noise Figure of Merit (Dolby level/noise Type II)	n/a
Line input sensitivity/overload	77mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	672mV/5.15V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.44%
Azimuth check R-L phase at 10kHz	50 degrees *
VU indication at IEC 0dB	1dB
Dimensions (wxhxd)	43x11x32 cm
Average wind/rewind time (C90)	2 min 24 sec
Typical Retail Price	£700

* when adjustment is altered -1/2 division clockwise, gives 0 degrees error



AUDIO NOTE AN - SERIES LOUDSPEAKERS

I made a brief mention of the new Audio Note Loudspeakers in last month's letter, this month I shall devote more space to the speakers, as they are a very major development in transducer technology, both sonically and technically.

I spent over 10 years building up the name and reputation of the late Peter Snell designed Snell models. With these we achieved very considerable success due to their outstanding neutral performance, dynamic range etc. They were used as a main tool in the development of the Audio Innovations range of valve amplifiers, and I put considerable credit towards Peter's speakers, for the sonic performance and general insight his speakers allowed us (and still allow us for that matter) during that important stage of development. I think it is fair to say that without speakers of this quality, it would have been very difficult to fully appreciate the genuine breakthrough in sonic performance that the Audio Innovations Audio Amplifiers represented.

The "Open Window" quality that Peter's speakers pioneered, was for me so important that after his very untimely death in September 1984, at the age of 38, we set up a small project to try to understand what made his speaker designs so special. Peter was quite secretive about this himself, and little exists in writing to support any theories that one may have, so the only "documents" available, are the speakers themselves.

When it became clear that Snell were going to stop producing my favorite speakers early in 1990, we speeded this program up considerably. We had already worked out the basics, but where to go from there proved somewhat more difficult. A good contact with a drive unit manufacturer turned out to be more than helpful, with their help we got the opportunity to look at drive units in relation to the other important parameters in the design's "key cabinet" (believe me, there are more keys in there than one can comprehend, despite the seeming simplicity!).

Based on what we had learnt, we respecified the drive units, redesigned the test equipment, changed the design of the cabinet to match the properties of the new improved drive units and, more importantly, developed a revolutionary method by which we can adjust and set the speakers up in a reverberant environment. This last development is the most important, as it not only does away with the traditional test procedures, but tests the speakers, under dynamic conditions, IN THE SAME TYPE OF ENVIRONMENT THAT THEY WILL BE USED IN, and simultaneously produces pairs that are acoustically identical (all pairs are matched to within +/- 0.1db over the full bandwidth, a level of consistency which is unheard of in the audio industry).

What does this mean in reality?

I shall try to explain.

For a stereo pair of speakers to be able to reproduce performers in a free three dimensional space they must have as closely as possible the same acoustic power and frequency response. If they do not, any difference in amplitude (loudness) or frequency (speed) between the speakers will make a change in amplitude or frequency by a performer or instrument result in a shift in position of the instrument or performer in question, plus a change in their character (timbre). The speakers will therefore not be able to reproduce neither correct stereo imagery or soundstaging, nor will they reproduce the instruments with their correct individual character.

It is a little difficult to justify labelling such speakers hifi!

One thing is certain, however, and that is that Audio Note speakers are the most accurate transducers available today, when viewed by these criteria.

Which brings me to an aspect of hifi (and other expensive consumer goods as well) that are little considered today, timelessness and longevity.

Since everything in modern society advances so quickly, or so we are led to believe, there should be little or no reason, not to mention possibility, to build properties like timelessness into any product. A small historic overview is therefore useful. Let us look at some products that have survived time and new developments well and see what conclusions can be drawn from these.

The Snell Type A was first introduced in 1976 and remains to this day a sought after and relatively expensive speaker, the original Type K, J/II and E/II were introduced in 1982 and have been selling well here until a very short time ago. Similarly valve amplifiers like the Marantz 8, a Fischer SA-1000, a Leak Stereo 20 or a Leak TL10/12 are all highly sought after and priced accordingly. The lesson that can be learnt from this is interesting when you consider that very few components in hifi have a "useful" life of more than a couple or three years, before they are replaced. Try to think of a transistor amplifier of 10-15 years vintage, do you think that would be worth anything today? No.? Then why not, when a valve amplifier that is 25-30 years old is still valuable?

In my view the explanation is that any short term "trends" that a product "has" to adhere to are to the detriment of its longer term validity. As it appears to lead to products that are designed to comply with the "flavour of the month" technical parameter and not a more balanced approach.

The old Snells and the old valve amplifiers are a case in point, the fact that there are people (and quite a lot of them as well) who are willing to pay good money for products that are so old, is an indication that this selected band of products have some qualities that have remained desirable despite time and the onslaught of more and more "new technology".

In stark contrast to this is the fact that all the products that were new technology 10 years ago are themselves today virtually worthless, and the contrast between valve and transistor amplifiers is very interesting here, since transistors are known for their "longer" life, it begs the question in what way manufacturers of transistor amplifiers justify the fact that their products have such remarkably poor performance on the secondhand market, when the technology itself promises longer life and better performance, both of which seem strongly contradicted by the market itself when seen over a decade or so. Interesting is it not? I could go on and on and I shall....

NEXT MONTH!

Peter Qvortrup

Audio Note Co. 0273 821371. Brighton

Pioneer CT-676

PIONEER HIGH FIDELITY (GB) LTD, FIELD WAY, GREENFORD, MIDDLESEX UB6 8UZ. TEL: (081) 575 5757



This model is the least expensive of the Pioneer newcomers covered in this issue, but it bears a striking resemblance to others in the range, as Pioneer has settled on something approaching a standard facia design, which includes a powered loading door that is fully integrated into the deck's electronics and an illuminated cassette well to match. Transport modes are engaged by gear and cam and so do their thing in almost complete silence.

The CT-676 is equipped with Super Auto BLE, a system which at the press of a button adjusts the level of bias, record sensitivity (to ensure proper Dolby replay tracking) and equalisation. This all happens to the accompaniment of some garish but informative graphic displays, the whole process taking about 12 seconds, including the time taken to rewind to the start point.

The record level meters are dual range as usual with Pioneer, but even in the wide range setting coverage is only 28dB. Pioneer would have been better off using single range meters of improved performance, but the remaining features are not so readily amenable to facile criticism. The tape counter reads in rolling numbers or elapsed time. There is no memory stop feature, but tracks up to fifteen away in either direction can be located directly, with a status display to show progress. Tape source/monitor switching is automatic with the usual manual override.

Test report

The transport is based on Pioneer's Reference Master Mechanism, a grand sounding title for a single capstan mechanism which performs in an interestingly disappointing manner. Basic weighted wow and flutter - the headline figure if you like - is perfectly satisfactory at 0.09 per cent, but flutter is at an unusually high level. This is perfectly illustrated in the spectrum analysis by a number of widely distributed flutter artefacts surrounding a

single, sharp peak indicating a lack of low rate pitch variations.

The record/replay frequency responses are all very accurately calibrated with good treble and excellent bass behaviour. The roughness in the treble area on several of the plots, however, is not an artefact: several runs had to be made with most of these tapes to achieve even these results. Tape to head contact is at best uncertain, and this may be related to the high measured flutter levels.

Signal/noise and distortion figures were about right for the price, 60.5dB was measured with metal tapes for three per cent THD, this representing the effective gap between bias noise and tape saturation at 400Hz.

Sound quality

In a word, poor. The first piece of music used to get a general idea of the Pioneer's capabilities was a Mozart concerto recording (featuring Gervase de Payer). The CT-676 lost any real sense of the layering of different string parts and homogenised the sound in such a way that it became hard to believe that it was being produced by a number of fiddle players in unison.

There was also some dulling of tone which was not apparent in the frequency response traces, and the clarinet had a cracked tone when playing loud, with odd, splashy echoes from the opposite side of the soundstage. This was despite the fact that on this run recording levels were not allowed to peak over 0VU with chrome tape.

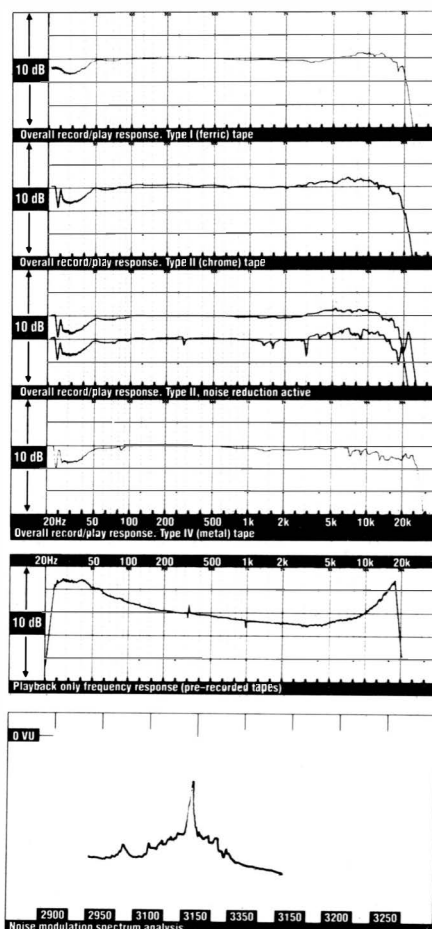
Metal tapes did little to help, though they generally sounded a little livelier, and noise was not an issue. Any added lack of transparency with Dolby B or C, if it existed, went unnoticed. The degree of perceived compression increased rapidly at highish recording levels, though again well before the onset of any obvious distortion.

Conclusion

The poor noise figure may give a clue to a deck that appears to have everything in its favour, yet which when examined critically simply fails to deliver the goods. The lack of dynamics and low level resolution are the most objectionable shortcomings.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 21kHz
IEC Type II	<20Hz - 21kHz
IEC Type IV	<20Hz - 24kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.09%/0.35%
Wow/Flutter - Peak DIN wtd	0.06%/0.25%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	47.5dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	50.5dB
Noise Figure of Merit (Dolby level/noise Type II)	55.0dB
Line input sensitivity/overload	106mV/>13V
Microinput sensitivity/overload	n/a
Line output for 0dB/maximum	545mV/2.12V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	1.77%
Azimuth check R-L phase at 10kHz	25degrees
VU indication at IEC 0dB	3dB
Dimensions (wxhxd)	42x13.1x32.3cm
Average wind/rewind time (C90)	2 min 25sec
Typical Retail Price	£249



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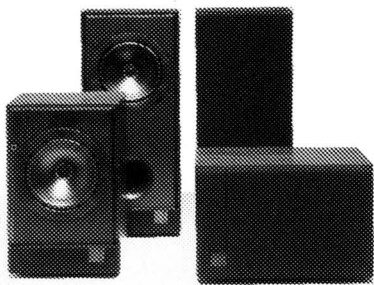


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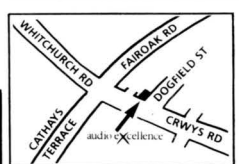
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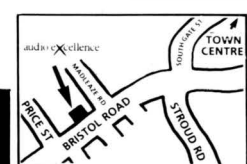
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Pioneer CT-900S

PIONEER HIGH FIDELITY (GB) LTD, FIELD WAY, GREENFORD, MIDDLESEX UB6 8UZ. TEL: (081) 575 5757



This is a stripped down version of the '93 and is much more attractively priced, mainly omitting features you'll probably figure you can manage without. Set the two side by side and you'll see that the control layout is remarkably similar, and indeed the similarity is just as marked under the skin.

Starting with the basics, this is, of course, a three head deck with off-tape monitoring, an auto tape alignment routine called Super BLE - no not an invariably fatal disease ending up in a hamburger near you, but a circuit that adjusts bias, level (sensitivity) and equalisation. The piece de resistance, however, is the inclusion of Dolby S.

Dig a little deeper and the differences between the two top end Pioneers start to make themselves felt. The BLE circuit is a simplified one that doesn't allow bias to be adjusted manually, a facility that proved useful on the '93 in helping to solve a slight EHF dullness. The tape counter features a time mode, but not time remaining, a much more useful facility. Dolby HX Pro is fitted of course, but cannot be defeated as it can on the senior model and there is no second 'straight line' input. Internally, the 900 remains superbly built, using excellent components, but the acres of copper plate from the CT-93 are missing, as is some of the screening around specific areas.

Test report

Both the transport and the heads are slightly downgraded from the CT-93, and the input signal routing is a little less direct, saving the cost of a long remote control switch. But the deck still achieves a high standard overall as is shown by the lab test results.

Wow and flutter is extremely fine, whilst not quite achieving the standards set by the CT-93. The spectrum analysis shows a single sharp 3150Hz peak and a low level of smooth distributed flutter

sidebands - an excellent result.

The signal/noise figures show a similar but much exaggerated trend, noise levels in particular being dramatically higher. The 51.5dB figure leaves a lot of headroom available to be exploited, but compares to a 61dB figure from the CT-93 when measured on the same basis - and incidentally, with the same tape sample. Perhaps the most representative figure, is the 61.5dB (cf. the CT-93's 65.5dB) for signal/noise ref three per cent THD (400Hz) with metal tapes. The equivalent figure with Type II tapes are 58.5(61)dB. The various record/replay responses, however, were extremely flat, with a gentle rolloff in each case around about 15kHz and a very smooth bass, largely free of head contour effects.

Sound quality

If we were judging by the internal hardware, this deck should have performed within a hair's breadth of the CT-93, but in the event it was not to be. It is true that specific areas of the deck were very good. There was never any doubt about the quality of the transport with any of the music used on test, and the Dolby S circuit generally sounded fine in the sense that tape noise on the eventual recording was negligible.

The system provided the usual benefits, including a cleaning up of textures, especially at lower frequencies, and a more stable, dynamic overall presentation. But this was in a direct comparison with Dolby C in particular, and must be set against a backdrop of compression and muddle compared to other good decks, the CT-93 included.

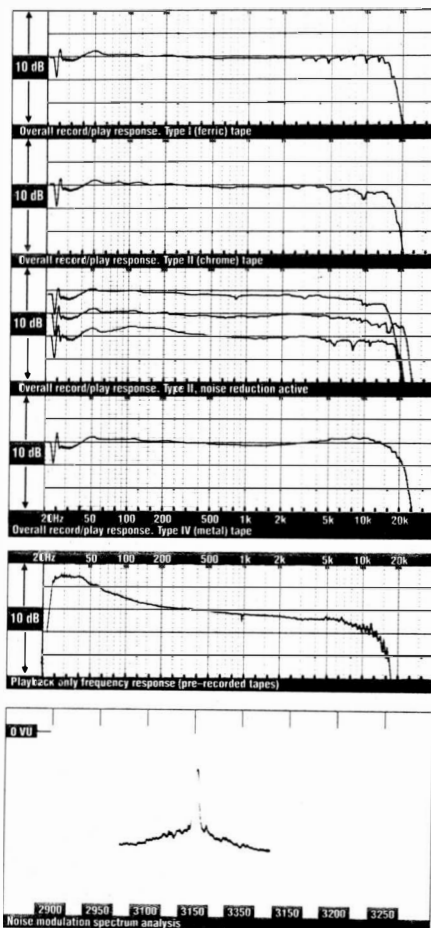
The Pioneer was at its best with simple material - Mary Black's voice and generally sparse accompaniments reproduced with poise and control, but material with any great density sounded flabby and lacking in clarity at both ends of the operating dynamic range.

Conclusion

This deck has some good features, Dolby S is seen to be a very powerful tool for reducing tape hiss and reducing some other tape related problems such as modulation noise. Tape handling is also highly accomplished. The electronics appear to be good too, but the measured flutter problem has turned into a range of ills, including audible compression, and a compressed, cluttered soundstage.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz A	
IEC Type I	<20Hz - 17kHz
IEC Type II	<20Hz - 18kHz
IEC Type IV	<20Hz - 21kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.06%/0.08%
Wow/Flutter - Peak DIN wtd	0.04%/0.07%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	49.5dB 0.65%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	54dB 0.50%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	51.5dB 0.42%
Noise Figure of Merit (Dolby level/noise Type II)	57dB
Line input sensitivity/overload	94mV/13V
put sensitivity/overload	n/a
Line output for 0dB/maximum	535mV/4.32V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.14%
Azimuth check R-L phase at 10kHz	25 degrees
VU indication at IEC 0dB	4dB
Dimensions (wxhxd)	42x13.5x37cm
Average wind/rewind time (C90)	1 min 40sec
Typical Retail Price	£499



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Pioneer CT-93

PIONEER HIGH FIDELITY (GB) LTD, FIELD WAY, GREENFORD, MIDDLESEX UB6 8UZ. TEL: (081) 575 5757

Recommended



Following the leader - Harman/Kardon - by a few months, Pioneer has been quick to throw its hat in the ring with a Dolby S equipped deck, supplemented here by Dolby B, C and HX Pro (switchable).

A three head deck with off tape monitoring, one of the CT-93's refinements is an improved tape alignment circuit called Super Auto BLE. SABLE (no less!) employs three calibration frequencies to align bias, EQ and sensitivity. The 15kHz point is adjusted to one of about 130 steps using a motor driven rotary bias control which can also be used manually.

Tape search aids include track search (+/-15 tracks), a multifunction real-time tape counter with zero return, repeat play and auto replay after recording. The meter has switchable resolution (a standard Pioneer facility), and can also be doused to reduce internal RF noise. Tape synchronisation is available for use with Pioneer CD players, and a 'straight line' input bypasses the balance control. It is almost redundant to say that the CT-93 feels like a Rolls Royce and drives like a BMW - motorised door and all.

Test report

Beneath the lid is what can only be described as a work of art, with masses of copper screening, and even a shrouded mains transformer. The transport boasts a diffused resonance dual capstan mechanism and a pressure pad lifter to reduce modulation noise. The cassette shell is clamped, and motor noise is carefully excised from the tape platform. Hermetic sealing around the door inhibits acoustic feedback.

Pioneer claims a first with micro-processor control over the reel (not just capstan) motors to keep the torque applied to the tape constant as the amount of tape wound on the hub varies. The spectrum analysis is utterly clean, and wow and flutter figures are state of the art.

Operating dynamic range even with-

out Dolby S is significantly ahead of any of the other decks tested. The best measured figure was the 65dB provided by the Type IV test tape (three per cent THD, 400kHz). The frequency response tests yielded impressively straight lines, with the transfer characteristic for Dolby S as accurate as for the other noise reduction circuits. A 2dB HF rise was measured with the prerecorded test tape, however.

Sound quality

Pioneer quotes 24dB signal/noise reduction with Dolby S, which is little more than Dolby B. But 'S' processing cannot be summed up in a single figure of merit. It does more than just reduce noise.

At high levels, it can be difficult to distinguish Dolby S from C, but at lower levels they diverge, Dolby C into its homogenised mode, whilst Dolby S retains focus and separation way down towards the noise floor.

It became possible to listen to complex but quiet musical passages without raising the volume and without any suggestion of cassette style waffle. Yet there was never any danger that Dolby S would equal the source in this respect. The original was always tauter, whilst ambience had a more spacious feel. Dolby S spoiled or muddled many ambient cues, but it was preferable to Dolby B or C.

'Brightly lit' is the phrase from the listening notes that best characterises pre-recorded tapes. There was masses of coherently presented detail and good stereo to match, but the balance was too explicit and favoured the treble too much to be wholly credible.

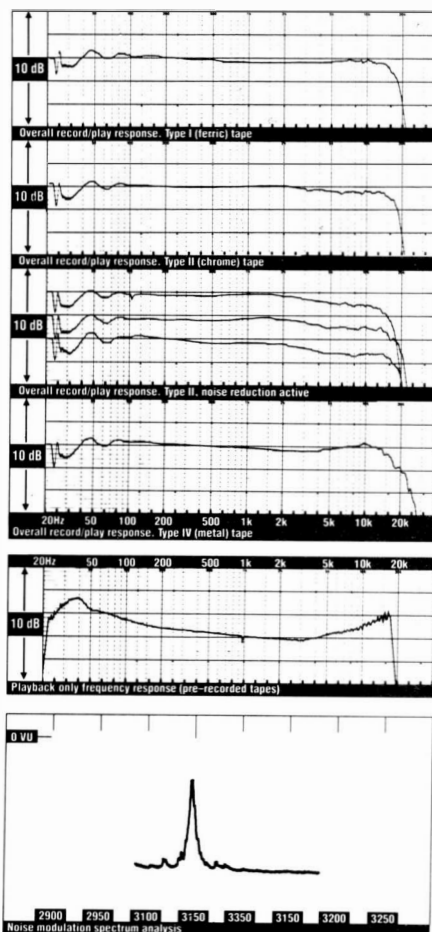
Conclusion

Easily the most successful Dolby S implementation to date, the CT-93 is an accomplished successor to the CT-91. This is a product of which Pioneer can be truly proud. Even leaving aside the Dolby S facility I would buy it just to make the

best use of modern tapes without noise reduction. The available dynamic range is wide enough to make this feasible, and the deck is engineered well enough to make the idea worthwhile. Unreservedly Recommended.

