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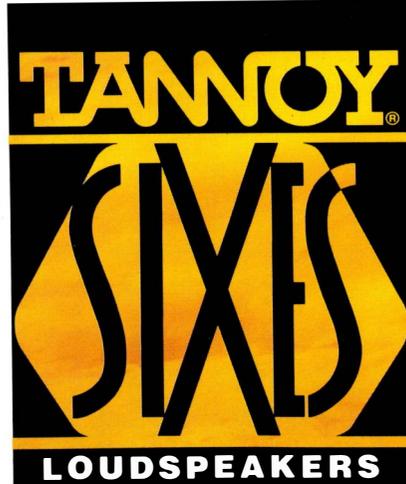
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Penta 92

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You'll read, for instance of the compact 603, **'A speaker this size simply should not sound that good'**. Stereo Review, (USA, February '92)

Of the 605, the U.K.'s 'What Hi Fi?' wrote in March '92 **'Unrivalled ability to reproduce details of musical expression'** and **'eyestopping good looks'**.

Audio Video in February '92 also said **'The 605 Tannoys positively shine with almost any kind of music,**

delivering with an enthusiasm and fullness that can make even the most jaded reviewer sit up and listen'.

Hi Fi News (in October '91) wrote that the 607 provides **'detailed sound', 'vivid imagery'** and are **'value for money speakers which perform well across a wide range of musical programming'**. Hi Fi Video of France (in October '91) said much the same - in French of course. Australia's Audio Video Lifestyle, in January '92, placed the 609 **'streets ahead of the competition'** with **'quite stunning'** performance.

Australian journal Hi Fi Review, in their January '92 issue, praised the 613 - **'Midrange was excellent'**, their reviewer adding **'nothing had prepared me for the depth of bass the speakers are capable of producing'**.

These, plus many more recent reviews are yours for the asking. Please ask - we'd like you to.

Please send me the SIXES 'Press Reviews' book and other recent SIXES reviews. I'd also like a brochure and price list.

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HFC 11/92

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HI-FI CHOICE

ISSUE NUMBER 112 NOVEMBER 1992

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PUBLICATION

PRODUCTS AND EDITORIAL SUBMISSIONS

Hi-Fi Choice welcomes all information on new and upgraded products and services, for possible coverage within the news and reviews pages. However, the publisher respectfully points out that the magazine is not obliged to either review or return unsolicited products. The editor is always pleased to receive ideas for articles, preferably sent first in outline form, with details of the author's background, and – where available – samples of previously published work. He cannot, however, accept responsibility for unsolicited copy and would like to point out that it may take time for a reply to be sent.

READER DIFFICULTIES

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

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THE GET OUT CLAUSE

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

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Menu

The conduct of the press has been the subject of considerable discussion over the last couple of months, mainly as a result of the activities of various members of the royal family. Although British hi-fi magazines are hardly in the same league as the *Sun* and *Daily Mail*, it's interesting to draw comparisons between the two, particularly in view of the 'scoop fever' that seems to have raised its ugly head again over the last couple of months.

The scenario goes something like this: *Which New Hi-Fi Universe*, under intense pressure from its advertising department because the current readership has been reduced to just the office cleaner and the production editor's dad, decides that the way ahead is to splash some supposed interesting product all over the front cover, accompanied by word such as 'scoop' or 'exclusive'.

So far so good but the problems start to arise when the magazine concerned is so desperate to revive its ailing circulation that it accepts a prototype player and then proceeds to review it as if it were the finished item, leading to not a little confusion on the part of the consumer when it turns out that the product in the shops bears little, if any, relationship to the box of tricks raved about in said hi-fi magazine. And a rave review it invariably is. After all, just printing 'the new Ardvaark XP6 is rubbish' isn't exactly going to sell a lot of magazines.

Often the manufacturers are as guilty as the magazines themselves, rushing out prototype players to unsuspecting magazines to get a review in print, just as the Heathrow warehouse starts filling up for the season. Although some magazines employ people with enough technical expertise to spot a prototype player, others have decided, as a cost cutting measure, to forego technical expertise, and just give the product to whoever happens to be sitting around the office at the time, ensuring that pages can be filled for a fraction of the cost of using an experienced journalist.

The problem from the consumer's point of view is to know whether the product being described is a prototype or the real thing. Often magazines are down right misleading. In one case which has come to my attention this month, a magazine proudly claimed to have the first full production sample of a unit which is still some months away from the production line. If a magazine is constantly resorting to such tactics, it should be obvious from the way the reviews tend to differ markedly from those run in other sections of the press. The hi-fi market has got enough problems at the moment, without magazines and manufacturers indulging in silly games which will have just the one loser, the poor soul who buys hi-fi.

Andy Benham

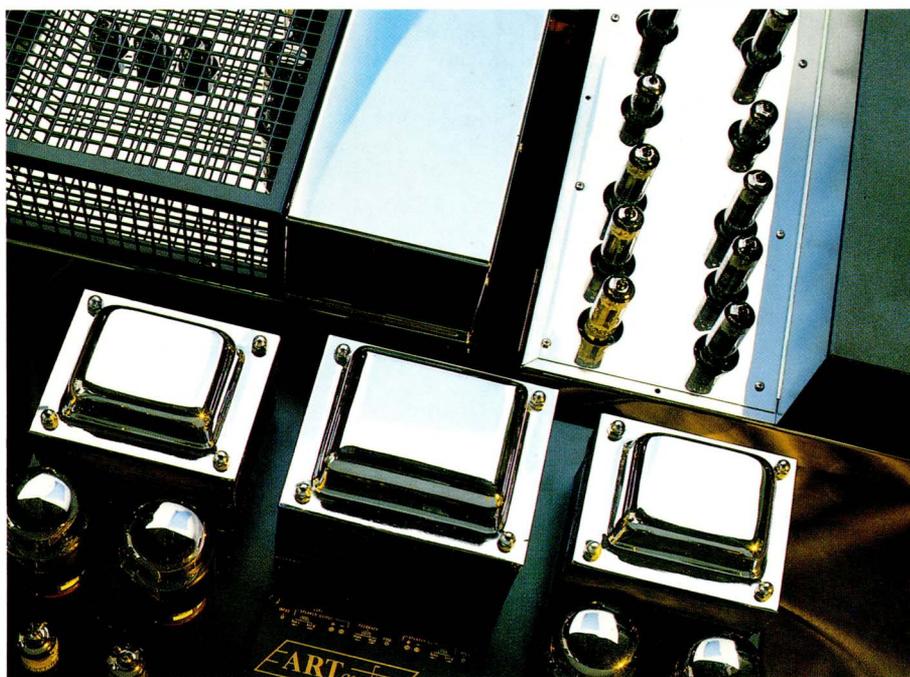


Cover photograph by
Chris Richardson.

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MiniDisc and DCC go head to head

The Penta Hi-Fi Show saw the first public appearance in this country of a near production MiniDisc player, with Sony pitching its new format into the fray for a digital, domestic, recording medium.

Philips was definitely ahead on points, with DCC merchandising dominating the foyer and a massive display in the Philips suite trumpeting its new format. However, there was still no sign of DCC players in the dealer's shops and the finished product, according to a Philips spokesman, is now being touted as being available to the public 'sometime before Christmas.'

Sony, on the other hand, was proudly showing off the first MiniDisc recorder to reach these shores, even if it was a mains powered prototype of theoretically professional orientation. Sony is now talking about a launch on November 1st, although whether this will be just in Japan or for the whole of the world remains



State of the art DCC, but will you be able to buy one this year?

unclear. Your ever cynical Editor managed to listen to a test recording being made on the MiniDisc recorder, and although no comments can be made on the sound quality, at least it works as advertised, at least from analogue sources.

Which one the general public will embrace remains

unclear, most of the interest at the show appeared to be aimed in the general direction of home cinema products, but at least both systems are now up and running and the general public will be able to make up its mind when the products go into the dealer's showroom 'sometime before Christmas.'

Hi-Fi Choice halts Marantz CD52II production line

Regular readers may be surprised not to see a review of Marantz' highly acclaimed CD52II in this issue. The reason is simply that we had a unit for review but on taking the lid off we found that it didn't contain the components we expected.

A quick phone call to Marantz describing the changes we had found, and the entire shipment of CD52IIs intended to go out to the dealers that night was put on hold.

A Marantz spokesperson informed us that a mistake had occurred on the production line where the players are assembled and that parts intended for the older CD52 model, which is still being built for the European market, had inadvertently ended up inside a batch of CD52IIs.

The entire batch from which our review sample had been

taken were then hand modified by Sontec in Norwich, the company that carries out the modification work for the CD52SE, before being released to the dealers.

The Marantz spokesperson

Rogue player: The CD52II that should have been in this month's group review.



Waiting for the mother superior

Royd is updating and upgrading most of its loudspeakers for the '92 season, and introducing a new line in monastic nomenclature.

The cabinetwork of all the new seven litre miniature models has been tidied up and the finish improved, eliminating untidy particleboard edging. Also fitted is a new and elaborate multi-tube reflex port which is designed to eliminate unwanted resonances.

The £140 *Seven* is replaced by the £173 *Topaz*, which uses the cast-frame main driver from the *Sapphire* alongside the inexpensive but widely respected and used Audax tweeter. The *Sapphire 2*, now £245, has a Royd designed and built tweeter based on Vifa components, while the £375 *Sintra 2* retains the Scanspeak unit of its predecessor.

Top of the Royd line is now the £666 *Abbot*, an all new slim floorstander that bears only a superficial resemblance to the earlier *Apex*. The *Abbot* uses the new Royd/Vifa tweeter alongside an all-new Royd main driver based on a 15.5cm frame, and this is loaded by an acoustic resistance panel connected to a generous ported enclosure.

Boogie to the tune of the Alpha

Arcam has produced a brand new Alpha 3 FM tuner to complement the Alpha 3 amplifier. Priced at £200 it is being touted as a 'great sounding' tuner with the minimum of bells and whistles, or features as they are known. It does appear to have some of the more useful ones however, most importantly 16 preset memories and a five level logarithmic signal strength meter.

The *Alpha 3* tuner uses a digital PLL tuning system and covers the entire FM range from 87.5 to 108MHz. It can be manually tuned in 50kHz steps or stations can be located with the seek facility.

B&O dives into the home cinema market at the deep end

B&O's new £9,000 *Beosystem AV9000* must surely redefine the state of today's A/V art, with a unique degree of integration that treats both types of sources evenhandedly.

Heart of the system is the striking *Beocenter AV9000*, an exceptionally advanced 28in/69cm CTV Monitor complete with VCR, multi-mode tuner, control centre and serious quality active loudspeaker. Standout features include an advanced integral contrast screen and gorgeous curtain opening feature, plus a sensor that automatically adjusts white and black level according to ambient lighting conditions.

CD, cassette and tuner sources are delivered from the *Master Panel*, along with all the system controls (including room lighting options), and this is small enough to sit on a table or stand near the operator.

Four active (equalised and amplified) loudspeakers complete the package, the slim floorstanding tubular *Beolab 8000* and new *6000* models being obvious partners.

The total of five high quality and very unintrusive speakers

may be used in five different configurations according to the sources and personal preferences. Regular hi-fi sources are automatically replayed in normal two-speaker stereo mode, while the same stereo signal can also be relayed via the rear pair.

With A/V sources the system selects Dolby-3 Stereo mode, correctly reproducing dialogue monophonically through the centre (TV) channel only, while the front stereo pair handles the stereo enhancement. Sound 5 brings in the rear channels as well, the built in Pro-Logic

decoder delivering the full cinema style surround sound experience. Sound 1 is simply single source mono from the wide-band active speaker built into the CTV plinth (see *Personal Messages*).

B&O bravely compared its system (in a hotel room, from videotape) to the full cinema experience of the same film clip. That it managed to get so close in everything except scale shows how much thought has gone into the system concept and architecture, convincingly supporting the slogan that 'the sound makes the picture'.



A typical Danish living room complete with B&O AV 9000.

Sony attacks the budget

Sony has launched a new budget miniature with a pricetag clearly aimed at the midi system upgrade market. The British designed and built SS85E is a 320mm high two way model. It's made out of MDF and chipboard and incorporates a 130mm polypropylene woofer and a 25mm soft dome tweeter. Apparently the SS85E, despite its £80 pricetag, will be 'music to many an audiophile ear'.

Two new cassette decks have been added to the Sony range in the form of the £130 TCK-390 which is a pretty straightforward two head, uni directional deck and the £160 TCK-490, which brings the price of three head decks to a new low. The TCK-490 also features fine bias control, a volume controllable headphone socket and a 16 level display. Both models can be used with an optional £25 remote control.

Remote control features highly in the new £180 TAF-319R integrated amplifier. This is a six input, 40W model incorporating source direct and an STD (which presumably doesn't mean standard) power supply derived from the prestigious ES range.

An 'affordable' SME turntable

Despite the harsh climate for vinyl software, SME has produced a second turntable to complement the existing £11k *Model 30*. The £2,495 *Model 20* is a scaled down version of the latter, it is built to the same high standards and incorporates many of that model's features such as the four point, fluid damped suspension system.

The *Model 20* has been engineered to offer high immunity to external vibration using eight rubber 'O' rings on each of its four suspension columns. The platter and chassis/subchassis are

machined out of solid aluminium, the former being faced with Isodamp for the record interface. The bearing is a hefty 19mm diameter affair made of carbon/chrome steel and runs in a sealed oil bath.

Every effort has been made to ensure that the *Model 20* not only operates as well as possible but also that it can be transported without risk. There are screws to lock the sub chassis and seal the dampers and jacking screws to raise the thrust bearing. The *Model 20* is available in A form including an *SME Series V* tonearm for an extra £1,005.



SME now has a turntable to take on the Linn et al.

In Brief

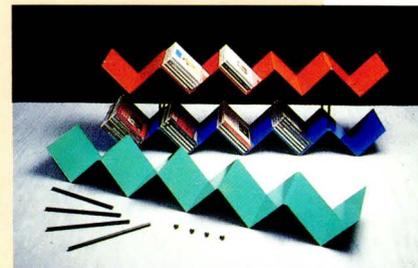
Sansui has changed ownership from Mission to Singer UK, its new address is Sansui UK, 91 Coleman Road, Leicester LE5 4LE. Telephone number (0533) 460 021.

This year's Scottish hi-fi and video exhibition will be held at the Royal Scot Hotel, Glasgow Rd, Edinburgh. It will run from Friday 13th to Sunday 15th of November, opening times 11am to 8pm Friday and Saturday and 11am to 6pm on the Sunday.

The Paul Roberts hi-fi and video show will be held at the Royal Hotel on the Sea front at Weston-super-Mare on the weekend of the 28th and 29th of November. Opening times are 10am to 7pm.

REL Acoustics has re-located to Unit 2, New Street, Bridgend Industrial Estate, Bridgend, Mid Glamorgan, CF31 3UD. Telephone (0656) 768 777.

KDA has come up with a new format in digital storage called V-CD. Don't worry, KDA is a shelving specialist and V-CD is a novel CD rack capable of holding 60 discs per layer. It costs £35 a shelf plus £6.50 for dividing bars. For further info contact KDA on (0273) 858 259.



The Northern Ireland Sound and Vision show will be held at the Confex Centre, Stormont Hotel, Belfast between the 23rd and 25th of October.

In Hi-Fi of Edinburgh has moved to more spacious premises at Galloway House, 8-10 Bakers Place, Stockbridge. The telephone number hasn't changed.

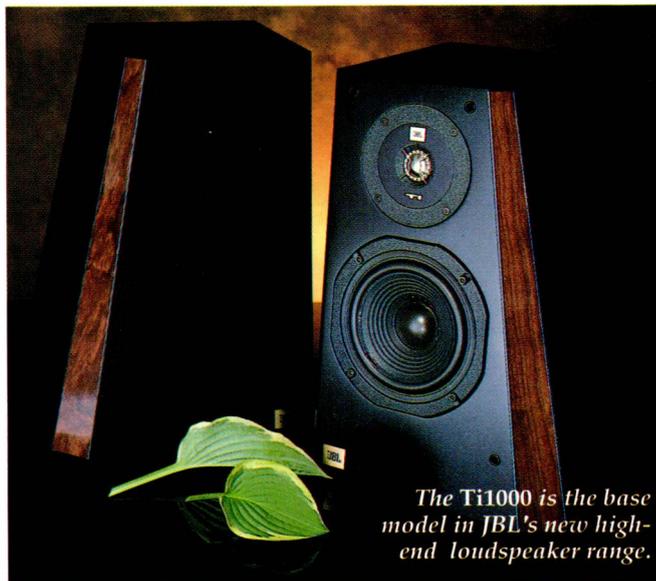
Erratum; the price of the Denon *DRS-610* cassette deck that we reviewed last month was incorrectly printed at £200, the correct price is £180.

JBL gets the high-end Ti'd up

American loudspeaker giant JBL is making a fresh attack on the high-end loudspeaker market with three new units. The models in the *Ti* range have highly damped, asymmetrically shaped enclosures that are finished in real wood veneers including cherry and rosewood. JBL has gone to great lengths to match crossover networks with their drivers and used polypropylene caps, resistors and inductors as well as what it calls 'the highest grade conductors' for internal connections.

JBL has also created a new line of transducers for this range, the 25mm 050Ti tweeter is made from nitrogen pressurised titanium sheet, and the woofers utilise cast frames and aquaplas treated pulp cones.

The £1,499 *Ti1000* (450x265x235mm) is a stand mount two way with a 165mm woofer and nominal 4ohm impedance, next up the line is



The Ti1000 is the base model in JBL's new high-end loudspeaker range.

the floorstanding £2,499 *Ti3000* (1050x460x350mm). This is a three way with a 130mm polypropylene mid unit and a 250mm woofer. Last and definitely not least is the £3,499

Ti5000 (1147x480x380mm) a slightly larger floorstander with a pair of midrange drivers and a 300mm woofer. At 55kg this is a loudspeaker for the muscular.

Figaro comes to Keswick

KAR (Keswick Audio Research) is a new loudspeaker company run by ex Wharfedale designer Dean Hartley. The company's first creation is the rather attractive £695 *Figaro*, a two way compact monitor featuring modified Morel drive units and a substantial 25mm thick cabinet that's available in real wood veneer or piano black lacquer.

Considerable emphasis is placed on the crossover design in the *Figaro*, which consists of a 6dB/octave filter with all pass linear phase characteristics. The speaker design, which is described as a 'quasi fifth order reflex system' is said to increase LF power and reduce distortion.

The *Figaro* is a diminutive 280x190x270mm (hwxwd) and contains a 130mm woofer and a 28mm soft dome tweeter behind a neatly inset grille. Efficiency is 86dB which is about average for this sort of design; the -3dB LF roll-off point is claimed to be 55Hz. KAR can be found on (0924) 870 606.

PENTA 92

Show report



Left; air bearing CD transport from Scandinavian company Posselt and right, Krell brings back twitching needles.

Penta is like the turn of the year for the British hi-fi manufacturing trade. It's a gathering of the clans, each one brandishing the fruits of its labours in an attempt to catch the eye of passing dealers. This year the accent shifted away from the out and out hi-fi approach that has been standard fare in recent times and had a mass market/home entertainment bent. Virtually every major loudspeaker manufacturer and the majority of Japanese

companies had their own A/V rooms, it's no secret that the industry is banking on this sector of the market to rescue it from the doldrums. New kit on this front included the £700 AVR30 Pro-Logic receiver and the £1,600 AV-P1 image steering preamp from Harman-Kardon, fully shielded £249 MA100 Gold miniature speakers from Monitor



Audio which also played a nicely veneered £299 subwoofer called *Sub 200/92*. JPW, Tannoy, Mordaunt-Short, KEF, B&W etc all had surround sound speaker systems but Celestion went one further by introducing the *Lexicon* range of serious digital surround processors.

But for those of you more

interested in sound there was plenty to listen to, look at and fondle. NAD launched a complete new range of electronics including a £160 replacement for the 3020i called the 302. Rotel jumped on Marantz' favourite bandwagon by producing a limited edition version of the RCD-965BX. For a £50 premium you get slit foil caps in critical locations and a £40 Monster interconnect cable, as Rotel has taken on the distribution of this US brand. Also of interest on this stand was an active preamp

under the Michi brand costing £850. Meridian is upgrading its transport/DAC combos with twin microprocessors in the former and Delta/Sigma BS chips in the latter, the 203 will also become the 263. Wharfedale surprised a few of us by bringing out an amplifier under its own brand name (*Wharfedale 2050a*, £250) rather than one of the more electronics oriented brands that it owns, and revealed the £130 *Diamond V*.

Acoustic Energy launched a new range of cheaper loudspeakers called *Aegis* with all metal drivers but more conventional cabinets than its existing speakers. AE's digital range has been joined by the £2,200 *Wadia 8* transport and £2,950 *Wadia 6* 20-bit CD player, both rather stylish and chunky beasts.

There were fewer turntables than ever before at the show but the rooms that were using them inevitably made some of the best sounds. There were even a couple of brand new models in the shape of the £1,450 Wilson-Benesch which uses a carbon fibre subchassis and a tonearm made of the same stuff is in the pipeline.

XLO cable distributor Wollaton Audio was showing off the distinctly substantial Maplenoll *Apollo* turntable, an air bearing fantasy in heavy materials (ie lead, Corian etc) with a £5k pricetag and a parallel tracking arm with a trough. For the less well to do there is the *Ariadne* at half the price complete with an acrylic chassis.

DNM's long awaited *Rota* turntable is gradually coming together and looks like being a very interesting deck with all sorts of new solutions to old problems, the company's unusual cardboard and cork *Ringmat* for all types of turntable is available now for between £25 and £35.

Inevitably there was more action on the digital front with new players from AMC — *CD6* £329, *AVI* — £999, Denon — *DCM-450* multidisc £350, Musical Fidelity — *CD2* £349, *Aura* — £369, and Teac, whose £769 *VRDS-10* has got to be the most macho sub £1,000 machine on the market.

The more interesting players were inevitably the dearer ones, Kronos was playing a typically luxurious transport from Pierre Lurné — *Audiomeca Mephisto*

£1,775, with a tube powered Audio Note DAC. This crowded room housed a £2,850 YBA *CD 2* player alongside new speakers from Triangle and tube amplification from Lectron. Path Premier was proudly displaying the first Mark Levinson £7,500 *No.31* CD transport alongside a less expensive version of the *No.30* DAC in the shape of the £6,790 *No.35 Digital Processor*.

Being a British show there was no shortage of new loudspeakers, the more interesting ones included TDL's £769 *Studio 0.75*, Rogers' *LS3/5a* shaped £400 *Studio 3*, Lineaum's tiny but very impressive £599 LFX Wood and some new Martin Logan hybrids called *Aerius*.

Monitor Audio didn't disappoint with an attractive red lacquer version of its £799 *Studio 6* alongside the unusually ported £599 *MA800/Gold*. JPW was showing early samples of some very MA'esque speakers called *Ruby One* and *Two* which use red anodised aluminium cones and cost £499 and £699 respectively.

Tannoy has been having fun with its *605*, now available in LE form for a £30 premium with mass loaded endcaps, Audioquest internal wiring and most obviously, inverted drive units. It's also brought out a substantial new £1,970 floorstander called the *D700*. B&W has been extending its *Solid* range with the car aerial mounted £399 *Verticale*, and has added a new budget range called *2000* with prices starting at £120.

One of the most interesting products I found was the £250 QED *Vector* preamp, an active or passive device that's completely devoid of controls outside the remote and has an internal motorised Alps pot.

Acoustic Research quietly previewed its AR Limited range of high-end electronics and loudspeakers, including a cut down version of the Cello *Audio Palette* audiophile equaliser, electronics design is by David Day (Day-Sequerra), Mark Levinson (Cello) and Dan D'Agastino (Krell). The products look like American high-end but prices will start at £2,000.

Absolute Sounds was having fun with some intriguing little devices called Harmonix resonance control products, stick four onto the baffle of your speaker and, hey presto, resolution dramatically improves. However,



Top to bottom: Michell Alecto monoblok power amps, Notts Analogue's graphite tonearm, Teac's VRDS-10. Right: the ASAT from Bruce Rae Audio. Top left: the Living Voice Air Partner.

US price for eight of these is \$100, a high price for a small but effective device.

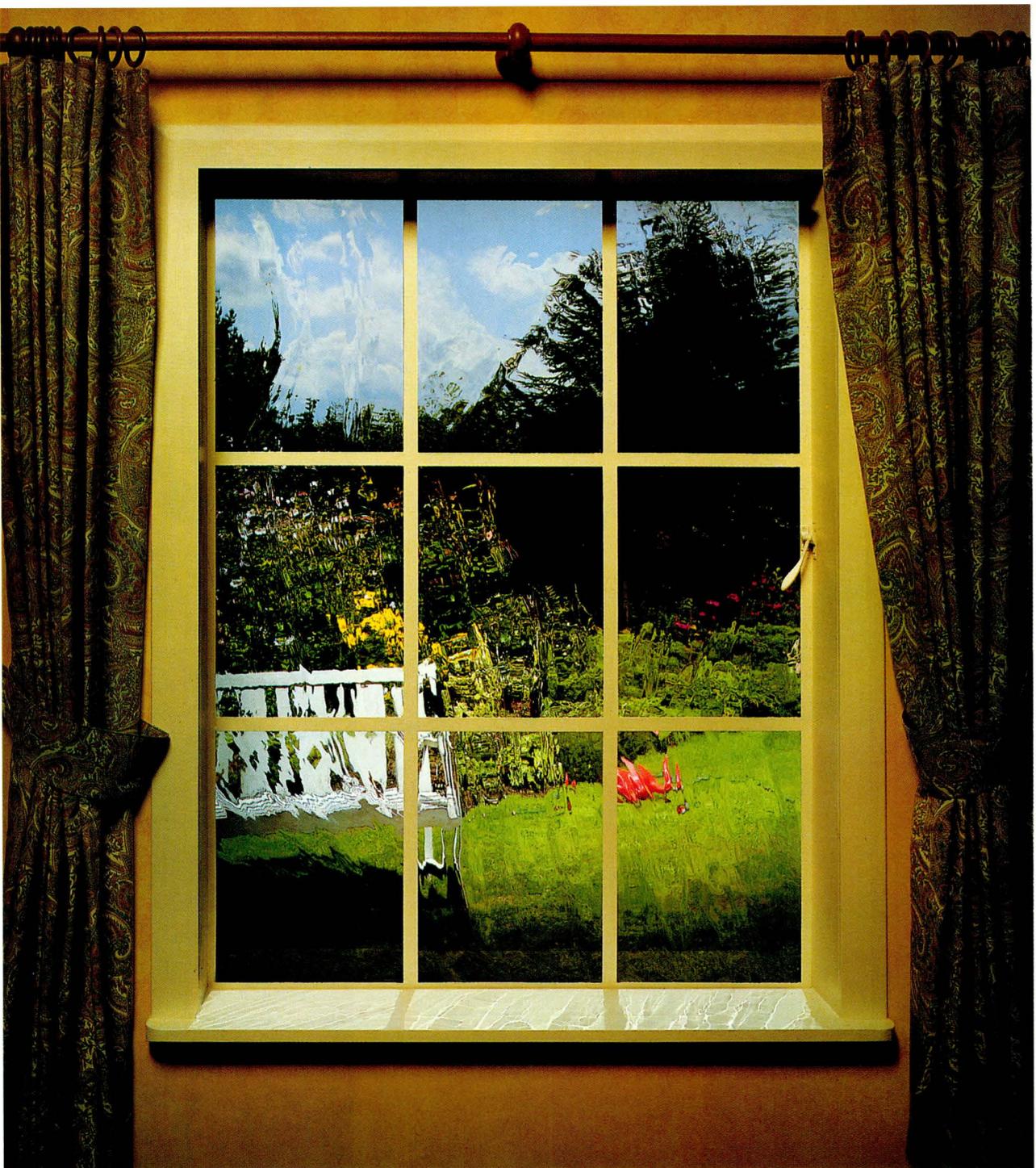
The show also saw the unveiling of Michell's £1,800 *Alecto* monoblocks, clad in back acrylic they not only looked good but made some astonishing sounds with the aid of an *Iso HR* (this must somehow stand for 'turbo nutter') and some tweaked Jamo speakers.