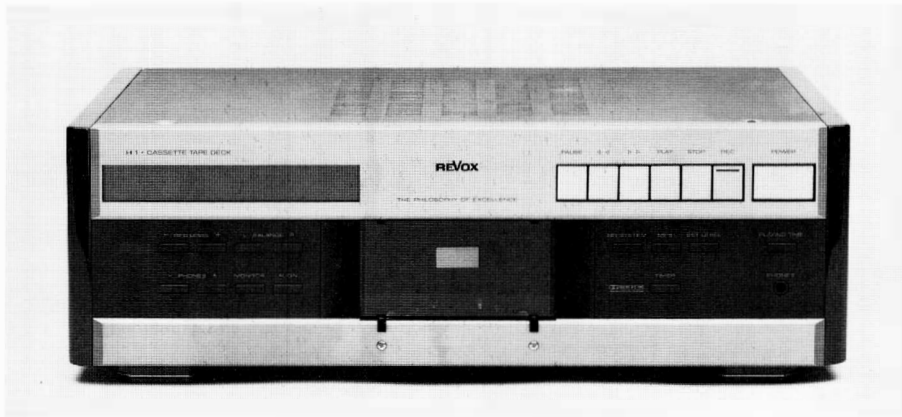
TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 19kHz
IEC Type II	<20Hz - 19kHz
IEC Type IV	<20Hz - 21kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.52%/0.08%
Wow/Flutter - Peak DIN wtd	0.05%/0.065%
Type I signal/noise CCIR/ARM 400Hz & distortion OVU	50.5dB 0.45%
Type II signal/noise CCIR/ARM 400Hz & distortion OVU	57.0dB 1.1%
Type IV signal/noise CCIR/ARM 400Hz & distortion OVU	61.0dB 1.4%
Noise Figure of Merit (Dolby level/noise Type II)	60.0dB
Line input sensitivity/overload	96mV/>13V
Mic input sensitivity/overload	n/A
Line output for 0dB/maximum	530mV/4.45V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.18%
Azimuth check R-L phase at 10kHz	45 degrees
VU indication at IEC 0dB	4dB
Dimensions (wxhxd)	45.7x13.6x37cm
Average wind/rewind time (C90)	1 min 43 sec
Typical Retail Price	£799



Revox H1

REVOX UK LTD, 1 BERKSHIRE BUSINESS CENTRE, ENTERPRISE WAY, THATCHAM, BERKSHIRE RG13 4NA. TEL: (0635) 76969



The H1 costs a cool £1,145 in the black finish (it's £1,203 in titanium) and has very similar main features to the B215, namely three heads and full off tape monitoring, full automatic tape alignment and a semi-automatic record level setting feature. The tape alignment procedure involves selecting 'record/pause' followed by 'align'; the tape rewinds to its start point when its done. It will store up to two separate alignments for Type I and II tapes - a simplified version of a feature found also on the B215. The record level setting adjustment, which astonishingly hasn't been taken up elsewhere, simply involves holding down a 'Set Level' key whilst playing an appropriately loud section of the source. Full manual setting is, of course, available using wide ranging, high-resolution meters.

A time counter is available, and headphone monitoring levels can be adjusted. A serial data link is fitted for Revox multi-room systems, and timer operation is supported. Changes from the B215 are principally related to items like MPX switching (deleted) and the record level meters (now a simpler fluorescent display) and the omission of features aimed at the more creative user: time and address searches, loop repeat, automatically controlled fades etc.

Test report

The mechanics of the transport are almost faultless, and the wow and flutter figures even make the Pioneer CT-93 look unstable, which is like having a car that makes a *Testarossa* look slow. A twin capstan, three motor transport with enormous flywheels irons out irregularities.

There is no loading door: you simply clip the tape in manually, and optionally mount the cover supplied. The flaws with this approach are that the heads are vulnerable if the cover is left off, and that mechanical transport noise is not as well

baffled as it would be by a conventional door mechanism. The transport is pretty quiet, but a gentle 'sh' noise can be heard up to a foot or two away.

Technically, the tape set-up routine produces errors consistent with mild underbiasing, but the magnitude of the errors is small, and the main part of the audio frequency band can be contained in a 1dB envelope at worst - not the best measured, but scarcely disastersville. Pre-recorded material is highly compatible as measured. The level of IM distortion measured is not insignificant, however, and the overall signal/noise results are uninspiring. Note in particular the best case Type IV three per cent THD figure of 59.5dB measured at 400Hz. The Pioneer CT-93 measured 65dB under the same conditions.

Sound quality

With a mild but engaging (European?) softness that contrasts with the diamond like glare of some Japanese cassette decks, the H1 sounds unobtrusively excellent. The test pre-recorded tapes were reproduced with elan but without false emphasis, and recordings created a similar picture.

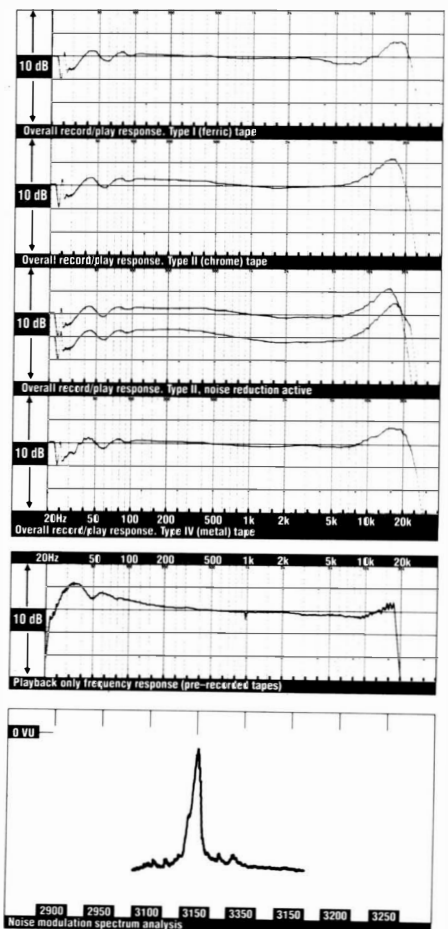
Type II and IV tapes were almost equally suitable for this deck, the slight softness noted probably preventing metal tapes showing any real advantage. In either case, the strength of the recordings made on the Revox was their superb midband, a combination of clarity and stereo focus which, with a good system, scarcely detracted from the three-dimensional imagery of the source. There was a suggestion of a lack of grip in the extreme bass, though bass depth and weight were way above average. With some material the slight rise in the extreme treble was also noticeable as a slightly heightened sense of fine detail and an occasional skewing of the soundstage towards the listener.

Conclusion

Too expensive for a formal recommendation with decks like the CT-93 available at little over two-thirds the price, the Revox remains a thoroughbred addition to any Revox set-up, and is more than good enough to be considered for other high grade systems.

TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 22kHz
IEC Type II	<20Hz - 22kHz
IEC Type IV	<20Hz - 22kHz
Wow & Flutter <Peak DIN wtd/unweighted	0.36%/0.07%
Wow/Flutter - Peak DIN wtd	0.024%/0.07%
Type I signal/noise CCIR/ARM 400Hz & distortion OVU	49.5dB
Type II signal/noise CCIR/ARM 400Hz & distortion OVU	54.5dB
Type IV signal/noise CCIR/ARM 400Hz & distortion OVU	53dB
Noise Figure of Merit (Dolby level/noise Type II)	0.75%
Line input sensitivity/overload	n/a
Mic input sensitivity/overload	55mV/2.68V
Line output for 0dB/maximum	n/a
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	890mV/5.05V
Azimuth check R-L phase at 10kHz	1.6%
VU indication at IEC 0dB	20 degrees
Dimensions (wxhxd)	2dB
Average wind/rewind time (C90)	45x15.3x33.2cm
Typical Retail Price	1 min 3 sec
	£1,145



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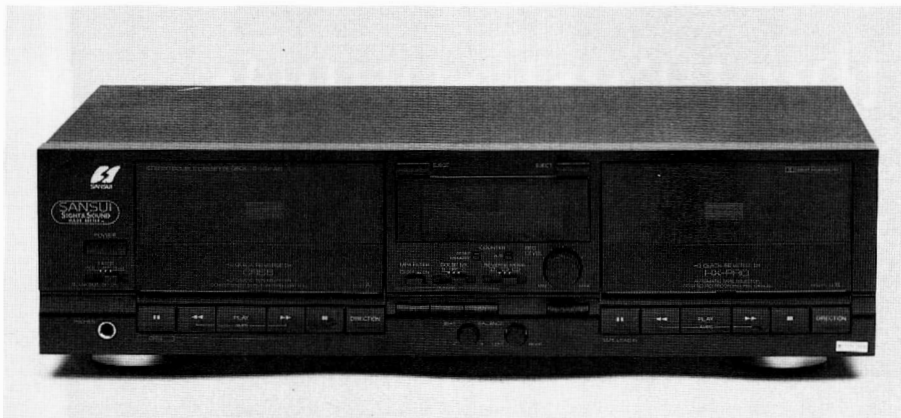
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Sansui D-X311WR

SANSUI UK, 93/95 GLOUCESTER PLACE, LONDON
W1P 3PG. TEL: (071) 487 4844



The Sansui D-X311WR is an altogether different animal from the more conservatively designed and similarly priced Denon DRW-750A. Although it too has only one transport capable of recording, both transports are equipped for full auto reverse operation with an optical end of side changeover to eliminate most of the waiting time for recordings that span the side break.

Normal or double speed dubs are initiated by the press of a button which will result in both sides of the tape being copied, if desired. An 'edit' key enables individual tracks or other specified selections from the source tape to be dubbed. There are some cute additional features too. The recording transport, for example, can be made to skip the leader in one operation. If in the past you felt you could live without such things, here's the chance to prove yourself wrong.

Dolby B, C and Dolby HX Pro are included in this package, and bias can be fine adjusted. The Sansui also includes a powerful tape search routine which will look up to 16 tracks forwards or backwards and resume play from that point. The recording transport also has a cue/review feature, which means the Sansui is unusually well equipped for exploring tapes.

A counter zero memory stop can also be used to locate specific points on tape. This works with both transports, as does the single electronic tape counter which will monitor either transport depending on the status of an A/B switch provided for the purpose. The record level meters are short and fairly low in resolution, though coverage is perfectly adequate at 28dB, and the dual colour operation makes them easy to read.

Test report

The Sansui is well adapted to the role of playing prerecorded material, and is accurately calibrated as it stands for metal

(Type IV) tapes. Type I and II test tapes both showed a 2dB HF rise which can be largely solved by fine tuning the bias level. What is not so readily amenable to adjustment however is the Dolby C circuit which introduces some significant response aberrations into the picture, especially in the area covered by the Dolby anti-saturation network. Low frequency roll-on also starts a little early.

Transport integrity is not the Sansui's strong suit. The raw weighted wow and flutter figure is high at 0.24 per cent and 0.28 per cent for the forward and reverse directions, and flutter energy is also high. Note the 0.55 per cent unweighted figure for the reverse direction: the degree of forward/reverse inconsistency is worrying. Noise and THD figures however are satisfactory, but the 20 per cent (!) IM figure (10/11kHz 0dB peak, 1kHz product) is extremely high.

Sound quality

Tested first with prerecorded vocal-cum-acoustic material (Tracy Chapman, Suzanne Vega), the Sansui sounded a little distant and soft, though surprisingly tidy and well controlled, especially at high frequencies, and this set the pattern for what was to follow. It generally managed to cough up an enjoyable earful, but at the expense of clarity and detail, and with some material also at the expense of audible wow. Piano transients sounded blurred and image depth seemed an invariable part of the sound, rather than being created by the music only when it was part of the music in the first place.

Curiously, and no ready explanation suggests itself to account for this final observation, sound quality was slightly clearer and sharper with Dolby C than Dolby B.

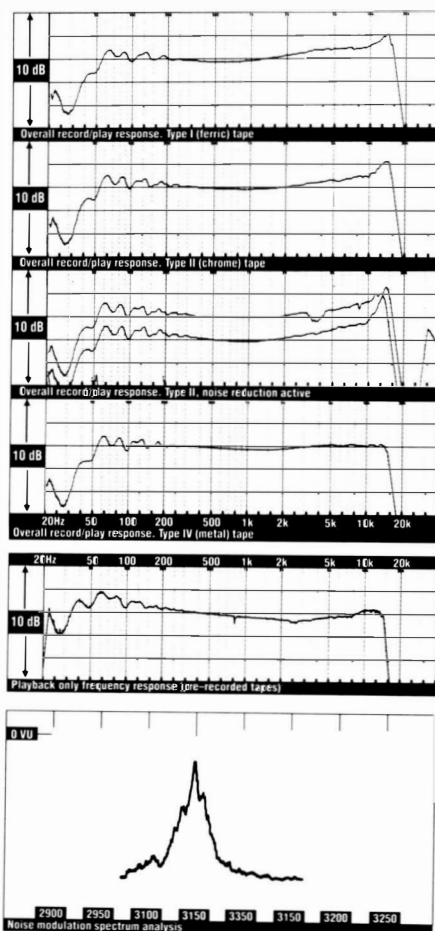
Conclusion

The problem with this deck is obvious: the resources available have been spread

too thinly. Something had to suffer, and in this case it is transport integrity.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	35Hz - 18kHz
IEC Type II	35Hz - 18kHz
IEC Type IV	35Hz - 16kHz
Wow & Flutter - Peak DIN wtd/unweighted	fwd 0.24% rev 0.28%/fwd 0.32% rev 0.55%
Wow/Flutter - Peak DIN wtd	fwd 0.09% rev 0.11%/fwd 0.25% rev 0.27%
Type I signal/noise CCIR/ARM 400Hz	49.5dB
& distortion 0VU	0.8%
Type II signal/noise CCIR/ARM 400Hz	54dB
& distortion 0VU	0.75%
Type IV signal/noise CCIR/ARM 400Hz	52.5dB
& distortion 0VU	1.0%
Noise Figure of Merit (Dolby level/noise Type II)	57dB
Line input sensitivity/overload	109mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	577mV/3.0V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	20%
Azimuth check R-L phase at 10kHz	A=fwd 20 rev 0 degrees/B=fwd 80 rev 90 degrees
VU indication at IEC 0dB	+3dB
Dimensions (wxhxd)	43x12.5x27cm
Average wind/rewind time (C90)	2 min 3 sec
Typical Retail Price	£250



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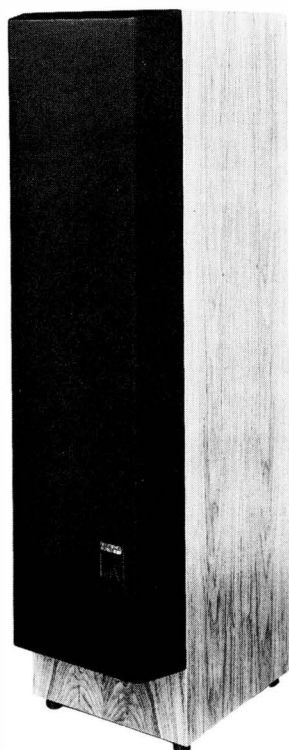
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The TC-K570 was conceived for those who take sound quality seriously but don't wish to commit both an arm *and* a leg to the acquisition of a seriously decent cassette deck.

First and foremost, this is a three head deck with the ability to monitor off tape whilst recording. Minor refinements include a motorised door mechanism with a cassette shell clamp. The transport engages quietly, a contrast with the clanky sound effects Sony built into previous ranges. The goody count extends to a time counter with memory stop and track search as the main search aids, and even an illuminated cassette well.

Dolby B and C noise reduction are switched by a natty rotary switch, and HX Pro processing is also included. Other features of note include an MPX filter switch and manual bias adjust. Tape/source monitor selection is manual, which is a mild annoyance. Finally, there is a three position switch which changes the display (which normally fields excellent 38dB record level meters with peak hold LEDs) to show the tape counter only, or nothing at all, a feature which serves aesthetic ends aside from any musical changes it implies.

Test report

Here is one of the very few three-head decks which does not also have a dual capstan transport, two items that normally fit together as close as a horse and carriage. Nevertheless the wow and flutter figures are good, though what looks as though it may be capstan wow can be seen in the spectrum plot.

Signal/noise is, if anything, a little better suppressed than usual, and harmonic distortion due to tape overload is held well in check, allowing peak levels of +7VU (three per cent THD, 400Hz) with metal tapes, though the +3dB figure for Type II tapes is unexceptional. Note also the high level of 0VU intermodulation

distortion with the applied 10 and 11kHz test signals, which is a sign that the record chain is becoming seriously non-linear at this point.

Sound quality

Sound quality of prerecorded material varied somewhat from tape to tape, presumably reflecting differences in azimuth, but at best was extremely good, with a naturally layered and extremely expressive style of delivery with free ranging dynamics and excellent control.

In other cases, the sound became grey and flat - but that's cassette for you. The inherent quality of the Sony shows the limitations of the medium all too effectively.

The CD direct input is connected directly to the Dolby noise reduction processor IC, bypassing the input buffer amp and MPX filter input level control, and this is the input to use. It is palpably more transparent and dynamic sounding, but even so the bass and midband have a sinewy quality, a heaviness or lack of airiness (as you prefer) which detracted from the source.

At the other end of the frequency band, it proved difficult to find tapes that exactly fitted the Sony's characteristics - and this includes Sony's own tapes. Rebiasing to correct the loss of mid/top presence always bought a dullness to the extreme treble. Although none of the effects described here are particularly severe, they are enough to cause some misgivings.

Conclusion

This model is a genuine pleasure to use, with an operating feel typical of decks costing rather more. This aspect is only let down by manual tape/source monitor switching.

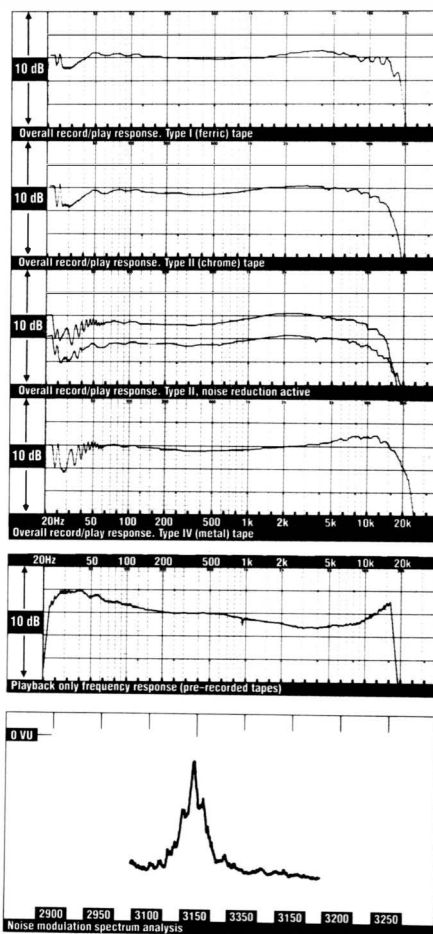
Notwithstanding the shortcomings uncovered on test, it would be bizarre not to recognise its very real virtues, or to fail to take into account the low price and

Recommended

excellent features count - headlined by off tape monitoring of course. Recommended.

TEST RESULTS

Dolby Level reading on deck's meters	-2dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 18kHz
IEC Type II	<20Hz - 16kHz
IEC Type IV	<20Hz - 21kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.10%/0.19%
Wow/Flutter - Peak DIN wtd	0.06%/0.17%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB 0.5%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	57.5dB 1.2%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	57.5dB 0.75%
Noise Figure of Merit (Dolby level/noise Type II)	55.5dB
Line input sensitivity/overload	109mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	525mV/3.5V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	15.8%
Azimuth check R-L phase at 10kHz	80 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43x12.3x30cm
Average wind/rewind time (C90)	1 min 48 sec
Typical Retail Price	£200



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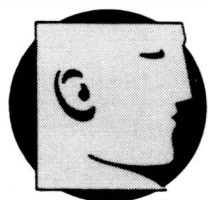
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The K870ES offers a mainstream solution to the problems of cassette recording, eschewing some of the more radical ideas aired in some of Sony's recent upmarket cassette decks, and in particular the TCK-950ES. Naturally, though, this is a three head deck with real time off tape monitoring.

The loading system is automatic on selection of a tape transport mode, and is fully powered, as is the rest of this very smooth, quiet transport - a distinct change for the better in Sony's case.

Tape alignment is possible using a needle matching process. Bias is set with a variable potentiometer, but record fine adjustment of equalisation is also available using a three position switch. There are two sets of inputs, and a Dolby HX Pro circuit that can be defeated, a feature it shares with an increasing number of decks, to the certain consternation of Dolby Labs which always intended that HX Pro processing took place invisibly in the background.

Everything else, from the wide ranging peak hold record level meters to the adjustable level headphone monitoring feature, is beyond easy criticism. The three position display off switch is the most attractive option of all.

Test report

Cliches as the external appearance may be, there is no shortage of good engineering just below the skin. Predictably, but none the less welcome for that, the TC-K870ES has a dual capstan closed loop transport with a quartz locked, direct drive capstan motor. A sapphire thrust bearing is used in the shaft of the capstan. Some rather extravagant claims are made for this one apparently straightforward feature, including improved rotational stability, suppression of lateral and vertical vibration in the spindle, reduced wear, improved vocal timbre, bass and clarity. But whatever the impact of these strengths

may be (see sound quality), they have little impact on the wow and flutter figures which are distinctly average, a comment that applies equally to the spectrum analysis plot.

Some reinforcement of the internal structure of the deck has been included, the tape housing itself being controlled by a layer of Sorbothane lining the cassette door. On the electrical side, special care is said to have been taken over the design of the low pass filter which removes the 210kHz bias waveform, and in the design of the FET playback amplifiers. Here the numbers prove more exciting.

The best available signal/noise with the metal test tape (three per cent THD, 400Hz) is a cracking 63.5dB, the kind of number that with many types of music makes it feasible to work without Dolby noise reduction. Finally, the frequency responses all suggest a degree of underbiasing. They were run after full optimisation using the Sony's set-up feature which provides a flat midband but some loss of treble energy. Optimising the treble tends to upset the midband and is therefore not recommended.

Sound quality

Pitched into play at the same price as Akai's improved GX-95, the Sony didn't perform with quite enough panache to steal the honours, though it still performed extremely well. It proved to be at its weakest with powerful bass sounds - an organ transcription of Mussorgsky's *Pictures on Delos* for example, or in a completely different vein a number of tracks from the first Tracy Chapman recording which was used during the playback tests. The louder passages were occasionally compressed where the Akai breathed more freely and offered additional dynamic headroom.

At other times the Sony did a fine job, and with percussive material (classical piano for example), the Sony sounded more comfortable, where necessary pro-

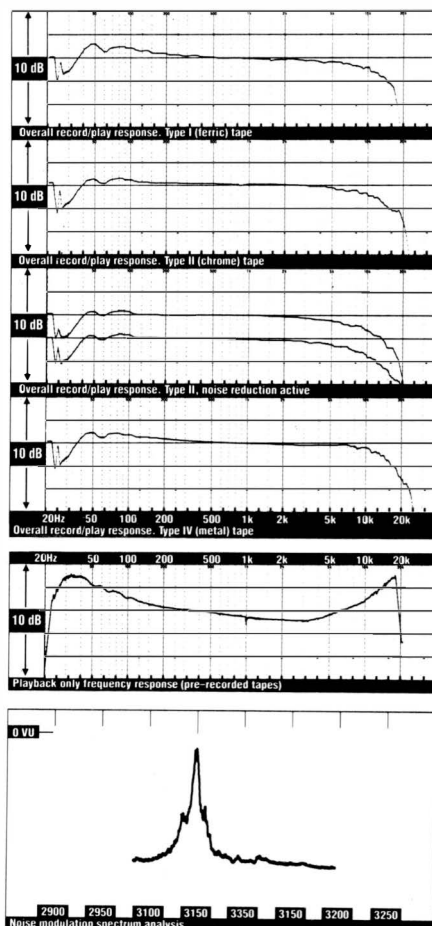
viding a lightning turn of speed and excellent timing to complement fine playing.

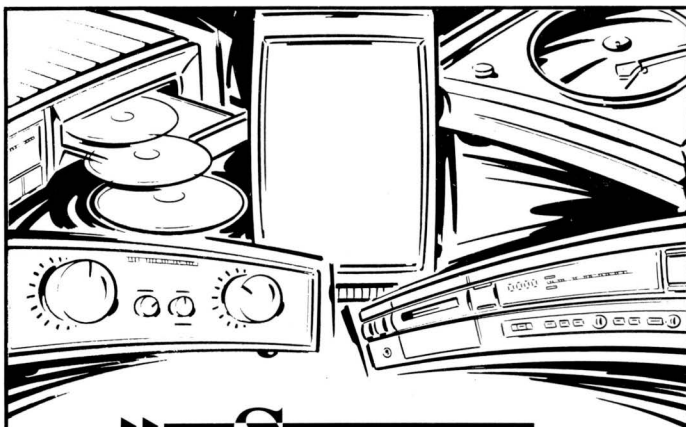
Conclusion

Extravagantly engineered as it is, this deck doesn't quite deliver what is promised. Nevertheless it is a more than a routinely competent deck aimed at a fairly purist audience.

TEST RESULTS

Dolby Level reading on deck's meters	+1dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 16kHz
IEC Type II	<20Hz - 20kHz
IEC Type IV	<29Hz - 20kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.09%/0.10%
Wow/Flutter - Peak DIN wtd	0.07%/0.09%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	51dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	53.5dB
Noise Figure of Merit (Dolby level/noise Type II)	56.5dB
Line input sensitivity/overload	97mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	700mV/4.45V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.35%
Azimuth check R-L phase at 10kHz	40 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43x13.5x35cm
Average wind/rewind time (C90)	2 min 7 sec
Typical Retail Price	£350





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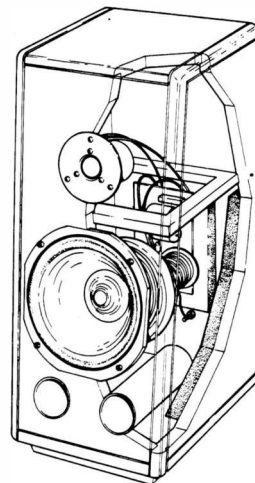
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Teac V-5000

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With the transport mounted amidships, the front panel of this player is neatly trisected into the transport controls, the tape loading door and input level and tape alignment controls. The former are standard full logic types and quiet on mode engagement, though the transport itself is rather noisy. The cassette loading door is logic controlled and a full and equal partner with the other transport functions.

Equalisation can be adjusted on a per channel basis using a dedicated calibration mode in which the sensitivity controls are adjusted until the meter indication matches a marker. The procedure is repeated to set the bias level. It is easy, repeatable and takes about 20 seconds - but it's a procedure that those who don't want to get their hands dirty will not be happy about. The V-5000 could not be described as grannyproof.

The Teac has a time counter with a 'return to zero' function, and a system for adjusting record levels when coupled to specific CD players. Headphone monitoring can be adjusted in level, and recording can be controlled by a timer. Dolby B and C noise reduction are complemented by HX Pro headroom extension circuitry and the record level meters cover a 52dB range, from +10dB ref 0VU.

The V-5000 joins an increasing number of cassette decks featuring remote control operation. The one provided here covers basic transport functions, record mode, tape/source monitor and some display modes.

As well as being deep and tall, the Teac is a little wider than the usual at 47.1cm, which may be relevant where equipment is to be stacked, though it is always better to avoid stacking if possible.

Test report

The Teac is equipped with a dual capstan transport, but with a DC servo capstan motor where the V-7000 uses a quartz

locked direct drive motor, a technology that has given that model a much better standard of pitch integrity.

Not that there's much wrong with this one, the spectrum analysis showing basically clean behaviour which is reflected in quite decent numbers.

The tape setup routine sets the mid-band response very accurately, but allows the treble to roll off slightly, which is of no great consequence. The bass end is well tailored and shows a very low level of head contour effect (woodles).

The level of IM distortion measured is a little higher than ideal for what is a relatively ambitious deck, but the V-5000 nevertheless has an excellent working dynamic range. Best case signal/noise (measured for a three per cent THD figure at 400Hz for all the three head decks) is an excellent 63.5dB (metal tape), which is only beaten by a couple of the most expensive models tested (though the budget price Aiwa 810 gets dangerously close).

Sound quality

The fine ultimate signal/noise figure isn't quite realised in practice where mid HF noise with Dolby C is at a slightly higher than normal level. This had little effect on the audition, however. The listening sessions were dominated by the clean, detailed and accurate sound of the electronics.

As usual with the cassette medium, there was a sense of gentle gerrymandering of dynamics and slackening of transients, which sapped some of the natural tension from at least some music. There was nothing severely wrong here, and the observations were partly ameliorated by the very free and powerful sounding bass performance. Nevertheless, it was a factor.

Prerecorded material was consistent with these remarks in all important details. Pitch and image stability were nota-

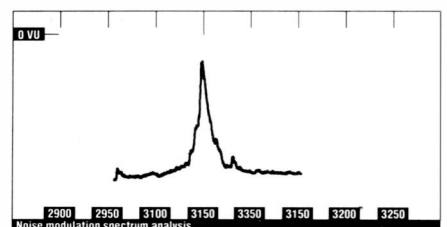
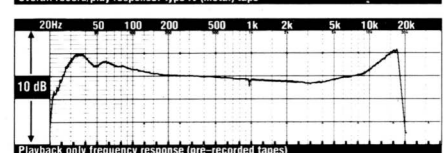
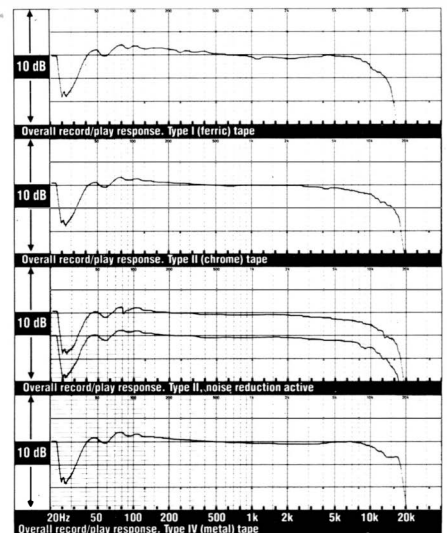
bly good, and the overall effect was lively and lifelike.

Conclusion

Easily the best £300 Teac to date, technically and build quality wise this is an excellent machine, and musically it is only just pipped to the post by the Yamaha KX-650. As such, a firm 'worth considering' is in order.

TEST RESULTS

Dolby Level reading on deck's meters	-1dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	30Hz - 15kHz
IEC Type II	30Hz - 18kHz
IEC Type IV	30Hz - 19kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.10%/0.13%
Wow/Flutter - Peak DIN wtd	0.08%/0.09%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	57.5dB
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	55dB
Noise Figure of Merit (Dolby level/noise Type II)	0.75%
Line input sensitivity/overload	56.5dB
Mic input sensitivity/overload	79mV/>13V
Line output for 0dB/maximum	n/a
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	522mV/3.45V
Azimuth check R-L phase at 10kHz	2.2%
VU indication at IEC 0dB	60 degrees
Dimensions (wxhxd)	0dB
Average wind/rewind time (C90)	47.1x14.9x35.5cm
Typical Retail Price	2 min 0 sec
	£299

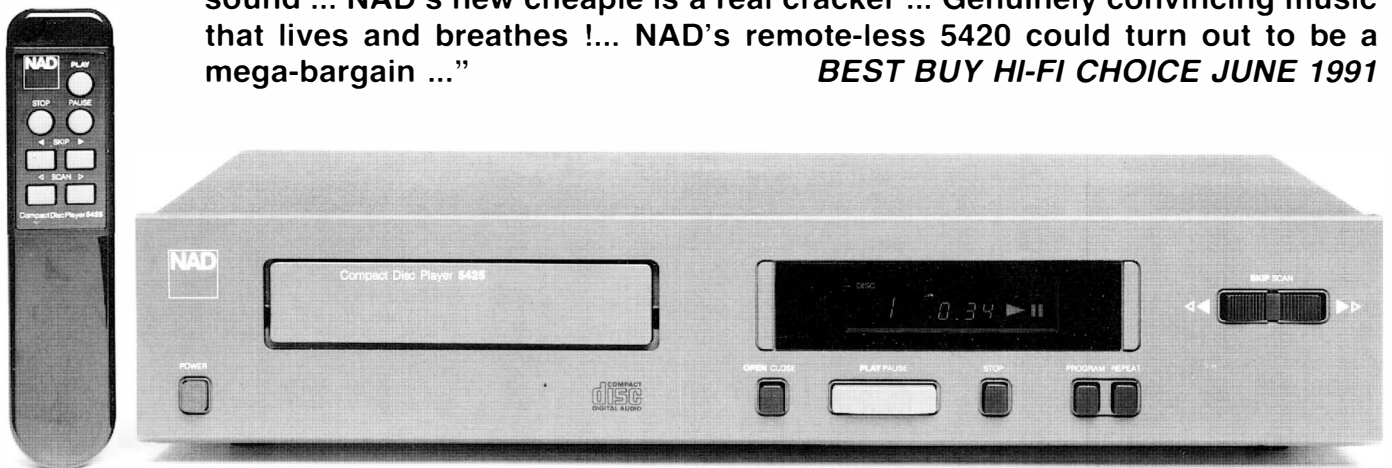


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Teac V-7000

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Like its cheaper counterpart, the V-7000 picks up on a number of recent developments, most notably the central positioning of the transport (cf Sony), thus placing the mechanism at what is claimed to be the point of greatest stability. The cassette loading door is powered and fully integrated into the control logic, allowing rapid transfer of the tape after inserting it straight into record mode if desired. The deck also boasts two sets of line inputs.

The V-7000 is a three head deck with a sophisticated transport and powerful tape alignment circuitry. The system is manual, but it's assisted by a specially calibrated display mode and a pair of presets (one per channel) for level and also for bias. Noise reduction is by the standard mix of Dolby B and C, with Dolby HX Pro headroom extension circuitry in support.

The Teac is fitted with a wide range of tape search aids, including RTZ (no, not Rio Tinto Zinc, but Return to Zero), track search (+/-15 tracks) and a rolling number/time counter. Other highlights include 50dB range record level meters and a feature which helps set record levels from compatible CD players with the aid of a special fast playback setting. Variable volume level monitoring is also supported and a remote control handset is included in the package.

Test report

The very stable transport fitted to this deck has a quartz referenced capstan motor and a dual capstan drive system, the combination reducing wow and flutter (and modulation noise, according to Teac) remarkably as the 0.038 per cent weighted wow and flutter figure demonstrates. The other figures are equally good, and although the spectrum analysis plot shows some discrete flutter sidebands, the area under the curve is small, reflecting the low measured values.

All three record/replay responses show a small but wideband suckout in the

midband, which is probably just enough to have audible consequences. Nevertheless, the tape setup routine is more accurate than the one fitted to the V5000. But note the rise in output at the two frequency extremes in the prerecorded tape test plot.

The Teac V-7000 is an electrically quiet deck. Signal/noise numbers are all sound, and the 62dB best case signal/noise figure (metal tape, three per cent THD, 400Hz), and the equivalent 61dB obtainable with Type II (which can be bettered with some ultra-quiet formulations) shows that it is worth experimenting with recording without Dolby noise reduction.

Sound quality

The prerecorded test tapes glittered, the balance clearly being designed to emphasise detail and to impress. But I quickly found the effect (and it does appear to be a deliberately engineered effect) tiresome, which is a pity, as underlying sound quality was very good. However, some material certainly benefited from the supercharged presentation.

Record/play performance was very much more neutral. Without Dolby noise reduction the Teac was very impressive indeed, especially with metal tapes like TDK MA-X, but switch in the Dolby circuits and the fast flowing notes of Evengy Kissim playing Liszt's *Rhapsodie espagnole* began to sound cluttered and slightly arthritic, the spark at the start of each note being repressed, along with much of the expressiveness that makes this performance so exciting. On the credit side, the bass is solid and true in tone, and both pitch and timing are beyond reproach.

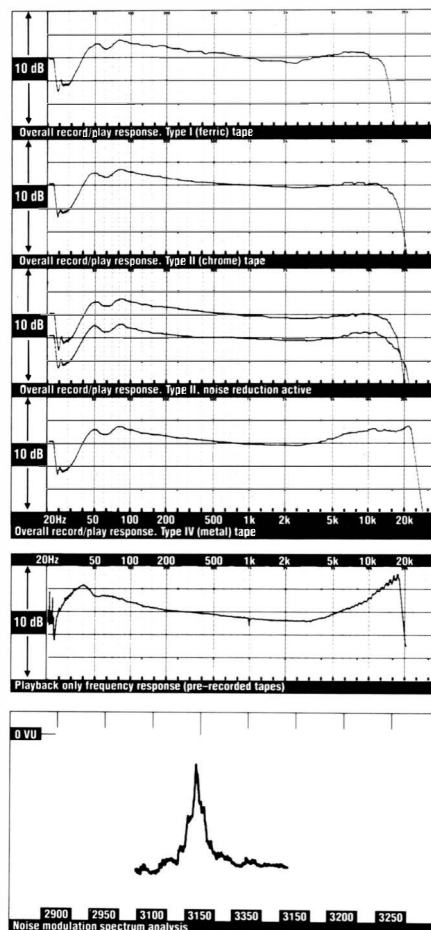
Conclusion

It's worth measuring up to be sure you can accommodate this deck, which is one of the largest on the market. It is superbly engineered - the quartz referenced transport mechanism is nothing less than a

masterpiece - and it offers immaculate sound quality. Until the Dolby circuits are switched in, that is. Even Dolby B removes the edge and spoils the magic; Dolby C sounds worse. Prerecorded tapes suffered from an excess of treble.

TEST RESULTS

Dolby Level reading on deck's meters	-1dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	25Hz - 14kHz
IEC Type II	25Hz - 19kHz
IEC Type IV	25Hz - 23kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.038%/0.08%
Wow/Flutter - Peak DIN wtd	0.09%/0.07%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB 0.5%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	58.5dB 1.4%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB 0.9%
Noise Figure of Merit (Dolby level/noise Type II)	57.5dB
Line input sensitivity/overload	105mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	680mV/3.56V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.22%
Azimuth check R-L phase at 10kHz	80 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	47.1x14.9x35.5cm
Average wind/rewind time (C90)	2 min 19 sec
Typical Retail Price	£399



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This is an astonishing box of tricks for the £129.95 price tag. Built and finished to a standard way beyond its price, the Technics is also equipped in a manner fully in keeping with the value for money flavour of these impoverished times.

The basics are straightforward: two heads, Dolby B, C (with an MPX filter switch even at this price) and HX Pro. The display has a respectable range (28dB) but is set apart from some at this price level by its illuminated scale markings and a peak hold facility that can, if required, hold an indicated peak indefinitely, which can subsequently be used as a guide when adjusting record levels. The tape counter is electronic and has a memory stop option. There are few other tapesearch aids, but audible cueing, which is increasingly uncommon elsewhere, is included, along with a fine bias adjust feature.

The RS-BX404 is also one of the few decks that still caters for microphones, for which two 6.3mm sockets are provided. Headphones are also accommodated, though without a volume control. And that's about it, apart from a mention for the excellent ergonomics and aesthetics which do Technics real credit.

Test report

The transport is clearly exceptional at the price. It is not just the weighted wow and flutter figure that is deserving of praise; the unweighted figure and that for wow, the most audibly obnoxious class of speed instability, are also low. The spectrum analysis is clean and free of dominant artefacts for the ear to latch onto. Great stuff.

The various frequency responses are also extremely well aligned, with notably smooth midband responses both for the record/playback cycle and when playing prerecorded material. There's also a freedom from pen wobble on the plots that at least implies good tape to head contact

integrity. Bass is quite well extended, though there is some sharp 'woodles' ringing caused by unfavourable head geometry.

The bias control can take care of most of what residual HF errors remain, though some extreme HF excess seems to be part of the package. Some 0VU inter-modulation is present too, implying limited headroom in the record amps or heads when dealing with complex waveforms, and this can militate against the deck, which appears to rely on headroom above the 0VU point to redress below average signal/noise figures. Note the low harmonic distortion figures at 0VU, which explain where the signal/noise went.