My notes seem to go on forever and there's no chance of mentioning everything but it's necessary, nay crucial, that I suggest you invest in large listening rooms so that you can use a pair of £8,990 *Living Voice Air Partner* horn loudspeakers.



These substantial yet attractive beasts were making some of the most tactile sounds I've ever encountered.

For once the literature understates the product's capabilities, describing them as offering 'a level of resolution and realism that can truly be described as adequate'!

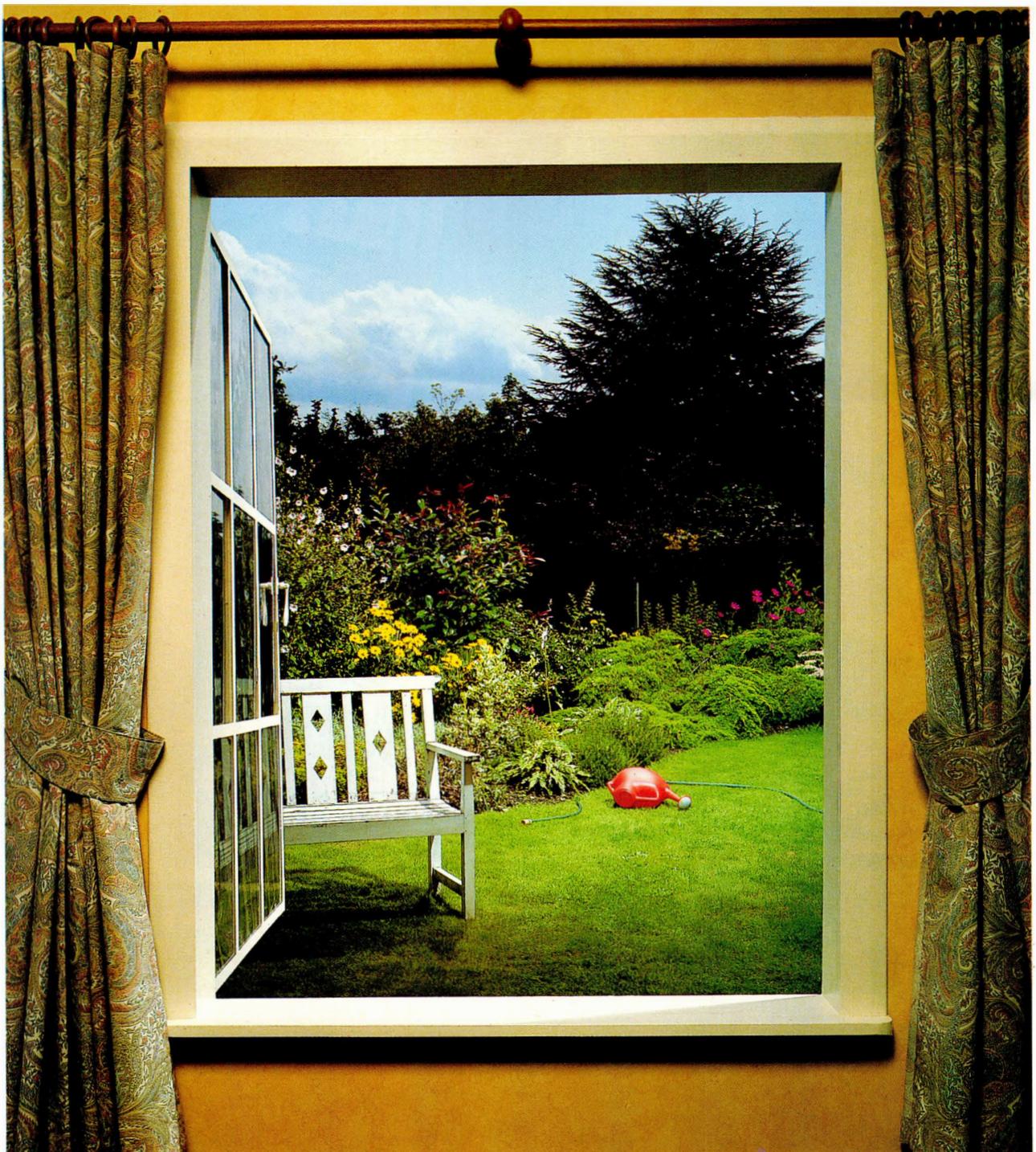


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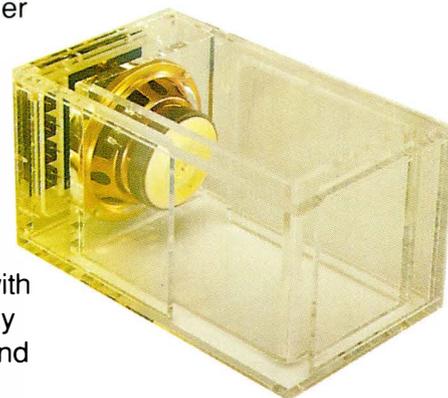


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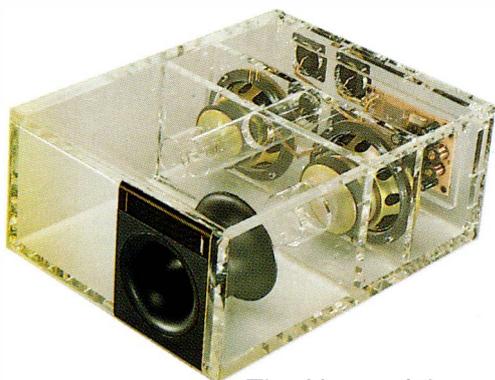
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A kindred spirit

Mission is attempting to recapture the spirit of its old favourite, the 770, with a new floorstanding design. Alvin Gold investigates.

It doesn't look much like the celebrated 770, the model that made Mission's reputation, but it is not hard to see that with the launch of the 753 Mission is trying to kindle the same kind of enthusiasm for a product with a similar fundamental appeal. Albeit one that's been updated to take account of the changes that have occurred in the decade or so since the demise of the 770.

While the 770 was a stand mounted speaker, the 880mm tall 753 stretches itself all the way to the floor via spikes and a neatly constructed plinth. The narrow (220mm) front panel and sleek lines make it the neater and less intrusive of the two, but its depth is a considerable 320mm. The 753 is intended for use hard up against the rear wall, which provides an LF lift and minimises the floor space lost to the loudspeakers.

Aesthetics have obviously been a priority, though most of the aesthetic decisions are functionally based. The real wood enclosure is finished in black or walnut, and while the latter is adequate, the walnut finish is magnificent, and costs no extra.

The cabinet edges are neatly angled, which contributes both to reduced diffraction and improved lateral dispersion compared to the dumpier 770. The narrow grill cover is cleverly integrated into the design, both visually and acoustically — Mission has designed the speaker to be used with the grill in place. In fact there are small gains in transparency if the covers are removed, but the top end then becomes a little too obvious and edgy.

From all angles the 753 is an interesting and even a surprising loudspeaker. Most enclosures are made by fitting a baffle and back to an open box consisting of the sides, top and bottom. This one works the other way, the hoop being formed from the top, base, front and rear, which provides the mechanical integrity where it is most needed — at the point of action, the front baffle. The theme is continued with the die-cast driver chassis which are much more securely bolted to the enclosure than



Mission's latest entrant in the value for money stakes - the floorstanding 753.

usual. The large side panels are braced for stiffness, and to reduce internal resonances the inset back panel is angled, a move that also provides clearance for the speaker terminals.

The drive unit complement consists of four similar 6inch bass/midrange units and a single soft dome tweeter. The arrangement has apparently been described by some as a line source: it isn't. The unit nearest to the tweeter operates over the bass and midband, and the next unit down provides some LF reinforcement, all three inhabiting a sealed section at the top of the column, a standard enough configura-

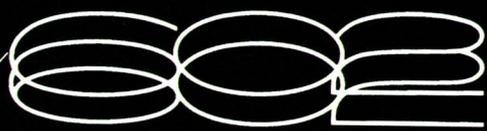
tion. The two units in the base of the enclosure extend the LF cutoff point from around 200Hz to below 40Hz, and also provide amplitude compensation for the characteristic peak and notch caused by phase additions due to nearby rear wall reflections. This then is a true boundary design, not merely one with a lean bottom end 'filled out' by boundary reflections.

The first sample of the 753 I heard was clean and dry sounding, fully in keeping with Mission's smaller loudspeakers. It had bass, but not of the kind that would rattle windows and upset neighbours. By the time the speaker had been readied for production the original voicing of the model had been ditched in favour of a fruitier and more obvious low frequency balance. In this form, which is the one being offered for sale, the 753 can and often does spit fire. Although in the nicest possible way.

The 753 takes a week or so to settle down, but by the end of this time the slightly prominent sounding treble is fully integrated into the main output, and the system as a whole is tonally near neutral, with a particularly accurate and explicit sounding midband. But the 753 really excels in other areas. This is a loudspeaker that is by any standards unusually quick and assured, producing something close to the coherent transient quality and natural sense of temporal flow normally associated with the better panel speakers. Yet it has the forcefulness and muscle extending deep into the bass that is the special preserve of good, big, dynamic transducers. Perhaps surprisingly, at least for those who have not previously encountered a properly optimised boundary design, the 753 also provides exquisitely delineated stereo soundstaging in both planes, soundstaging typically extending both behind and well forward of the plane of the loudspeakers.

There are some mild colorations in the mid and treble, though much depends on the exact orientation of the loudspeakers with respect to the listener. Despite this, the 753 is far from being a 'sweet spot' design, and its wide treble dispersion makes it more than usually capable of providing clean treble and believable stereo over a large listening area. The speakers also have a good 'throw,' indeed listening from a little further away than the standard two meters or so helps re-



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duce residual colorations and gives a more naturally distanced stereo image. My feeling was that the system had been voiced for listeners around three to four meters away, and that small rooms don't really do the design any favours.

Any loudspeaker of the 753's unusual inherent resolving power benefits from the finest partnering equipment that can be assembled, and the speaker was magic on the end of exotic amps from Audio Research and others. At the same time, however, the 753 has a lowish (but benign) 60hm load impedance and a high (90dB/watt/m) sensitivity, and I quickly discovered that it is as happy being driven by small high grade amplifiers like Pioneer's *A-400* as it is with Mission's own much more potent *Cyrus 2/PSX* supplied for test with the 753s.

First impressions of the 753 had led me to mentally price them around the £1,200 mark. In fact they cost only £595 a pair following a decision to attempt to sell the design in real quantity. It is not just the price that is relevant here of course: the fact that they are happy driven by low power amplifiers makes the real cost of ownership remarkably low. You don't need stands either, and it would be perfectly practical to build a high class system with real bass around the 753 for somewhere around £1,100. This new design is an unrivalled bargain, and comes highly recommended.

The price is right

Victoria Cooper checks out the Michell Mycro, further evidence that you needn't pay a fortune to get the best from your record collection.

There's an old saying in retail 'if it isn't selling put the price up!'. When it was launched the Michell *Syncro* met (and beat) such audiophile darlings as the Linn *Axis* and Manticore *Mantra* head on. But since then times and prices have changed.

Like it or not, CD now virtually dominates the front end market. Turntable manufacturers who once called the shots have been reduced to a poor second, jostling for position in the 'something to play my old records on' stakes. Or that's the way it seems. But there's a nasty side effect to this competition. Current fave rave, the Pink Triangle *LPT*, has pushed the price of quality over the £400 mark, and you still need a tonearm. The shapely *Syncro*, a mere £378 including arm, is adrift

in the doldrums, balanced between the serious decks like the Rega, and the £500 'hot hatches'.

John Michell could simply have hiked the price back in line with the others (and made a quick killing from the shrinking turntable market). Experience with the *Gyro* however, tells us that it's not his way. Instead he's spent the extra cash on improving the product. Enter the *Mycro*, a *Syncro* sporting the acrylic platter from its big brother.

The large slab of black didn't really work with the *Syncro*'s aluminium metal work, and necessitated a re-style. Aside from the new black visuals, other changes are strictly minor. That means you still get the simple-to-set suspension, Bauhaus looks and compatibility with the Rega arm (a must for any cost conscious deck.)

The things I liked about the original *Syncro* were its speed, separation and dynamic range. Music always seemed quicker, livelier and more fun than the competition. The price of that precision was a leanness to the bass and an occasional tendency to over exuberance, but the good points more than made up for that. Life, zest, looks and sense of humour, who could ask for more? You guys, apparently. Despite, or perhaps because of the price, the *Syncro* was all too often dismissed as just a pretty face.

Unfortunately, attempts to 'improve' products rarely seem to hit the mark. Happily, the marriage of *Syncro* and *Gyro* is a resounding success. It keeps all the

good points of the original but fleshes out the picture with welcome weight, poise and stability. The soundstage is wider and deeper, and much more transparent.

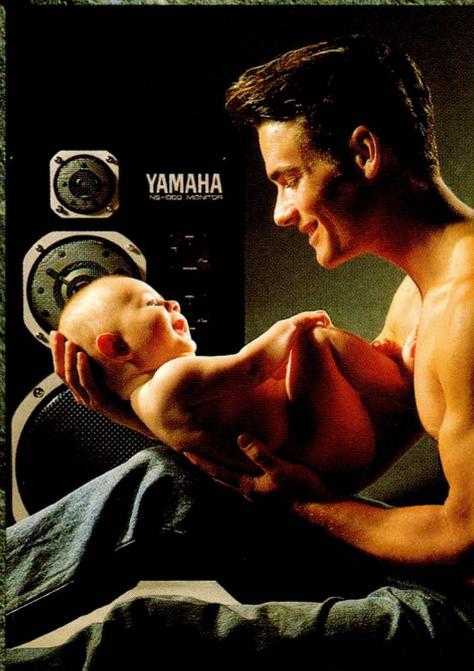
Comparisons with an *LPT*, also fitted with an *RB250* and Goldring *Eroica*, consistently favoured the *Mycro*. This wasn't just with me, three other listeners identified its greater stability, control, detail and above all authority. If the *LPT* heads the current field then it's in for some stiff competition.

The differences were wide enough to effect every kind of music played. Solo piano thrived on the weight and focus; the Pet Shop Boys just loved the speed and solidity. That confident versatility is the *Mycro*'s hidden strength, it seems equally at home with Monks; Thelonius or Gregorian, Malcolms; Arnold, Sargent or Maclaren. Regardless of what was played the Michell turntable gave us body and soul, mind and matter, a trick that only the much more expensive models can manage.

At £539, the combination of the *Mycro* and *RB300* should rattle a few cages. They don't just sound better than the competition, with one important exception, they look better too. The *Mycro* might be more than a match for the *Syncro* on sonic grounds, but it can't match it for looks. In this case the original is still the best, and happily for architects, design victims or the terminally tasteful everywhere, it remains available. *And* it's still the same price.



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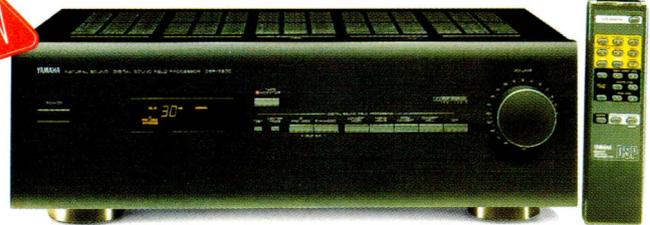


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LESS NOTES



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Statements

by Paul Messenger

The spread and spread of metal diaphragm drive units has been the most pronounced loudspeaker design trend of the past few years. Celestion started the ball rolling with the tweeter fitted to its radical *SL* series, back in the mid Eighties, while Acoustic Energy went the whole hog by adding a metal cone main driver a couple of years later. Now half the speakers on the market feature metal dome tweeters, and others such as Monitor Audio have followed the full metal diaphragm route.

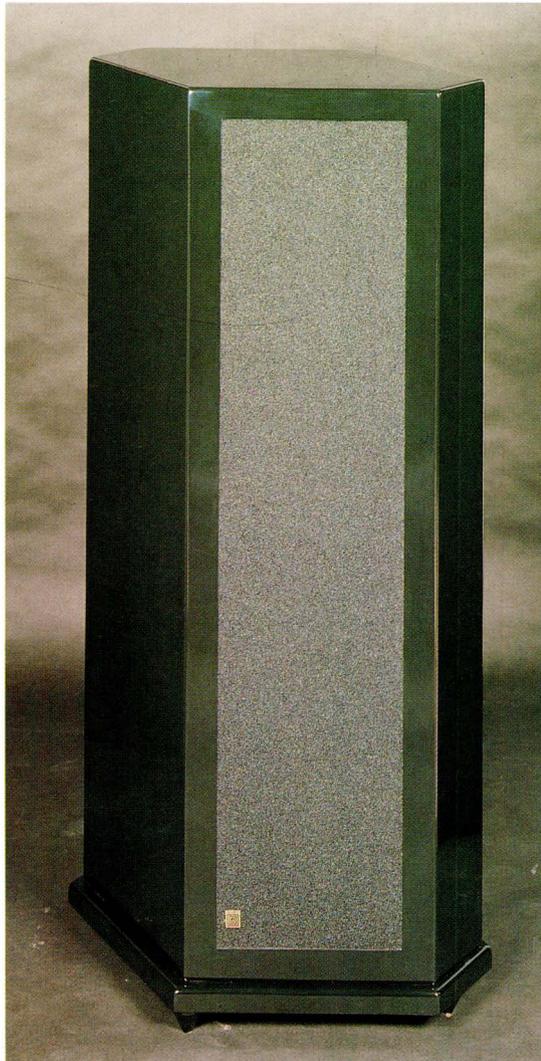
With all this relatively recent hi-tech action, it's easy to forget that metal has been seriously considered for the business end of loudspeakers since the very earliest days, being mentioned in the original 1925 Rice and Kellogg paper. Later on in the Fifties the Hugh Brittain designed GEC *Metal Cone Loudspeaker* driver and its partnering *Presence* unit (which evolved into the famous Celestion *HF1300* tweeter in due course) were important influences on the UK scene.

On the flagon

Ted Jordan had already established his reputation as Goodmans' senior engineer and as author of several seminal papers and books on loudspeaker and enclosure design when he left to start Jordan Watts and develop the *Module*. This is a small full-range metal cone driver that has been in continuous small scale production since 1964, most notably for the curious but well regarded *Flagon* with its tiny ceramic enclosure. I didn't in fact stay with W for very long, but has spent much time over the intervening years refining and developing his metal-cone technology.

The late Seventies saw the introduction of Jordan's own drivers, a 50mm mid/high frequency device and 125mm bass/mid unit. Most are sold direct to enthusiasts constructing their own enclosures, though the latter was an important feature in the original Townshend *Glastonbury*, a speaker that deservedly achieved cult status among cognoscenti. The Bandor metal drivers, found in several unusual and interesting speakers (Seventh Veil, Pentachord) also evolved from Jordan's work.

The original Jordan Watts company carried on building *Flagons*, changing hands once or twice until being taken



In a Classic of its own: the Jordan Watts JH 5K is sure to impress.

over recently by Roy Houlder, one of Britain's most respected cabinetmakers. To bring this saga to a speedy conclusion, Roy persuaded Ted to rejoin as technical consultant, and Ted was over the moon to find a cabinetmaker prepared to put his somewhat unconventional ideas into practice.

The first fruits were to be found at Penta '91. Those lucky enough to discover the JW room, including yours truly, were treated to some delightfully coherent sounds from an extensive range of beautiful black piano lacquer cabinets. Whether Britain will get another opportunity to hear these distinctive speakers

must remain to be seen. There are few UK dealers at present, most present production going to export markets, especially in the Far East, but I pulled rank and persuaded JW to drop down with a pair of the bigger ones for me to try.

I secretly hoped for the £7,680 *Classic JH 10K*, weighing 65kg and standing over 1.5m off the ground, but didn't feel too regretful by the time I'd lugged in and unpacked the smaller *Classic 5Ks*. Even these are 45kg, 1.25m high and cost three and a half grand, so we're still in serious high-end territory here. The two models are in fact very similar, differing only in the number of drivers and enclosure height, so I put my foot in it by suggesting Roy brought down a pair of *10Ks* just for the afternoon, when he returned to collect the *5Ks*.

Unfortunately, by the time the review had been finished and was waiting its turn in the publication queue, a number of important and worthwhile modifications had been made to the drivers and crossover, though not the basic configuration of the speakers. The resultant changes in balance and sensitivity required a further update session with the *5K*, with insufficient time for extended listening, or for further examination of the *10K*.

Jordan's justifications for his metal foil drivers make fascinating reading for anyone interested in loudspeaker technology. The assertion that for maximum linearity a diaphragm should be made of essentially elastic materials like metals rather than more lossy or plastic hysteretic materials makes some intuitive good sense. However, discussing the subtleties of compensating for the variation of air load impedance with frequency by controlling cone propagation velocities to give an even acoustic power response is pretty heavy going technically, and explanation would take up more than my space allocation.

The drivers are unconventional in other respects too. Instead of using a conven-

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OUTSTANDING VALUE



tional suspension 'spider' between cone and voicecoil fixed to the frame just ahead of the magnet face plate, a pin attached to the apex of the cone passes through the centre of the magnet assembly to a suspension fixed on the back, an arrangement which is claimed to offer worthwhile improvements in high compliance linearity.

Armageddon time

The most orthodox aspect of the speaker is that it's a simple sealed box, albeit one that's built to survive Armageddon, heavily braced and damped, and hexagonal in plan. In fact it's shaped like an elongated playing card diamond (a rhombus if you prefer), but with about 90mm lopped off the sharper points and replaced by a 110mm flat. The whole effect is enhanced by a hefty little separate plinth, slightly oversized and with spiked cones to provide proper floor coupling.

The cabinets are mirror imaged (as were the terminals, be warned) and designed to be placed well out into the room with what would have been the longer diagonal set parallel to side walls and directed towards (and away from) the listening area. Even more than usual, careful experimentation with the angling and siting pays great dividends with this speaker. The drivers are mounted on the forward inside panels, so that the normal axes invariably cross well in front of the listener. Slightly wider than usual spacing seems advantageous.

The drivers consist of two Jordan 120mm cone bass/mid units plus a row of four 50mm mid/tweeters, all arranged in a vertical line. The larger 10K uses thirteen drivers in total — nine mid/tweeters in vertical line plus two bass/mids above and another two below. The blurb mentions (and measurements confirm) that there's wide overlap between the drivers, so over much of the midrange the array acts as a full line source. It does so in the treble too, but to a lesser degree so it's quite important to sit so the ears are between the lower and upper tweeters, which in the 5K is a fairly narrow spread of about a foot (300mm between 700mm and 1m from the floor).

I carried out the usual *Choice* room-based measurements, and am quoting those referring to the latest (Sept '92) samples of the 5K. The load is very easy with no abrupt changes, just dipping a little to about 4ohms at high frequencies. In-room bass extension is very healthy (-8dB

They are undeniably
expensive, but few can
match a combination of
delicacy, cleanness,
coherence, scale and
focus which must
represent the apothe-
osis of metal
diaphragm technology.

at 20Hz), while sensitivity is just a little below average at around 86dB (a tremendous improvement of around 5dB over my original samples).

Though not entirely neutral nor free from resonances, the overall balance is pretty good, the in-room response falling within an impressive plus/minus 5dB 20Hz-20kHz. The most obvious character is a slight presence forwardness and unevenness, with significant variations according to the precise angling of the cabinets, plus some loss of energy through the upper treble.

The sound quality follows the measured performance very closely indeed — much more so than is often the case, largely because the sound itself is so remarkably clean and linear. You can clearly hear the fine subsonic extension and good midrange balance, alongside the rather emphatic and occasionally untidy presence/treble. There's some nasality and hardness on unkind material, but fine clarity and great multitrack analysis too.

The slight treble roll-off does lead to a mild loss of air, while the significant variations introduced by slight changes in orientation about the vertical axis can be a source of both frustration and fun. Get it right and sit on the sweet-spot and the speakers themselves seem to disappear, acoustically speaking. Much like the finest electrostatic panel designs, you hear

the music, and a beautifully focused stereo soundstage, but remain largely unaware of the boxes themselves.

Constraints in the treble, in very low level resolution and the sense of dynamic freedom do limit total transparency a little, but the overall coherence, cleanness and consequent clarity and musical insight is right up near the top of the first division.

Kicking it

I accused the original samples of a consummate inability to kick ass, made the more irritating because it's so clean you want to keep pumping up the volume, but run out of volts, amps and/or excursion all too frustratingly quickly. The latest version goes a long way towards satisfying this criticism, and is capable of very respectable loudness levels even though it's still not really a first line choice for headbangers. Although there could be more authority and grip, the speakers are notably revealing of the drive signal, especially in the midrange, and sound quite delicious when valve powered.

I only had a couple of hours with the original 10Ks, and no time to correlate with the latest driver versions, though intelligent application of deduction allows some of the changes to be inferred. Clearly superior in several important respects, it nevertheless has its own idiosyncrasies too. Sensitivity is up a useful 3dB, so the loudness potential is significantly enhanced. Extension is much the same as the smaller model, but the nine-strong tweeter array is still short of upper treble output in the far field, which I'm sure is responsible for some 'shut in' character and coloration.

No speaker is perfect, and both these Jordan Watts *Classics* have their share of foibles, but also some very real strengths. They're undeniably expensive (thanks in part to the superb lacquer finish), but few can match a combination of delicacy, cleanness, coherence, scale and focus which must represent the apotheosis of metal diaphragm technology, and which leaves most conventional alternatives sounding relatively dirty and uncouth.

The elegantly slim and extravagantly over-engineered enclosure plus line source operation results in a delightful freedom from boxiness that compares well with panel speakers. And as the name implies, the relaxed and delicately coherent presentation is particularly well suited to classical music reproduction.

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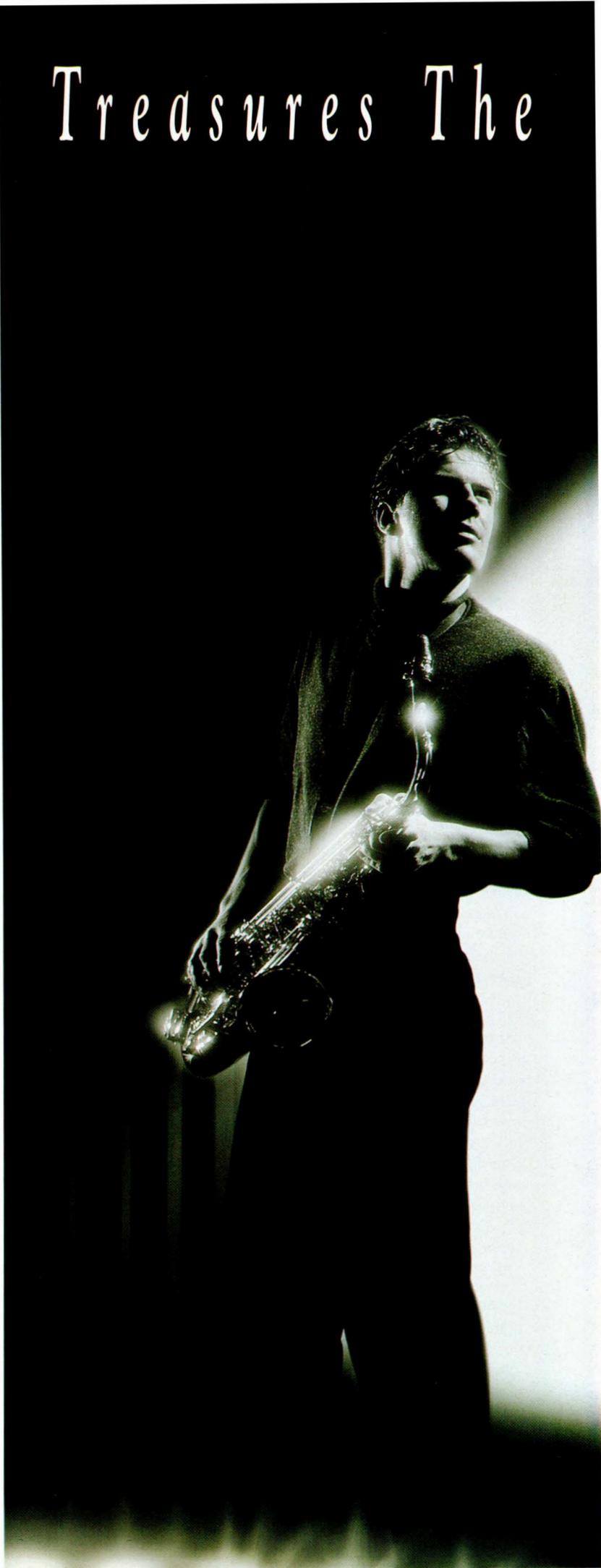
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*This month the intrepid
Houston and Richardson
discover a modern gramophone in an energy efficient
house which was designed
and built by its inhabitants.*



The greenhouse sound

The ethics of conservation govern the theme behind this month's *Aspirations* feature which visits a middle-aged couple who designed and built their energy-saving home in South East London. David and April Matthews live in what is best described as a greenhouse, with a huge double-glazed window covering the whole of its front facade. The house was designed to be 'green' in the energy efficient sense as well: the south-facing wall-window maximises heat absorption from sunlight so that during winter the average temperature remains in the seventies. The Matthews have heavily insulated their home, and only need to use a wood-burning stove on the ground floor as a backup on cold nights. The windows are angled so that the summer sun, being higher in the sky, does not turn the house into a natural oven.

They are also somewhat conservationist in the audio sense, preferring to stick with a collection of jazz LPs rather than opt for the 'new' formats of cassette and Compact Disc. However, investment in a brand new gramophone system means they are hearing these records afresh, an

impressively capable Voyd record player bringing out instruments and detail on their records that they had missed before.

The house was built from scratch in 1984 on a rare fifth of an acre vacant plot of land in Forest Hill. David Matthews had always wanted to build his own house since his days as a furniture design student at the Royal College of Art, and so the couple already had some ideas about how they wanted to live. Even so it took them two and a half years to build, doing much of the work themselves, while living in a caravan in the garden.

The result is something which looks very different from the three storey Victorian and Edwardian houses on the rest of the street, both inside and out.

The Matthews reappraised their lifestyle while designing the house, and opted for open plan living on both floors. Upstairs their living and sleeping areas are separated by two bathrooms (one each) and square pillar-like bookcases; light, and warmth, filter through to the back of the house where French windows open onto two plain wooden balconies. There are no handrails on these; there are no children to consider, so the Matthews'

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morning view of their explosively verdant garden is uninterrupted.

On the ground floor there is a similar lack of doors with just one to the guest bedroom and its adjoining bathroom. This is a more communal area, with the kitchen at the back of the house leading out through a dining area to the reception space at the front.

Instead of net curtains the Matthews have set up a wealth of indoor house plants at the front of the house which break up a passer's by view into their home. A clever extractor fan, which uses heat-exchanging technology to warm up fresh air as it is brought into the house, prevents the condensation that might be expected from so many plants.

David Matthews sold his manufacturing and joinery business two years ago and now works as a designer from home. For him commuting to work involves a leisurely stroll through the plethora of plants in his back garden, over the small wooden bridge of his goldfish pond and into his office with its high tech computerised drawing system, in a large shed.

Counselling advice

His knowledge of design and the timber industry undoubtedly helped in building the house. "We have an architect friend who held our hand a bit at the planning stage, but there were no problems with Lewisham Council. They supported the idea especially because it was energy-saving," he says. The house is of timber frame construction, supported by 15 massive concrete and steel foundation piles because it is sited on a hill. "It has a skin of brick over the outside; planners haven't yet forgotten the great fire of London," David added.

While he and April were living in the caravan they lent their old hi-fi system to friends. Having moved in they retrieved it and partly upgraded it four years ago with Linn amplification and loudspeakers. The old system is still in place in their upper living area, with Linn *Kan* loudspeakers against the wall on one side. The trusty Rega 3 turntable, Linn *LK1* preamplifier and *LK2* stereo power amplifier are set on shelves to the side with a Creek *CAS3140* tuner.

But David found himself increasingly dissatisfied with the rather tinny nature of the *Kans*, which sound as lost as a mosquito in the Arctic in this open plan setting.

"At first I wanted some decent speakers," he says. "But I was also finding the Linn amplifier difficult to operate. Half the time I could only get it to work with the remote control and I can't cope with



"I went to the Heathrow Penta Hi-Fi show in 1991 but I found it all so artificial, and I did look at several other systems, some of them were very expensive and I found some of the dealers very snobbish — I couldn't be bothered with that."

A Voyd turntable forms the heart of the Matthews' system.

things like that; I didn't even claim on the insurance when my video recorder was stolen. It would have been immoral since I didn't want to replace it!

"I also felt the Rega turntable had never worked so well after we got it back from friends. It had been knocked off a table and I think the arm was damaged. Anyway the long and the short of it was that I decided to buy a complete new system."

Conveniently an actor friend, John Arthur, had recently run the gauntlet of upgrading his hi-fi system and David was able to benefit from some of his experience. "I went to the Heathrow Penta Hi-Fi show in 1991 but I found it all so artificial, and I did look at several other systems, some of them were very expensive and I found some of the dealers very snobbish — I couldn't be bothered with that. Then John Arthur introduced me to Gary Dews of Definitive Audio."

After an initial visit to hear some alternatives at Definitive's Brighton base, Dews brought a prospective system for the Matthews to audition at home.

The system is a proven winner in terms of sound quality with the components from different manufacturers chosen for their compatibility. The front end consists of a Voyd record deck and SME *V* tonearm internally wired with Audio Note *ANI* silver cable. An Ortofon *MC2000* cartridge is used to transduce the magic from a record's grooves which is then amplified



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with an Audio Innovations valve pre and power combination — the *Series 200* and a brace of *Series 1000* monobloks. The loudspeakers are *Impulse H2s*, a three way horn loaded design.

The hi-fi was set up in the downstairs living area at first and has done the required job of selling itself on approval. The Matthews plan to move it upstairs shortly which will hopefully improve the sound further. Upstairs the acoustics will almost certainly be more inert, with the woollen carpet, sofas and bookcases absorbing echo and softening the tone.

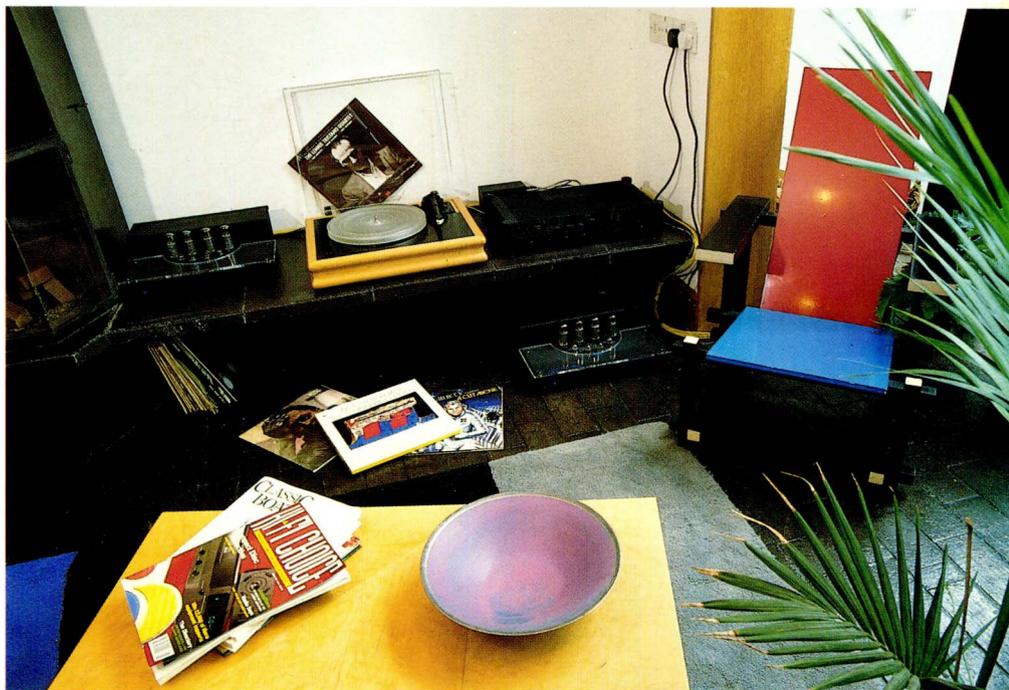
For our hosts, having the system on trial at home was invaluable: "It's impossible to evaluate hi-fi like this without listening to it at home first," David Matthews opines, "most dealers' rooms aren't like this place and so you don't know what it will ultimately sound like."

Describing the sound quality of the system David ventures that it is more realistic than other hi-fi he's heard: "It's like trying to describe the difference between a pretty girl and one who isn't pretty. Saying something is attractive is a subjective judgment. I don't know about the technology involved and I don't want to know about the technology, if it's good then that is what matters."

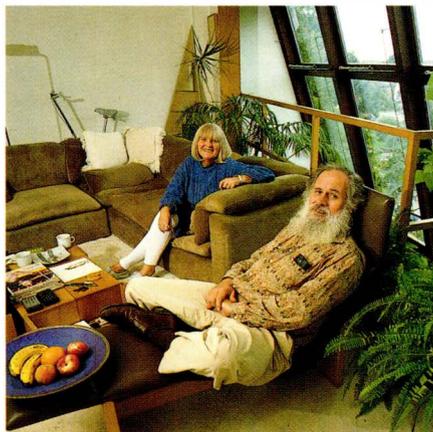
Apart from the cartridge, interconnect and loudspeaker cable this hi-fi is entirely British and suits a refined taste. It presents a clear undistorted sound which is often described as relaxing, especially over long periods of listening. Gary Dews explains to his customers that all hi-fi systems manage to distort the sound of a musical instrument or singer's voice to some extent: "Your brain then makes the adjustment between what you are hearing and what you know you should be hearing," he says. "The point of a system like this is that your brain has less work to do in bridging the gap between the sound of the recording and that of the original, so listening is easier."

Having owned a valve amplifier in the Sixties David was not surprised that the technology is still viable. But he has found that listening to this system has changed his view on what hi-fi can, or perhaps should sound like. "It's something I've only just noticed, but I realise that after listening to a system like this, it's only when you go back to what you had before that you realise how different the quality is. And apart from perception of music I find there are musicians on the record that I'd never heard before.

April, who has spent more time listening to the system, is also enthusiastic about its merits, describing it as much easier to use than most other hi-fi. "I'm still a bit



Above: The system itself, complete with a most excellent hi-fi magazine, and (left) its proud owners.



this harshness, which the new deck doesn't have, especially with some of the older be-bop jazz records, or early Miles Davis which are my favourites."

The pair used to regularly listen to live music, principally at the famous jazz haunt Ronnie Scotts. But by the mid Eighties they found that it had been usurped by yuppies whose appreciation of music was limited to paying the entrance fee and then running up extravagant bar tabs. "You couldn't listen to music there any more," they lament, "even the musicians stopped playing in protest at the noise a couple of times when we were there."

As one-time committed jazz fans (they call their three cats Gerry, Mulligan and Stan Kenton), they are now looking forward to rediscovering music as a pastime, but accept that for their tastes this may mean buying records second-hand from specialists. They don't want a CD player: "I don't see any point in buying CDs," David says, "I think that would be a step backwards to the kind of sound we used to have. The worry is that it is difficult to buy new records, although there are a couple of local shops which sell them."

The Matthews are planning to sell their greenhouse and to move to a place where they can grow more plants and vegetables. They'll leave much of themselves behind in the house they've built, but at least they can recreate some tuneful memories, if they find somewhere with a decent listening room.

The System:

Voyd turntable	£1,580
SME V customised tonearm	£1,550
Ortofon MC2000 cartridge	£599
Audio Innovations Series 200 preamplifier	£349
Audio Innovations Series 1000 monobloks	£1,499/pr
Impulse H2 horn loudspeakers	£2,250
Audio Note ANV interconnect cable	£150/M
Audio Note ANV loudspeaker cable	£12.50/M

Supplied and installed by: Definitive Audio, Brighton. Tel: (0273) 208 649.

respectful of it at the moment," she said, "But it doesn't have a lot of silly little coded buttons which I find annoying — I'd have to go off a find my glasses just to use the old system. I never really liked the sound of hi-fi before, it seemed to have



A special transducer

Audio Note cartridges were invented in Japan but are now made in Britain. Dan Houston traces the historical development of the IO.

It's a highly unusual transference of technology. Many people think that hi-fi is a result of Western research and Eastern development, and that Japanese economic success in particular has been due to turning the West's inventions into cheap and reliable products.

But this month's *Craftsman* feature tells a different story — that of the Audio Note cartridges, which were invented in Japan, but which are now made in Britain.

Hiroyasu Kondo is the 50 year old engineering genius behind Audio Note of Japan. He is famed for such designs as the £34,000 Audio Note *Ongaku* valve amplifier, something *Choice* has described as probably the best sounding amplifier in the world. Having set up Audio Note in 1976 after working for Teac and CBS Sony, Kondo quickly established a reputation for superlative-sounding designs that often used large amounts of silver wire.

Choice profiled Kondo himself in a *Craftsman* feature in August 1990 (issue 85). He's a likable, retiring man, almost shy and not the sort of person you would expect to break with the Japanese tradition of working for one company all your life. A degree in electronics from Tokyo

University led to a job with Teac researching digital technology for tape recorders, and developing and improving solid state circuitry in amplifiers. Later, from 1968 to 1976, he was a recording engineer with CBS Sony, now Sony Music. At that time he began writing technical articles on audio circuitry for Japanese audio magazines, establishing himself as an authority with a perspective on both the software and hardware sides of the industry.

Specialising in excellence

Most small companies in the hi-fi industry concentrate on one area of design, and have to do it very well to succeed. But those who have come to know Audio Note are often awestruck by Kondo's grasp of the diverse technologies used in his cartridges, amplifiers and loudspeakers. His designs are as much reappraisals of the technology involved as a linear development from what has gone before. His roving genius has recently been applied to in-car loudspeaker systems, which have found loyal fans in Japan.

Kondo was born in 1942, in Japan's northern province of Hokkaido. The second son of a Buddhist priest, he grew up

with a background of religious music and once told me: "Being quiet can be heard; good philosophy is always about listening to the inaudible sounds of nature."

He adopted his father's hobby of do-it-yourself audio, making a three watt power amplifier using a single 2A3 valve while still at school. At the same time he became familiar with western classical music, and vividly remembers at the age of 15 hearing Arturo Toscanini conduct for the first time.

The advent of the transistor in the Sixties led to his making solid state designs for his own use, and it was not until he founded Audio Note that he looked again at the possibilities of amplifier design using valves.

Audio Note's first major product was a step-up transformer which used silver wire in both primary and secondary stages. Kondo describes the use of silver in audio components as giving a 'pure, full and natural sound'. "It is especially good in terms of low frequency resolution being smooth and distortion free," he maintains. Typically for a genius he remembers having the idea of using silver wire while sitting on the lavatory one day!



His first foray into cartridge design was in the late Seventies when he rewired an Ortofon *SPU* with silver cable. This was followed soon afterwards by the introduction of the Audio Note *IO* and in 1983 by the *IO Limited* — an active design with its own power supply.

The basic *IO* is more conventional than its *Limited* cousin. The most interesting aspect of its design is that it uses two magnets instead of the single unit found in most moving coils.

The two magnets are also positioned extremely close to the gap occupied by the coil at the end of the cantilever, thereby effectively focusing the magnetic field. The gap itself, as a reverberant space, has been closed to a point where the resonant frequencies produced would be super sonic, and inaudible.

The *IO* cantilever is made of tapered titanium, a material chosen because its stiffness to weight ratio is better than that of the more common aluminium. The body of the cartridge is made of brass, chosen for its rigidity, again to eliminate any feedback caused by resonant mechanical energy which would transfer and interfere with the tiny electronic signals being produced.

“Being quiet can be heard; good philosophy is always about listening to the inaudible sounds of nature.”

Kondo's listening room in Japan where the prototype products are tested before production begins.

Even the shape of the body, with its various angled surfaces, is designed to dissipate resonance and the whole thing is bolted together to ensure maximum rigidity.

The diamond stylus tip is the widely respected van den Hul Type One, which has a fineline profile. These are made in Japan and are claimed to be finer than those made by van den Hul itself.

Even with the *IO* design Kondo felt he could improve the sound quality of the cartridge by introducing electromagnets. The *IO Limited* has its own power supply to create the magnetic field, and comes with six terminals instead of the usual four, the extra pair supplying current to the electromagnet.

Moving on

When we visited Kondo in his factory in the Shinagawa suburb of Tokyo, we found him preparing to launch a completely new type of loudspeaker system for his Sound Meister Range of in-car loudspeakers. The bass unit is a double diaphragm

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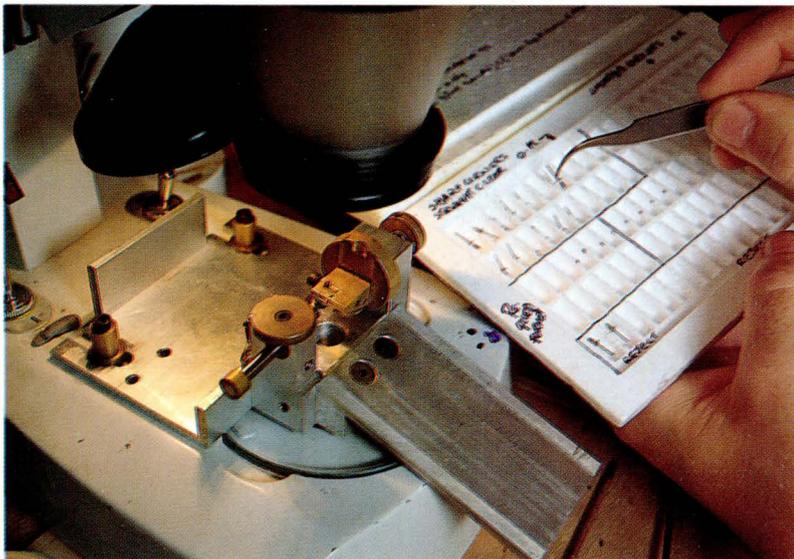
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Right: Robert Dowse, who builds the IO cartridges, and below, the jig where the birth takes place.



cone design with four holes cut into the outer cone. Kondo claims this design, which is critically engineered, improves the bass range of the 160mm loudspeaker, giving it the characteristics of a 380mm normal cone design.

His tweeter uses a silver cone as opposed to the more popular alloy alternatives. "I tried other types," he confesses, "but I found that aluminium sounded heavy, titanium was too sharp and beryllium was too noisy and brilliant. The silver has a clear sound but is soft and mild as well." Listening to the demonstration it was impossible to disagree.

The factory occupies the first floor of a nondescript building, above light engineering workshops. Kondo shares it with five artisans who make the Audio Note products. The listening room at one end contains his colossal Italian marble fronted loudspeakers as well as some horn loaded designs and the odd *Ongaku* here and there.

His own office has a signed photo-

graph of Toscanini in it to remind him of what it's all about. Down the corridor there are stores containing raw materials which will be cut, drilled and turned into the required shapes. Two workshops and a test room, with its CAD system glimmering in the corner, take up the rest of the space, and barely a square inch seems wasted.

Do it yourself

Everything is done by hand here; Kondo makes his own capacitors and loudspeaker coils. One gets the feeling that if he could no longer source decent triode valves he would set up a little glass blowing facility in the corner and make the chunky vacuum tubes himself!

The reason for such intensive craftsmanship, where an engineer winds silver speaker coils one day and solders silver amplifier circuitry the next, is that Kondo cannot get many of the internal components he has designed for his own systems elsewhere. A silver wired capacitor

weighs as much as a hand grenade, costs a little more and probably elicits the same explosive response if you asked the local electronics company to make you one.

By the time of our visit all that remained of the cartridge production was a little wooden compartment box showing its design in evolution.

With most IOs being exported to Europe and the fiddly manufacturing process taking up valuable time which he wanted to concentrate on other projects, Kondo agreed to ship the technology to Britain in 1989.

The solution was Audio Note UK, which has distributed Kondo's designs in Europe for the past decade. Recently Audio Note UK has begun manufacturing its own products and British designs, such as Snell-like loudspeakers and the *Oto* integrated valve amplifier, which run alongside imported Japanese exotica.

The IO cartridge is an essential part of the analogue oriented Audio Note UK product line-up, so when Kondo ceased to make it a British craftsman was sought for its manufacture.

The task was given to Robert Dowse, who has been working with Audio Note UK for several years and developed the Snell-friendly *Pirate* loudspeaker stands.

Dowse, who studied design with wood, metal and ceramics at art college, works from the basement of his Brighton home.

The language problem

Dowse was asked to visit Kondo in Japan and see how the IO and IO Limited were put together. With the language barrier

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causing obvious difficulties Dowse found that he could only watch the Japanese at work and learn as much about the intricate assembly process as possible. "I think the two weeks in Japan were just pointers and it has taken the last three years to find out what makes the cartridge work," he says.

Back home Dowse refined his own manufacturing technique while existing stocks of Audio Note cartridges were allowed to run out. At the same time he was working on a counterweight less tonearm design, the Delta *i*, which unfortunately proved impossible to manufacture consistently. Dowse describes himself as best suited to 'productionising ideas' and learned much of his practical engineering skill working for a spiral staircase manufacturer.

He is not new to hi-fi, however, and describes an early passion for home-made sound systems: "When I was 12 I made a record player from Meccano and bits of wood, it had a yoghurt can with a pin through it that I used as an acoustic horn — that was my first cartridge!"

Happily his system has improved along with his manufacturing skills and nowadays he is likely to be found with medical tweezers rather than Meccano spanners, peering down a microscope as he turns

Much of the assembly process takes place under a microscope.

the intricate wire which makes up the moving coil of the *IO*.

With a sheaf of Kondo's definitive design drawings at his disposal, and the ability to make his own jigs and tools, Dowse was ready to go into full production by January 1991.

The *IO* is made up of 46 individual parts and, as many of them have to put together under a microscope, he can only make two or three each week. He imports such parts as the cantilever and tip which are glued and oven cured before he puts the signal coils on, and uses his own magnetiser to put together the magnet assembly as fast as possible, something he describes as necessary for consistent results.

Turn it on again

One of the most difficult tasks is turning the coils on the cantilever assembly, which use 120mm of silver wire 50 microns thick — sneeze and you have to start again! This is apparently the thinnest available silver wire and is imported from Japan.

However, it necessarily limits the number of coils that can be turned at the

end of the cantilever and so restricts the output of the cartridge (with 20 turns per channel the *IO* needs a step up boosting transformer which is happy to deal with its three ohm output impedance).

Other moving coil cartridges use copper wire which can be extruded to 20 or even 15 microns, so resulting in more turns and a higher output, but even so silver is considered better in terms of sound quality.

For turning the coils Dowse found the Japanese jig difficult to use and so made up his own which speeds up this tricky process.

He has also been able to optimise the production in other areas and says the cartridge will continue to improve as the production process evolves. For instance he found that the Japanese pole pieces were non uniform and has developed a system of finishing them with extremely fine 'glasspaper' to ensure a smooth, flat surface.

Whatever refinements have been made, or are yet to come, it is clear that the transfer of technology has been a success — Audio Note UK has even been able to sell a few of the British made cartridges back to Japan. Which is rather like the French drinking an Australian Chardonnay.

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Actually, with the 900 Series, the only time John and Sue need their hands free is to count all the superb features.

The FT 930 digital tuner is equipped with Radio Data System (RDS) for easy station identification and storage, whilst the CD 950 Compact Disc player has DAC 7 Differential Bitstream conversion for absolute clarity of sound.

Talking of which, the 900 Series is the only range to offer the all new Philips Digital Compact Cassette (DCC) which gives you CD quality sound on tape.

And as the FA 930 amplifier has digital circuitry, John and Sue can record those favourite love songs of theirs from CD to DCC with no loss of sound quality.

The system is available from £649.99 (R.S.P) and is also available as separates from £149.99 (R.S.P).

Don't waste any time getting down to your local Philips dealer to see the 900 Series. After all, you won't waste any when you use it.