Sound quality

It would be going too far to describe the Technics as having the *joi de vivre* of, let's say, the Aiwa AD-F410. Its treble can sound a little insistent or even steely with some material, especially when recorded on metal tape.

The bass end too can sound a trace wooden, showing some boxy coloration with certain material, not least male voice (as, for example, the title role in Britten's *Paul Bunyan*).

On the other hand, the Technics, which costs only £130 remember, has an uncommonly assured character, with real stability throughout the audio frequency range. It also works well with metals, sounding even more solid and consistent, though there is some extra brightness with this particular tape type that cannot be fully eliminated, even after resorting to the fine bias control.

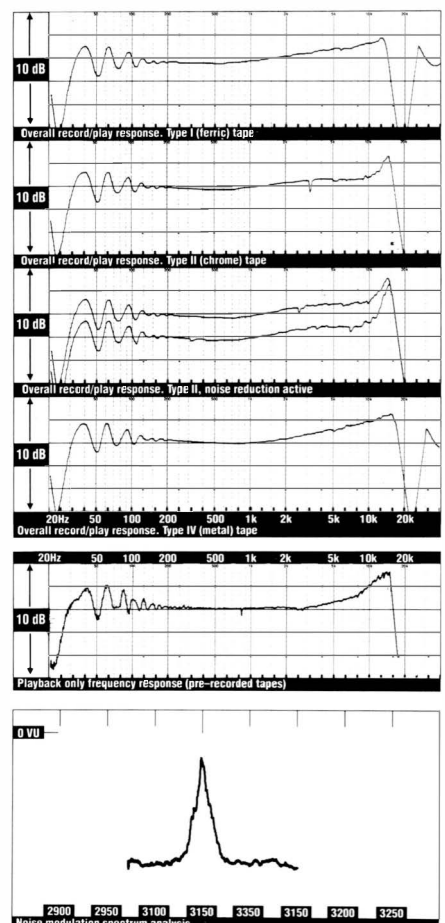
Clarity is always of a high order, making it possible to hear deep down into the mix, and if the Technics lacks real root and branch subtlety, it is also possible to hear through the music without obvious masking. Prerecorded material followed the same pattern, though the measured brightness was audible on audition.

Conclusion

Best Buy, obviously. This deck won't please many of Technics' competitors. It is, however, an excellent low cost cassette deck with features and performance fully the match of the best at £150, yet it costs only £130.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	24Hz - 16kHz
IEC Type II	24Hz - 18kHz
IEC Type IV	24Hz - 20kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.11%/0.18%
Wow/Flutter - Peak DIN wtd	0.07%/0.17%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	46dB 0.8%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	51.5dB 0.5%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	50dB 0.5%
Noise Figure of Merit (Dolby level/noise Type II)	54.5dB
Line input sensitivity/overload	5mV/>13V
Mic input sensitivity/overload	0.41mV/22.7mV
Line output for 0dB/maximum	698mV/2.72V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	6.3%
Azimuth check R-L phase at 10kHz	20 degrees
VU indication at IEC 0dB	5dB
Dimensions (wtxhxd)	43x12.5x29cm
Average wind/rewind time (C90)	2 min 10 sec
Typical Retail Price	£130

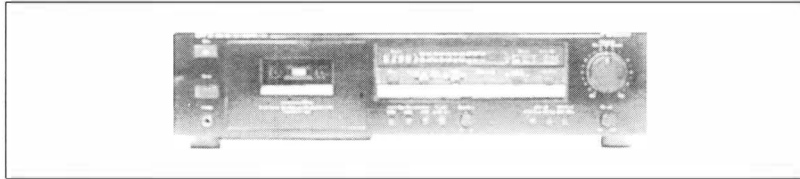


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Yamaha KX-650

Recommended

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Designed to succeed the KX-630, the KX-650 has been built with Yamaha's customary clean cut but rather cluttered high-tech styling, relieved only by the subtle rounding of the top and bottom edges.

Headline features include independent record and play heads for monitoring off tape in real time. The only tape tuning facility is a fine bias control. Prerecorded tapes and tapes recorded on other decks with incompatible head azimuth, or slightly different Dolby level settings that would cause mistracking, can be accommodated however - not with adjustable azimuth, but with the next best thing: play trim, which gently varies the overall HF response to help it fit the Dolby replay curve. Dolby HX Pro is included.

A remote control covers most main features, and some not available from the deck itself - bi-directional intro-scan being a good example.

Test report

The well specified transport features twin capstans and three DC motors (the KX-630 had a single capstan transport and two motors). Bias frequency has been raised to 210kHz, which reduces downband intermodulation, though the improvement this brings to sound quality is hard to quantify. The siamesed record/replay head is executed in hardened permalloy.

There are no important technical weaknesses with this deck, but there is little to trumpet about either. The Yamaha has an acceptable working dynamic range, but is not amongst the front runners as the signal/noise numbers listed later show, and which is reinforced by the best case signal/noise figure of 60.5dB (metal tape, 3 per cent THD, 400Hz). Similarly, wow and flutter levels are quite reasonable but unexciting, the spectrum analysis showing some flutter sidebands which also show up in the flutter figure and the unweighted figure for wow and flutter.

The record/replay responses are good in each case, but the Dolby C circuit is wayward, conjuring a 3dB 20kHz peak from an intrinsic response that is little over 0.5dB bright in the treble. Dolby pumping is something to look for. The prerecorded plot shows some treble loss, but because of the play trim facility, this is not a serious limitation.

Sound quality

The last point may explain why prerecorded material could be made to sound very good on this deck, though relatively minor adjustments of the play trim were sufficient to set the test tapes employed to rights.

More than just a potentially flat frequency response is at play here though. Even with the control slightly mis-set (to simulate the errors found on other decks as they come from the box), the Yamaha offered a degree of subtlety and insight in the midband and above that set it apart. At the same time, the bass end was perceptibly bloated in feel. It wasn't out of control exactly, but it certainly lacked the precision and focus of the very best.

Naturally the Yamaha was compared to the Teac V-5000, which costs the same, and this proved to be a real battle, but one in which the Yamaha eventually prevailed.

The KX-650's noise reduction circuits, although intrusive, were less so than those on the Teac, and, in the case of Dolby C, a little more effective at suppressing HF tape hiss - and all this despite the anomalous Dolby C measurement.

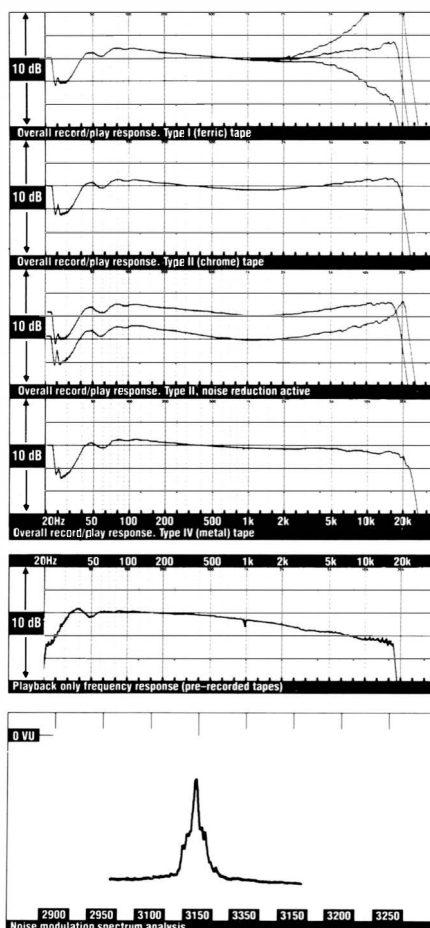
More important, and this was most apparent when recording percussive material like piano (in this case some Prokofiev from Evgeny Kissim's stunning Carnegie Hall debut album), the Yamaha sounded a little more clearly focussed, with a better localised stereo image and more organic and powerful reproduction of the playing.

Conclusion

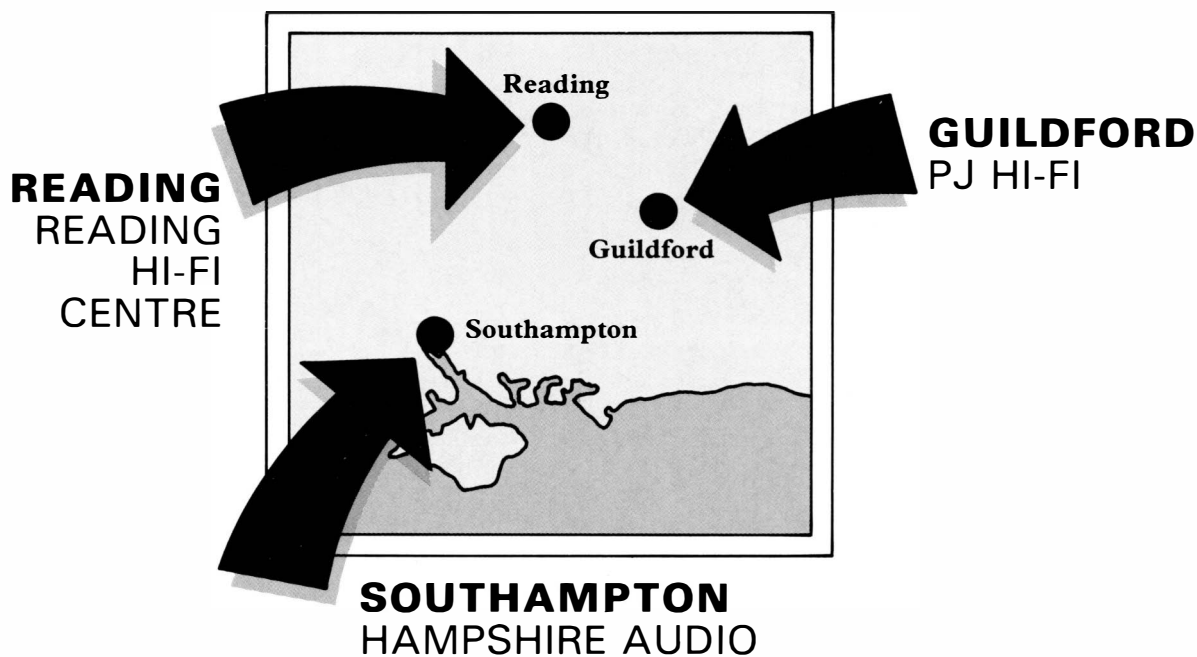
At its best with metal tapes, the crude manipulative effect of Dolby noise reduction can be heard, but generally wasn't ruinous to musical health. A good all rounder, let down only by a slightly softened lowest octave or two. Recommended.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	28Hz - 18kHz
IEC Type II	28Hz - 21kHz
IEC Type IV	28Hz - 22kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.09%/0.18%
Wow/Flutter - Peak DIN wtd	0.08%/0.12%
Type I signal/noise CCIR/ARM 400Hz & distortion OUV	48dB
Type II signal/noise CCIR/ARM 400Hz & distortion OUV	52dB
Type IV signal/noise CCIR/ARM 400Hz & distortion OUV	53dB
Noise Figure of Merit (Dolby level/noise Type II)	48.5dB
Line input sensitivity/overload	133mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	571mV/2.3V
IM distortion 10kHz/1kHz 0dB peak, 1kHz product	24%
Azimuth check R-L phase at 10kHz	100 degrees
VU indication at IEC 0dB	4dB
Dimensions (wxhxd)	43.5x12.2x27.3cm
Average wind/rewind time (C90)	1 min 12 sec
Typical Retail Price	£300



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Tech Talk

Every review includes a table of laboratory test results. Alvin Gold explains how the tests were carried out and how to interpret the results.

At the outset let me acknowledge the help I received from Chris Bryant, who did the sensitivity, overload, azimuth, intermodulation and VU indication at IEC 0dB measurements. All the remaining machine tests and tape tests were done using the author's own facilities.

As in previous projects, the cassette decks were assessed in two distinct ways: first as hardware designed to play commercially recorded musicassettes, and secondly as recording tools.

The vital distinction is that for the former, the deck must correspond (in physical alignment and electrical equalisation) to the external standards applied during the duplication of prerecorded material. In the latter case this stricture doesn't apply in quite the same way. Although a recorded tape ought still to replay accurately on other cassette decks (the owner's *Walkman* or ICE players, for example), some of the commonest errors (notably those due to head alignment) are essentially self-correcting with the same machine.

Lab testing

Dolby Level. Dolby level 200nW/mm as indicated on cassette deck meters, using Teac test tape. Note limited resolution of some meters can give reading errors.

Rec/replay response - 3dB ref 1kHz. The two figures given are simply the frequency extremes that define the bandwidth (referred to the arbitrary 0dB 1kHz level, and recorded at -10dB ref IEC). These are shown separately for all three tape types.

Wow and Flutter - Peak DIN wtd/unweighted.

Central to the task of writing to and reading from tape is that the consequence of any lack of absolute speed stability will superimpose itself on the signal, and you

will hear the effect of that. In an analogue system like compact cassette, the inevitable variations in speed of the tape passing over the heads appear as momentary (and sometimes longer term) pitch variations. This class of variation is known under the blanket term wow and flutter, and is shown in unweighted and weighted form. Wow and flutter are shown separately.

Speed error is measured in percentage deviation from the nominal standard (4.75cm/s).

Signal/noise ratios are quoted with CCIR/arm weighting. The test frequency is 400Hz, the distortion is shown at the same point (0VU on the deck's meters) for each of the three tape types.

Noise 'Figure of Merit' like signal/noise but referred to as constant magnetisation level, ie Dolby level Type II tape used.

Line input sensitivity/overload. Will it match your amplifier tape feed?

Mic input sensitivity/overload. What sort of microphones (if any) can be used?

Line output for 0dB/maximum. Will it drive your amplifier properly? (Probably.)

IM distortion 10kHz 1kHz 0dB peak, 1kHz product. This test gives a useful measure of how well or badly the various machines respond when asked to record two high frequency signals at 0VU level simultaneously. Real life musical signals are much more complex still, of course, and an inability to deal with this test cleanly suggests an inability to cope with upfront percussion or other high energy material without sounding hard, splattery or just plain distorted.

Azimuth check R-L phase at 10kHz. Expressed in three degrees (of treble phase shift), this is a measure of azimuth misalignment. The higher the error, the greater the HF loss when playing commercially recorded cassettes.

VU indication at IEC 0dB. A flux level corresponding to IEC 0dB (= 250nW/m) will usually produce a record level metre reading in the range +/-3VU.

Dimensions (wxhxd). In centimetres, of course.

Plots and graphs

In addition, a number of plots and graphs are included with each review. The frequency response plots were run with the highest pen writing speed available, which means that dropouts tend to show up in all their glory, and frequency response errors are not 'sanitised' as is often the case. The chart recorder was used with its greatest vertical resolution. This exaggerates response aberrations by a factor of 2.5 times compared to previous cassette deck tests but brings them into line with CD players, cartridges and amplifiers. The record/replay sweeps were also continued right up to 40kHz.

All response plots were run at -10dB, which stresses the machines rather more than if they were run at the traditional -20dB.

Also included are similar comparable plots showing the effects of the noise reduction systems in the frequency domain.

The playback only plots were run in exactly the same way giving an indication of the frequency response available with prerecorded material. For these tests, thanks to Sony and Pioneer, we were able to run with official IEC 120mS replay sweep test tapes from ABEX. The tapes used were TCC-162B (20Hz to 18kHz) and TCC-162 (31.5-18kHz).

We also performed spectrum analysis tests to investigate the mechanical behaviour of each of the decks, though space prevented the publication of more than one of these.

The noise modulation spectrogram graphically illustrates the mauling endured by a 3150Hz sinewave when recorded and replayed by the deck under test - there are close parallels with a similar analysis carried out in last year's edition. The central peak should be as fine and as thin as possible, any problem here being heard as a lack of pitch stability. Response runs were also made using the high speed dub option, but have not been reproduced for space reasons. With auto-reverse decks, all data refers to Side One, but the reverse side was checked in the same way, and again discrepancies were reported as they arose. In the case of decks with automatic tape alignment, the alignment procedure was followed, and where a bias adjustment facility was fitted, the setting recommended for TDK AD, SA and MA was used if available. Otherwise, the central setting was adopted.

Listening tests

The listening was divided into two sections. The first involved using each deck in turn in a system which included a Philips CD850 CD player, a Pioneer A-400 amplifier, various loudspeakers including Tannoy DC3000s and a pair of Sennheiser HD560 *Ovation* headphones. Much routine listening was done with this system, along with all the functional work - which button did what and so on.

Finally, and most important of all, each deck was auditioned in a high grade loudspeaker based system. Equipment used included Krell KSL and KST-100 pre and power amplifiers, Meridian 602/603 CD player, Roksan *Xerxes/Artemiz/Shiraz* record player, with an *Artaxerxes MkII* step up and various loudspeakers including Monitor Audio *Studio 15s* bi-wired with Roksan cable.

Conclusions, Best Buys and Recommendations

Which cassette decks made the grade? Alvin Gold sums up the best and the rest from this month's issue.

Continued weakness in the UK economy and the threat of redundancy that hangs over many people's heads have had a severely depressing effect on the market for cassette decks. Average prices have been held down, and manufacturers have responded by including more and more features and under the skin engineering at lower and lower price points. Without doubt, if you are in a position to buy there has never been a better time to do so. Entry level three head decks now cost £200, and despite inflationary trends, it is still possible to buy a respectable no-frills cassette deck for less than £100.

At the other extreme, Dolby S has finally made it onto the dealer's shelves. After a much delayed launch by Harman/Kardon, Pioneer has jumped in with two models, one built into their new flagship model and the other a cheaper variant. Both are covered in this group, but following a lukewarm reception by the author and others in previously published reports, Harman/Kardon decided not to play ball for this issue. The better of the two Pioneer models is summarised below, but the overall conclusion must be that with DCC around the corner, Dolby S may be too late to end up as more than a footnote in history. There certainly seems little enthusiasm by the producers of prerecorded material to jump on the bandwagon. But on technical and musical grounds the best Dolby S decks suggest the system deserves to do better than this rather downbeat assessment implies.

DAT

A thin stream of new DAT recorders continues to appear, with Aiwa making much of the running in this issue with a couple of relatively cost effective models. By the most optimis-

tic reckoning, however, DAT has an uphill struggle on its hands. Even with such excellent and individually popular models as Sony's *DTC-55ES*, which continues to set the standards, active interest in the medium remains at an increased but still comparatively low level, and any chances of DAT being a replacement for compact cassette must now be treated as science fiction.

Best Buys and Recommendations

Not for the first time, Aiwa plays a prominent role at the affordable end of the market with two decks whose fine performance, modern attributes and sharp pricing makes them obvious Best Buys. The first is the *AD-F410*, a £100-less-5p derivative of the £150 *AD-F500* with logic controls, fine bias adjust so that you're not totally at the mercy of the manufacturer's lining up procedures, and Dolby HX Pro, a historically low price point for this feature. There is some LF cotton wool and Dolby C lineup is poor, but at £100, any complaints are muted. Then there is another Aiwa, the three head on a shoestring *AD-F810* which also boasts a remarkably well engineered dual capstan transport. Excellent MOLs and wow and flutter figures lend credence to another of the very small number of Best Buys to be awarded in this test. Sony also has a strong contender at the same price point. This is the *TC-K570*, another three head design with a very polished user interface (except for the lack of automatic tape/source monitoring) but sound quality that is just a tad less transparent than the Aiwa. The Sony achieves a straight Recommended.

Sandwiched above the cheapie Aiwa and the entry level three head models is an excellent deck model from Technics, the £129.95 *RS-BX404* (Best Buy), a well

equipped and polished design which even includes microphone sockets. At just a tenner more there is the Denon *DRM-510* (£139.99, Recommended). This is an excellent machine, with established Denon virtues including a fine single capstan transport, the only snags being a somewhat iffy setup for some tape types and no timer standby.

From the ranks of the remaining single transport decks, five further models were awarded Recommend status. In common with the other four, the Kenwood *KX-7030* (£260) has dual capstans and three heads and a fussy but effective range of search related features. Auto biasing takes the drudge out of lining up tapes, but you are then at the mercy of the alignment circuit which adjusts for a rather bright, lean balance. Nevertheless this is a clear and articulate deck of considerable stability and - for the price - class.

Surprisingly, the Yamaha *KX-650*, which costs £300, has only a manual bias adjustment, but makes up for this with a play trim feature, making this deck of considerable interest to those with a large tape collection. On audition the Yamaha turned out to offers more than the strict sum of the parts. It had a sharp, positive style broadly in keeping with the aforementioned Kenwood *KX-7030*.