PHILIPS



Readers Write

CHOICE ANSWERS

Too harsh for an old rocker

I have written to your good selves in the past (in fact I bought my CD player on your recommendation), but my system has changed somewhat, so I'll tell you what it consists of at present: Arcam Alpha CD, Thorens TD160 mkIV (Goldring 1012 cartridge), Naim NAC 32.5/SNAPS/NAP

Isoda
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160, Rega ELA loudspeakers, Denon cassette deck and a Technics tuner. The speaker cable is NAC A5, CD to preamp interconnect is Van Den Hul and the amplifier interconnects are SNAICs.

All the equipment is on home made shelving, which is fairly solid, but will be replaced with more suitable racks/wall shelves when I redecorate. The room is approximately 14 by 12 with a solid concrete floor and the speakers are almost 'in' a bay window, about three to five inches from the rear wall. My taste encompasses almost everything except opera and dance music. I'm told that I'm an old rocker at heart.

At the moment the system sounds very similar to the recent review you carried out of the Rega loudspeakers! Sometimes a bit nasty (harsh?) and rather lacking in bass weight and authority. I realise that my sources are not quite 'up' to the Naims or the Regas, I know this, because Naim and Rega told me

as much! However, apart from upgrading my equipment supports, I feel the 'problem' lies with the speakers.

I have heard many alternatives; Epos 11s and 14s, Naim IBL/SBLs, some small Royds (can't remember which ones, but they did supply an improved bass, but also a very ragged treble) and some Linn Kabers, none of which fulfilled my criteria. I am after a much warmer sound basically, one that doesn't push you back into the listening chair! It's not the amount of bass I want to improve upon, more the quality of it, ie, a bit deeper and much warmer. Clarity etc are fine as they are. Do you have any suggestions?
Nigel Smith, Bedford, Middlesex.

Apart from the Regas other sources of aggression in your system include the cartridge, which should be changed for something a bit more relaxed, such as a Shure VST-V, and the CD player.

The Alpha is a good player but when combined with speakers like the Regas is likely to be a tad abrasive, adding a smoother sounding DAC like the Audio Alchemy DDE would help matters.

However, if you'd prefer a pair of loudspeakers that tame the system down a bit try one or more of the following: Boston T830 (£399), Infinity Reference 30 (£330), Mordaunt-Short 5.40 (£299) and last but not least the Tannoy 609 (£250).



The MS 5.40, a possible taming influence for Nigel's system.

The wisest way to blow £600

Should I buy a pair of Castle Chesters to go with my present set up, Linn Basik/Akito/K5, Audiolab 8000A, Marantz SD60 and speakers which I don't really want to mention because you might laugh, or would the more sensible and rewarding route be to upgrade elsewhere and go for cheaper boxes?

I have listened to quite a few speakers priced around £600, and for my tastes in music (mainly classical and jazz) the Chesters are simply dazzling in both the looks and sound departments, but the same question insists on rearing its head — is this the wisest way to blow six hundred quid!?

Additionally, what CD player would you go for round the £300 mark?

R A Smith, Saddleworth, Lancashire.

If you like the Chesters that much then blowing your entire budget on them wouldn't seem such a rash move. Your turntable would then be the weakest link in the system but capable of providing good musical entertainment nonetheless, and you could of course always upgrade it at a later date.

Before you actually do the deed however, make sure that your front end, amp and any prospective disc players work as well as the demonstration systems you've been using to check out the Chesters.

As for Compact Disc player nominations this issue has a feast of highly regarded machines on test, and if none of them appeal there's always the tried and tested Rotel RCD-965BX waiting to do its stuff.

Achieving the desired effect

I am pleased with my hi-fi, but if possible would like to develop its performance.

My system is: Pink Triangle/Rega RB300/Goldring 1012 via Mission Cyrus I to Epos ES11s bi-wired with Naim NAC A5 cable. The turntable support is a Target TT2 equipment stand and the ES11s are on the maker's dedicated stands. The listening room is 12 by 14 feet. I like the sound of this set up, as I enjoy an open, detailed, neutral presentation of the music I listen to, which is mainly jazz, blues, and orchestral classical music.

I would like to achieve a greater sense of presence and depth, with better definition in the lower registers. I don't like bass to sound artificially enhanced, but would like to be able to follow acoustic bass lines with more ease.

My friendly local dealer thinks that a change of cartridge would produce an improvement and recommends an Audio Technica AT-OC5. I have never used an MC cartridge before, and would like your opinion on whether this would be a cost effective way of achieving the desired effect.

If the answer is no, do you have any recommendations, in terms either of another cartridge or any other ideas that would be effective, if possible without changing any major components?
G Sawyer, Bristol, Avon.

Your dealer is on the right track, a different cartridge would help bring about the sort of improvements you are seeking, but I'm not sure about his choice for a replacement. You might well find the OC5 a bit dull after your 1012 which, if nothing else, is a lively little beast.

I would be inclined towards an Ortofon MC15 Super (£100) which has excellent resolving powers for the price but doesn't have a tendency to sound uninviting.

Another thing you should consider is improving your turntable support with a Mana Soundframe between it and your Target TT2.



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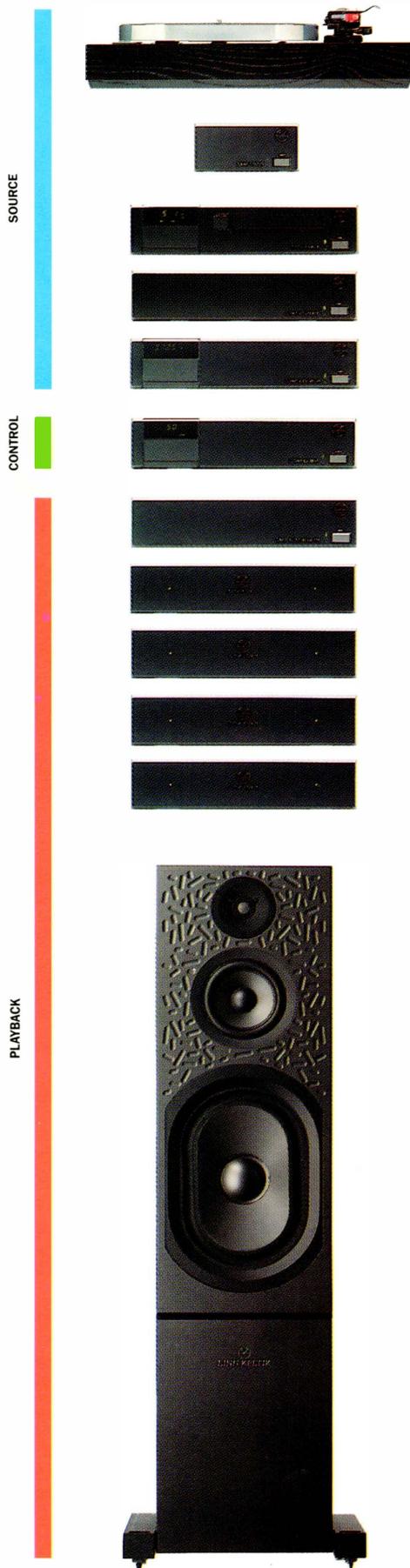
Every hi-fi system has three sections: the source, the control and the playback. In our top system the source includes a turntable, an FM tuner and a CD player.

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In a real hi-fi system you have the freedom to improve any of the three sections. With Linn you can start with our more affordable components and, upgrading step by step, build up to the best.

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To choose a real hi-fi, first choose where to buy it. Because your choice of hi-fi is important, we choose our retailers carefully to meet the standards of the most discriminating customers.

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It really is as simple as that. Choosing hi-fi is nothing to do with jargon or interpreting specifications.

All equipment sounds different, and you don't have to be an expert to make the best choice. Often the less you know the easier it is. If you have an open mind you can trust your own judgement. A Linn retailer will allow you to relax and take your time. Remember, all you have to do is listen.

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thusiast explains.

work in professional digital recording equipment, the Lingo enables more musical information to be extracted from records by more precisely controlling turntable speed and stability. It takes us closer to the sound captured in the studio.

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Like the LP12, the Linn Karik CD player is the outcome of many years of research and development to obtain the performance required to meet Linn's high standards. Unlike other manufacturers, we have designed and built our own CD transport to allow our customers to benefit from future upgrades as digital expertise and components improve.

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The unique circuitry we developed for the Linn Kairn preamplifier will do justice to any source. Its innovative solid-state switching does not interfere with the music or degrade with use.

Like the Karik and the Kremlin, the Kairn is operated principally by remote control. The powerful handset has dedicated buttons for all sources and operations, making it simple for anyone to use.

The Kairn is equipped to deal with multi-room sound systems when used with the Linn Matrix. This enables remote control operation of various products around your home. So you'll be able to listen to your tuner in one room, your turntable in another and your CD in a third.

Our policy of continual improvement to all our products enables our customers to benefit from our knowledge as it grows. Even when we discontinue a product, we maintain, service and upgrade it if required.

Quality hi-fi represents exceptional value. You use it more often, it lasts longer, gets more music from your software and will provide pleasure from your investment for many years.

WHAT MAKES IT RELIABLE?

Care and attention to detail are crucial to obtain the extra performance that enables Linn to sell by demonstration.

Our factory in Scotland is highly auto-

mated. We use robotics and sophisticated design and test equipment to make the best hi-fi. Skilled people assemble, test and listen to our products. Only when they are completely satisfied will they sign their name on the back and pack it for despatch to the customer. This build, test and pack philosophy at one workstation ensures a standard of construction impossible on a production line.

CONFIGURING YOUR SYSTEM.

Linn hi-fi equipment is designed to work best in a domestic environment. After you have auditioned and selected our products, you will find that when the retailer installs your system it will sound even better.

All Linn equipment is designed to look unobtrusive and be easily accommodated in your home. Our electronics are designed to allow stacking without impeding ventilation and have screened transformers to avoid inducing hum.

Loudspeakers are the crucial interface between your hi-fi system and your home. Therefore their location is important.

All Linn systems offer the facility to play your TV or video through your hi-fi. The improvement to the sound can be surprising. Our loudspeakers have low external magnetic fields to minimise interference with your TV or video.

HOW IMPORTANT IS INSTALLATION?

Your retailer will set up your system and make constructive suggestions as to how top performance can be obtained.

He understands that correct set-up is vital, will ensure that the equipment is positioned to perform at its best and will confirm that you have made the right choice for your room.

He can advise on how to locate equipment discreetly.

After siting the equipment in the best agreed position and professionally cabling your system, a Linn retailer will show you and your family how to use and look after it.

Linn retailers will be on hand to help and advise you on all aspects of your system long after your initial purchase.

Linn provides its retailers with training and equipment to assess and maintain product performance quickly and easily. With proper care and maintenance, a good hi-fi will last a lifetime.

MUSIC FOR LIFE.

Customers who love music have built our business, so we look after them by continually improving our products and making it easy for them to upgrade or expand their systems.

Linn hi-fi is sold only by selected specialist retailers who share our commitment to music. They will help you get the benefits of the best possible hi-fi by demonstrating the full range of possibilities and explaining how to judge the differences so that you can decide for yourself.

Ivor Tiefenbrun MBE
Managing Director

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Fed up with the systems failings

My system consists of an Oracle *Delphi MkII* turntable, Rega *RB300* arm, Ortofon *Quartz* cartridge, Philips *CD850 MkII* CD player, Conrad-Johnson *PV10* valve preamp, Quad *405-2* power amp, and Rogers *Studio 1a* speakers single-wired with Supra 4mm. Interconnects are van den Hul *MCD-102 III* between CD, preamp and power amp.

I have listened to this system for about a year, but have grown fed up with the lack of detail, bass depth and control, although stereo imaging is first rate (especially with vinyl). My music tastes range from good old Genesis and Pink Floyd to Jazz (Miles Davis), with some classical. I listen to vinyl and CD alike. Is the lack of detail and bass due to the power amp or the speakers? I am considering replacing both. My budget is £3,000. (£1,200 now and £1,800 in six months time).

I am considering the Sumo *Polaris*, Denon *POA 6600* or VTL *50+50* power amps. For speakers I am considering the KEF *104/2* or *105/3* and the B&W *802*. Since a lot of money is involved in these



A big KEF could be just the answer to provide a little extra welly.

purchases, I would like to have your comments.
Rui Santos, Coimbra, Portugal.

Your right in assuming that the power amp and loudspeakers are the most likely culprits when it comes to lack of detail, you need something with more transparency than the Quad and better bass extension than the Rogers.

Power amps that you should consider alongside those that you mention, especially the Denon, are the Hafler *XL-600* (£1,200), Musical Fidelity *P180* (£800) and the Audio Innovations *Series 1000* monoblocks (£1,500). All three are capable of detail and bass extension, though the *XL-600* probably has the edge when it comes to welly and the Innovations has greater resolving power.

As far as loudspeakers are concerned you are on the right tracks with the *105/3* but consider also the Audio Note *AN-E* (£1,300), Roksan *Darius* (£1,725) and Vandersteen *2ce* (£1,395). The latter two require more power than the former, which would work well with the tube amp listed above.

Finding the right lines

I have been reading your excellent magazine for a few years now and have a good idea of some of the better products currently available. I've come to the point where I would like to upgrade my old system but frankly, with so much (Hi-Fi) choice, I don't know where to start.

My system comprises the following; Technics SU-V60 amp, Sony CDP-790 CD player and Philips four way speakers bought from the brother-in-law some years ago.

I estimate my budget to be approximately £1,000. I guess the order of upgrading should be; amp, speakers then CD player, and as such have shortlisted Tannoy 609 speakers, Arcam Alpha, Marantz CD52SE and Sony CDP-X339ES CD players. Am I on the right lines or is a different approach required?
Mr K Taylor, Bideford, North Devon.

It looks like you are indeed on the right lines, however, if can't afford to buy the system in one go, at least try to listen to complete systems before you decide on the components to go for.

Even with budget equipment there's more than enough evidence to suggest that a system's sound can be more than the sum of its parts, so listen to a few combinations to see which suits you the best.

The problem with upgrading in stages and losing sight of the complete picture is that you can end up with a number of products, all of which are very good in their own right, but which don't quite hang together when put together in a system.

Providing you chose a decent dealer there should be no problem in setting up a number of possibilities and auditioning the end results. Please don't be tempted to go for the cheapest offer and buy it without an audition.

Finding a decent dealer is probably the most important step in putting together a decent system and with the sort of money you are looking to spend you should be able to find someone willing to give you the time and effort required to get the very best for your money.

Looking for some digital shade

My system is made up of a Rega 3/RB300/Elys front end, Cyrus II amp (original model) and Rogers LS3/5A speakers. I have listened to various CD players — but to my ears they tend to be on the 'bright' side.

As my amp is said to be on the 'bright' side, I would like to know if you can recommend a CD player up to about £300 which would be suitable for my system?
E S Austin, Crawley, West Sussex.

It's true that early Cyrus IIs had a slightly bright balance but I should think that your loudspeakers balance this out quite well.

Therefore you don't necessarily need a particularly laid back sounding CD player, just one that isn't bright. Now that bitstream D/A conversion has taken over the budget and mid end of the market this isn't a very tall order, the difficulty is narrowing the field down to a single player.

There are several new machines in this issue which might suit your tastes, and don't dismiss the Pioneer PD-S801, which has the potential to work well in your system.

Of the players that we've listened to in the past the ones that look like they'll suit you include the JVC XL-V441 (£200), NAD 5425 (£200), and the Yamaha CDX-450 (£250). The latter two are particularly smooth and virtually incapable of brightness.



JVC's mellow sounding bitstreamer, the XL-V441, ideal for a well balanced system.

Write on . . .

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

In defence of the Tannoy 611

After reading the review in issue 110 of the Tannoy 611, I felt I had to put pen to paper. After an excellent review in *What Hi-Fi?* (June 1992) *Choice* gave the 611 a less enthusiastic reception. I changed my 609s for the 611s, for the sheer power and quality the bass had over the 609s. I wouldn't agree with the 'lack of detail' and would say there's a heck of a lot of it. I'm definitely converted to dual concentrics — the sound is much more open and lively than conventional designs (they replaced Celestion DL12 IIs).

It doesn't say in the review what tracks were played, but I would recommend another audition with the third track on Beethoven's fifth conducted by von Karajan (DG) or Tchaikovsky's



**Record
Token
Winner**

1812 conducted by Neeme Jarvi (also DG). You can't get a much wider soundstage, power and detail than the 611's for £400!

My 611's are mass loaded with sand and I have had new, longer and sharper, machine-



The Tannoy 611; can sound nice, but is hard to drive.

tooled spikes fitted.

As for 'demanding on the amp', *What Hi-Fi?* contradicts *Choice* and says that the 611 is very easy to drive. I've had no trouble with my Cyrus!

At the end of the day it all comes down to auditioning, and the odd tweak or two. But the 611's pack plenty of punch and detail — remember they won't make up for a poor

recording or poor quality CD. D Gossner, Wakefield, West Yorkshire.

If you like the sound of the 611s then good for you. However, in terms of being demanding on the amplifier, the impedance curve of our pair dropped to 3ohms, which is obviously hard to drive. I wonder who did What Hi-Fi?'s measurements?

Maggie tweak- ing Swiss style

I was glad to find your publication in Switzerland, and I refer to June's issue. I quite agree that one becomes a good listener, I listen to as many systems as I can and go to concerts. What impresses me often is the shine of the brass instruments, not only trumpets, and finding speakers which transmit this brightness is quite unusual.

I found your booklet about tweaking quite interesting, and will try some 'new-to-me' tricks. I am a user of Kontak and find it tremendously effective for cleaning gold plated connectors. One thing that might be added is polarity checking (see the German magazine Stereoplay 3/92 (or Choice March '90 for that matter - Dep Ed).

Ear Extenders? I was thinking of making some myself but it seems that someone has beaten me to it. I often put my hands next to my ears while listening at low volume, one gets more sound, better resolution, especially more treble and improved definition. It's especially effective with less than excellent speakers.

My system features a Sansui CD-X711 CD player, a BB100 valve amplifier and a pair of Magneplanar 1.4 speakers. I have found that definition is much improved for a sitting listener, when the 1.4s are closer to the vertical position than designed by the manufacturer.

The newer models 2.6 and 3.3 are vertical. Magneplanar has obviously recognised the weaknesses of the 1.4, since its replacement, the 1.5, has a folded ribbon-tweeter, which is claimed to be quicker; it certainly improves detail. The BB100 performs superbly with the Maggies, beating several amps we tried before buying. Paul Bagnoud, Neuchâtel, Switzerland.

A real humdinger of a CD player

Following reviews of the Aiwa XC-700 CD player and the AD-F810 cassette deck, both of which achieved Best Buy status, I bought a sample a few months ago. They are great and I am living very happily with them. However, this is only after having discovered and solved an electromagnetic compatibility (EMC) problem which affects stackability.

The XC-700 emits a hideous magnetic field which injects hum into just about everything on top of or below it. I suspect this is

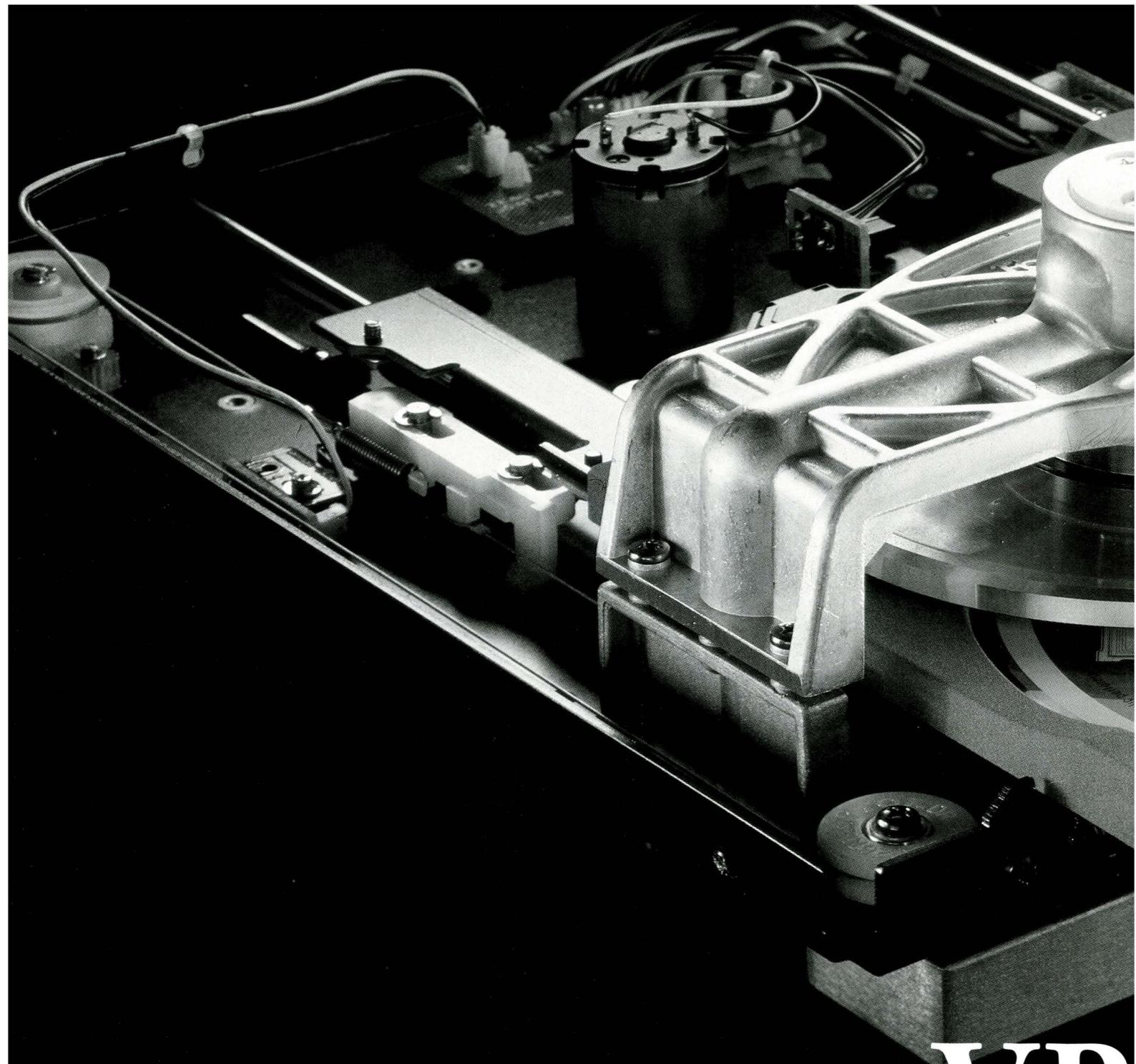
due to the cheap mains transformer within, and in a more expensive design a toroidal component would probably not exhibit the same effect.

Nevertheless, the problem exists and it is quite impossible to operate the CD player in close proximity to the AD-F810, or for that matter, my other deck.

The only solution is to stack it with the record deck (a Thorens with an MM cartridge). This also picks up the stray field but since it would not be operated at the

same time as the CD player this isn't a major problem. In view of this experience do you think it's worth investigating EMC problems in future tests? C E Pykett, Weymouth, Dorset.

In theory such problems will be removed when the EEC directives in this area are fully complied with. The date for this seems to be constantly being put back but one day manufacturers are going to have to face the music and sort this source of irritation out.



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21st Century Fox

It is always good to have things on the record. The electronics industry is notorious for rewriting history. Failed products and unkept promises just evaporate without trace. Ask any magazine picture researcher what it is like trying to get a photograph of a Laservision, VHD or CED/Selectavision video disc player out of Philips, Thorn-EMI or the relics of RCA.

I can now put on the record the comments of Wim Wielans, Managing Director of Philips Audio, about the launch delay on DCC. Remember that Wielans and his team had originally promised DCC for April, then September, and now it is most likely to be October. This brings the DCC launch very close to Sony's launch of Mini Disc on November 1st in Japan

New formats — or are they? DCC, Photo CD and Laserdisc all come under the watchful eye of Barry Fox this month.

and the first or second week of December for the UK.

Says Wielans, a few months after unambiguously pledging September for DCC: "The launch of such a fundamental system . . . requires extra quality checks on products coming out of the first mass production runs . . . I decided that moving the launch date would serve the company's interests better than possible critical statements after the launch in September".

All this makes sense, but isn't it the job of an MD to think ahead on matters like this? Ye Gods, Philips has had enough experience of delays in the past. Laservision was literally years later than promised. Metal audio tape was late. CD was late. CDV was late. The first Long Play VCRs were late, and V2000 was so late it was dead before it arrived.

The price is right

Taiyo Yuden has now gone on the record, too, on the price of blank recordable CDs. I had asked TY (maker of That's tape) how the company justified its trade price of nearly £15 per disc, when Kodak can now charge under £5 retail including 17.5 per cent VAT for exactly the same discs for use as Photo CD blanks.

Says Atsushi Ishizaka, MD of Taiyo in Europe: "Kodak's price of less than £5 is hard to believe for us. We have sold substantial quantities to Kodak for their experimental purpose, quite a long time ago. The price was similar to our current wholesale price. We believe that Kodak has a supplier which enables them to sell at £5, or Kodak in Rochester is able to manufacture discs using its own know-how and technology".

Write-once discs of Taiyo/PCD type are made by coating a blank disc with metal, dye and plastics layers. Metal coating is a doddle; CD pressing plants do it for every disc. Kodak has more experience than any company in the world of dye and plastics coating. Photo film is coated with many different layers of these chemicals, several at the same time using a technique called laminar flow. The production line is horrendously difficult to get working, but is then easy to keep running.

My bet is that Kodak is now coating its own Photo CD blanks, in large volumes. If Photo CD fails to catch on as a mass market product, Kodak can switch part of the factory to audio blank production.

By the way, those who can remember Tandy's promise of Thor CD, an erasable disc using reversible dye and plastic changes, can forget about it. Tandy recently shut down research into Thor, without an announcement or even replying to questions.

Laserdisc on the launch pad (again!)

Meanwhile, laser video disc is on its third, fourth or fifth relaunch in the UK, depending on how you count past launches of Laservision, CD Video and Laserdisc in several stages. This time it looks more hopeful than ever before, because for the first time since the early days of Laservision there are some good movie titles. These now have the added benefit of CD quality digital sound (LV had only analogue FM sound) and Dolby surround.

As a long time lover of Laserdisc I do, however, worry about the newly formed, and oddly mixed, UK Laserdisc Association. Some members are hardware/software people who know the LD business, because they have been through it all at least once before. These members take the pragmatic view that LD will remain a niche market for people who care about picture and sound quality. Others reckon that there are now enough players around to make sales of 800 discs per title, the break-even number, possible. A few are fresh-faced, innocent or ignorant. They hope for a much wider, even mass, market for LD; they do annoying things like telling me what LD is.

The UKLDA had planned a launch and press conference at the Penta show, but replaced the conference with a series of one-to-one briefings. I have never met a journalist who liked this kind of event, for at a closed briefing there is no cross-fertilisation, and, worse still, the journalist can afterwards be accused of misquoting. This is not a fantasy fear. It happened to me years ago when I went for a solo briefing with the man at the NRDC/British Technology Group who was then responsible for trying to get the Ambisonics surround sound system off the ground. It was early in the days of VHS Hi-fi stereo, and it did not take a genius to see that when movies were released on tape in stereo, any surround sound from the cinema mix would be there on tape to decode.

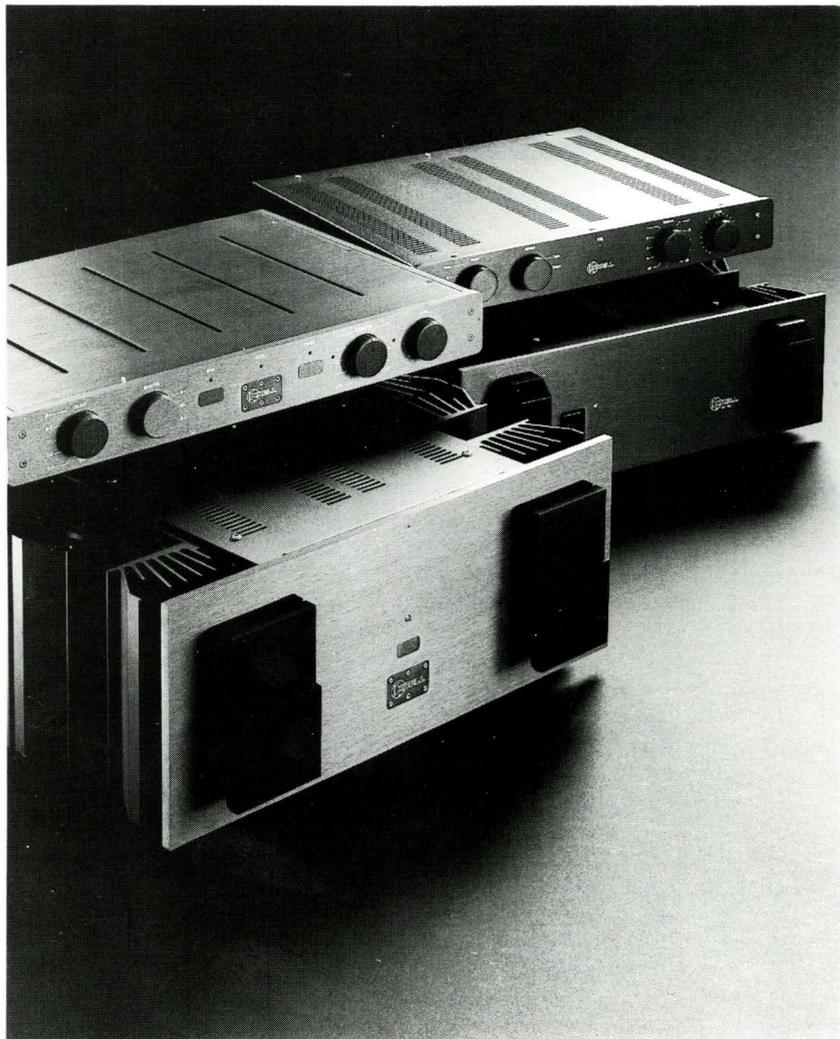
I tried to get it across to the NRDC/BTG man that the only way to get Ambisonics decoders into homes would be to do a deal with Dolby. My idea was for a dual system decoder, which would decode both Dolby surround sound video material and Ambisonic-encoded music recordings.

I reckoned that the NRDC/BTG man had a poor grip on the subject and said so in print. He accused me of misquoting him. Since then I have avoided solo briefings and let people show their colours in public.

There never was a deal with Dolby and there never was a dual system decoder. Video surround sound is now getting to be serious business and Ambisonics has never taken off, despite being a far better system for audio-only use.

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Absolute Sounds has been for over a decade the leading source of high-end audio equipment in Great Britain. The secret to this success lies in the company's ability to select and promote the very finest equipment produced in the world today and, since its inception, Absolute Sounds has built a global reputation for creating systems without equal.

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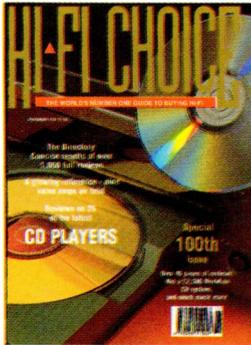


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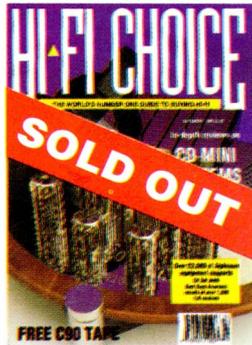
*'I have the simplest of tastes...
I am always satisfied with the best'*
Oscar Wilde

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CD MINI SYSTEMS and digital
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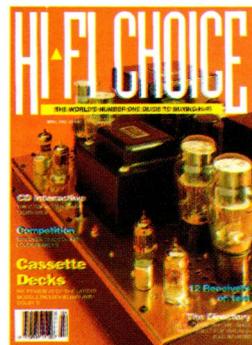
January 1992 - Issue 102
LOUDSPEAKERS and
walkmen plus a free blank
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February 1992 - Issue 103
DIGITAL TO ANALOGUE
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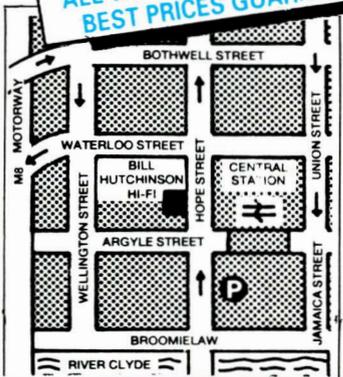


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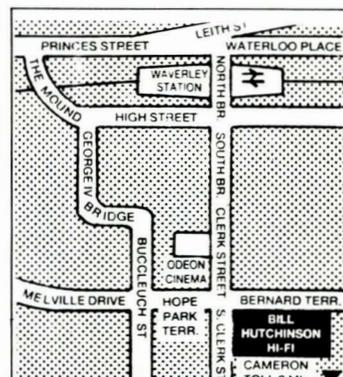
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COMPETITION

The quiz

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

1. Sound Research rose from the ashes of which other valve amp manufacturer?
2. Which Sony CD player might induce feature phobia?
3. How many loudspeakers are required for a basic Dolby Pro-Logic surround sound set-up?
4. Which individual currently builds Audio Note cartridges?
5. Abbot is the name of a Greene King beer and a loudspeaker from which manufacturer?



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Choosing and Using . . . CD players

Nine years on and the little silver disc continues to supplant the conventional vinyl LP from the mass market, and although the cost of the discs themselves seems to have hardly budged, the price of the players themselves has tumbled year after year. Now it is possible to choose from a clutch of perfectly adequate players priced at no more than £130, less than the cost of a dozen discs.

An extra £30-£50 will catapult you into another league, a cut-throat market populated by fully-fledged budget players offering advanced features alongside the very latest in digital technology. So sophisticated are these models that it would seem churlish to wait for prices to fall even further.

In the short term players are unlikely to become appreciably cheaper. Instead the technology and facilities available at each existing price point will be steadily upgraded. After all, below a certain point it is the exorbitant cost of the discs themselves rather than the price of the player that puts off the first time buyer from taking a dip in digital waters.

*Splashing out into the digital ocean?
Paul Miller takes on the role of life guard
and highlights what to look for when
buying a new Compact Disc player.*

So what should you expect from a decent budget player these days? Featurewise you are spoilt for choice, with full remote control supplementing a broad range of facilities already incorporated on the player itself. Basic track location, fast music search, repeat and program play options can be taken for granted, while other features like tape edit (fitting selected tracks onto predetermined lengths of tape), peak search (an invaluable aid when setting the record level), random play, index selection and variable outputs still creep in on some players below £200.

Of course the more expensive players are graced with appropriately grand facilities including expansive non-volatile memories used to recognise favourite tracks or index points from many tens or hundreds of different CDs. Philips started the ball rolling with FTS (Favourite Track Selection), Sony following suit with its Custom File memory, while Kenwood and Yamaha also offer a simpler Disc File program on some of their players.

Build quality also improves as you progress from the budget £160-£200 models to those pitched at £250 or more. Plastic mouldings are replaced by alloy fascias and the casework is reinforced with extra struts and more substantial metalwork. These factors, along with separate mains transformers for the digital and analogue circuits and beefier CD transport mechanisms, can increase the weight of the

player several times over. So they 'feel' like good value, even though the less substantial players are no less reliable in reality.

What of the technology trends? You might expect that paying more will take you further down the technological path. The last couple of years has witnessed profound changes in the digital gubbins at the heart of every CD player, but so sweeping have been these changes that almost every new player — whatever the cost — will have been touched.

For the benefit of those who have been asleep since 1990 this technological innovation comes under the heading of bitstream, a swift little revolution that has heralded the most fundamental change in the way CD players actually process the digital data since the format was originally introduced.

Not that you'd appreciate any of this from the exterior of any new bitstream player. This has been a quiet revolution, influencing the technical and subjective performance of the player without disrupting the layout or range of controls that are on offer. In fact the only facility that's lost to a bitstream player is 'Pitch Control', employed on some older Denon players to speed or slow the music's tempo.

Bitstream is all about converting the CD's digital data back into recognisable music. At one time CD players used multibit digital to analogue converters (DACs) to do the job, but these chips required expensive quality control to control low-level accuracy, could produce unwanted spikes called glitches and suffer from hiccups like zero-cross distortion. The new generation of bitstream DACs overcame these problems by reducing the large 16-bit digital numbers into smaller packets of four bits or less.

Smaller chunks of data are processed at an appropriately higher speed, and as the DAC handles just one bit of information at a time it avoids the uneven steps, glitches and distortions of its multi-bit forebear. Of course these bitstream players are not perfect, they can be more sensitive to digital jitter and RF interference, for instance, while they also kick out an awful lot of (inaudible) noise that can place added stress on some amplifiers. Bitstream is certainly progress, but it's no panacea.

Most importantly, however, you need not fret over the relative compatibility of different CD players. Regardless of the technology housed within each and every machine they must still conform to certain agreed standards. So every CD player will play the standard 12cm silver disc, will offer the same basic track skip, pause and stop facilities and will require the services of a line input on your amplifier.

Never connect a CD player to an input market 'phono' or 'disc' on your amp, but choose instead any line-level connection such as aux, tuner, tape or, indeed, one marked specifically for CD. So compatibility is assured. But sound quality? That's another matter altogether . . .

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Arcam Alpha Plus

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Keen to keep the ball rolling in its favour, Arcam has just announced a series of mini-revisions to pep-up its long-standing *Alpha* CD player. Arcam has had the good taste to call the player *Alpha Plus* and not *Alpha SE* though certain of the mods, like sticking a rubber grommet over its 11.3MHz crystal, are pretty familiar.

Externally nothing has changed so the uniquely 'British' appearance of this player will have to remain a matter of taste. A remote control adds direct track access and index cueing to the fairly standard complement of features available on its matt fascia.

In common with Philips, Marantz and Technics, Arcam is still using the ever-reliable CDM4 transport assembly. Few manufacturers, however, are still using this well-trodden 16-bit four times oversampled chipset! Nevertheless Arcam has stretched its capabilities by referencing the DAC's current-to-voltage conversion to a transistor-based current source rather than a simple biasing resistor.

Furthermore the response of its final analogue filter has been altered along with the output coupling capacitors — swapped for a pair of 'Black Gate' electrolytics.

Lab report

If you're interested in technological parallels then try the Ariston *Maxim* or Creek *CD60* back in issue 107. Their dithered -70dB traces all highlight third and fifth order products due to zero-cross distortion in the TDA1541 DAC but only Arcam has managed to stretch the overall S/N ratio to a fabulous 116dB — unmatched by any existing bit-stream convertor.

Then again, all three players reveal the SAA7220's filter ripple on their frequency responses as well as the out-band rippling of its V-shaped stop-band images (see 3D plot). Unfortunately for Arcam, this 3D plot also exposes the huge increase in third order

distortion (0.31 per cent) plus extensive sampling intermodulation that occurs at high frequencies.

I am bound to say, however, that this phenomenon only occurs close to 0dB and so will be of momentary — if any — significance under music conditions. Nevertheless there is no excuse for not curing the problem while engineering its latest mods.

Sound quality

Oblivious to my gripes, our listeners applauded the *Alpha Plus* for its big and generous sound. One that's not uncomfortably 'loud', they remarked, simply very expansive. It is slightly light in balance and there's a hint of coarseness through the upper octaves. Nevertheless the player is neither objectionably lean or dry, just sufficiently acute to maintain the 'bite' of otherwise full and heavy bass notes.

On the flipside, though our pop selection sounded lively there was not always the appropriate weight to sustain the boldest of dynamics. However, when we opted for a gentler track, the vulnerability of Jennifer Warnes' vocals contrasted with the masculine harmonies in delightful fashion. So here was compelling, emotive music without resorting to false colour or euphony.

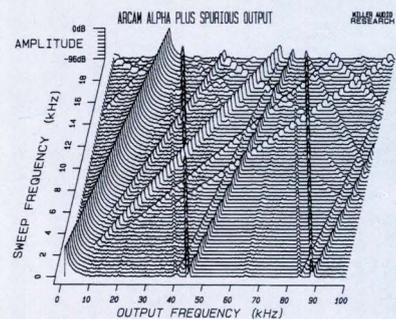
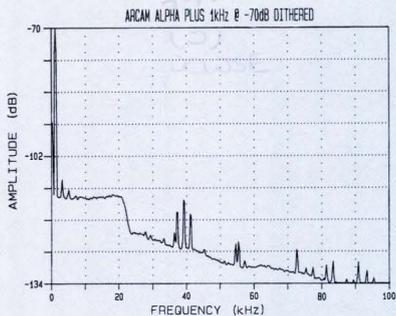
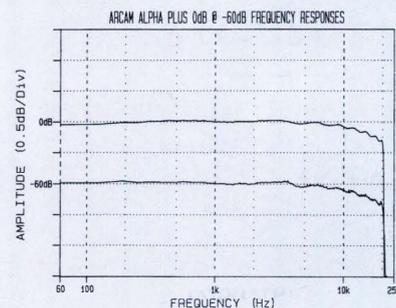
Then our listeners returned to its 'lightness of touch', a quality that imbued our classical strings with a certain 'wildness'. A carefree quality that might have detracted from the real drama of the recording if it wasn't so entertaining in its own right!

Conclusion

By way of conclusion, one listener defended the player's quick, expressive but lightweight character by maintaining 'it still produced good music'. And that, in the light of the performance offered by many in this test, is praise indeed, and certainly enough to merit formal Recommendation.

TEST RESULTS

Channel Balance	20Hz	1kHz	20kHz
	0.10dB	0.09dB	0.02dB
Channel Separation	98.1dB	101.9dB	89.8dB
THD vs Level, 0dB	-103.3dB	-100.0dB	-50.3dB
-30dB	-71.4dB	-68.0dB	-61.3dB
-60dB	-51.5dB	-47.7dB	-35.5dB
-80dB	-20.5dB	-28.5dB	-39.7dB
Dithered, -90dB	-7.75dB	-16.9dB	-30.6dB
Dithered, -100dB		-14.2dB	
Dithered, -110dB		+2.90dB	
Resolution @-60dB		+0.01dB	+0.23dB
-80dB		-0.14dB	+0.10dB
-90dB		-3.87dB	+0.02dB
-100dB		-1.40dB	+5.45dB
Peak Output Level, L			2.34V
R			2.369V
Relative Output Level			+1.42dB
Output Impedance			25.5ohm
Radio Frequency Spurious			12mV @ 22.6MHz
1Hz Noise Modulation			+16.2dB
CCIR IMD, 0dB			-75.8dB*
Suppression of stop-band IMD			40.8dB
De-emphasis Accuracy,			
1kHz			-0.01dB
5kHz			-0.10dB
16kHz			+0.02dB
S/N Ratio (A-wtd), w emp, 0LSB			117.1dB
w/o emp, 0LSB			116.4dB
w/o emp, 1LSB			116.2dB
Digital Output			Coaxial
Crystal Clock Accuracy			+10.6ppm
Track Access Time (99)			4 secs
Serial Number			ACD018812
Typical Retail Price			£420



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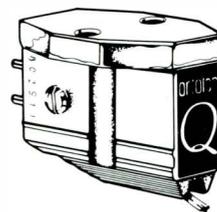
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Denon DCD-890

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Devilishly persistent, Denon is continuing to come up with slogans that would bring a flush to the cheeks of the most enterprising Estate Agent. It's that 'Real 20-bit Lambda Super Linear Converter' business all over again, except it's now squeezed into a new box called the *DCD-890* and sold at a price destined to challenge the likes of Rotel and Marantz.

Nothing wrong with the box of course, though the seven second end-of-side track access is rather sluggish. Otherwise the *DCD-890* promises high standards of construction with a bright if rather mundane display. Slick features include a 20-track memory, direct track access, fader, time edit, repeat and peak search options. Most of these are duplicated on Denon's remote handset which also offers a 12-step digital volume control, covering a full 18dB (an eight fold change in level) in discrete 1.5dB hops.

Denon's original version of 'Lambda' would offset sensitive low-level signals from the MSB, create a differential datastream (L+/L- and R+/R-) and leave higher level signals to swamp the audible effects of zero-cross distortion produced by its 20-bit DAC. Fair enough.

Today's *DCD-890* employs a standard eight times oversampling digital filter that is capable of outputting each new oversampled 'word' in 20-bit form. However, the PCM61P DACs are mono 18-bit devices, so this version of 'Real 20-bit Lambda' is neither differential in operation nor 20-bit in performance. A far cry from the *DCD-2560* (issue 95)

Lab report

In reality the *DCD-890* has more in common with Denon's *DCD-1290* (issue 107). The same NPC digital filter gives rise to a familiar pattern of stop-band noise on the 3D plot though distortion, especially at high frequencies, is slightly worse. This said, distortion is

actually lower than most multibit players at -30dB where the range of 0.016-0.039 per cent is fairly impressive.

Moreover this *DCD-890* is a more 'polished' item than the *DCD-1290* we reviewed five months ago, offering a superior 110dB S/N, linearity to within 0.8dB limits and a superior dynamic range — just compare the plots of 1kHz @ -70dB.

Sound quality

Unmindful of Denon's propaganda, our blind panel pronounced the *DCD-890* 'a lively-sounding player', one that has no hesitation 'mixing it' with the most complex musical styles. There's an attractive sense of enthusiasm about its music but it's a flair achieved at the loss of subtlety and fine detail. Or so they'd have me believe.

Christy Moore's track, for example, was certainly forward and plucky but his voice lacked its customary 'gravel and depth'. 'Sounds as if he'd not smoked enough cigarettes that morning', suggested one listener by way of explanation.

Low bass definition was certainly blurred, losing track of the bongos from the Tracy Chapman CD while bringing an overblown persistence to bear on the bass guitar. On the other hand this blowsy effect suited the jazz acoustic of the Marty Paich disc, bringing out the weight of the double bass, just as it brought an open and airy quality to the strings from Mozart's Concerto.

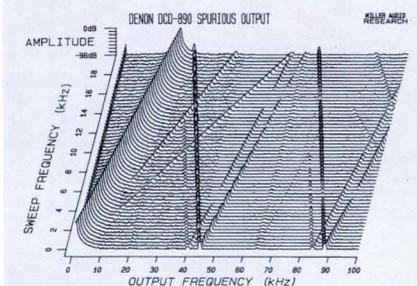
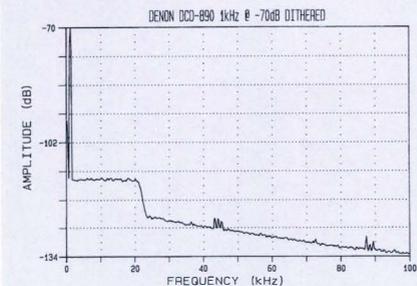
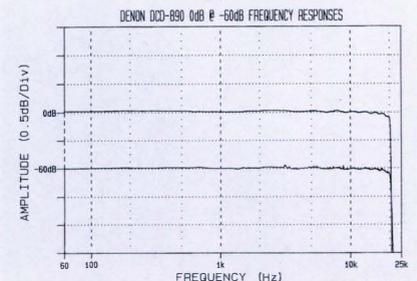
Conclusion

The basic problem here is that Denon continues to apply unnecessarily complex solutions to problems that were solved some two or three years ago by far more elegant and cost-effective digital techniques.

The *DCD-890* is certainly a player that tickled our fancy from time to time, but ultimately it was also a player that failed to do enough to secure Recommendation.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.05dB	0.06dB	0.02dB
Channel Separation	136.3dB	117.3dB	91.1dB
THD vs Level, 0dB	-104.3dB	-100.5dB	-80.2dB
-30dB	-75.9dB	-73.8dB	-68.2dB
-60dB	-52.8dB	-47.1dB	-57.3dB
-80dB	-28.1dB	-31.1dB	-39.7dB
Dithered, -90dB	-17.9dB	-22.7dB	-30.3dB
Dithered, -100dB		-20.7dB	
Dithered, -110dB		-7.55dB	
Resolution @ 60dB		-0.06dB	-0.05dB
-80dB		-0.19dB	-0.13dB
-90dB		-0.83dB	-0.74dB
-100dB		-0.60dB	-0.72dB
Peak Output Level, L			2.184V
R			2.170V
Relative Output Level			+0.74dB
Output Impedance			682ohm
Radio Frequency Spurious		10mV @ 10-500MHz	
1Hz Noise Modulation			+8.7dB
CCIR IMD, 0dB			-97.6dB
Suppression of stop-band IMD			60.5dB
De-emphasis Accuracy, 1kHz			+0.01dB
5kHz			+0.11dB
16kHz			+0.13dB
S/N Ratio (A-wtd), w emp, 0LSB			113.1dB
w/o emp, 0LSB			111.1dB
w/o emp, 1LSB			109.7dB
Digital Output			Coaxial
Crystal Clock Accuracy			+45.5ppm
Track Access Time (99)			7secs
Serial Number			2041500018
Typical Retail Price			£250



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These CD player reviews will often read like a mini-series of whodunits. Detective stories separating those who are pushing the frontiers of design forward and those that are, ahem, re-packaging existing players.

All of which brings us smartly along to JVC's latest creation — the XL-V152. But if anyone tries to tell you it's 'new' then they've not been doing their homework. What we've got, in a nutshell, is an XL-V241 CD player minus its remote control and camouflaged by XL-Z441 aesthetics. You can compare notes by referring back to issues 100 and 107.

JVC's centralised drawer mechanism gets pride of place and is flanked by a series of direct track access, repeat, program, tape edit and random play facilities.

If you already own a compatible JVC cassette deck then the added luxury of one-touch recording (with automatic level control) is available via the on-board DDRP (Dynamics Detection Recording Processor) facility.

Lab report

With the player hooked up in the lab I struggled to determine any meaningful variation between the 'new' XL-V152 and 'old' XL-V241 (issue 100). The stop-band patterns, caused by the Sony CXD2554 eight times oversampling filter, all match-up with the 3D plot from Issue 100. Ditto for the huge 0.16dB ripples in its frequency response.

Meanwhile the JCE4501 PEM DAC retains its superb low-level linearity and 106-107dB A-wtd S/N ratio. Fine results that imply a healthy 17-bit resolution. Nevertheless there's still a hint of peak-level compression at the frequency extremes where distortion actually increases from 0.0016 to 0.0047 per cent (20Hz). It's the analogue electronics that let this player down.

However it is the similarities rather than

the differences that catch the attention, particularly as they relate to very subtle measurements. The exact correlation of the 8.5MHz RF output, the +168ppm clock error and +7.2dB noise modulation all spring to mind. If nothing else it just goes to prove the consistency of JVC's production line!

Sound quality

Despite its characteristic bloom, the vague and swimmy quality that persisted through all our CDs, this player still managed to grow on our listeners. They might not have appreciated its sound, but they certainly became accustomed to it!

Mozart's classical strings were differentiated in smart order, viola from violin and cello for example, though the accompanying piano, by majority verdict, was described as boxy and soft.

The bite of Marty Paich's keyboard was also lost from our jazz CD, leaving the player equally troubled by the underlying sense of reverberation and ambience. So the staccato blasts of sax died even more abruptly than usual — prompting our listeners to describe it as 'a rich and old-fashioned sound'.

When we switched to pop the band-limited but polite nature of this player was equally obvious in the way it 'removed certain annoying bits of detail' from the Jennifer Warnes CD!

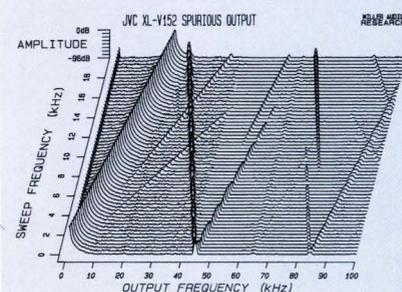
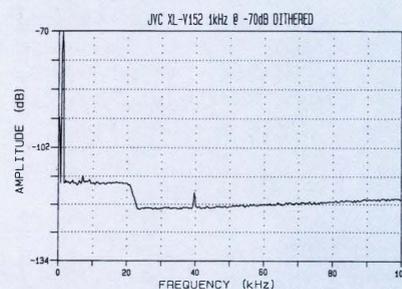
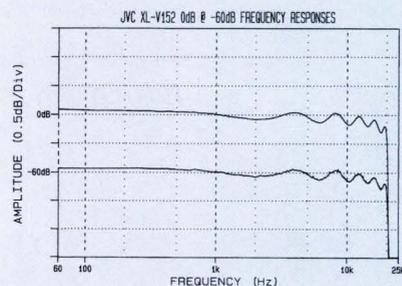
No one could defend this as a neutral-sounding player for although it's capable of handling dynamic material it tends to trade a feeling of freshness and clarity for straight-forward 'punch'.

Conclusion

A player from the Nineties with a sonic flavour extracted from the Fifties, or so our listeners would have me believe. One year on and the correlation between these opinions and those prompted by the XL-V241 is quite remarkable.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.07dB	0.08dB	0.06dB
Channel Separation	114.4dB	113.1dB	75.2dB
THD vs Level, 0dB	-86.5dB	-98.2dB	-77.9dB
-30dB	-95.5dB	-82.2dB	-78.5dB
-60dB	-54.6dB	-51.8dB	-51.1dB
-80dB	-28.3dB	-30.6dB	-32.5dB
Dithered, -90dB	-18.3dB	-21.5dB	-22.0dB
Dithered, -100dB		-17.7dB	
Dithered, -110dB		-5.77dB	
Resolution @60dB		-0.01dB	-0.05dB
-80dB		+0.31dB	+0.29dB
-90dB		+0.34dB	+0.17dB
-100dB		+0.60dB	-0.70dB
Peak Output Level L			1.934V
R			1.916V
Relative Output Level			-0.33dB
Output Impedance			483ohm
Radio Frequency Spurious			8mV @ 8.5MHz
1Hz Noise Modulation			+7.2dB
CCIR IMD, 0dB			-95.4dB
Suppression of stop-band IMD			43.4dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			-0.05dB
16kHz			-0.01dB
S/N Ratio (A-wtd), w emp, OLSB			106.5dB
w/o emp, OLSB			106.3dB
w/o emp, 1LSB			106.4dB
Digital Output			None
Crystal Clock Accuracy			+167.8ppm
Track Access Time (99)			5.5secs
Serial Number			15690068
Typical Retail Price			£130



JVC XL-Z452

JVC (UK) Ltd, JVC Business Park, 12 Priestley Way, Staples Corner, London NW2 7BA. Tel: (081) 450 3282



JVC's latest contender for the £180 price point, the XL-Z452, has a heritage that stretches back all of six months to the XL-Z441. However, despite being some £20 cheaper than its predecessor, this latest player offers exactly the same range of repeat, program, random play, tape edit and DDRP facilities with the bonus of a 21-key direct access keypad.