If you can pay £100 more though, you will be amply rewarded by the Akai *GX-95II* which due to a series of subtle, under the skin changes reinforces its claims to attention. The Akai includes an assisted bias/level setup routine of unusual accuracy, and a first rate transport, and is a clear class leader at the £300 price level.

Commendations for Nakamichi decks are almost a matter of course. This is one company with an apparently intuitive grasp of cassette deck engineering. In some ways the *Cassette Deck One* is

disappointing. The lack of tape alignment facilities other than a fine bias control for example is limiting, and the lack of auto tape sensing is little less than bizarre. But the deck scores on two points, the key one being a finely judged audio character that allows a degree of analysis of disparate elements in the mix that most decks smudge out of existence. The *Cassette Deck One* is one of those initially disappointing packages that really proves itself in the long run. The other plus point of course is the unrivalled backup Nakamichi provides for their decks, whether current or discontinued.

Finally, the Pioneer *CT-93* updates the already superbly engineered and well liked *CT-91a* and adds Dolby S to the mix. The Pioneer is a design that, in contrast to say, the Nakamichi, can seem to work almost too hard to achieve the results it does achieve, but over a period of weeks this immaculately engineered and fully equipped deck has proved its mettle in some top ranking systems alongside some fine DAT and CD playing hardware. Used sensibly, with Dolby S or (best of all where the music allows) with no noise reduction at all, the *CT-93* can deliver outstanding results all round.

The main interest however must be in Dolby S of which the *CT-93* is currently the best exponent. The system is most impressive not so much in reducing noise, at which it is only marginally more impressive than Dolby C, but at cleaning up LF and MF textures, reducing the muddying effects of modulation noise and generally making the medium sound sharper and more together. The impression of rather heavy low-level manipulation of the source signal is never entirely absent however, and purist (non-NR) recordings can sound more open and more transparent if you can excuse the largely cosmetic (eg hiss) shortcomings.

Choice Offers

Welcome to our new mail order section, where along with old favourites such as the Furakawa interconnects and CD extracts 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.

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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 own inherent resonant frequencies interfering with the groove to stylus interface.

Will work with most popular turntables.

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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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Record Cleaning Pad And Stylus Cleaning Kit 2 £4.99

An entire record cleaning kit consisting of 75ml of isopropyl based record cleaning fluid, four applicator pads and a stylus cleaner and brush.

Manual CD Cleaning Kit £5.99

45ml of CD cleaning fluid together with an applicator, jig and a cleaning pad for the removal of harmful dirt from Compact Discs.

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A record cleaning brush for the removal of dirt and dust from deep in the grooves of records. Should be used before every play of a record in order to remove dirt and dust which otherwise interferes with sound and becomes deeply imbedded in the record.

The carbon fibres are single strand as opposed to two joined strands and as such are less likely to fall out. A copper conductor contacts the strands and removes static electricity through a metal handle.

Mk 10 Carbon Fibre Brush With Velvet Pad £9.99

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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.

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The FV11 Series comprises a range of unbalanced digital interconnects designed to carry a high frequency square wave pulse signal such as that transmitted from a CD transport to a separate DAC, or a video to a TV set.

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The outer sleeve consists of soft PVC and Furakawa hermetically sealed all PCOCC plugs are employed for termination.

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The FA21 Series of analogue interconnects is supplied in matched pairs employing the Furakawa all PCOCC RCA plug 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.



Furakawa FA11S Series balanced analogue interconnect cables

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Choice Offers Order Form

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Speaker Cables

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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 large 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	FS2F09	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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| <input type="checkbox"/> A2 Static Elim. Spray & Lubricant & Cleaning Pads | £10.99 | <input type="checkbox"/> A8 Mk10 Carbon Fibre Brush with Velvet Pad | £9.99 |
| <input type="checkbox"/> A3 Record Clamp | £11.99 | <input type="checkbox"/> A9 System Hi-Fi Cleaning Kit 1 | £15.99 |
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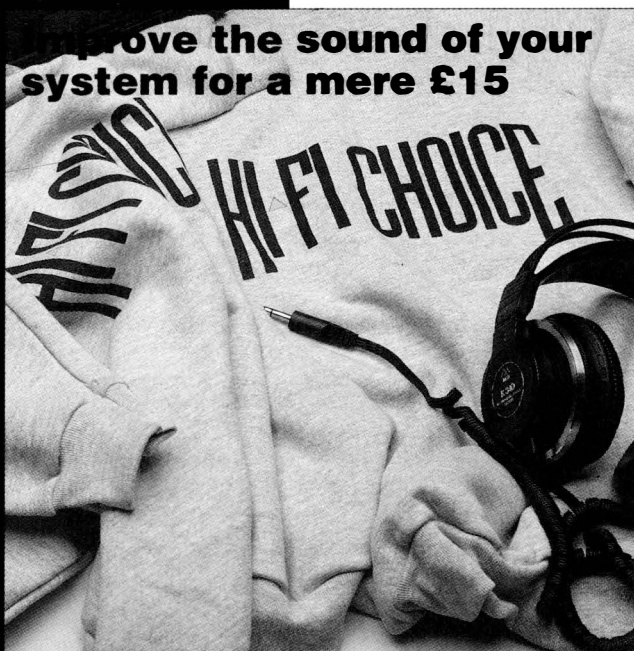
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Reference Recordings

This month we're taking a look at some of the titles on offer from Reference Recordings. All Reference Recordings are engineered by Keith O Johnson and are mastered directly from a hand built focussed-gap analogue recorder.

Microphone techniques range from single point Blumlein to spaced omnis to complex studio pickups, depending on the

musical forces involved and the performing space.

RR Compact Discs are made from digital masters wherever possible and this means that two separate recording systems are run during each recording session, one to provide the analogue master used for the albums and one to provide the digital master used for the Compact Disc.

Below you will find details of the first half dozen or so titles and over the coming months we'll be examining the rest of the range as space permits.

We've also managed to get along to a recent RR recording session in London and will be bringing you a feature on just how these remarkable recordings are put together in the very near future.



Copland: *Appalachian Spring Suite*, Eight poems by Emily Dickinson. Keith Clark/Pacific Symphony Orchestra, Marni Nixon, Soprano (in the poems).

Music by America's best loved composer, *The Appalachian Spring Suite* is presented in its original version for 13 instruments. Also included is the world premiere recording of Copland's orchestration of eight of his Emily Dickinson songs.

This recording was a Grammy Award nominee in 1987. The CD version also contains *An Outdoor Overture*.

Prof Johnson's Astounding Sound Show: Sampler. Orchestral Fanfare - Red Norvo Quintet - Cal Arts Ensemble - Richard Morris - Organ - Susan Mc Donald, Harp - Kronos Quartet - David Rosenthal, Tubulung.

A perennial audiophile favourite, this sampler of Prof Johnson's early work shows what Reference can do with a wide variety of musical and sonic experiences. Includes the only known recording of an unusual tuned mallet instrument, the Tubulung. Guaranteed to give your playback system a royal wringing out!

Kronos Quartet: In Formation. The funky chicken - Remember - Blues - When - Enantiodromia - Joan's Blue - Wind on my back - The Junk food blues - Dark razz - Whatever happened to the hoodoo meat bucket?

Ever heard a quartet play the blues? Kronos, celebrated exponents of 20th Century masterpieces have another side, represented by this collection of lighthearted tuneful scores, all written specially for the group.

Recorded in St Mary's Cathedral, San Francisco, for an unusual, highly effective soundstage.

Berlioz: Fantastique. *Symphonie Fantastique*. Varujan Kojian, The Utah Symphony Orchestra.

This is widely considered to be the recording of this magical work. The Utah Symphony Orchestra, playing in Salt Lake City's Symphonic Hall, gives world class performance, and the excellent recording captures it in its entirety. The CD contains two versions of the explosive finale, one with standard orchestral bells, and another with digitally recorded church bells.

The 2-disc 45RPM LP set contains two copies of *March To The Scaffold* and *Dreams Of A Witches Sabbath*.



Helicon Ensemble: Vivaldi/Bach *Vivaldi: Sinfonia in C-Trio Sonata in G minor - Double Concerto in E-Flat. Bach: Trio Sonata in C - Double Concerto in D minor.* (Compact Disc also contains *Prelude in C*)

Albert Fuller conducts from the harpsichord a varied original instrument ensemble in works featuring two solo violins, including the great *Double Concerto* by Bach and three rare, ingratiating works by Vivaldi. Featured solo artists are Japp Schroeder, Stanley Richie and Linda Quan.

Recorded at the John Harnes Centre for the Performing Arts in Englewood, New Jersey. CD also contains Bach's *Prelude in C*.

Walton: Facade Suite. *Walton: Facade Suite - Strauss/Hasnrohr: Till Eulenspiegel - Scriabin/Elliott: Waltz in A-Flat - Nielsen: Serenata in Vano.* Chicago Pro Musica.

An instrumental from Walton's whimsical *Facade* in the composer's original scoring makes a perfect vehicle for these brilliant musicians. A chamber version of *Till Eulenspiegel* and the seldom heard pieces of Scriabin and Nielsen complete this engaging programme.

The Absolute Sound magazine even went so far as to comment: "Walton's *Facade* has seldom seemed so spanky fresh as this crystalline recording. Congratulations to all concerned."

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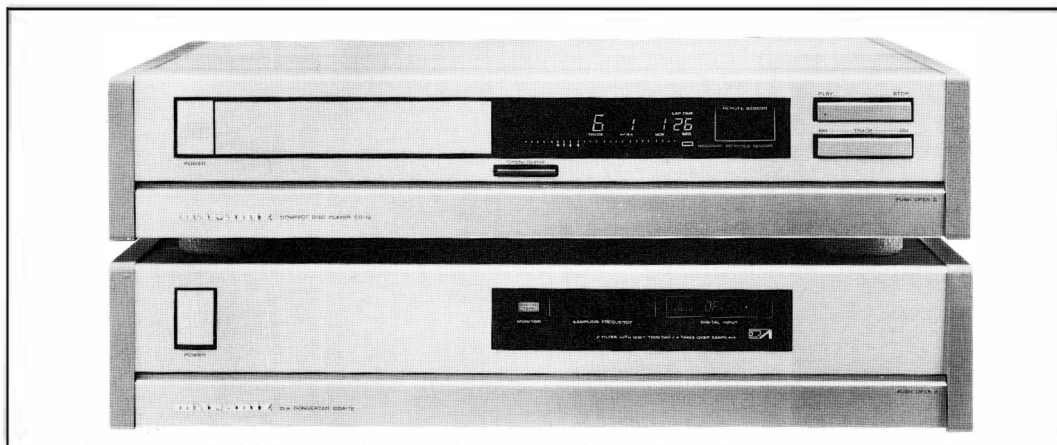
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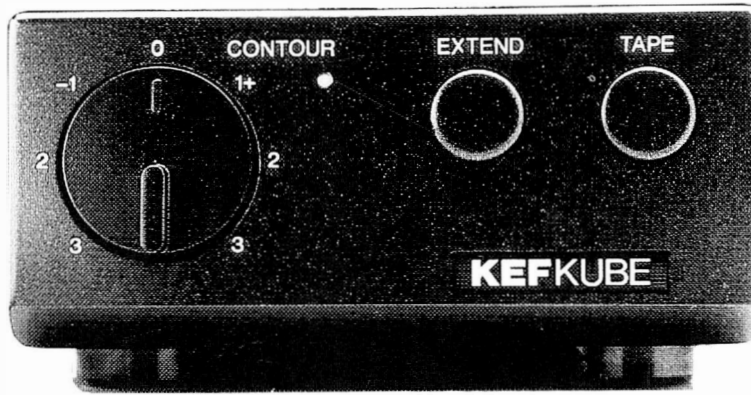
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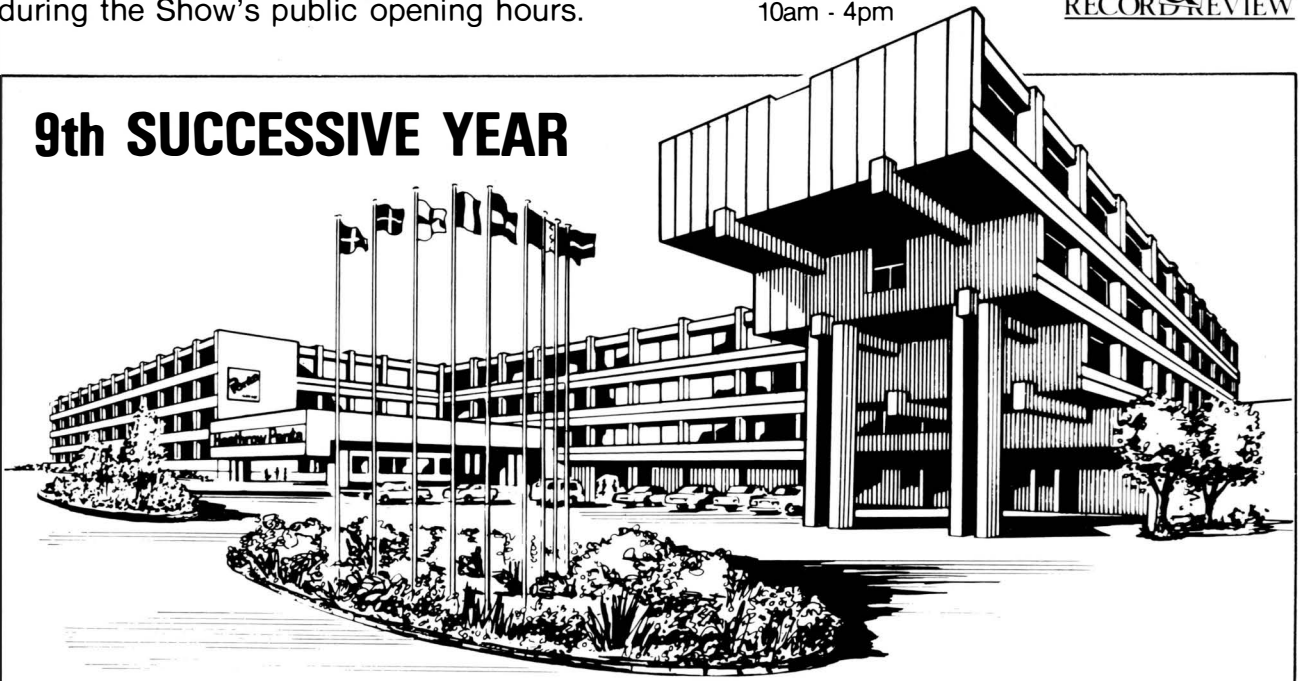


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PETERS HI-FI, 4 St Michaels Squ., Grosvenor Precinct, Chester. (0244) 322063/319392. Linn, Arcam, Technics, Sony, Marantz, Dual, Denon, Tannoy, Wharfedale, Quad. 2single spker dem rooms, no appts nec., free installation, service dept. Access, Visa, Amex, Peters credit chargecard. Mon-Sat 9-5.30. **BADA**

SOUNDSTAGE, 99 Brook St, Chester CH1 3DX. (0244) 341172. Linn, Alphasound, Creek, Onix, Royd, Epos, NAD, Denon, Mission, Rotel. Two dem rooms. Home trial. Free installation. All major credit cards. Credit facilities. 9.30-6, 6 days. Evening dems by appt. Part exchange welcome. SWIFT OF WILMSLOW, 4-8 St Annes Parade, Wilmslow. (0625) 526213. Arcam, Denon, Kenwood, Musical Fidelity, Marantz, NAD, Cambridge. 2 dem rooms. Tues-Sat 9.15-6pm. No pressure! **BADA**

CLEVELAND

ACTION ACOUSTICS, 155-157 High Street, Redcar, Cleveland TS10 3AN. 0642 480723. Audio Innovations, Cambridge, Harman-Kardon, JBL, Michell, Musical Fidelity, Pink Triangle, Revox, Rogers, Thorens, etc. Dem Room. Appts nec. Home trial facilities, free installation, service dept. Access, Visa & H.P. Open 9.15-5.30. **BADA**

GILSONAUDIO 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. **BADA**

CORNWALL

DEFINITIVE AUDIO, St Austell, Cornwall TR16 5NH. (0726) 844039. Voyd, Audio Innovations, Snell, Heliuss, Audio Note, System Dek, JPW, Deltac, Goldring, TEAC, SME, etc. Free Home Demo and Installations throughout Cornwall. Credit facilities. Open 7 days. **BADA**

TRURO HI-FI at E.T.S., 25 Kings Street, Truro. 0872 79809. Linn, Quad, Mission-Cyrus, A&R, Denon, Pioneer, Aiwa, Technics, Mordaunt Short, Tannoy. Single speaker demo room. Appts. available if required by customer, free installation on many products, service dept. Access, Visa, instant credit up to £1000 subject to status. Open 9-5.30 Mon-Sat. **BADA**

CUMBRIA

PETER TYSON, 6 Abbey St, Carlisle, Cumbria CA3 8TX. 'Cumbria's premiere hi-fi centre'. Part exchange welcome. (0228) 46756. Linn, Musical Fidelity, Cyrus, Marantz, Denon, Philips, Nakamichi, Technics, Pioneer, Creek & more. Dem room. Demos without obligation. Home trial. Free Install. In-house service dept. Visa, Access, HP. 9-5.30. Closed Thurs. **BADA**

DERBYSHIRE

ACTIVE AUDIO LTD, 12 Osmaston Rd, The Spot, Derby. (0332) 380385/385185. Arcam, Ariston, Celestion, Denon, Exposure, Kel, Ref Kefence, Cyrus, Marantz, Revox, Rotel, Rogers, etc. Account and credit cards. Ring for opening times and free 'Fact Pack'. The only BADA member in Derbyshire. **BADA**

DEVONSHIRE

CHELSTON HI-FI, 38 Walnut Road, Chelston, Torquay, Devon TQ2 6HS. Tel: (0803) 606863. Denon, Marantz, Rotel, Musical Fidelity, Acoustic Energy, NAD, Castle, Heybrook, Celestion, JPW etc. 2 dem rooms. Home trial. Free installation. Access, Visa, Amex, Diners, Hi-Fi Markets Chargecard. Credit facilities. 9.30-7.30 Mon-Fri, 9.30-6 Sat. **BADA**

RADFORD HI-FI, 6 Fore St, St Marychurch, Torquay. (0803) 326723. Choose from a huge selection of the world's leading hi-fi manufacturers in one of our 3 modern dem rooms. Expert advice and personal service guarantee your total satisfaction. FREE home trial, FREE installation. Visa, Access credit facilities. 9-5.30 Mon-Sat. **BADA**

RADFORD HI-FI, 107 Cornwall St, Plymouth. (0752) 226011. 2 dem rooms. Other details as above. **BADA**

RADFORD HI-FI, 28 Cowick St, St Thomas, Exeter. (0392) 218895. All details as Torquay shop above. **BADA**

RICHLOW ELECTRONICS, 264 Torquay Rd, Preston, Paignton, Devon. (0803) 523734. Pioneer, Technics, Panasonic, Toshiba, Goldstar, Yamaha, Harman-Kardon, JBL, Cerwin Vega, Heco. Demo room, free installation, service dept, home trial facilities. Access, Visa, Amex, instant credit up to £1000 subject to status. Mon-Sat 9-5.30, closed for lunch 1-2.15, closed all day Wed. **BADA**

UPTON ELECTRONICS, 31 Torquay Road, Paignton, Devon. (0803) 551329. Pioneer, Denon, NVA, Musical Fidelity, Tannoy, Ruark, Arcam, Cambridge, Linn, Revolver etc. Single speaker dem room. Home dems. Appts. pref. for dems. Free Install. Own service dept. Access, Visa, inst. credit up to £1000. 9-5.30 Mon-Sat - 9-1 Weds. **BADA**

DORSET

SUTTONS HI-FI, 18 Westover Road, Bournemouth. 0202 555512. Call for details. **BADA**

DORCHESTER HI-FI, 15 High West St, Dorchester, Dorset DT1 1UW. Aiwa, Celestion, Deltac, Heybrook, Infinity, Philips, Pioneer, Rogers, Rotel, Spendor, etc. Single speaker demo lounge. Home trials available. Free installation, Service department, guarantee on all products. Access, Visa. 9-5.30 6 days **BADA**

ESSEX

AUDIO T, Gants Hill, 442-444 Cranbrook Rd, Gants Hill, Ilford, Essex IG2 6LL. Tel: 081 518 0915 Fax 081 554 8463. Great Hi-Fi from Linn, Arcam, Denon, Meridian, B&O, Mission/Cyrus, Rotel, Yamaha & many more. Tues-Sat 10-6. Wed till 8pm. 2 single spker dem rooms. Free del. & instal. **BADA**

1ST AND FOREMOST HI-FI CENTRE, 49-55 North Station Road, Colchester, Essex CO1 1RQ. Tel: (0206) 549842. Fax: (0206) 762900. Tlx: 987873 SAIDG. Trio Kenwood, JVC, Akai, Aiwa, Sony, Pioneer, Technics, Nakamichi, Panasonic, Revox, etc. Home trial, free installation. Service dept. Instant credit available + all credit cards accepted, Mon to Sat 9am-6pm. **BADA**

The Choice Dealer Directory

AUDIO T, 44/2 Cranbrook Rd, Gants Hill, Ilford. (081) 518 0915. Mon-Sat, 10-6. Two dem rooms. Access, Visa. Sony Hi-Fi News Best Dealer '86 & '88 (National)

BADA

BRENTWOOD MUSIC & HI-FI CENTRE, 2 Ingrave Rd, Brentwood. (0277) 221210. Alphason, Denon, Marantz, Quad, DNM, Rock/Glastonbury, E.A.R., Exposure, Kelvin Labs, Rotel, plus many more. Dem facilities, home trial, evening appts, (high end). Home installations. System problem diagnosis. Mon-Sat 9.30-5.30 (Thurs from 10am, Sat from 9am). Credit facilities. Access, Visa. Hi-Fi Markets Chargecard. Service facilities LYON AUDIO, 16 Peartree Business Centre, Peartree Road, Stanway, Colchester, Essex CO3 5JN. (0206) 560259. Quad, Rogers, Mission, Denon, Cyrus, Marantz, Audiolab, Rotel, NAD, Wharfedale. Dem facilities. Mon-Sat 9-6. Installations. Access, Visa. Instant credit. Service dept RAYLEIGH HI-FI, 44a High Street, Rayleigh, Essex. (0268) 779762/747571. 216 Moulsham St, On-the-Parkway, Chelmsford. (0245) 265245. 132-134 London Road, Southend-on-Sea. (0702) 435255. A&R, Creek, Cyrus, Denon, Epos, Ion, Linn, Mission, Naim, Quad, Rega, Roksan, Rotel, Royd. 0% finance

BADA

THOMSONS, 2 High Street, Great Baddow, Chelmsford, Essex. Tel: (0245) 71465, Fax 0245 77528. JVC, Kenwood, Mitsubishi, Toshiba, Tannoy, Mordaunt-Short, Wharfedale, Philips, Audio-Visual dealer. Home trial. Free installation. Service dept. Access, Visa, HP. Open 9-1. 2-5.30 Mon-Sat. Open 9-1 Wed.

GLOUCESTERSHIRE

AUDIO EXCELLENCE, 58 Bristol Road, Gloucester. (0452) 300046. Audio Research, Arcam, Mission, Quad, Linn, Naim, NAD, Yamaha and lots more. Closed Mon

BADA

AUDIO T, 40-42 Albion St, Cheltenham, Glos. GL52 2RQ. (0242) 583960, Fax (0242) 226435. Great hi-fi from Linn, Arcam, Denon, Meridian, Audiolab, Mission/Cyrus, Rotel, Sony and many more. Mon-Sat 10-6pm Single spker dem room. Free del. and instal.

BADA

ROBBS OF GLOUCESTER, 13/15 Worcester Street, Gloucester GL1 3AJ. (0452) 419777. Sony, Technics, Aiwa, Pioneer, Denon, Bose, Celestion, Dual, Kenwood, JVC. Largest selection in Gloucestershire. Dem facilities. Home trial. In house service dept. Access, Visa. 9-5.30 6 days.

HAMPSHIRE

AUDIO T, 4 Feathers Lane, Basingstoke, Hants. RG21 1AS. (0256) 24311, Fax (0256) 24430. Great hi-fi from Linn, Arcam, Denon, Meridian, Mission/Cyrus, Rotel, Sony and many more. Mon-Sat 9.30-5.30pm, closed Wed. Single spker dem room. Free del. and instal

BADA

HAMPSHIRE AUDIO LTD, 2-12 Hursley Rd, Chandlers Ford. (0703) 252827/265232. Quality CD and analogue agencies. 5 dem studios. Large free car park.

BADA

HOPKINS HI-FI, 38/40 Fratton Rd, Portsmouth PO1 5BX. (0705) 822155. Technics, Quad, Monitor Audio, Tannoy, Denon, Nad, Heybrook, Onkyo, Dual, Marantz, Rotel, Wharfedale, JVC, Creek, Sansui, plus others. Dem room by appt. Access, Visa. 9-5.30. Open to 6 Thurs. Closed Wed. Service dept.

JEFFRIES HI-FI (PORTSMOUTH), 29 London Road, Portsmouth PO2 0BH. (0705) 663604. 2 dem rooms. Closed Mon. Latenight Wed. Parking Bus Route. Credit fac.

BADA

MARTON MUSIC, 5 Ventnor Way, Fareham, Hants. (0329) 231773. AV International, Marantz, Kelvin Labs, Townshend Audio, TDL, Spendor, Grant Amplifiers, Audio Technica, Dynavector, Origin Live. Demos by appt. Home Trial Facilities. Free Installation. Phone anytime.

STANS, 8 The Mall, Bridge Street, Andover, Hampshire. Fax: (0264) 361624. Aiwa, Harman-Kardon, Musical Fidelity, Pioneer, Monitor Audio, Dual Bose, Kef, Celestion, Castle. Next day money back guarantee. Installation and delivery service. service dept. Access, Visa, credit facilities available - interest free on selected items. 9-5.30, late Thurs & Fri to 7pm, 6 days

TRU-FI SOUND & VISION, 10-12 Grosvenor Road, Aldershot, Hants. Tel/Fax: (0252) 26390/332424. Aiwa, Audio Technica, B&W, Nakamichi, Mission, Mordaunt-Short, Nagaoka, Sony, Technics. Dem fac. Free install. Service dept. 0% finance. Access, Visa. Mon-Sat 9.30-6.

HEREFORDSHIRE

ENGLISH AUDIO, 95 Whitecross Road, Hereford HR4 0DG. (0432) 355081. Musical Fidelity, Arcam, Pink Triangle, Denon, Marantz, Rogers, Audio Innovations, Rotel, Nakamichi, Heybrook and others. Dem room. Home trial. Free install. Service dept. Access, Visa, Credit arranged. Open Mon-Sat 10am-6pm

GOSPEL MUSIC AUDIO, 32A High St Kington, Herefordshire. (0544) 230254. Alphason, Alison, Revolver, Luxman, Yamaha, QED, Audio Systemline, Wharfedale, Jamo, Micromega, No appts nec., home trial facilities, service dept. -5.30 +evening dems.

HERTFORDSHIRE

ACOUSTIC ARTS LTD, 101 St Albans Rd, Watford, Herts. (0923) 245250. A&R, Audiolab, Audio Research, Apogee, Denon, Krell, Marantz, Meridian, Quad, TDL. Mon-Sat 9.30-5.30

BADA

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.

HYPERTEC, 6 Bancroft Road, Hitchin, Herts SG5 1JQ. (0462) 452248. B&W, Denon, Marantz, Musical Fidelity, Pioneer Reference Point, Rotel, Tannoy, Wharfedale, Bang & Olufsen, Linn, Alphason. 2 dem rooms without appt. Private dem room + evening dem by appt. Home trial. Free install. Service dept. Access, Visa, Hypertec credit charge. 9.30-5.30. Closed Wed

STUDIO 99, 82 High Street, Harpenden. (05827) 64246. Linn, Naim, Meridian, Rega, 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, Short, 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

KENT

HI-FI CENTRE LTD, 65 King Street, Ramsgate. (0843) 590321. A.R., Aiwa, Ariston, Celestion, Goodmans, Kenwood, Marantz, NAD, Radford, Tannoy etc. + guaranteed recon. equip. Dem room + home dems. Hi-Fi repairs & servicing. Trade in & Cred facs. Mon-Sat (9.30-5.30)

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 trial fac. Mon-Sat 9-5.30 closed Thurs. Free install. Credit to £1,000. Access, Visa, Credit charge. Service dept.

KIMBERLY 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. 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

TONBRIDGE HI-FI, 96 Woodlands Road, Gillingham, Kent. (0634) 52858. Linn, Naim, Rega, Pink Triangle, Exposure, Creek, JRT, Sony, Ruark, KEF, Arcam etc. If your interest is music pay us a visit & find out what we do. TONBRIDGE HI-FI, 31 High Street, Tunbridge Wells, Kent. (0892) 24677. Linn, Naim, Rega, Pink Triangle, Exposure, Creek, JRT, Sony, Ruark, KEF, Arcam etc. If your interest is music pay us a visit & find out what we do. VOLUME ONE, 41 Upper Wickham Lane, Welling, DA16 3AD. 081 304 4622. Arcam, Creek, Dual, Epos, Exposure, Mordaunt Short, Monitor Audio, Nakamichi, Pink Triangle, Rotel. Large demo room, no appt nec, darts & snooker facilities. Evening dems in shop by appt. Home trial & demo, free delivery & installation. Access & Visa, credit up to £1000 9.30-5.30 Mon-Sat.

V J HI-FI, 29 Guildhall St, Folkestone. (0303) 56860. Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Quad, Dem and home trial facilities, free install, credit to £1000. Amex, Diners, Visa, Access. Service dept.

V J HI-FI, 119 High Street Margate. (0843) 226977. Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Pioneer. Dem and home trial facilities, free installation, credit to £1000. Amex, Diners, Visa, Access. Service dept.

LANCASHIRE

MONITOR SOUND, 54 Chapel St, Chorley. (02572) 71935. A&R, Denon, Dual, Pioneer, Quad, Rogers, Rotel, Spendor, 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 demo 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) 46977. The Rock, Audio Innovations, Kelvin Labs, Snell, Helius, Sugden, Ruark, Concordant, Valdi, JPW. Dem and home trial facilities. Mon-Sat 9.30-7.00. Free installation and service dept. Visa, Access

THE LEICESTER HI-FI CO, 6 Silver Walk, St. Martins Square, Leicester LE1 5EW. 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. Leicestershire's first Bada member.

BADA

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 finance available. Mon-Sat 9-5.30pm, closed Thursdays

LONDON

ANALOG AUDIO, 849 High Road, London N12. (081) 445 3267. 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 Audiophile, Michell, Nova, Ongaku, Oracle, Originlive, Orthophon 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. 9.00-6pm. Till late Mon-Sat. Demo by appt. please

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. 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

The Choice Dealer Directory

BRITISH AUDIO DEALERS ASSOCIATION

BADA
THE ULTIMATE IN
SOUND ADVICE

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

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

GRAHAM'S 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.

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

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 till 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, Halfer, 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, Unit 4 Pickfords Wharf, Link St, London, SE1 9DG. (071) 403 2255/3088. 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, London NW6. (071) 624 8855. Linn, Naim, Meridian, Rega, Quad, Nakamichi, Mission/Cyrus, KEF, Bang & Olufsen, Yamaha, Creek etc. 2 single speaker dem rooms. Appts. nec. Home trials, free install. Service dept. Visa/c, Access/c & finance terms. 10-7 Mon-Fri, 10-6 Sat

TIME AND TUNE, 218/220 Whitechapel Road, London E1 1BJ. (071) 247 0567/8/9. 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

VOLUME ONE, 41 Upper Wickham Lane, Welling. (081) 304 4622. For full details see entry under Kent.

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 2yr guarantee on all products. Access, Visa, Lombard Tricity, licensed credit broker. 10-6 Tue-Sat.

SWIFT HI-FIDELITY, 12 Chapel Street, Cheadle. (061) 428 7222. Arcam, Denon, Kenwood, Marantz, Nad, Cyrus, Rotel, Pioneer, Mission, Tannoy Demo room. 9.30-6. Closed Wed.

MIDDLESEX

AUDIO T, 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.

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

NORTHWOOD AUDIO, 126 Pinner Road, Northwood, Middlesex HA6 1BP. (0927) 420877. Exposure, Marantz, Mission, Cyrus, Monitor Audio, Musical Fidelity, Pink Triangle, Audio Innovations, Sansui, Rotel, Ruark. Dem room. Home trial. Free install. Access, Visa. 9-6 Mon-Sat

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 LTD, 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.

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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

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PETERS HI-FI, 11 St Werburgh Squ., George 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

AUDIO CENTRE MAINWAY, Sharing Asda Car Park, High Street, Bloxwich, Walsall, W. Midlands. (0922) 473499. /493499 Meridian, Kef Reference, Arcam, Quad, Rogers, Musical Fidelity, TDL, System Dek, Moth, 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 till 8pm

GRIFFIN AUDIO LTD, 94 Bristol Street, Birmingham. (021) 692 1359/ (021) 622 2230. Castle, Creek, Cyrus, Denon, Linn, Marantz, Naim, Quad, Rega, Rotel, 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.

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.

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, Spendor, 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.

MARTINS HI-FI, 85/91 Ber Street, Norwich. (0603) 627010. Est. 1968.

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 AUDIO SHOP, Coffee Tavern Court, High St, Rushden. (0933) 56651. Denon, Goldring, Ariston, Tannoy, Royd, Mordaunt Short, JPW, Ion Systems, Rotel, Creek. Dem room. Home trial and free installation. Mon-Sat 9.30-5.30 (Thurs 9.30-2). Service dept.

NOTTINGHAMSHIRE

CHANTRY AUDIO, Chantry Walk, 18a Eldon Street, Tuxford, 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.

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. Tue-Sat 10-6pm. 2 single spker demo rooms, AV dept. free del. & instal

OXFORD AUDIO CONSULTANTS LTD, Cantay Hse, Park End Place, Oxford OX1 1JE. (0865) 790879. Oxford Acoustics, Audio Research, Krell, Magnephaner, 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.

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BRITISH AUDIO DEALERS ASSOCIATION

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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, CambridgeAudio, Deltec, 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.

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.

GRANGE HI-FI LTD, 153 Branston Road, Burton-on-Trent, Staffordshire DE14 3DQ. (0283) 33655. Audio Innovations, Arcam, Castle, Denon, Pink Triangle, Rotel, Rogers, Systemdek, SME, Quad, Voyd. Demonstrations facilities available, appointments necessary on Saturdays. Free installation. Service department. Access, Visa. 9.00-5.30pm. Closed Wednesday. Closed for lunch 12.00-12.30

INTERSOUNDS, 62 Bennett Precinct, Longton, Stoke-on-Trent. (0782) 336233. Arcam, Denon, Dual, Mission, Musical Fidelity, NAD, Nakamichi, Revolver, Rotel, Systemdek, etc. G 000 8 different speaker manufacturers. 2 dem rooms. Free install. In-house service dept. Access, Visa, £1000 credit subject to status. 9.30-5.30 Mon-Sat. Closed Thurs.
MUSICAL APPROACH, Unit 7, Woodings Yard, Bailey Str., Staff. (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).

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 demo 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. (0293) 619295. 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.
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) 504091. 9-6 Mon-Sat. Linn, Meridian, Creek, Arcam, Quad, Revox, Musical Fidelity, Rotel, NAD, Nakamichi, Marantz.

RIVERSIDE HI-FI, 422 Richmond Road, East Twickenham. TW1 2EB. Tel: (081) 892 7613. Fax: (081) 892 7749. See main entry under Middlesex
ROGERS HI-FI, 13 Bridge Street, Guildford, Surrey. (0483) 61049. Aiwa, Denon, Dual, JPW, Marantz, Monitor Audio, Philips, Pioneer, Systemdek, Tannoy. Demonstration facilities available, no appointment necessary. Free installation. Service department. Access/Visa. Instant credit up to £,000 subject to status. Monday-Saturday 9.30-6pm, later by appointment.
SOUNDS EXCLUSIVE, 1 Kent House, High Street, Cranleigh, Surrey GU6 8AU. (0483) 268185. Marantz, Sumo, QED, Michell, Alphason, SME, Ortofon, Finestra, Proac, Bose. Home trial. Dems a pleasure. Appts preferred. Service dept. Free install. Access, Barclaycard.
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.

SURBITON PARKRADIO, 48 Surbiton Rd, Kingston-Upon-Thames, Surrey (081) 5465549. Quad, Dual, Denon, Kenwood, Nakamichi, Rotel, Pioneer, QED, B&W, Tannoy. Dem and home trial 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. Dems. 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.

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.

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, 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).

MALCOLM AUDIO, 12 South Street, Chichester, W. Sussex. (0243) 787562. Sony, Technics, Denon, Yamaha, Sherwood, Mordaunt Short, Wharfedale, Allison, Quad, 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 and 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, 2 yr 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.

WORCESTERSHIRE

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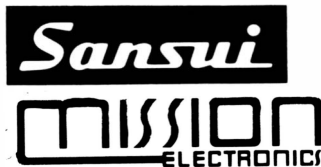
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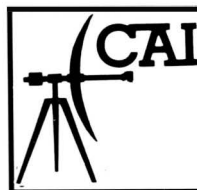
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The Directory

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 electromagnetical 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.

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 wolly sound is at least not offensive, but easily bettered by the CS505-4. Good value in material terms	Semi auto, belt drive, 10g	R	91
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
Mantecore 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 awedly 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 'welligie'	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 subtle 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 improves LF detail significantly	Belt drive, suspended, electronic PSU, front-end damping, 12g	R	79
Voyd Reference/Helius 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 5A Prestige/PSU £1500/£2500/£500	n/a Excellent	The very well made and finished heavy platter S4 with the superb Pluto arm make a devastating combination ranking up there with the very best	Subchassis, manual, available without PSU	R	72

MOTOR UNITS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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 Syncro £265	Good Good	A happy blend of qualities endows the Synchro with a blend of subtlety and force - the mailed fist in the velvet glove. Easy on the ear in the best sense.	Manual, belt drive, suspended motor unit	R	67
NVA Senior £450	Good - Average	Very high sensitivity to low-frequency vibration, especially on NVA stand, gives strange subjective bass response and confused sound. Looks are unusual but pleasing	Belt drive, electronic PSU, two-part plinth		79
Oracle 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 T00 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 around 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

TO NEARMS

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	ISSUE
Airtangent 1B £1990	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	60
Alphason Delta £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	Excellently engineered 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 targetted 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 + Good	Now available through a new distributor at a saving of some £300, the Chorale is still blessed with a delicate but highly detailed treble. Arm matching is a problem	3-9g Low, MC		72
Denon 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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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 unforgiving	3-8g Normal, MM		67
Ortofon MC10 Super £70	Average Good	"What a delightfully sweet-sounding cartridge this is . . ." we said	5-15g Low, MC	BB	48
Ortofon 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
RATA RP20 £22	Average - Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average +	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average +	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
RATA RP70vdH £99	Average + Good	Able to retrieve bags of musical detail (thanks to the vdH stylus), RATA's top cartridge ranks as one of the most articulate MM's available	11-18g Normal, MM	R	67
Rega Bias £34	Average Average +	Difficult to mount in some arms due to its shallow build, the bias offers a gentile, refined SQ that certainly makes it worthy of audition	4-10g Normal, MM		67
Rega Elys £74	Good Good	Clearly superior to the Bias, despite their common heritage, the Elys is both more detailed, accurate and musically convincing	8-15g Normal, MM	R	67
Revolver £20	Average + Average	This modified AT-95E enjoys a very lively mid and treble even if the bass is somewhat 'slower' in 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

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MODEL PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	ISSUE
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 £1399/£2999	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, monoblocks	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 integrated and more solid style of music making	81W, 3 tape, 4 line and both MM/MC inputs. Tone defeat	R	97
Audiolab 8000C/8000P £375/£545	Very Good Good	Audiolab has revamped its pre/power combo though the very distinctive almost stark neutrality that results will not appeal to all listeners. Good value engineering, nevertheless	157W pow amp + bi-wire outputs. 3 Tape, 4 line + MM/MC on preamp		97
Audion CD-1 £399	Average + Very Good	Nicely presented valve (line-only) preamplifier with fine bandwidth and enjoyable, musical sound. Great – if you can justify the cost. Well worth hearing	5 line inputs		77