JVC's busy fluorescent display lurks under a centralised mechanism, providing all the usual details alongside a familiar clock face level meter and 20-position track 'calendar'. Its lightweight CD transport is a stock JVC item but at least the laser sled is fashioned from a cast alloy block.

Under the bonnet is another of JVC's JCE4501 DACs, the PEMDD convertor that's advertised on its cluttered fascia. This is a complex bitstreamer that squeezes a greater variation of pulse 'widths' into each 64 times oversampling period by defining the 'edge' of each new pulse as the difference between two existing PWM data streams.

The end result is superior resolution and lower noise than any conventional bitstream DAC operating at the same clock (crystal) frequency.

Lab report

And if proof were needed then take a squint at this little lot. Distortion, for example, settles at a stonking 0.00045 per cent (1kHz/0dB) while its low-level linearity holds to within 0.5dB across the entire audio spectrum. The fabulous 110dB S/N ratio even beats the best of Yamaha's PDM bitstream DACs while the plot of a dithered -70dB/1kHz tone matches the supreme dynamic range achieved by the likes of Sony's CDP-X229ES (see page XX).

JVC's XL-Z441 established this precedent in issue 107 but then both players use NPC's SM5840 eight times oversampling filter, avoiding many of the problems suffered by

the cheaper XL-V152. Changes to the analogue circuitry, however, have pushed up its 20kHz distortion from 0.0018 to 0.0066 per cent. You never get something for nothing — just compare the 3D plots.

Sound quality

Unaware of the 452's family tree, our panel continued to justify their existence by reviving opinions previously given in favour of the XL-Z441. 'Big, impressive and engrossing' they began 'but not in a manner that could be described as false or contrived'.

Tonally it can sound slightly lightweight but it's one of the few budget players capable of sustaining a very 'difficult' piece of music. It actually made some sense of Tracy Chapman for a change, highlighting the link between her voice and the synth line for example. The Mozart Concerto also hung together in convincing fashion, the strings and piano combining forces to give a gratifying sense of purpose and urgency.

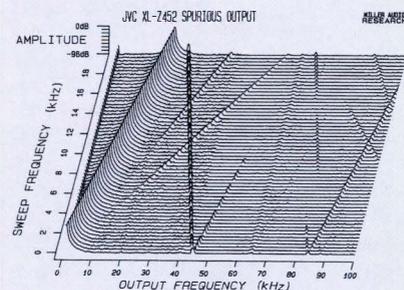
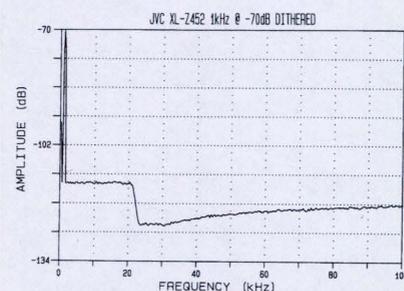
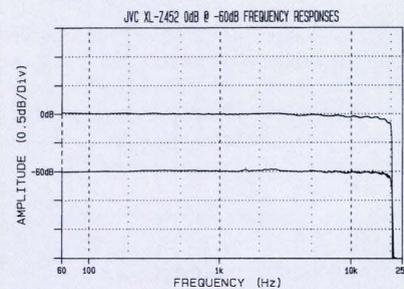
Our jazz selection enjoyed a greater sense of momentum than usual, complemented by a marvellous impression of depth and rock-solid L/R stereo images. Nevertheless this unaggressive confidence could work against it when faced with snappier, up-beat pop disc. So Jennifer Warnes' voice, for instance, was both warm and free of 'stodge', even if the piece as a whole remained a trifle reserved. A relaxed player, they concluded, but always 'in the groove'. They mean 'pits', surely?

Conclusion

This XL-Z452 represents a saving of £20 over its predecessor, the XL-Z441, with absolutely no sacrifice in flexibility or convenience. Moreover the new £180 pricetag has been achieved without threatening its Recommended status in the process. Leaving us with a more affordable but equally sophisticated performer.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.02dB	0.00dB	0.12dB
Channel Separation	121.0dB	121.6dB	102.7dB
THD vs Level, 0dB	-107.1dB	-107.0dB	-83.6dB
-30dB	-90.5dB	-81.7dB	-80.9dB
-60dB	-54.9dB	-48.0dB	-53.4dB
-80dB	-28.3dB	-30.8dB	-33.1dB
Dithered, -90dB	-18.1dB	-23.1dB	-24.5dB
Dithered, -100dB		-22.0dB	
Dithered, -110dB		-8.15dB	
Resolution @ 60dB		-0.02dB	-0.02dB
-80dB		+0.04dB	+0.06dB
-90dB		-0.35dB	-0.24dB
-100dB		-0.08dB	+0.50dB
Peak Output Level, L			2.227V
R			2.223V
Relative Output Level			+0.93dB
Output Impedance			332ohm
Radio Frequency Spurious	11mV @ 45MHz	every 1MHz	
1Hz Noise Modulation			+10.3dB
CCIR IMD, 0dB			-103.7dB
Suppression of stop-band IMD			61.1dB
De-emphasis Accuracy, 1kHz			+0.01dB
5kHz			0.00dB
16kHz			-0.07dB
S/N Ratio (A-wtd), w emp, 0LSB			112.1dB
w/o emp, 0LSB			112.7dB
w/o emp, 1LSB			110.4dB
Digital Output			Optical
Crystal Clock Accuracy			+163.6ppm
Track Access Time (99)			5secs
Serial Number			07790009
Typical Retail Price			£180



Kenwood DP-3040

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



Taken at face value, the only thing that separates Kenwood's disappointing *DP-5040* from the somewhat less disappointing *DP-3040* is a motorised volume control. The *DP-3040* is built into the same chassis, employs the same 'Silent-Drive Mechanism' and is graced with the same on-board controls. But inside it's an entirely different story.

Here you'll discover the updated bones of the old *DP-4030*, a player that earned a hearty Recommendation back in issue 95. Kenwood has retained the discrete Master Clock system, the beefed-up laser-pickup and cascode audio amplifier. The DAC, meanwhile, is still sourced from NPC but this time around they've plumped for the SM5870 - a new generation bitstream chip.

By contrast Kenwood's costlier players, the *DP-5040* and *DP-7040*, use a high-speed, PLM bitstream DAC from Sony (see issue 107). From the outside of course all three players look pretty darn similar. The curved alloy fascia, adjustable fluorescent display and smattering of track access, program and repeat play facilities all serve to enhance Kenwood's latest brand image.

Extra widgets like peak search, edit and random play are available from the remote handset which also controls the *DP-3040*'s variable outputs. This digital volume control is calibrated in five coarse 10dB steps which are then indicated on the display.

Lab report

There's something a little odd about this one. Ok, so the third order noise-shapers in NPC's latest PWM DAC are responsible for the Philips-like splurge of ultrasonic noise on the -70dB plot. This chip, meanwhile, is allied to an eight times oversampling filter in Sony's CXD2500 signal processor.

Yet the stop-band rejection is a poor 31dB (I would expect 61-64dB), giving rise to the bold V-shaped patterns on the 3D plot

in addition to exaggerated 0.15dB ripples in the frequency response. Just compare this with the superior results obtained by the Pioneer *PD-201* and *PD-S501* in this very same issue. Perhaps NPC should check-out the upsampler in their SM5870.

Otherwise the 0.0007-0.02 per cent distortion and superb low-level linearity beat the old *DP-4030* hands down, even if the 'real' 98dB S/N ratio is rather low.

Sound quality

'A gentle and thoroughly refined sound' they mused 'though this player is certainly no softy'. Our listeners might have identified the *DP-3040* as a cheapie but they qualified the point by suggesting it was 'less spiky than most budget offerings'. Kenwood certainly seems to have removed the hash that often plagues the up-front and superficially exciting players.

Its music is very clean but perhaps a little too polished for its own good at times. A trait that some listeners interpreted as 'very careful, very measured' while others chose to define it as 'sleepy'.

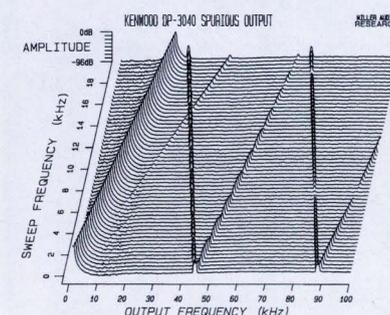
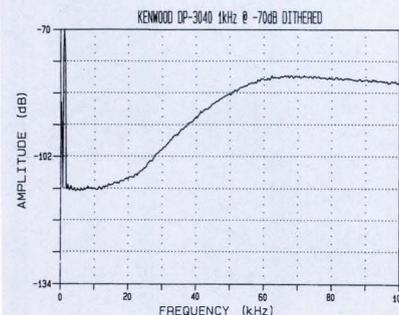
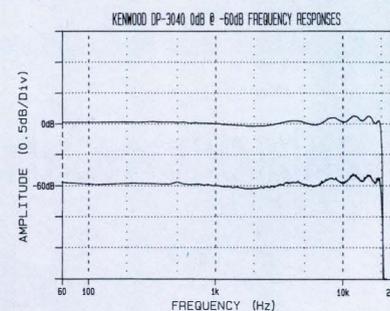
Female voices and classical strings might sound a tad dry on occasions but the general presentation remains both clear and confident. It certainly grasped the clubby atmosphere of our jazz CD with both hands, revealing the naturally rich and mellow timbre of the sax without that 'granular coloration' that so often adds an unwelcome edge to brassy instruments.

Conclusion

'Nice for the price' was the general consensus, adding that it would provide 'an ideal tempering influence for the wayward budget system'. But even if your hi-fi is already house-trained, the *DP-3040*'s ability to sustain a sense of refinement, smoothness and atmosphere is unlikely to pass unnoticed and certainly deserves Recommendation.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.08dB	0.08dB	0.13dB
Channel Separation	97.8dB	94.5dB	77.5dB
THD vs Level, 0dB	-103.0dB	-103.1dB	-73.2dB
-30dB	-94.8dB	-80.3dB	-48.1dB
-60dB	-60.7dB	-39.4dB	-17.4dB
-80dB	-27.7dB	-23.9dB	+0.25dB
Dithered, -90dB	-13.2dB	-18.3dB	+9.50dB
Dithered, -100dB		-11.5dB	
Dithered, -110dB		-2.80dB	
Resolution @-60dB		+0.02dB	+0.03dB
-80dB		-0.11dB	+0.12dB
-90dB		-0.31dB	-0.58dB
-100dB		-0.05dB	-0.53dB
Peak Output Level, L			2.190V
R			2.212V
Relative Output Level			+0.83dB
Output Impedance			576ohm
Radio Frequency Spuria			8mV @ 85MHz
1Hz Noise Modulation			+1.4dB
CCIR IMD, 0dB			-99.9dB
Suppression of stop-band IMD			31.3dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			+0.02dB
16kHz			+0.03dB
S/N Ratio (A-wtd), w emp, 0LSB			121.5dB
w/o emp, 0LSB			121.4dB
w/o emp, 1LSB			98.2dB
Digital Output			Optical
Crystal Clock Accuracy			-173.8ppm
Track Access Time (99)			4secs
Serial Number			20140003
Typical Retail Price			£180





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Chester

Frequency Response: 44Hz-22kHz · Crossover Frequency: 2.7kHz · Nominal Impedance: 8 ohms · Sensitivity: 90dB for 1 watt input at 1 metre · Amplifier requirements: 30-100 watts · Castek Overload Protection: Up to 300 watts · System type: Quarter Wave Bass Loading · Bass unit: 150mm rubber roll surround · Treble unit: 25mm metal dome · Dimensions: Height 915mm Width 230mm Depth 250mm · Weight: 16.8 Kgs



Winchester

Frequency Response: 35Hz-22kHz · Crossover Frequency: 3kHz · Nominal Impedance: 8 ohms · Sensitivity 5PL: 90dB for 1w Input at 1m · Amplifier requirements: 30-150 watts · System Type: Quarter-Wave Bass Loading · Overload Protection: Castek · Crossover: Hard wired multi element 81 wired · Terminals: Suitable for large diameter cable and 4mm plugs · Bass Unit: 2 x 150mm rubber roll surround · Treble Unit: 25mm Metal Dome.



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Height (without castors or spikes)-External: 680mm-26 1/2" · Internal: 641mm-25 1/4" · Width-External: 565mm-22 1/4" · Internal: 451mm-17 3/4" · Depth-External: 457mm-18" · Internal: 413mm-16 1/4" · Castor height 50mm-2" · Spike height 38mm-1 1/2" · All dimensions are nominal.

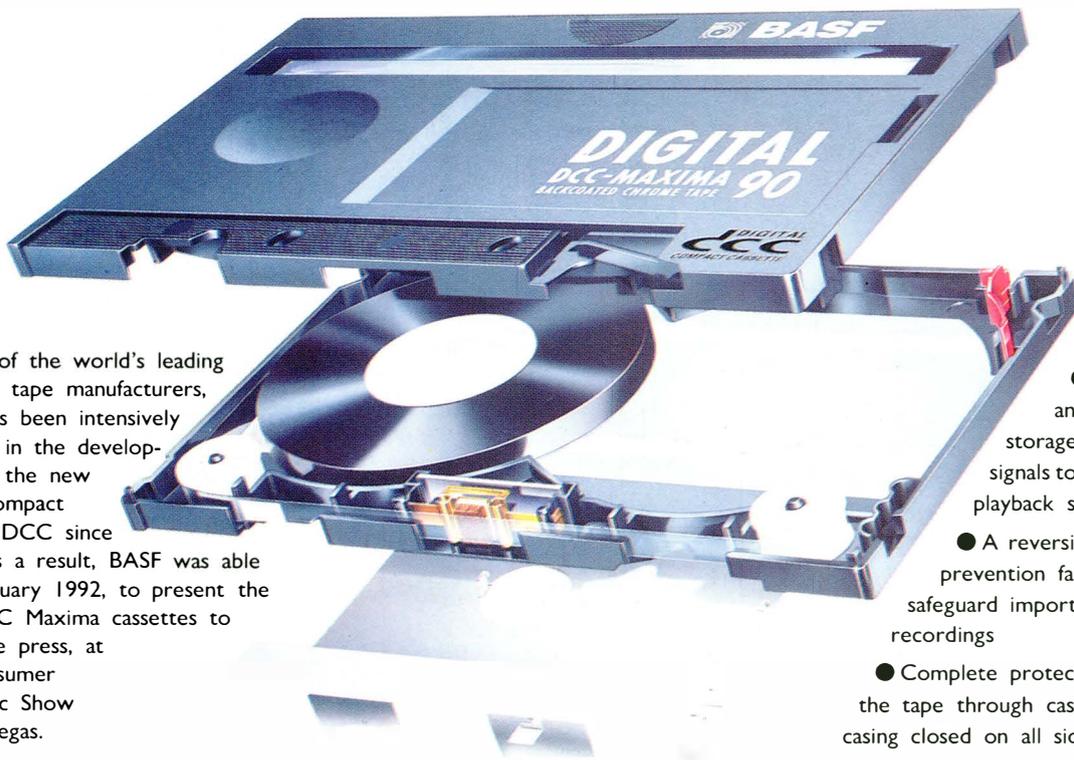


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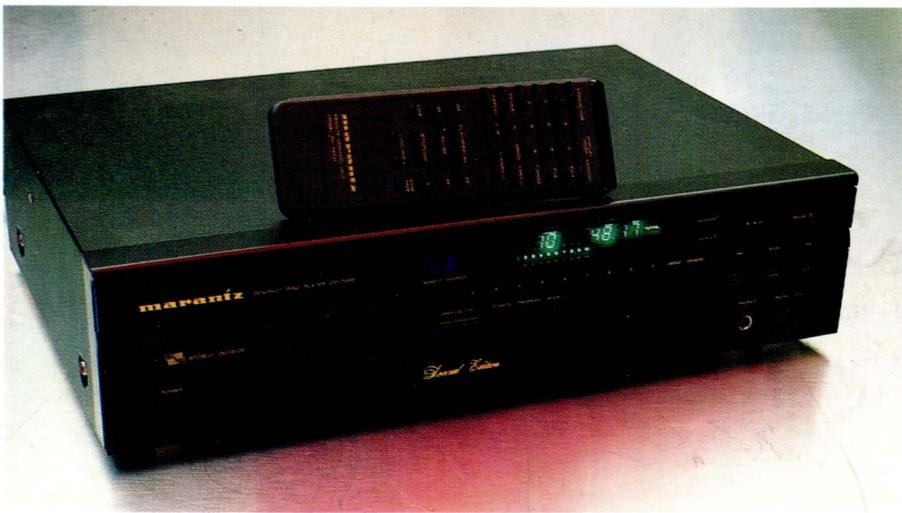
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Marantz CD-72SE

Marantz Hi-Fi (UK) Ltd, Kingsbridge House, Padbury Oaks, 575-583 Bath Road, Longford, Middlesex UB7 0EH. Tel: (0753) 680 868



No sooner had the ink dried on our appraisal of the *CD-72* than Marantz took up the challenge of providing an 'SE' version for good measure. The *CD-72*, if you cast your mind back five months, was the ultimate incarnation of its popular *CD-42* and *CD-52*. Same Bit Stream chip set but an entirely new circuit layout housed in an equally new chassis.

Drawing back the curtains on this Special Edition *CD-72* reveals no difference either in the wealth of FTS, program, repeat and random play modes or in the useful index and track skip facilities. In fact the only obvious change is a pretty 'SE' badge and an extra £100 slapped on the retail price.

But lift its bonnet and the extra dosh is at least partially justified by the lavish internal copper-plating. Marantz has even gone to the extent of introducing bolt-on copper-plated screens to shield the main PCB from its power supply. And under this plating you'll discover new NJM2114D op-amps, replacing the NE5532s in the first stage of the analogue filter network.

Marantz currently has an obsession with Silmic capacitors so you'll also find plenty of these replacing the Elna Cerafines used in the basic *CD-72*. The final NE5534 op-amp remains firmly soldered to the main PCB but the variable output (with its motorised volume control) now features an extra NJM2114 to boost its output from 2V to 3.9V — sufficient to slam the most insensitive of power amps into clipping!

Lab report

Once again we find a technical performance dominated not by Marantz' SE mods but by the underlying choice of SM5840 oversampling filter and SAA7350 PDM DAC. Particularly as the entire show is run at the lower 11.3MHz (256 times oversampling) clock rate in order to accommodate Philips' SAA7310 decoder.

So the plots all bear a remarkable resemblance to those squeezed from the *CD-72*, *CD-52SE*, *CD-52* and *CD-42* (issues 100 and 107). The *CD-72SE* still betrays a compressive deviation in low-level resolution with slightly lower distortion but a reduced S/N ratio over the 'basic' *CD-72*. And all this is just as likely to stem from the production spread of Philips' BS DAC as Marantz' switch to NJM2114 op-amps.

Sound quality

There's little question that Marantz' impromptu mods have successfully tamed the very bold and immediate sound of the *CD-72*. A virility that caught our listeners off guard in issue 107. Nevertheless by whipping the player into line Marantz has also quelled its fiery passion. While the deep and sparkling sound of this player was initially described as 'arresting' our listeners became fidgety in response to a performance that was 'too polished for its own good'.

Dynamics are restrained, so that the trumpet, vibraphone and percussion never really leapt from our jazz CD. Strings also sounded smoother than usual yet the forte piano lacked both focus and solidity, its timbre described variously as 'odd' and clanky.

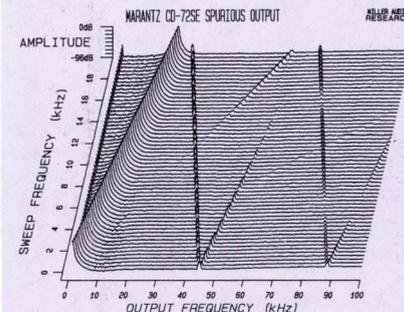
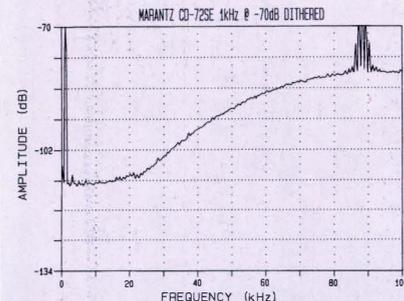
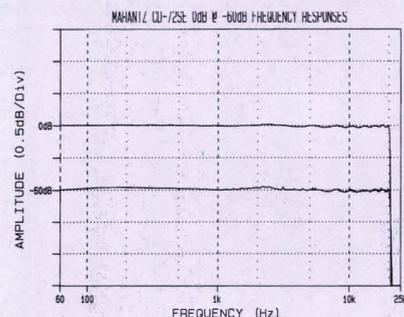
Meanwhile our pop selection lost a little of its verve and colour. Not unpleasant, they remarked, but the music had lost the spring in its step.

Conclusion

Astute to a fault, our listeners accurately guessed the price of this player by dint of its extremely detailed but frustratingly temperate balance. So the upshot of having gone berserk in a copper-plating factory while upgrading key components is not quite the raving success Marantz had anticipated. But a player pitched between the froth of the *CD-72* and the gentility of the *CD-72SE*? Now that might be worth a shot.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.08dB	0.07dB	0.10dB
Channel Separation	114.1dB	110.3dB	102.7dB
THD vs Level, 0dB	-97.3dB	-97.2dB	-71.1dB
-30dB	-83.5dB	-75.5dB	-47.9dB
-60dB	-51.4dB	-45.0dB	-17.5dB
-80dB	-26.3dB	-26.8dB	-0.13dB
Dithered, -90dB	-15.3dB	-17.9dB	+8.00dB
Dithered, -100dB		-15.6dB	
Dithered, -110dB		-3.30dB	
Resolution @ 60dB		+0.02dB	+0.01dB
-80dB		+0.48dB	+0.29dB
-90dB		+0.94dB	+0.98dB
-100dB		+1.41dB	+3.10dB
Peak Output Level, L			2.041V
R			2.022V
Relative Output Level			+0.14dB
Output Impedance			203ohm
Radio Frequency Spurious		8mV @ 50-110kHz*	
1Hz Noise Modulation			+4.3dB
CCIR IMD, 0dB			-95.3dB
Suppression of stop-band IMD			60.6dB
De-emphasis Accuracy, 1kHz			+0.01dB
5kHz			+0.01dB
16kHz			0.00dB
S/N Ratio (A-wtd), w emp, 0LSB			100.1dB
w/o emp, 0LSB			102.4dB
w/o emp, 1LSB			100.5dB
Digital Output			Coaxial/Optical
Crystal Clock Accuracy			+8.0ppm
Track Access Time (99)			4secs
Serial Number			MZ000000000011 (1)
Typical Retail Price			£500





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If Kermit the frog ever designed a CD player, then I imagine it would look rather like the CDT. Except, of course, it'd be finished in green (funny you should mention that, see pic above - Ed). The hooded ECC88 triodes peeping out over a broad 'smile' on the spring-loaded cover of this top-loading CD player certainly give it a decidedly amphibious appearance.

Novel visuals aside, the feature count is definitely on the Spartan side comprising just play/pause, track skip, memory and stop. There's no direct track access, repeat or tape edit features and no remote control.

This very unconventional player is built into an A1-style case and it looks as if a vast chunk of its budget has been lavished on a proprietary 'Class A single-ended triode' output stage. This is a unity-gain stage tacked onto the output of the main digital board, rather similar, in fact, to Cary's CAD-955 (issue 107).

MF's previous player was exposed in issue 107 as a costly Rotel clone, so maybe the company is a trifle reluctant to have me poke about inside the Frog — or perhaps there's a valid sonic reason for MF drilling through the heads of its ten chassis bolts.

Lab report

Still, concealing the evidence just makes my job all the more challenging! And what a challenge, for under the bonnet you'll find a basic implementation of Sanyo's LC7881 hybrid PWM/multi-bit DAC, subject, judging by the 8.64MHz clock, to just four times oversampling.

Just look at the appalling 13dB stop-band rejection, the erratic -60dB frequency response and compressive low-level linearity. Faint -90dB/20kHz treble detail, for example, actually crops-up at -76dB, a boost of 5:1.

Meanwhile a huge range of intermodulation distortions (typically 1.4 per cent) clutter the mid and treble octaves as

audio and 88.2kHz stop-band signals 'mix' in the triode output stage (see 3D plot). However, at slightly lower levels these distortions fall away quite rapidly, leaving the strong 2nd/3rd harmonic 'colour' of the valves to thoroughly tint these digital nasties.

Sound quality

Blissfully unaware of the lab test peculiarities, the panel's response was a resounding 'Groovy'. Tracy Chapman sounded markedly louder than usual (so much so that I was obliged to re-check the listening level) yet her voice remained clear and expressive just as the bongos were finally released from behind the bass guitar. 'The bongo man's finally been miked-up' commented one.

Christy Moore also sounded alive and expressive, allowing us to appreciate subtleties in the guitar playing if not in his voice. Sibilance was slightly exaggerated but then this is a common side-effect of players which also emphasise the space and ambience captured in the recording.

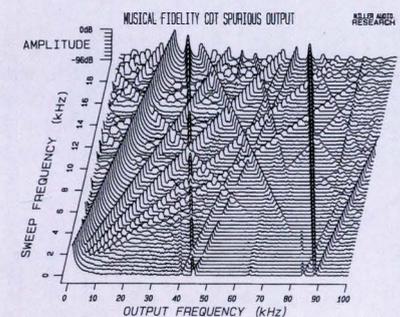
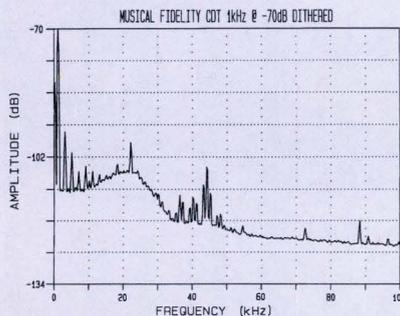
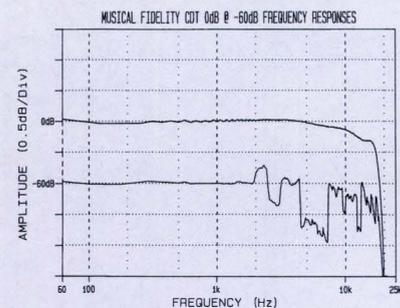
Reverting to Mozart, our panel described the lovely sense of touch, the sense of air and delicacy now surrounding the forte piano. There was a real feeling of depth and extension to the notes, prompting one listener to suggest it was 'more convincing, natural and — dare I say it — musical'. A fresh, dynamic and unusually 'loud' sound then, yet never forceful.