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AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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
Bryston 0.5B/2B £695/£695	Very Good Good	Very rugged Canadian pre/power combo that sounds cool, confident and punchy. Headamp available to suit MC cartridges	65W, MM and 4 line sources, overload LEDs on power amp	R	74
Bryston 12B/4B £1295/£1395	Good + Good	Bryston's massive 4B power amp stood out as the backbone of this combo, the preamp sounding a trifle unbalanced between MM and MC inputs	272W, bridgeable to 800W. 6 line, 2 disc inputs, subsonic filter		68
Cambridge P25 £180	Good+ Average	Despite clocking-up a solid set of measurements the sound of the P25 proved to be as grey as its appearance.	37W, 4 line and MM/MC inputs + tone defeat.		92
Cambridge P50 £200	Good Average +	A pleasant enough sound with full bass yet with a slightly mechanical quality that reduced its sense 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		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 R 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
Denon DAP-2500/POA-4400A £550/£600 pr.	Very Good Good	Denon's fully-fledged preamp also incorporates D/A converters that did not improve the sound of our £299 CD player. The power amps are brill!	172W, monoblocks Opt/Coax dig + 2 tape, 4 line and MM/MC inputs		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 + R source direct	R	92
Denon POA-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 Mostet 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 660AMS £948 pr.	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W 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

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AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Hafner SE-100/SE-120 £365-375/£375	Good +	The smallest of Hafner's pre/power range but still imbued with the open, sparkling quality of their bigger models. Preamp sounds significantly better via CD than MM or MC	96W, bridging option. 2 Tape, 3 line + Aux or MM/MC	R	97
Hafner XL-600 £1145	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	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	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	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+	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 +	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 +	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 +	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	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 £3950/£9900	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, variable loading options. Balanced topology	R	72
JVC AX-A3TN £140	Very Good	A true minimalist amp from the masters of mass-production! Offers a very comfortable, accessible sound yet with some loss of deep bass and extreme treble.	50W, 3 line, 1 tape and MM i/p's. CD DiRT and 'Bass Compensator'	R	92
Kelvin Digital Integrated £550	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	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 +	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 +	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 +	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	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	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+	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	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	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 +	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 +	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	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	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 +	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	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

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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. 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	50W, MM/MC, 5 line inputs, tape monitor	R	80
Musical Fidelity B200 £349	Very Good Good +	Running cooler than other MFs, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/mc 4 line inputs straight line	BB	62
Musical Fidelity MA50 £875 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. Outboard PSU option		97
Orell SA-040 £359	Good Good +	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/MC, 4 line inputs, straight line	R	56
Orell SA-040SE £400	Average Average +	Very natural, relaxing if not overly exciting via CD, the sound closed-in to become 'pinched' or lettered via disc	64W, 5 line + MM/MC i/p's. Tweakable components.		71
Philips DFA-888 £300	Good Average	As above but including a modified disc input and onboard DAC. Sounds tight but also slightly thin	107W, as above + opt and coax digital inputs		74
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, variable MC gain, 4 line inputs	R	74
Proton AP-1000/AA-1150 £250/£395	Good + Average +	Bags of headroom available from this pre/power combo, but can seem bloated or unrefined via MM	67W, MM/MC, adjustable MC gain, 5 line inputs		80
QED A240 CD II £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 line	BB	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 monobloks which represent good value. What they lack in musical subtlety they make up for in sheer muscle. And these are Lumley's small monobloks!	75W monoblok		78
Revox B150 £1047	Very Good Average +	Beautifully constructed but hampered by Revox's convoluted logic control. Open and smooth sound. Still costly.	117W, CMOS sw. for 3 line, 2 tape and MM		68
Revox B250 £1467	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/MC system/house remote tone controls		56
Rose RV-23 £395	Good Very Good	Beautifully built classy British 'hybrid' preamplifier. You can spend more to get a more transparent sound — but it's hard to criticise the Rose given the competitive price	MM plus 3 line inputs	R	77
Rotel RA-810A £120	Very Good Average	As a cut price RA820AII this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W, MM, 5 inputs, hdph, tone controls	BB	62
Rotel RA-820AX £150	Very Good Very Good	The spacious, detailed and very musical performance of this budget amp is almost too good!	47W, MM, 4 line inputs	BB	80
Rotel RA-820BX4 £190	Good + Good +	Very authoritative but creamy-smooth and delightfully musical. Spatially convincing too, yet not as open as RA-820AX	39W, 4 line + MM/MC, dual-conc. volume.	R	85
Rotel RA-840BX4 £250	Good Good +	Very sedate and controlled in presentation but check phasing for optimum stereo effect	63W, MM/MC, 4 line inputs, tone controls		80
Rotel RA-870BX £300	Very Good Good +	A powerful blockbuster with solid and well focused sound, good versatility and fine load tolerance	85W MM/mc 7 line inputs tone controls	R	56

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Rotel RC/RB-850 £140/£160	Very Good Good +	Quality separate pre and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/mc 4 line inputs tone controls	BB	62
Rotel RC/RB-870BX £220/£230	Excellent Good +	Reduced price makes the 870 combo better value but, despite mods to the preamp, it is the power amp that must take the lion's share of credit	128W or 208W bridged CD direct, 4 line, 2 tape and MM/MC	R	68
SAE P102/A202 £499/£599	Average + Average +	Microprocessor-controlled pre and power amp that sounds much better at low rather than high volume levels. Pro-oriented aesthetics	151W, MM/MC + CD tuner and 2 tape tone memory, spk switching		74
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
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

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
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
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

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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 30Hz (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 lifelike musical images. Not overly transparent to source, but very civilised	180 x 30.5 x 43.5 free standing away from	90dB/w 42Hz	R	72
Duntech PCL500 Marquis £3998	n/a Very Good	Better value for money than the Crown Prince - and arguably more dynamic, with real bass 'slam' but a little less refined in the higher registers	147.5 x 27 x 40cm free standing away from	92dB/w 48Hz	R	65
Eitax Linear Response 8 £399	Average- Average+	Good material value Danish floorstander suffers from 'loudness contour' balance due to twin main drivers, but nevertheless has pleasing coherence	97 x 21 x 33cm floor, free space	88dB 22Hz		98
Epos ES11 £300	Good Good+	Pretty luxury compact uses integral baffle/driver to give a remarkable combination of low coloration, transparency and speed; bass is a bit shy	37.5 x 20 x 25cm stands 1ft from wall	86dB/W 45Hz (in room)	BB	94
Epos ES14 £449	Good Very Good	Substantial stand mount model delivers delightful midrange focus and delicacy with good bass control. Tends to be system sensitive	49 x 22.5 x 29cm own stands 1-2ft from wall	85dB 25Hz (in room)	R	98
Equation 0 £1290	Average + Very Good	Expensive but most attractive floorstanding miniature. Bass is limited and mid tends to shout but sound is fast and lively with fine dynamics and timing	85 x 20 x 35.5cm floor, c1ft from wall	85dB/w 45Hz	R	90
Faraday Siren £330 (direct sale)	Average- Average-	Interesting if ugly high mass concrete cabinet is let down by imbalance of ageing driver combination	46 x 27 x 27cm stands, free space	87dB/W 48Hz (in room)		94
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 50Hz (in room)	R	86
Goodmans M300 £100	Average Average -	Conveying much of the charm and life which has made the Maxim 2 so popular, the M300 is sensitive, but hampered by upper bass cabinet coloration	38.5 x 21.5 x 17cm stands close to rear	89dB/w 50Hz (in room)	R	82
Goodmans M500 £130	Average Average-	Large 'bookshelf' size means plenty of speaker for the money plus good sensitivity, let down by unruly mid/bass performance and indifferent build	47 x 24.5 x 21.5cm stands, free space	89dB/W 50Hz (in room)		94
Goodmans Maxim 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'lizz' 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 attractively transparent midband. Bass is well extended but follows rather than drives the music along	110 x 26 x 31.5cm free space	88dB/w 20Hz		86
Heybrook HB1 S3 £250	Average+ Good	Latest version of long established favourite delivers good liveliness and fine coherence for the price, even though the shape looks a bit dated	47 x 29 x 24cm HBS1 stands close(ish) to	88dB 30Hz (in room)	BB	98
Heybrook HB100 £279	Average + Good	Well matched for wall siting, the HB100 is a lively and informative performer in the tradition of the popular HB1	47 x 26 x 28cm stands near rear wall	86dB/w 50Hz	BB	66
Heybrook HB150 £369	Average Good	Convincingly communicative but a bit coloured and congested, this lively compact wall-mount is nicely finished but a little costly for the content	40.5 x 23 x 22cm stands close to rear	89dB/w 42Hz (in room)		82
Heybrook HB200 £429	Average Average	This luxury successor to the HB2 is lively and informative, but sounded insufficiently balanced to convince our listening panel	46 x 23 x 26cm stands against rear wall	87dB/w 55Hz		66
Heybrook Point 5 S2 £179	Good Good	Lively, revealing and enjoyable wall-mount can sound unruly with multi-strand but comes dramatically into focus with solid core cable.	37.5 x 23 x 24.5cm HBS1s against wall	85dB/W 28Hz (in room)	BB	94
Heybrook Point 7 £185	Average Average	Physically an attractive package, but not entirely convincing in lab or listening panel test; interesting for all that	40.5 x 23 x 23cm stands against rear	85dB/w 60Hz		68
Heybrook Solo £159	Average + Average +	Discreetly styled wallmount sounds a little untidy in both bass and treble but handles complex rhythmic material much better than most	36 x 23 x 22cm HBS1 stands close to wall	87dB/w 28Hz	R	90
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 is carefully conceived and beautifully executed. Undeniably attractive in the midrange and treble, the Modulus failed to handle the bass end of the spectrum 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

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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
KEF C15 £129	Good Average	One of the tiniest around delivers a surprisingly 'big' and well balanced sound, with excellent stereo from free space siting	26.5 x 18 x 14cm stands in free space	85dB/w 60Hz	R	71
KEF C25 £159	Average + Average -	Very safe and competent, but rather short on inspiration, the '25 lacks the brio and flair of its smaller C15 brother	34 x 20.5 x 17cm high stands near wall	87dB/w 60Hz (in room)		78
KEF C45 £239	Good Average -	Conventional and competitively priced, C45 delivers an impressively consistent and competent sound. As one listener commented: "Offensively inoffensive"	47.5 x 28 x 24cm uncritical	87dB/w 30Hz (in room)		86
KEF C55 £269	Good Average +	Similar to but less good value than C75, the '55 provides Uni-Q stereo stability but not real wood veneer or good low frequency room match	48 x 24.5 x 25cm stands, free space	91dB/w 30Hz (in room)		82
KEF C75 £429	Good Good	Compact floorstanding model's Uni-Q driver provides fine crossover integration, giving stable stereo and fine dynamic range within a slightly rich tonal balance	72 x 24.5 x 25.5cm floor in free space	90dB/w 45Hz	R	71
KEF C85 £599	Good Good	Essentially a simplified vinyl finish version of C95, the 85 delivers a similarly coherent, neutral, rich and slightly lazy sound	88 x 25 x 22cm well clear of walls	89dB/w 27Hz	R	90
KEF C95 £699	Good Good	Rich and lazy, but nonetheless very endearing in a cosy sort of a way, the '95 is a lot of speaker for the money, and delivers a big sound with grace and subtlety	88.5 x 24.5 x 31cm floor in free space	90dB/w 28Hz (in room)	R	78
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 MGilla £2700	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/w 35Hz	R	46
Magneplanar SMGa £675	Average - Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/w 56Hz		46
Marantz LD-50DMS £230	Very Good Good	Well behaved larger two-way has fine balance, stereo and integration with good bass extension, albeit with mild boxy, chesty and fizzy effects	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)	R	71
Martin Logan CLS II £3998	n/a Very Good	Much improved high resolution design, fussy about system set-up and demanding of ancillaries and software alike. It rewards the efforts though	60 x 28 x 7.5cm open space	86dB/w 45Hz	R	72
Meridian Argent 1 £1,200	Good+ Good+	Beautifully built, finished and shaped but pricey compact has fine bass extension and virtual absence of 'boxiness'; needs a big amplifier	33 x 27(max) x 27(max)cm Slate stands	83dB 28Hz (in room)		98
Meridian Argent 2 £995	Good+ Good	This beautiful but pricey high-tech 'large compact' delivers an extended, smooth and neutral sound with fair speed. Slate Audio stands are almost essential	48.5 x 21 x 29.5cm stands free space	85dB/W 23Hz (in room)		94
Meridian M30 £895	Average + Average	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

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■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
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 +	Pricy but very pretty miniature based on Mission 760 but with beefed up box and crossover network to enhance sound quality still further	29 x 18 x 26cm light stands close to wall	88dB/w 50Hz	R	90
Mission Cyrus 781 £250	Average + Good	Properly run in, the pretty little 781 delivers a fast, dynamic and informative sound which more than justifies its price.	43 x 22.5 x 28cm matching stands 1ft	88dB/w 28Hz (in room)	R	86
Mission Cyrus 782 £350 (stands £80)	Good - Good -	Lively, articulate and beautifully finished, this compact wall-mount model with twin main drivers has good integration but a rather rich, 'Loudness' balance	50 x 25 x 32.5cm Cyrus stands near wall	90dB/w 50Hz		71
Monitor Audio MA1200 £900	Average Average +	This smooth and civilised slimline floorstanding loudspeaker is well built and nicely presented. But it is also expensive	94 x 20 x 26cm in free space	85dB/w 48Hz		68
Monitor Audio MA1800 £1400	Good Average +	Attractive and beautifully finished, even when ballasted with lead shot the 1800 inclines towards upper bass richness and lacks genuine extension	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)		81
Monitor Audio Monitor 11 £330	Average Good	This tall and slim and attractive free space compact has an extra driver to help out in the bass, giving extra urge at some price in delicacy	52 x 20 x 24cm stands free space	87dB/W 48Hz (in room)	R	94
Monitor Audio Monitor 14 £400	Average Average	Floorstanding version of M11 suffers from excess upper bass, giving a thick, chesty coloration beneath a quite lively and well focused mid and treble	78 x 20 x 24cm floor well clear of walls	86dB 30Hz (in room)		98
Monitor Audio Monitor 7 £180	Average - Average	This lively and punchy near-miniature looks pretty enough and is good value but is let down by an unruly and indifferently integrated tweeter	34 x 16.5 x 17cm stands 1ft from wall	84dB/w 70Hz		74
Monitor Audio Monitor 9 £220	Good Average	Despite a much better treble balance than the 7, the Monitor 9 is less engaging and lively at low frequencies than its smaller sibling	37 x 20 x 21cm high stands near wall	85dB/w 30Hz		78
Monitor Audio Studio 10 £1200	Average Average +	Expensive, luxury build/finish and all-metal driver diaphragms provide engagingly transparent midrange and treble, spoilt by over-strong mid-bass.	40 x 20 x 25cm heavy stands clear of walls	87dB/w 45Hz		90
Monitor Audio Studio 5 £500	Average+ Average+	All metal diaphragm luxury miniature has splendid presence coherence but sound can be aggressive and lacks welly.	32 x 18 x 20cm stands close to wall	83dB 28Hz (in room)		98
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 38Hz (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	Stereotypically a Rogers model with impressively even balance, prospective purchasers will have to weigh the fine midband naturalness against slightly lazy dynamics and timing	51 x 27.5 x 28cm stands in free space	86dB/w 25Hz (in room)	R	86
Rogers LS7t £449	Good + Good +	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/w 48Hz	R	59

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY	VALUE	ISSUE
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 60Hz		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		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 DC1000 £210	Average Average -	The smaller of two DC models with dual concentric drivers, the '1000 is much less well balanced than the larger, floorstanding '2000	50 x 24 x 25cm	91dB/w 53Hz		71
Tannoy DC2000 £340	Good Good	Remarkably high sensitivity from unique dual concentric driver that has an involving but characteristic sound. Bass could be better	68.5 x 26 x 27cm floor in free space	93dB/w 55Hz		66
Tannoy DC3000 £670	Good Good	Giving new meaning to terms like dynamic range and headroom, the magnificent '3000 is a must for those who enjoy high-level monitoring.	94 x 26 x 31cm Floor 1ft+ from wall	94dB/w 30Hz (in room)	R	78
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

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY	VALUE	ISSUE
Technics SB-RX50 £600	Very Good Average +	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/w 40Hz	R	46
Technics SBC 250 £140	Average + Average -	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/w 60Hz		46
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 grillwork 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 uninvolved	34.5 x 22 x 22.5cm stand against wall	89dB/W 45Hz (in room)		94
Wharfedale 505.2M £260	Average+ Good-	Luxury red mahogany finish version of 505.2, confirms that this well balanced design remains fully competitive nearly three years after the original	44 x 25.5 x 25.5cm stands in free space	87dB 45Hz (in room)	R	98
Wharfedale 505/2 £190	Average Good	This lively Wharfedale provides plenty of speaker with unusual refinement for the money, and should be fairly tolerant of room siting	44 x 25.5 x 24cm stands 1ft from wall	86dB/w 55Hz	BB	66
Wharfedale 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 is good	38 x 22 x 17cm stands close to wall	88dB 48Hz (in room)	BB	98
Wharfedale Diamond IV £109	Good Average +	Thanks to a new metal dome tweeter, the new Diamond is much more civilised than its predecessors, with an attractive lively bounce but some boxiness	27 x 18 x 18.5cm stands close to wall	86dB/w 48Hz	R	90
Yamaha NS 1000M £900	Good Good +	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/w 40Hz	R	46

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 £150	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-F700 £199	Good Average	Somewhat less than the sum of the (most fine) individual parts, this deck has an artificial quality which spoiled the efforts of a fine transport	Dolby B/C/HX Pro, fine bias, CD Direct input		75
Aiwa AD-F800 £250	Good Very Good	Close to first class performance - and superb value. The Aiwa is purposeful and finely engineered. It provides a near irresistible blend of good mechanics and electronics	3 head, dual capstan, Dolby B/C/HX Pro, tape calibration	BB	75
Aiwa AD-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-R470 £150	Average Good	For once, an auto-reverse deck with the performance of a decent uni-directional one at a similar price. The Aiwa is modern in concept, and has good, transparent electronics	Dolby B/C/HX Pro, auto reverse, cue & review, bias adjust	BB	69
Aiwa AD-WX616 £150	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 £180	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 £250	Good Good	Inaccurate set-up spoils metal tape operation, but with other tapes the deck works well. This deck offers fine engineering, facilities and sound	Dual auto-reverse twin deck, Dolby B, C and HX Pro	R	75
Aiwa XK-007 Excelia £400	Good Good	Downmarket version of XK-009 with simplified bias/equalisation adjustment section and more forgiving but less informative sound. Still good, but less exciting than XK-009	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment		63
Aiwa XK-009 Excelia £550	Very Good Very Good	Excellent detail, stable articulate midband and slightly obvious treble. The most interesting Aiwa for yonks	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment, CD direct	R	63
Akai GX-32 £170	Average Poor	Constrained and smeared sum 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

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CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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. The calibration system is simple and effective, and the deck sounds great	Dolby B/C/HX Pro, 3 head, manual R tape set-up		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 bias adjust, track search	Auto-reverse (optically triggered), Dolby B/C/HX Pro,		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 good value	This simply equipped model is a little fiddly to operate at time, partly because of the way the single set of transport keys is assigned. But sound quality is generally workmanlike -	Twin transport, Dolby B/C/HX Pro	R	93
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, parallel record capable	R	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 2 £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-845 £130	Average - Average +	Extremely fine transport and clean sounding electronics for the price. Bass lacks weight, but deck works remarkably effectively with chrome tapes.	Dolby B/C, manual tape selector	R	81
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	R	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, track search		99

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CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Sherwood DS-1135C £100	Average	Excellent value. There is a low level constant background drone, and Dolby C recordings sound flat and coloured. Elsewhere sound quality exceeds expectations	Dolby B/C/HX Pro	R	87
Sherwood DS-7000R £230	Average Poor	Rough and ready cassette deck in which sound engineering has been sacrificed on the altar of extra selling features, namely three heads for real time off-tape monitoring	3-head Dolby B/C/HX Pro		87
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

DAT RECORDERS

DAT, or digital audio tape, has been on the market for quite some time now but has never really 'made it' as a consumer medium, probably due to the fact that very little prerecorded software has been made available.

In the last year or so it has begun to carve itself a niche at the top end of the market replacing reel to reel tape recorders as the audiophile's tape based medium.

The DAT standard specifies a 48kHz sampling rate, which is higher than CD, so direct copying in the digital domain is only possible on those machines with dual sampling frequencies, ie 48kHz and 44.1kHz. Some machines also record at 32kHz to give a longer recording time for a given length of tape.

To try and get around the copying problem many machines incorporate SCMS, the Serial

Copy Management System, a device which enables you to record from a CD but not to 'clone' one digital tape from another.

Portable machines are now entering the market but make sure the price you are quoted includes an analogue to digital 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. only, digital fade, fine cueing, remote control.	Digital LP/digital & analogue SP record/play, LP analogue play	R	93
Grundig Fine Arts DAT-9000 N/a	Good Good	Conventional DAT recorder offering standard facilities. The deck is well made and equipped, and is engineered to a satisfactory quality standard. It performs to an acceptable standard, though it is not state of the art.	2/4 hour recording, mic inputs, digital in/out		69
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	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 record modes	BB	94 Supp.

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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
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
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 the indifferent lab performance could be improved, it would probably sound even better	Remote, programme, hdph, comprehensive display etc	BB	70
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
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 transport £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
Arcam Delta 70.2 £600	Very Good Good	Now in Mk II form a further improvement is seen in features, performance and sound quality. Solidly built and British	Now adds simple remote vol + std features; also display off	R	76
Arcam Delta 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.		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+	Re-worked Philips player with chunky alloy casework and sophisticated analogue stage. Narrowly escaped a Recommendation with its dynamic and purposeful sound. Slightly grainy treble	Remote control, coax digital output. 16bit 4x chipset.		95
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
Deltec PDM-One £500	Average Very Good	A no frills audiophile bitstream converter at an affordable price	Coax-in, special cable and mains filter options	R	83
Denon DCD 960 £300	Good + Average	A fine feature package with good lab results, but unfortunately an unexceptional sound quality	Remote inc vol, hdph, keypad, well featured		88
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 but it still sounds great at high volumes!	Remote, pitch and full tape edit facilities. 18bit 8x.	R	95
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, hdph (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
Grundig CD9000 £1000	Good Good	Aimed at a market which puts external styling above sound quality. Although this player is of slightly above average competence, in most departments it is expensive	Remote, programme, hdph socket, calendar display etc		70
Harman Kardon HD7450 £300	Good Average	A very stylish machine but one that is let down by its aggressive and 'dirty' treble quality which pierces through most types of music. Weak bass resolution undermines the 'roots' of the player	Remote control but no headphone socket. MASH/PWM bitstream 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 HK7300 £200	Average Average -	Budget low bit technology, does not deliver enough for a recommendation	No remote, no digital out; basic control features		83
Harman Kardon HK7500 £330	Average + Average	Decided improvement over 7300 in all respects. Still fairly unimpressive sound	Remote, hdph + vol, good programming		83
JVC XL-V231 £149	Excellent Average -	Text book lab result but below par sound, nice and boring. Must be some potential here	Remote, hdph (fixed), JVC 1-bit PFM		88

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
JVC XL-Z1010 £499	Good	Despite some high tech design and a good lab result, this model did not deliver good sound quality	32 track prog., disp. off, auto fade, 2 digital op		76
JVC XL-Z431 £200	Very Good Average-	This is a player that started life off the back of the successful XL-V231 but whose performance fails to come up to scratch. The sound is weak and uninspiring - poor use of JVC's PEM DAC.	Remote operation, motorised volume + tape edit. PEM bitstream DAC		95
Kenwood DP-4030 £180	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-7030 £300	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
Luxman D105u £699	Average Average	Visible valves are essentially for show in this rather ordinary player - both sound and lab	"valves", remote inc vol, hdph, well equipped		88
Marantz CD-40 £200	Very Good Good +	Like the Philips CD620 equivalent, this is the Philips/Marantz performance/value equation at its best	Multi bit, remote, hdph (fixed)	BB	88
Marantz CD-41 £230	Good Average	Based on Philips' CD624/634 but stashed in the older CD-40 case, this player suffered from a loose, boomy bass quality together with an impure treble. Not a good advert for PDM Bit Stream.	Remote, index scan but no digital output. SAA7321 PDM DAC		95
Marantz CD-50SE £330	Very Good Very Good	Souped up CD50 delivers reference performance in its class. Worthy successor to the '65SE legend	Full remote, power volume. Hdph, (fixed). FTS. Good programming	BB	83
Marantz CD-60 £330	Very Good Very Good	Lacking the SE flair, the 0 remains a fine player by market standards. Second best is more than good enough	Multi bit, remote inc. vol., hdph, FTS etc	BB	88
Marantz CD-60SE £380	Very Good Very Good	Luxury '50SE with superior remote volume and variable headphone socket; a fine performance all round	Optical digital output, full remote, power vol. FTS, hdph	BB	83
Marantz 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 £750	Very Good Very Good	Broadly compatible with most DACs and offering a light, fresh and very bubbly sound that is both natural, engaging and unatiguing	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
Meridian 206B £950	Excellent Excellent	What a stunner! Audiophile quality from the reference one box CD player, and at a most realistic price	Differential bitstream, keypad remote, prgming	R	88
Meridian 208 £1575	Excellent Excellent	State of the art CD sound combined with a decent preamp and full remote control	Hdph + remote level. Programming, R phase invert, various outputs		83
Meridian 602 £1500	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

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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 Optic BS £695	Average Good +	A bitstream rebuild of a Philips chassis, this player shows promise for the future	Bitstream, remote, hdph (fixed)		88
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		95
NAD 5440 £290	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 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 classical works which seem to lack focus and secure soundstaging	Remote with track access, headphone, coax dig. output. 18bit 8x		95
Philips CD 850 £400	Very Good Very Good	An upgrade of the 840, Philips has got bitstream to work well here. A fine allrounder	Bitstream, keypad remote, FTS etc, etc	BB	88
Philips CD624 £200	Good Good-	Philips' cheapest Bit Stream machine is still equipped with a vast array of features. Sounds pretty civilised too but lacks the crispness and freedom necessary to set it apart.	Remote, FTS programming, digital output. SAA7321 Bit Stream DAC		95
Philips CD634 £250	Good Good-	The all-singing all-dancing version of Philips' budget Bit Stream player and one that seems better able to cope with the pizzaz and dynamics of a decent recording. Nevertheless it still lacks the lucidity and conviction of the best at this price.	Remote, FTS + Title + personal programming, SAA7321 Bit Stream		95
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		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 scart + digital out etc	R	76
Pioneer PD-7500 £280	Very Good Average	Has potential but has not brought it off on sound. Good aspects of earlier models have been lost with the new technology	Low bit dual DAC, full remote, hdph		88
Pioneer PD-8500 £400	Very Good Good+	A genuine 20bit unit, the PD-8500 enjoys a thoroughly unrestrained and full-bodied sound. It rarely sounds hard or abrupt but prefers civilised classical CD's over pop, it has to be said.	Remote with tape edit and fader controls. Variable o/p. 20bit 8x	R	95
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 will not offend anyone but then neither will it spark much excitement	Remote with fader and index facilities. Two dig o/p's. 20bit 8x		95
Pioneer PD-9300 £499	Excellent Average	A mid price flagship of excellent build and lab performance but only average sound - interesting though	Remote, 24 track programming, 2 dig. op		76
Proton AC-120 £180	Average Average -	Fine styling, low price but barely average performance	15 track memory, simple design, remote, hdph		76
Radford 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
Radford 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
Revox B126 £649	Very Good Good	Made in Switzerland so the build quality and technical performance is high, but then so is the price and the sound quality is only good	Programming, Revox system compatible		70
Revox B226S £840	Good Average	Top quality build and finish for the Revox system enthusiast. For high value sound look elsewhere	Remote vol, hdph, 19 track memory, digital op		76
Rotel RCD-855 £250	Good Good +	Stripped for action, this well built Philips technology player delivers fine performance and sound. First rate value	Remote, 20 track prog, 1 audio op, 1 digital op	BB	76
Rotel RCD-865 £300	Average Good	Curious mixture of bold musical presentation and foreshortened imagery. Grows on you though. One to audition with care	'bitstream', remote control	R	87
SAE B102 £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.		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-X711 £600	Excellent Very Good	Luxury features, finish and sound from this classy Sansui; no excuses required here	Hdph + vol, remote full programming	R	83
Sharp DX150 £129	Average Average	This is one oversampled player which is rather outclassed for technical and sonic merit by the vast majority of the competition. Pretty enough but would you want to put discs in it?	Programmable, skip, search, repeat		70
Sharp DX750 £179	Average Average	It has a remote control but it's too like the 150 which is rather outclassed for technical and sonic merit by the vast majority of the competition	Remote, programmable, skip, search, repeat		70
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-228ES £400	Very Good Average +	Good value, this is Sony's best mid price design and comes superbly equipped	Hdph, remote, rem vol, custom file	R	76
Sony CDP-338ESD £600	Excellent Good	Only a bit better than the 228, the 338 is a good machine, but not quite good enough for formal recommendation at the price	Custom file, remote, rem vol, hdph, shuffle etc		76
Sony CDP-790 £200	Good Average	Great on the test bench but new tech sounds worse than its predecessor. Who does the listening?	Low bit, full remote, comprehensive facilities		88
Sony CDP-990 £300	Very Good Good+	Every feature under the sun is available on this busy-looking machine though its sense of pace and drive at bass frequencies is less hectic. Treble detail is crisp and sparkling by contrast.	Remote, Custom File program on scrolling display. PLM bitstream.	R	95
Sony CDP-X77ES £1090	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		95
Stax Quattro £2995	Very Good Very Good	Now in mkII guise this substantial player recreated exceptionally strong and convincing bass lines together with a beguilingly musical midband	18-bit DACs, 20-track memory, full IR remote, variable o/p	R	72
Teac CD-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.	Most facilities moved to remote. Midship drive. MASH/PWM DAC		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		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		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		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

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MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Technics SL-P277A £160	Very Good Average +	High value, budget priced, yet well equipped and finished, a strong example in its group	Remote, programming, hdph + level. No d. op.	BB	83
Technics SL-P550 £220	Very Good Average	Superb, slick presentation, well equipped, average sound, fine build	Hdph, rem. prog., edit/fade, dig. optical		83
Technics SL-PA10 £450	Good + Good	Built to partner the SU-MA10 upmarket integrated amp/DAC, this transport has the unusual limitation of only optical output. Reassuringly solid and more immune to vibration than most	CD transport, optical output only, remote		88
Wadia WT-2000/Digimaster 2000 £5495/£6500	n/a Very Good	Very high grade player which provides state of the art in believable music making from CD, and promises a degree of upgradeability	Transport/multi bit DAC - 32, 44.1, 48kHz o/s		Coll. '90
Wadia WT2000 £5495	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.	CD transport, AT&T opt + direct coupled coax outputs, Class 1		96
Wadia WT3200 £1995	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
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

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier

cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually)

across the bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories. (The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

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.		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	93 Supp.
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 CD £25	Good Average +	If you're not too fussy about quality of finish and don't have an elfin head then these British phones warrant attention. Sound could be smoother	Supra-aural, semi-open, dynamic		75

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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	R	99
Sennheiser HD520 £65	Good + Good +	A very comfortable and musically capable headphone. If you've got this sort of bread to blow on cans, give 'em a blast	Circumaural, semi-open, dynamic	R	75
Sennheiser HD530 £75	Very Good Good +	One of the better dynamics in its group, the 530s create a sense of space that eludes most sub £100 cans, and they're dead comfy to boot	Circumaural, semi-open, dynamic	R	75
Sennheiser HD540 Ref Gold £160	Good Very Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sennheiser HD560 Ovation II £120	Very Good Good+	A comfortable and nicely styled headphone that could be more natural sounding at HF, but is detailed and open with good power	Circumaural, open-back, dynamic		99
Sony A21EX £20	Good - Good -	Forward facing in-ear drivers on a folding plastic band provide exceptional clarity for such an inexpensive phone. However, no bass, and fit isn't to everyone's taste	Intra-aural, semi-open, dynamic	BB	75
Sony MDR-CD3000 £300	Very Good Very Good	Better than most of the headphone outputs around so hard to make the most of, potentially up there with the electrostatics	Circumaural, closed-back, dynamic	R	99
Sony MDR-CD350 £32	Good+ Good	Very impressive for the price the 350 is possibly the most open sounding cheap closed back can around, lightweight in balance but transparent	Circumaural, closed-back, dynamic	BB	99
Sony MDR-CD550 £50	Good+ Good+	A very competent headphone for the price, creates a remarkable sense of space for a closed back design and sounds natural to boot	Circumaural, closed-back, dynamic	BB	99
Sony MDR-R10 £2500	Excellent Excellent	Costly state of the art sealed moving coil design built to the highest standards using the finest materials. Sound quality reflects this care, being big, clear, sweet and refined	Circumaural, closed-back, dynamic	R	72
Stax Gamma pro/SRD-X pro £296/£230	Very Good Excellent	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
Stax Lambda Signature/SRM-T1 £470/£895	Very Good Excellent	The Signature when combined with the SRM-T1 valve driver must be the most transparent headphone available	Circumaural, open-backed, electrostatic	R	72
Stax SR Gamma £299 (inc. SRD-6 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 Energiser £360/£635	Very Good Excellent	This combination extracts layers of information that other headphones only hint at. The SRM-1 has more edge than the SRM-T1, but it's good	Circumaural, open-back, electrostatic	R	75
Stax SR34 £140	Average Very Good	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR84 £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	63
Yamaha YHL-006 £30	Average Average	Unusual personal stereo oriented phones that curl up when not in use. Earphones are like golf balls and balance is well suited to Walkmans	Supra-aural, open-back, dynamic		75

PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than all manner of domestic systems and as such demand some attention.

Now that personal CD players have joined the ubiquitous Walkman in the market, the variety and standard of sound quality is huge, with obscurely named cassette players practically falling out of your cornflakes packet and the top Discmen going for £300 or more.

Despite their diminutive size personals attempt to incorporate as many gimmicks and features as possible, cassette players often incorporating tuners, Dolby noise reduction or even graphic equalisers

CD players are still relatively expensive, although prices have come down a lot, and don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Rechargeable batteries are extremely useful and increasingly popular, some can now be recharged within the unit and charge capacities are also being increased.

Most models come with a mains adaptor, which in some cases doubles as a battery charger and some include a wired remote control. A few are now appearing with infra-red remote control although this is more applicable to CD players.

Sound quality on the cassette front seems to

have a proportional relationship to price and integrity of construction – wow and flutter being quite obvious on the cheaper models.

CD players become less noisy as they get dearer and also reduce in size; one drawback of the latter seems to be that immunity to shock suffers as a consequence, although newer models are starting to buck this trend. Cassette players do, on the whole, seem better suited to the outdoor life than their digital counterparts, as does the software.

Bear in mind that the sound and lab ratings given below cannot realistically be compared to those in other categories or between cassette and CD personals

PERSONAL CASSETTES

MODEL PRICE	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-OFC - 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-OFC 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	Smother sounding than the Topaz, the extended crystal Ruby is less grainy and coarse, better able to resolve complex passages	FCL copper twin axial	R	59
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 Excellent	Inherently neutral, the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of facility	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 + 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 'tizzy' 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 unfatiguing 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 -	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 dielectric	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-OFCC 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
Appolo A10 £52.50	4 leg Average	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old.	19 x 19cm 44cm	R	58
Appolo A820 £44	4 leg Average	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
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

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 17.5/ 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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The Directory

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 -	Compact and delightfully versatile non-NICAM set, respectable on-board stereo sound, lovely screen graphics, 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

Paul Messenger takes a roundabout route to explaining why he believes the Lecson Quattra is the most radical and innovative amplifier for years.

Of the hundred or more pairs of loudspeakers that find their way here every year for evaluation, the chances are now better than even that the rear panel will be equipped with an extra pair of terminals, and the instruction leaflet will talk about something called bi-wiring (or in rare instances, tri-wiring).

The idea is simply to feed each individual drive unit separately, via its own dedicated cable run, from the amplifier.

It's a feature that's only really become widespread in the past five years or so, though its origins are much more difficult to track. There's probably some sort of precedent back in the cinema multi-way horn systems of the nineteen thirties, and certainly some American high end manufacturers have been

Though now fitted by many manufacturers even on near budget models, the whole question of how and why bi-wiring works remains a matter of some controversy. One cynical view is that it merely allows dealers to sell twice (or even thrice) as much speaker cable as before. But proof of this pudding comes in the auditioning, and bi-wiring more than vindicates its modest extra cost in the great majority of combinations. Moreover there's some cogency in the engineering propositions that it's innately sensible to keep the current demands of the bass driver and tweeter as separate as possible, and that the speaker should be 'star earthed' to the amplifier.

I admit to having been a bi-wire sceptic myself, and since there are plenty of good loudspeakers around with

the avoidance of the passive network resonances.

Bi-amping and bi-wiring are exactly the same from the loudspeaker point of view, though both of course require that each drive unit has its own independent and separable crossover circuitry and terminals. By linking together the two red and the two black terminals, such a speaker may be driven by a conventional single cable run from a single amplifier, but remove the links and you can add the extra cabling and benefits of bi-wiring.

The very cheapness of this upgrade accounts for its popularity, but in the enthusiasm for bi-wiring, the bi-amp option seems to have been largely ignored. That's probably because the separate pre/power amplifier combinations that facilitate bi-amping are so much rarer

and more expensive than the common or garden integrated variety. Which is precisely the loophole in the market that the £350 Lecson Quattra amplifier seeks to address.

To my knowledge its combination of four channels of power amplification alongside the usual preamp in a single integrated case is unique, and such singularity deserves recognition beyond the blind panel review in issue 92.

Best bi

Quattra bypasses bi-wiring completely and instead goes straight on to bi-amp drive any twin terminal two-way loudspeaker. It's an alternative that should provide a worthwhile advantage over the equivalent stereo amplifier, though practical compromises include a shared power supply and rather limited 20Watt power output for each of the channels. But this trade off seems eminently worthwhile to my ears. Used just as a stereo

amplifier, the Quattra is a pleasant enough performer, essentially sweet with nice vocal focus, decent control and reasonable pace. That said, it does sound a shade small and shut in, lacking the dynamic freedom and welly of the current industry budget amp standard, the Pioneer A400.

Bi jingo

Exercise the bi-amp option, however, and the situation changes dramatically. The pace, liveliness, focus and coherence of the system is sharpened significantly, dynamics are more convincing and the sound seems much better detached from the speaker boxes. Stereo soundstaging and transparency are much improved and the sound has a delicacy and subtlety that is foreign to comparable stereo amplifiers, and which should delight and entice impecunious audiophiles.

I'm left in no doubt that the extra power amp approach adopted by this unique amplifier offers real sonic benefits over the normal stereo/bi-wire layout, and delivers a sound quality that precious few conventional stereo integrated amplifiers at any price are going to match.

It's an obvious and effective way of exploiting the twin terminals now automatically provided by many speaker manufacturers. I'm amazed no other amplifier manufacturer has yet imitated what amounts to a major advance in integrated amplifier design, albeit in terms of configuration rather than circuitry.

Sadly, the Quattra is a bit of a rare bird. The differentness that gives this model its performance edge also seems to be scaring off the essentially conservative British dealer, who clearly has no idea he's overlooking one of the most interesting and cost effective budget audiophile amplifiers around.



A rare bird for audiophiles - the Lecson Quattra.

providing the extra terminals for a number of years, though with bi-amping rather than bi-wiring in mind (to which I'll return in a few paragraphs time).

Bi the way

There's certainly a Toshiba patent in Japan dating from the mid Seventies that specifically describes bi-wiring, but the first UK mention I can track down was back in early 1984, when arch-experimenter Jimmy Hughes and Steen Doessens of SD Acoustics got some interesting results by bi-wiring the SD2 - a design which Steen had equipped with separate crossovers and terminals primarily for bi-amping, due to his pro-audio background.

just a single terminal pair I still don't regard it as an essential feature. However, one reason for my reservations arises from having personally used full active drive for several years before either bi-amp or bi-wire possibilities emerged, leaving me feeling rather superior to both these later and lesser steps down the same road.

Active drive uses separate power amplifiers to power each individual drive unit directly, the signal being divided electronically at line level prior to feeding the various power amps. Though some purists may quibble with the extra complexity of an electronic crossover, the main benefit of active drive is the simplification of the load driven by the power amplifiers, thanks to

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A black Mission Cyrus Group speaker is shown with a green vine and purple flowers growing on it. The speaker has a textured surface and a logo that reads "MISSION" in a stylized font. The vine has several leaves and two purple flowers, one of which is in bloom. The background is dark, making the speaker and the plant stand out.

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