Conclusion

Believe it or not, one of our blind listeners concluded by announcing 'this sounds like a Musical Fidelity product'. When asked to qualify this statement, he replied 'it has the slightly loose bass but natural mid and sweet treble quality that I've come to recognise as its hallmark'. Whatever the means, the sound quality alone is more than sufficient to earn MF formal Recommendation for what is certainly a most unusual player.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.14dB	0.04dB	0.28dB
Channel Separation	62.6dB	70.2dB	41.7dB
THD vs Level, 0dB	-42.7dB	-52.1dB	-48.9dB
-30dB	-64.1dB	-63.7dB	-75.5dB
-60dB	-39.5dB	-35.2dB	-48.6dB
-80dB	-16.2dB	-18.7dB	-34.1dB
Dithered, -90dB	-11.3dB	-15.5dB	-31.3dB
Dithered, -100dB		-3.35dB	
Dithered, -110dB		+11.5dB	
Resolution @-60dB		-0.26dB	+0.06dB
-80dB		+2.33dB	+7.18dB
-90dB		+5.88dB	+14.0dB
-100dB		+8.13dB	+16.6dB
Peak Output Level, L			2.328V
R			2.337V
Relative Output Level			+1.34dB
Output Impedance			229ohm
Radio Frequency Spurious	16mV @ 8.5MHz/145MHz		
1Hz Noise Modulation			+12.1dB
CCIR IMD, 0dB			-55.2dB*
Suppression of stop-band IMD			13.3dB
De-emphasis Accuracy, 1kHz			-0.15dB
5kHz			-0.27dB
16kHz			+0.77dB
S/N Ratio (A-wtd), w emp, 0LSB			98.3dB
w/o emp, 0LSB			97.4dB
w/o emp, 1LSB			97.5dB
Digital Output			None
Crystal Clock Accuracy			+173.4ppm
Track Access Time (99)			3secs
Serial Number			065723
Typical Retail Price			£500



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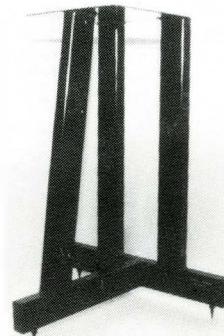
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Philips CD930

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Philips' 900 Series is now well and truly upon us. Issue 109 saw the FA-930 amplifier achieving a hard-fought Recommendation while Issue 110 marked the hesitant launch of Philips' DCC-900 DCC machine. All this leaves the CD930 occupying a central position in the revamped CD range, the 'Hammerite' styling marking a radical departure from the old 600 Series.

A display of cinematic proportions combines traditional track and time data with running-text, providing useful snippets of information for the novice. For example, press the wrong button at the wrong time and messages like 'Wrong Track' or 'Go To Play' will appear by way of guidance.

Anyway, beneath this display lies an example of Philips' new CDM9 mini-mechanism, a replacement for the CDM4 which has become something of an industry standard. And below this you've a magnificent selection of facilities including fade/scan/auto-pause and play preset modes, 30-track program and FTS memories, intro-scan, fade-in/out, random (shuffle) play, repeat and tape edit options.

All this plus single-touch direct track access, a decent coaxial (electrical) digital output and a natty remote handset complete with digital volume control. This versatile control operates in rough 1dB steps from 0dB (peak output) to -20dB before continuing in 2dB steps to -32dB.

Lab report

Philips' CD930 has been likened to a cheap version of the old CD850II. In practice though it's very much closer to Marantz's CD-42 and CD-52. Same decoder, eight times oversampling filter and SAA7350 BS DAC. A very similar circuit all round in fact, except Philips has used LM833N op-amps in place of NE5532s for its analogue filter.

Either way the resemblance between the frequency response, -70dB/1kHz and

3D plots here and in issue 107 is understandable. And, once again, we see that huge 'bump' of ultrasonic noise caused by Philips running the BS DAC at 256 times rather than 384 times oversampling.

Still, by using the latest iteration of its PDM DAC Philips has achieved better low-level resolution and lower distortion (typically 0.01 per cent at -30dB) than Marantz. Yet I am dismayed at Philips' having programmed its latest DAC to recognise digital silence tests, thus attempting to cheat on S/N ratio measurements.

Sound quality

This contender was described as a 'pastiche of most budget players' by our panel who, at this stage, were in the perfect position to judge. Nevertheless there was some disagreement over its basic character. Some found it 'easy-going but slightly thin and prone to nasal coloration with female vocals'. Others, by contrast, felt this was a rather over-ripe player, pleasingly lush but also lacking extreme treble detail.

Nevertheless powerful vocalists, and Tracy Chapman in particular, would still sound oddly stilted, prompting one panellist to suggest she was 'more hopelessly idealistic than usual'. The accompanying bass line, meanwhile, was also heavier and more persistent than we'd noticed before.

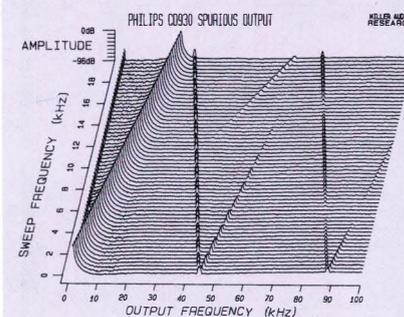
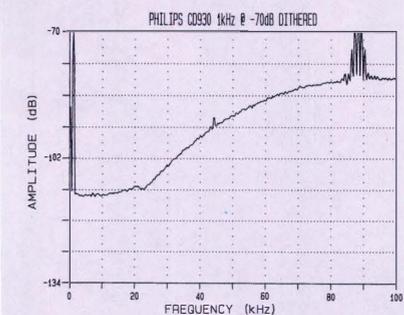
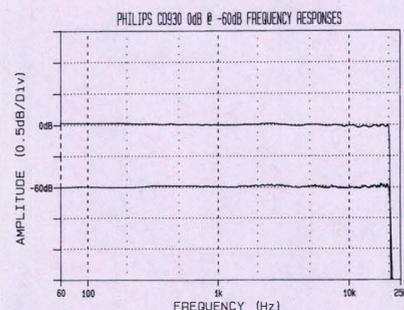
Yet there were times when the 'doctored' sound of this player genuinely suited the mood of the music. Our jazz selection, for example, sounded incorrigibly languid. A criticism in any other context. But here? Well, there was magic in the air.

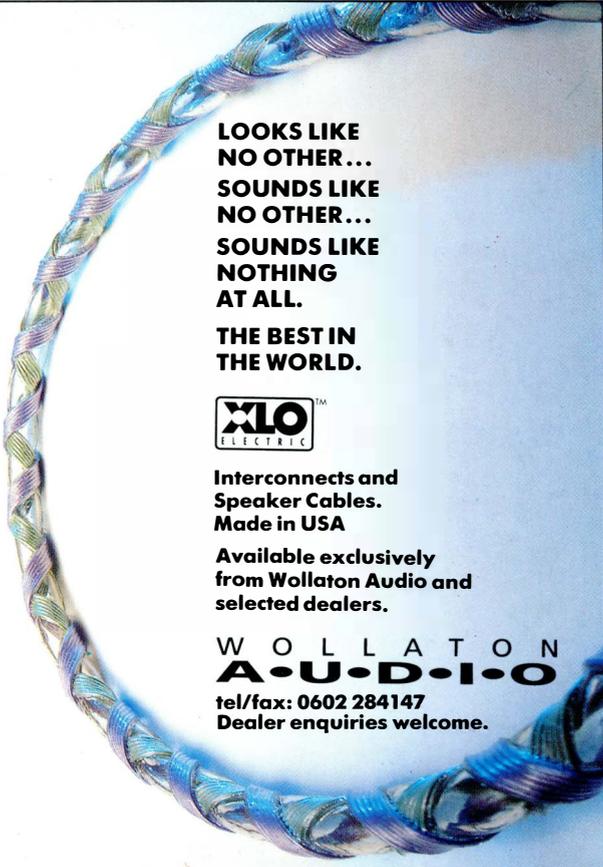
Conclusion

Unfortunately the odd flash of wonderment is not enough to disguise what is basically a very easy-going player. A player with plenty to offer unless, of course, you're looking for a sense of flair and sparkle.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.07dB	0.07dB	0.08dB
Channel Separation	127.2dB	133.1dB	129.6dB
THD vs Level, 0dB	-100.9dB	-97.4dB	-72.1dB
-30dB	-89.1dB	-80.1dB	-49.2dB
-60dB	-53.5dB	-46.3dB	-18.5dB
-80dB	-28.1dB	-29.1dB	+1.50dB
-90dB	-17.3dB	-20.3dB	+10.5dB
Dithered, -100dB		-16.1dB	
Dithered, -110dB		-3.65dB	
Resolution @60dB		-0.01dB	-0.01dB
-80dB		+0.12dB	+0.12dB
-90dB		+0.13dB	+0.08dB
-100dB		+0.55dB	+2.20dB
Peak Output Level, L			1.905V
R			1.920V
Relative Output Level			-0.39dB
Output Impedance			208ohm
Radio Frequency Spurious			5mV @ 2-30MHz
1Hz Noise Modulation			+3.3dB
CCIR IMD, 0dB			-98.7dB
Suppression of stop-band IMD			60.6dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			+0.01dB
16kHz			-0.01dB
S/N Ratio (A-wtd), w emp, OLSB			120.5dB
w/o emp, OLSB			120.3dB
w/o emp, 2LSB			101.7dB*
Digital Output			Coaxial
Crystal Clock Accuracy			+31.1ppm
Track Access Time (99)			3.5secs
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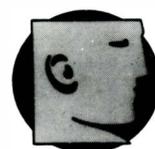
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Philips CD950

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



After months of expectation Philips' has gotten around to utilising its own two-chip Bit Stream DAC — the fabled DAC7. Not that the sober exterior of the CD950 gives any hint to the treasure lying within. In terms of styling the CD950 is hot from the 900 Series mould, it even has the same display and CDM9 transport mechanism as the budget CD930. To be perfectly fair, however, Philips has tarted-up its CD drawer with a soft covering of felt.

Shifting the direct access keypad onto its RD6910 remote control certainly lends the CD950 a less cluttered appearance, but there's no escaping the most advanced of widgets. How about FTS programming with shuffle play and cancel modes for instance? Tape edit and Personal Preset features have mysteriously disappeared but at least you can now douse that huge display.

Inside is where the real action is, for here Philips is using its SAA7350 chip — not as a DAC — but simply to create the oversampled and 'noise-shaped' bitstream before it hits the TDA1547 'DAC7' switched-capacitor network. After this we find a real audiophile analogue stage, complete with Signetics NE5532N op-amps, Nichicon MUSE capacitors in the audio stages and Elna Cerafine electrolytics for power supply decoupling.

Lab report

Meridian, DPA and Forte (issues 101 and 103) are all using Philips' DAC7 chipset, though none are using this particular combination with NPC's eight times oversampling filter. Incidentally it's this filter that causes the mild response ripple and V-shaped stop-band images detected on both the CD930 and CD950. Just compare 3D plots.

DAC7 brings with it certain advantages. Distortion, for example, is up in the Kenwood/JVC class at 0.00043 per cent midband while even at -30dB (important in musical terms) it's just 0.0083 per cent. Low-level

resolution is also extremely good just as the extra 5dB or so of S/N is reflected in the added dynamic range visible on the dithered 1kHz/70dB plot.

Once again, however, Philips has activated the 'Digital Silence Detection' mode of the SAA7350, enabling it to quote a S/N ratio of over 115dB in its technical specs. The real-life value is more than adequate at 107dB (A-wtd).

Sound quality

Following hard on the heels of the CD930 this up-rated version offered a far tidier, cleaner, crisper and more detailed performance. But then it costs twice as much. There was now a realistic warmth and richness about the harmonies that accompany Jennifer Warnes' dominant vocals, a ruddiness that enhanced rather than cloaked the passion of her voice.

Turning to Mozart and the classical strings were equally involving, the double bass and cello providing a convincing backdrop to the assertive nature of the forte piano. Nevertheless the scale of this instrument, both here and in our jazz track, was lightly rebuked for its 'soft' dynamics.

By contrast both Christy Moore and Tracy Chapman sounded positively riveting. The grit, gravel and sense of 'fun' had returned to Moore's voice just as Chapman enjoyed a rare degree of intelligibility.

Conclusion

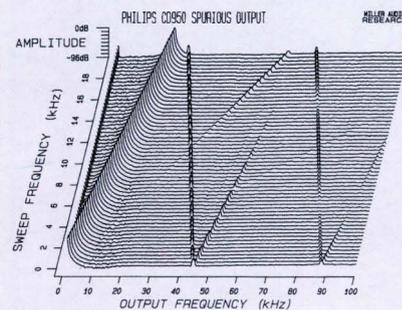
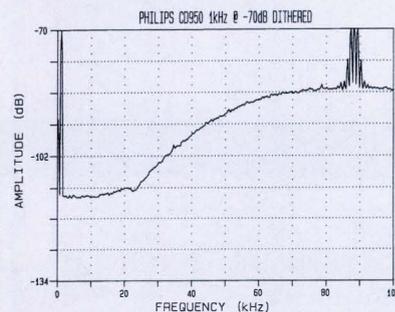
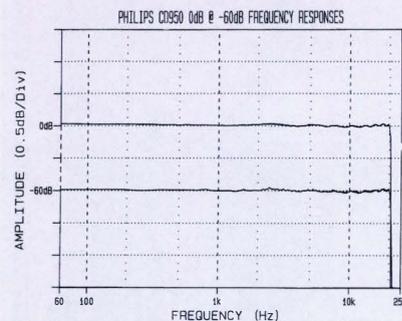
Philips' implementation of its own high-end technology looks to have been a success. The CD950 might not sound especially 'DAC7-ish', but at just £350 it's clearly been worth the wait.

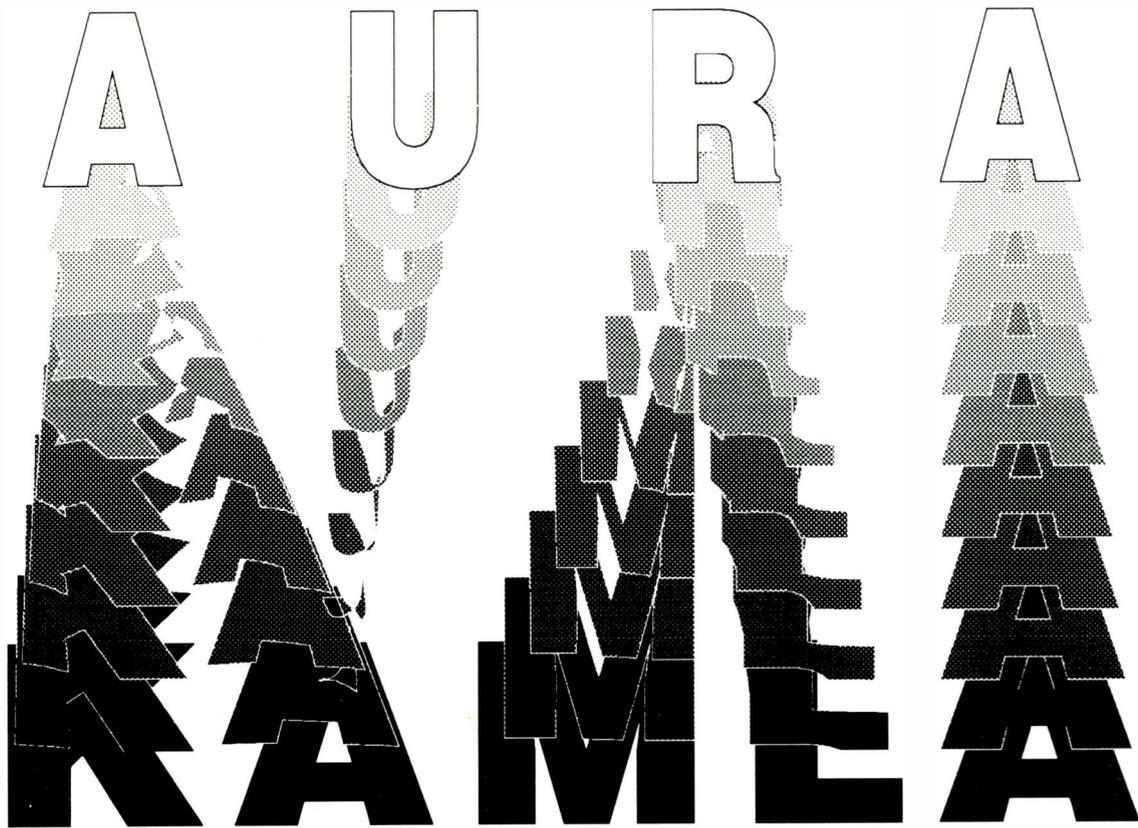
It delivers a broad array of strong and positive qualities with, according to our listeners, 'little if anything in the way of an Achilles heel'. Certainly more than enough to justify formal Recommendation



TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.04dB	0.04dB	0.04dB
Channel Separation	116.4dB	116.7dB	116.3dB
THD vs Level, 0dB	-107.9dB	-107.4dB	-72.9dB
-30dB	-90.3dB	-81.6dB	-51.0dB
-60dB	-54.2dB	-47.2dB	-21.5dB
-80dB	-28.9dB	-31.2dB	-1.25dB
Dithered, -90dB	-17.8dB	-22.2dB	+8.50dB
Dithered, -100dB		-20.1dB	
Dithered, -110dB		-5.50dB	
Resolution @-60dB		-0.01dB	-0.01dB
-80dB		+0.15dB	+0.01dB
-90dB		+0.10dB	-0.10dB
-100dB		+0.52dB	+1.20dB
Peak Output Level, L			2.109V
R			2.117V
Relative Output Level			+0.48dB
Output Impedance			203ohm
Radio Frequency Spurious			12mV @ 90MHz
1Hz Noise Modulation			+6.8dB
CCIR IMD, 0dB			-102.6dB
Suppression of stop-band IMD			60.6dB
De-emphasis Accuracy, 1kHz			+0.01dB
5kHz			+0.01dB
16kHz			0.00dB
S/N Ratio (A-wtd), w emp, 0LSB			122.4dB
w/o emp, 0LSB			122.3dB
w/o emp, 2LSB			106.8dB
Digital Output			Coaxial/Optical
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Pioneer PD-201

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Here's further proof of CD players becoming more affordable without sounding nastier into the bargain. But then the *PD-201* is really not that radical a player, more like an old *PD-5700* with a facelift. Same digital gubbins, same linear-tracking transport, remote control and range of features.

Full track, time and tape edit information is flashed up on Pioneer's standard fluorescent display while oft-used controls like play, pause, track skip and search have been shifted to a new position on the far right of the fascia. Below the display you'll now find secondary features like direct track access, program, auto-edit and hi-lite scanning. So the layout's a little unorthodox but be patient and you'll get the hang of it.

Then there's the remote handset which brings access to Pioneer's 25-step digital volume control. Lose this and you effectively downgrade your player to a *PD-101*.

Lab report

No £150 player of yesteryear would clock-up measurements of this calibre. Ok, so Pioneer has opted for its first-generation PDM DACs (the PD2026A) but this remains a top-notch choice: a monotonic convertor, free of glitches and offering a linearity true to 1dB at all frequencies from 0dB to -100dB. Distortion is also remarkably low, especially at 20kHz where a figure of 0.003 per cent compares very favourably with the 0.03 per cent or so suffered by Philips' 'equivalent' Bit Stream DAC.

The V-shaped stop-band images seen on the 3D plot are not caused by the upsamplers in the DAC but by the eight times oversampling filter in Sony's CXD2500 signal processor. This may also be the cause of those unusual — but real — spikes in the player's low-level frequency response.

The 0.6dB treble cut, meanwhile, also shows up on the de-emphasis response and

is a product of Pioneer's final analogue filtering. And, unless you're a bat, it's unlikely to be audible.

Winges? Well the clock selection is a trifle naff, the output impedance a little high at 1kohm and the real S/N ratio only just inside the 16-bit target at 99dB.

Sound quality

'Grip', 'drive' and 'snap' exclaimed our crew of listeners. No, they were not describing a new breakfast cereal but were applauding the bubbly sound that frothed from our selection of CDs. This player certainly has a very open and transparent quality but there's also a clear emphasis of upper mid and upper bass detail.

The voice and percussion from Jennifer Warnes' CD, for instance, were highlighted along with an extra rumbling quality added to the male harmonies. Not entirely faithful, we concluded, but still entertaining. So the player sounds loud and ebullient, but it couldn't be described as uncouth.

As a result our classical and jazz tracks sounded like fresh, new recordings. Marty Paich's double-bass seemed fuller than usual while the tenor sax was rich and chesty — all very out-of-the-box, they suggested.

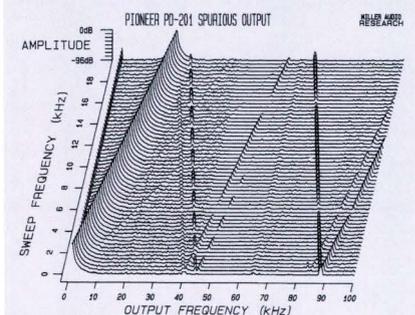
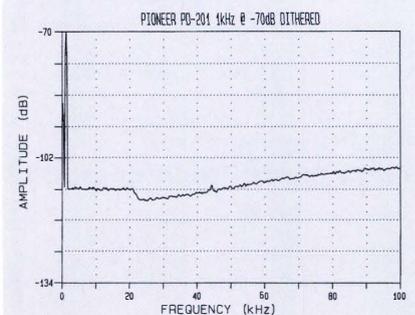
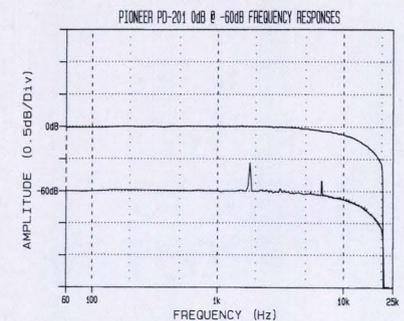
Similarly, Mozart's fortepiano strode boldly from the speakers while the strings had a decent sense of 'thrill and sweetness'. A difficult recording handled with confidence by this unassuming player.

Conclusion

A fine result from a player that's not afraid to stray from the path of neutrality. From this alone our panel recognised the *PD-201* as a cheap and relatively unsophisticated design. Yet it still won us over with what our listeners described as 'its cheeky charm and wit'. A player that blows raspberries at the stifling politeness of costlier designs, but one that succeeds despite its audacity!

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.01dB	0.00dB	0.01dB
Channel Separation	108.7dB	103.8dB	83.6dB
THD vs Level, 0dB	-98.3dB	-96.2dB	-90.1dB
-30dB	-96.0dB	-79.7dB	-69.7dB
-60dB	-59.3dB	-50.7dB	-42.9dB
-80dB	-28.1dB	-29.3dB	-20.7dB
Dithered, -90dB	-17.7dB	-19.1dB	-11.6dB
Dithered, -100dB		-11.5dB	
Dithered, -110dB		-4.70dB	
Resolution @ 60dB	0.00dB	-0.03dB	
-80dB		-0.11dB	
-90dB		-0.54dB	
-100dB		-0.60dB	
Peak Output Level, L		1.929V	
R		1.927V	
Relative Output Level			-0.32dB
Output Impedance			1.02kohm
Radio Frequency Spurious		6mV @ 30MHz-1.3GHz	
1Hz Noise Modulation			+1.9dB
CCIR IMD, 0dB			-96.9dB
Suppression of stop-band IMD			64.9dB
De-emphasis Accuracy, 1kHz			+0.01dB
5kHz			-0.03dB
16kHz			-0.35dB
S/N Ratio (A-wtd), w emp, 0LSB			104.9dB
w/o emp, 0LSB			104.5dB
w/o emp, 1LSB			98.9dB
Digital Output			None
Crystal Clock Accuracy			-162.6ppm
Track Access Time (99)			3 secs
Serial Number			MD7503200
Typical Retail Price			£150



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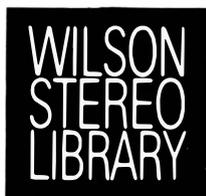
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Pioneer PD-S801

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Several years of conducting blind listening tests has taught me to expect the unexpected. And this new contender has 'unexpected' written all over it.

You see the *PD-S801* is no ordinary CD player. Sure enough it looks little different from either the *PD-S501* overleaf or even its immediate predecessor, the *PD-8700* (issue 100). It features the same upside-down Stable Platter Mechanism and includes a similarly generous array of facilities. Inside, however, lurks the shadow of 'Legato Link Conversion' or LLC for short.

LLC has little to do with the D/A converter, however, which is an up-dated version of the bitstream (Pulse Flow) IC used in earlier players. No, the heart of LLC is a rather novel DSP chip that 'moulds' unwanted stop-band noise.

Conventional FIR digital filters will attempt to scrub-out everything beyond 22.05kHz (half the 44.1kHz sampling frequency). Yet Pioneer's 'filter' is less severe, letting a certain amount of these reflected 'digital images' through. Incidentally, this is exactly the same process adopted by Wadia in its *DigiMaster* DACs.

Lab report

On paper it looks as if the player's frequency response has been miraculously extended, drooping 3.6dB at 20kHz but rolling off gently thereafter so that it's just 12dB down at 25kHz and 48dB down at 35kHz. However, do remember that everything above 22kHz is digital rubbish with no harmonic relationship to the music lying below 22kHz.

The reality of LLC's 'extended response' is exposed by the vast column of stop-band noise rising out of the 3D plot. Compare this with the Wadia DACs in issue 101. Otherwise Pioneer's 1-bit DACs ensure the player offers superb low-level resolution, a fine 107dB S/N ratio and very low mid-level distortion (typically 0.008 per cent at -30dB).

Sound quality

Two samples and three sessions later and our listeners fell into one of three camps.

Camp one admired its subtle detailing, the uncommonly realistic imaging and the warm, human quality it brought to vocals. It captured the clubby acoustic of our jazz selection very well indeed, yet, because the music had plenty of 'weight', it was neither as crisp or nimble as with some of the better players in the group.

Camp two was less convinced. They thought it was flummoxed by the complexity of the Mozart Concerto as the piano, double bass and cellos were squashed together, muting the instruments' upper harmonics. Nevertheless its weighty bass was appreciated, especially as it contributed to the warmth and intimacy of the Jennifer Warnes CD.

Camp three were utterly scathing in their appraisal. 'It has an inoffensive but boring presentation' they began 'yet retains the ability to shock with unexpectedly fierce flashes of strings or percussion'. Abrupt bursts of sound which, apparently, were quite out of character with its otherwise very mellow balance.

The Mozart CD was described as screechy and fierce. A mess of sound that, despite possessing a surprising sense of depth, maintained very little contact between the strings and their acoustic.

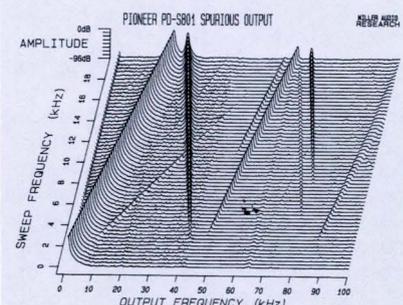
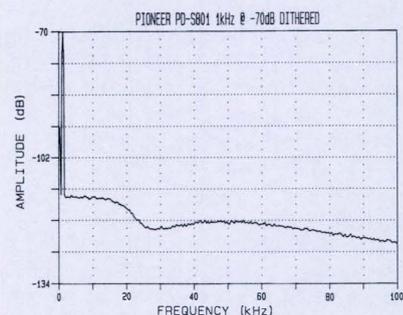
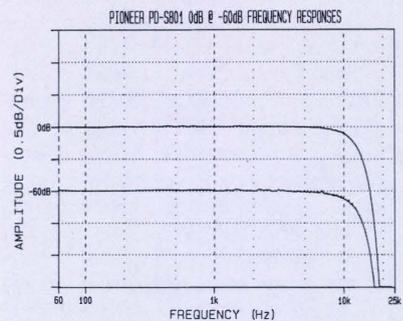
Conclusion

Many listeners will be attracted by the openness, the visceral detailing and unusual 'atmosphere' recreated by this player. Equally, others are just as likely to be frustrated by its smooth, gentle but muted treble quality. As one panellist concluded, 'easy-going yet with an uncanny ability to offend'.

Love it or loathe it, you'll never know unless you try it. We'll leave you to sort this one out in the demonstration room.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.12dB	0.13dB	0.15dB
Channel Separation	135.5dB	122.9dB	110.7dB
THD vs Level, 0dB	-91.4dB	-90.2dB	-83.3dB
-30dB	-98.9dB	-82.4dB	-78.1dB
-60dB	-64.9dB	-55.9dB	-51.1dB
-80dB	-28.4dB	-31.1dB	-31.7dB
Dithered, -90dB	-17.8dB	-22.0dB	-22.5dB
Dithered, -100dB		-19.4dB	
Dithered, -110dB		-7.85dB	
Resolution @ -60dB		0.00dB	-0.01dB
-80dB		-0.02dB	-0.03dB
-90dB		-0.35dB	-0.22dB
-100dB		-0.20dB	+0.20dB
Peak Output Level, L			2.358V
R			2.391V
Relative Output Level			+1.49dB
Output Impedance			475ohm
Radio Frequency Spurious			<1mV Broadband
1Hz Noise Modulation			+6.3dB
CCIR IMD, 0dB			-92.5dB
Suppression of stop-band IMD			6.6dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			0.00dB
16kHz			-1.09dB
S/N Ratio (A-wtd), w emp, 0LSB			116.1dB
w/o emp, 0LSB			112.9dB
w/o emp, 1LSB			107.3dB
Digital Output			Optical
Crystal Clock Accuracy			-164.9ppm
Track Access Time (99)			4.5secs
Serial Number			ME8503709
Typical Retail Price			£300



Sansui CD-X617

Sansui UK, 91 Coleman Road, Leicester LE5 4LE.
Tel: (0533) 460 021



It's become something of a tradition to lambaste the likes of Denon for its glorification of ancient technology but when it comes to bare-faced audacity, Sansui is a tough act to follow. Here's an example plucked from its literature 'after extensive research and development, we've devised a revolutionary D/A conversion system — the 1-bit MASH D/A convertor'.

This is followed up with the equally unbelievable: 'Enter Sansui's new 1-bit MASH DAC' and 'In the CD-X617, we've improved our MASH DAC'. Now I'm all in favour of a little creative writing but Sansui, along with Teac, Harman Kardon, Dual, and NAD, use just one version of the many MASH/PWM bitstream DACs manufactured by Technics. The original project started back in 1984 with NTT developing the algorithm (the maths) for Multi-StAge noise-SHaping and Technics designing the circuits.

This 'economy with the truth' aside, Sansui's CD-X617 shares the same case and role-call of features as the CD-X317, but uses a pair of MASH/PWM DACs rather than the single unit employed by its predecessor. Features like direct track access, program, repeat and random play abound, along with fade, tape edit, peak search and a dimmer for the orange display.

All very nice but, and I'm trying very hard not to appear churlish, these stiff little buttons usually cause the entire player to move backwards before registering.

Lab report

A pair of MN6474 DACs give Sansui the opportunity to use four PWM switched-capacitor networks in double-differential mode in each channel. Sansui achieves this by using three external NJM4558 op-amps and a balanced LC filter network on the output. As a consequence the player's linearity, distortion and S/N ratio should all outstrip the CD-X317 (issue 107)

In practice, however, no such advantage is realised. Distortion actually increases from 0.00096 to 0.003 per cent at 1kHz, noise modulation increases from +2.8dB to +6.1dB while, more importantly, its S/N ratio has collapsed from 103dB to just 98.5dB. A similar reduction in its dynamic range is evident from the plot of 1kHz @ -70dB.

Sound quality

Light 'n tizzy, the panel exclaimed, qualifying this outburst by claiming it was one of the few players to highlight the sibilance on Jennifer Warnes' voice while simultaneously exaggerating the splash of percussion. So the player can sound quite spacious but also rather insistent and unforgiving.

Yet with our jazz and classical material it was portrayed as 'smooth, tidy but dull as dishwater'. Indeed some five listeners said they might have found it offensive if they hadn't already fallen asleep. So here's the music, they explained, moseying along, hands in pockets and without much enthusiasm for the efforts of the composer.

Nevertheless one listener interpreted this casual, moseying rhythm as a feeling of momentum that maintained the stride and interest of the music. Funnily enough this was the same panellist who, five months ago, stuck out in favour of the CD-X317.

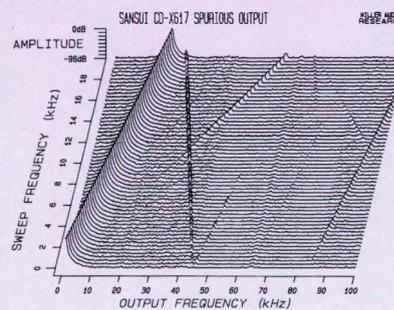
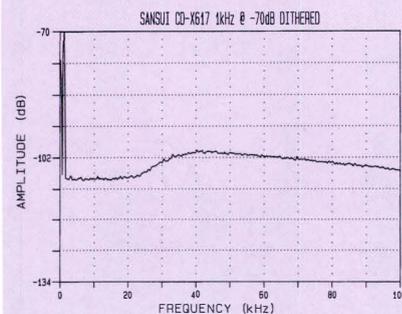
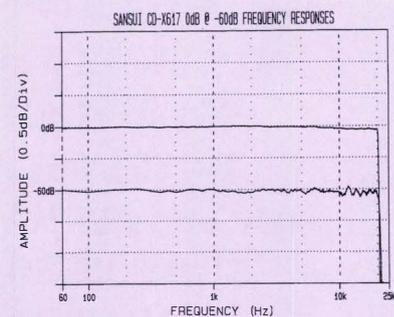
Conclusion

By a majority verdict the CD-X617 is almost bereft of any 'get up and go', a player that's constructed and finished to a high standard but is saddled with a very uninspiring sound. Technics' MASH/PWM DAC might have an enviable track record, but this in itself is no guarantee of success.

Sansui has found out the hard way that the implementation, rather than the basic technology, is the key to sound quality. It got the formula right in the CD-X711, so a little back-tracking might be in order.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.04dB	0.04dB	0.12dB
Channel Separation	111.0dB	97.8dB	69.6dB
THD vs Level, 0dB	-86.1dB	-90.1dB	-76.5dB
-30dB	-88.5dB	-76.5dB	-63.0dB
-60dB	-57.5dB	-48.8dB	-36.4dB
-80dB	-27.6dB	-28.5dB	-17.2dB
Dithered, -90dB	-15.5dB	-18.8dB	-8.65dB
Dithered, -100dB		-9.75dB	
Dithered, -110dB		-4.90dB	
Resolution @60dB		-0.01dB	-0.02dB
-80dB		-0.16dB	-0.32dB
-90dB		-0.42dB	-1.02dB
-100dB		-0.54dB	-2.90dB
Peak Output Level, L			2.249V
R			2.259V
Relative Output Level			+1.04dB
Output Impedance			935ohm
Radio Frequency Spuria			<1mV broadband
1Hz Noise Modulation			+6.1dB
CCIR IMD, 0dB			-95.7dB
Suppression of stop-band IMD			83.1dB
De-emphasis Accuracy, 1kHz			-0.05dB
5kHz			-0.05dB
16kHz			+0.06dB
S/N Ratio (A-wtd), w emp, 0LSB			101.0dB
w/o emp, 0LSB			97.8dB
w/o emp, 1LSB			98.5dB
Digital Output			Optical
Crystal Clock Accuracy			+43.8ppm
Track Access Time (99)			3.5secs
Serial Number			15201000349
Typical Retail Price			£300



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KEF 105/3



Sony CDP-397

Sony UK Ltd, Sony House, South Street, Staines, Middlesex. Tel: (0784) 467 000



This player is neither built like a tank nor likely to set any records for supreme sound quality. Yet, at just £140, Sony's CDP-397 is little short of remarkable. Remarkable because it's one of the very few budget all-rounders, a player that achieves just the right balance between features, technical performance, build and sound quality.

Just look at what's on offer. Very slick track access courtesy of a CD mechanism still used on far costlier players. Facilities like continuous, random, program, delete and repeat play plus peak search and a five-second fade option. A ten, 20 or 30-second intro scan and a variable-output headphone socket just add to the armoury.

Sony has even included a basic version of its Custom Edit function, allowing you to decide the length of tape (Time Edit), automatically shuffle the track order (Just Edit) or manually program the track order (Program Edit). All this plus remote control and direct track access!

Once inside, the miracle continues for the CDP-397 is 90 per cent fresh air. Its first CD player I've come across that's almost entirely composed of miniature surface-mount components (chip resistors, capacitors and semiconductors) with flat-pack ICs and the smallest circuit board I've seen this side of a portable.

Lab report

Sony's CDP-397 uses the same complement of CXD2560 eight times oversampling filter and CXD2561 PLM bitstream DAC as the CDP-797 (issue 107). Hence the excellent low-level resolution and even frequency response.

However Sony's 'budget' implementation has prompted an increase in distortion from 0.0036 to 0.02 per cent at 20kHz plus a jump to 0.04 per cent in 3rd-order IMD. There is also an increase in the 'leakage' of

noise at 2Fs (88.2kHz), visible on both the 3D plot and dithered 1kHz spectrum at -82dB. The 1.14kohm output impedance is also a little high in my opinion.

The good news is that having been exposed in successive issues of *Choice*, Sony is now disabling the 'cheat mode' that promises such wonderful (though thoroughly artificial) figures for S/N (see issue 100 for the full story). So now the 'real' and thoroughly adequate 103dB figure is revealed.

Sound quality

Here's a player that will capitalise on the simpler recordings in your playlist thanks to its bright and lightweight sound. The spacious acoustic of Jennifer Warnes' CD played right into its hands, her voice striding forward in a bold rather than elegant fashion. Not exactly rich or supremely articulate, they remarked, but still pretty entertaining.

A big and spacious sound, by all accounts, but with a slight 'tissue paper' quality that can undermine its foundation. Nevertheless the Tracy Chapman CD impressed us with its 'big bass sound', a surge that brought extra warmth to the music without really reflecting its true depth and solidity.

In fact this player has a tendency to shout at times, a mid-treble forwardness that adds a rasp to female vocals while simultaneously muting extreme treble detail. The classical strings and piano, for example, lost a little of their customary 'thrill and brilliance'.

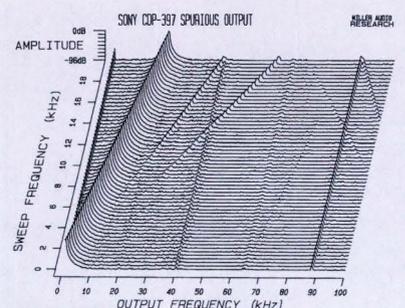
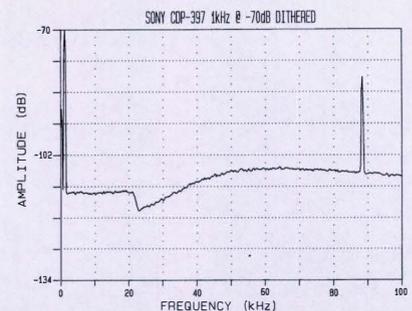
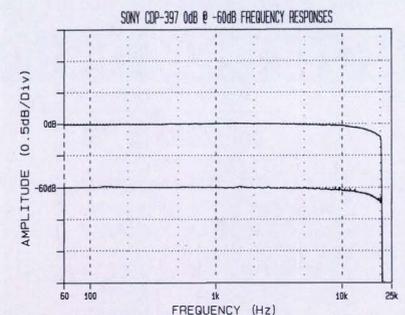
Conclusion

Compared with Sony's CDP-397, the sub-£150 players of yesteryear were shabby in the extreme, although there's clearly some clumsy tailoring of its overall balance to dodge problems that might otherwise have been apparent in the extreme treble.

Unsophisticated then, but far from unenjoyable, and, in the view of our panel, a clear Best Buy.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.10dB	0.10dB	0.08dB
Channel Separation	104.0dB	105.1dB	74.4dB
THD vs Level, 0dB	-90.6dB	-95.6dB	-74.2dB
-30dB	-95.7dB	-82.1dB	-71.0dB
-60dB	-60.5dB	-53.8dB	-41.7dB
-80dB	-27.9dB	-30.0dB	-21.5dB
Dithered, -90dB	-17.9dB	-20.6dB	-12.7dB
Dithered, -100dB		-15.6dB	
Dithered, -110dB		-7.80dB	
Resolution @60dB		+0.01dB	-0.03dB
-80dB		-0.04dB	-0.06dB
-90dB		-0.37dB	-0.20dB
-100dB		-0.10dB	-0.41dB
Peak Output Level, L			1.964V
R			1.987V
Relative Output Level			-0.11dB
Output Impedance			1.14kohm
Radio Frequency Spurious	11mV @ 88.2kHz/264.6kHz		+7.0dB
1Hz Noise Modulation			-93.5dB
CCIR IMD, 0dB			95.4dB
Suppression of stop-band IMD			-0.09dB
De-emphasis Accuracy, 1kHz			-0.09dB
5kHz			-0.19dB
16kHz			103.0dB
S/N Ratio (A-wtd), w emp, 0LSB			102.9dB
w/o emp, 0LSB			102.7dB
Digital Output			None
Crystal Clock Accuracy			-26.3ppm
Track Access Time (99)			2.8secs
Serial Number			500426
Typical Retail Price			£140



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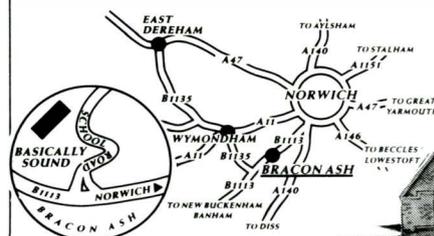
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Sony CDP-X229ES

Sony UK Ltd, Sony House, South Street, Staines, Middlesex. Tel: (0784) 467 000



Do you suffer from feature-phobia? Then turn the page because Sony's new *CDP-X229ES* is positively festooned with facilities. The very same facilities, in fact, that graced the lookalike *CDP-X339ES* in issue 107. How about continuous, shuffle, delete, repeat and program play for starters?

Begin here and then graduate to full Custom Edit and Custom File programming with the ability to store personalised disc titles, favourite track selections, custom index points and even the volume level. Incidentally if you think programming your VCR is tough, just wait till you see Sony's *RM-D991* alphanumeric remote control.

Comparisons with the costly *CDP-X339ES* continue inside because here Sony has opted for a similar frame chassis with precisely the same combination of CXD-2560 oversampling filter and Advanced-series CXD-2562 bitstream DAC. Third-generation digital hardware at a fraction of the expected cost.

But you never get something for nothing, so any saving over its '339 cousin can only have been achieved by 'streamlining' both power supply and analogue circuitry.

Lab report

Digitally speaking, there really is little to criticise. Its low-level resolution, for instance, is uncannily close to the *339's* state-of-the-art performance. Its new eight times oversampling filter also provides a thundering 107dB of stop-band rejection while leaving an imperceptible ripple on the final frequency response.

The dithered 1kHz plot reveals a very wide dynamic range, free of distortion and with a very well controlled splurge of ultrasonic noise. Unfortunately Sony's new policy of not cheating on S/N ratio tests hasn't reached the *CDP-X229ES*. A figure of 122dB is clearly outrageous but the lie is proved by

the equally outrageous +17.8dB noise modulation.

If there is a problem then it's in the analogue section. Here we discover an increase in high frequency distortion (0.006 from 0.003 per cent) that's also revealed as a 3rd-order track on the 3D plot. Compare this with the plot from issue 107. The higher 660ohm output impedance is further evidence of change.

Sound quality

Sony's *CDP-X229ES* provides an altogether leaner and meaner picture of events than its budget sibling. This manifests as a slightly dry and forward balance that fights shy of the strongest bass notes. Vocals are often bleached of colour, taking on an edgy rather than sibilant quality.

More importantly its sound was described as 'odd', a quality our listeners found difficult to verbalise yet was genuinely unsettling in the long term. By way of example the classical piano took on an unusually wooden timbre just as the jazz sax (from Marty Paich's CD) wandered confusingly about the left of the soundstage. 'He's either on roller skates' quipped one listener 'or something is amiss'.

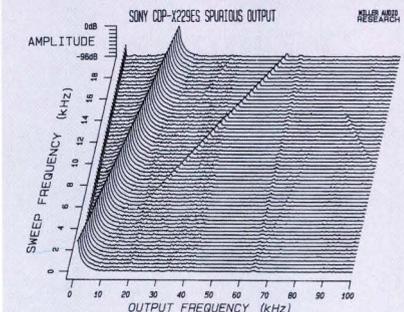
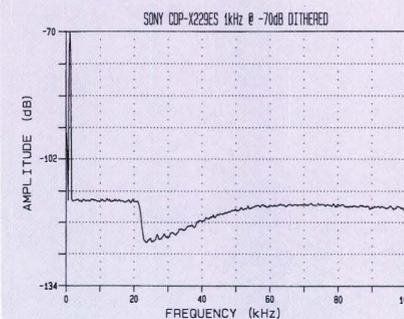
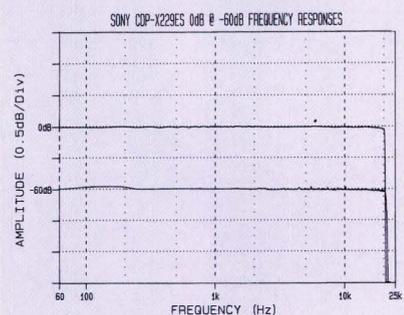
Indeed all styles of music were stilted, possessed of a disjointed yet clearly etched quality that led to an 'accumulation of sounds rather than an integrated, welcoming performance'. Where, oh where was the emotion we'd heard with the *CDP-X339ES* in issue 107?

Conclusion

A quick audition is likely to give a false impression of this player, where its immediacy, its 'edgy' definition and sharp imagery could lead to an impulsive decision. Although the *CDP-X229ES* may look like a *CDP-X339ES* on the cheap, its sound betrays a wealth of 'hidden' compromises.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.01dB	0.02dB	0.00dB
Channel Separation	129.4dB	122.4dB	93.0dB
THD vs Level, 0dB	-105.1dB	-104.2dB	-85.1dB
-30dB	-97.8dB	-82.6dB	-78.5dB
-60dB	-60.3dB	-54.9dB	-48.4dB
-80dB	-28.9dB	-31.5dB	-28.2dB
Dithered, -90dB	-18.1dB	-22.5dB	-19.6dB
Dithered, -100dB		-19.8dB	
Dithered, -110dB		-7.75dB	
Resolution @-60dB		-0.01dB	0.00dB
-80dB		-0.05dB	-0.03dB
-90dB		-0.44dB	-0.28dB
-100dB		-0.20dB	+0.39dB
Peak Output Level, L		1.952V	
R		1.948V	
Relative Output Level		-0.22dB	
Output Impedance		660ohm	
Radio Frequency Spurious		5mV @ 1-14MHz	
1Hz Noise Modulation		+17.8dB*	
CCIR IMD, 0dB		-100.6dB	
Suppression of stop-band IMD		106.7dB	
De-emphasis Accuracy, 1kHz		-0.09dB	
5kHz		-0.08dB	
16kHz		-0.10dB	
S/N Ratio (A-wtd), w emp, OLSB		121.6dB	
w/o emp, OLSB		121.3dB	
w/o emp, 1LSB		121.7dB*	
Digital Output		Optical	
Crystal Clock Accuracy		-0.80ppm	
Track Access Time (99)		2.5secs	
Serial Number		500098	
Typical Retail Price		£300	



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Teac CD-P3500

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Flushed with the Recommendation earned by its *CD-P4500*, Teac has spent the intervening period beavering away over a stripped-down version of its first Bit Stream success. So the *CD-P3500* looks rather like its big brother with a centralised drawer mechanism, soft orange display and limited range of on-board controls. But appearances, as I'm fond of saying, can be deceptive.

Taken at face value there seems little to quibble about. After all Teac is offering a similarly well-built product with a host of extra widgets, many of which are included on a matching remote control. Pretty much everything the *CD-P4500* has except its variable pitch facility, in fact. There's even a digital volume control that operates in accurate 1dB steps from 0dB (full output) to -20dB before dropping into mute.

A peek inside the box reveals the same eight times oversampling filter and Bit Stream DAC plus familiar Sony support chips. I even spotted what looks like a transformerless coaxial digital output. But the power supply, the passive component quality and analogue filter network have taken a hammering. But what did you expect? After all with £80 to trim-off the price of the *CD-P4500*, something had to give.

Lab report

Compare these three plots with those from issue 107 and you can certainly see the family resemblance. The -70dB trace is entirely characteristic of Philips' SAA7350 DAC running with a 16.9344MHz crystal (384 times oversampling) for instance. Aiwa's *XC-700* and *XC-900* (issues 95 & 100) give the same result for the same reasons.

However, compare the 3D plot with that from the *CD-P4500* and you'll see that any stop-band noise produced by the NPC SM5840 oversampler is dealt with less effectively by Teac's final analogue filter. Sec-

ond and third harmonic distortions, meanwhile, are clearly in the ascendant but actually reduce from 0.023 to 0.015 per cent as the level drops from 0dB to -10dB.

This implies that Teac's analogue op-amps, already restricted to a low 1.6V maximum output, are further stressed at high frequencies and high levels. Long or highly capacitive interconnects will only add to its grief while the -2dB loss in output will put it at a disadvantage in quick A/B demos.

Sound quality

The appetite of our panel was initially whetted by the ambient, weighty and authoritative tone of our Jennifer Warnes CD. However this turned out to be a reflection of the disc itself, achieved almost in spite of the inherently congested and cardboard quality of the player.

Vocals, on the whole, are delivered in an indifferent and laid-back fashion, though they are free of irritating sibilance. Indeed all our vocal CDs sounded disarmingly smooth, but also were uninformative and lacking passion. The Mozart really caught the *CD-P4500* napping, the player's vague sense of stereo imagery leaving the quartet of strings in tangled disarray. 'We couldn't tell who was bowing what', bemoaned the panel.

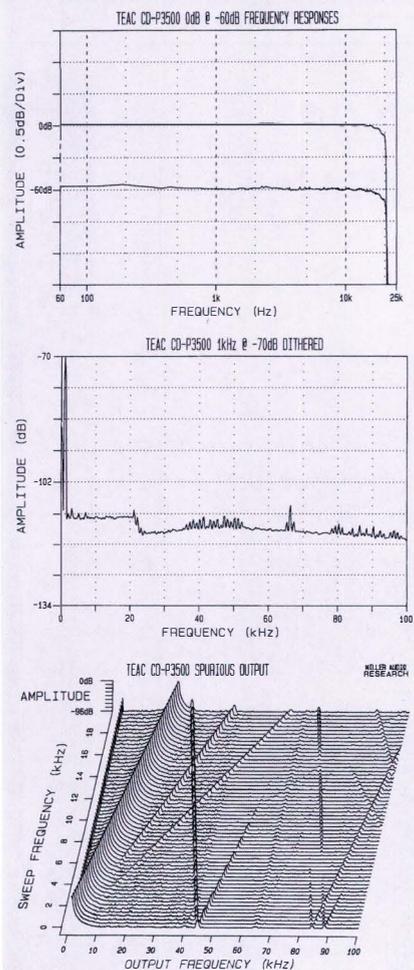
Switching to both the Tracy Chapman and Marty Paich CDs also served to highlight this peculiarly skewed imagery, flat soundstaging and muddled vocals. Its bass, meanwhile, was likened to 'the excitement provided by a bowl of All-Bran'.

Conclusion

Stripping-out the *CD-P4500* to produce the *CD-P3500* was a creditable idea. Unfortunately the '4500 is not exactly bristling with dead wood and so £80 worth of pruning has more than made its mark. The end result is a mere shell of a player and one that tenders 'a uniformly bland account of itself'.

TEST RESULTS

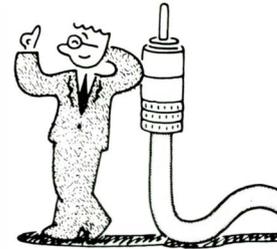
	20Hz	1kHz	20kHz
Channel Balance	0.02dB	0.00dB	0.12dB
Channel Separation	112.6Hz	105.3dB	81.1dB
THD vs Level, 0dB	-99.4dB	-95.0dB	-72.8dB
-30dB	-83.8dB	-76.5dB	-76.7dB
-60dB	-51.3dB	-44.9dB	-48.3dB
-80dB	-27.7dB	-27.8dB	-28.9dB
Dithered, -90dB	-17.5dB	-20.4dB	-22.0dB
Dithered, -100dB		-15.3dB	
Dithered, -110dB		-2.95dB	
Resolution @ -60dB	+0.05dB	+0.02dB	
-80dB	+0.58dB	+0.45dB	
-90dB	+1.06dB	+1.38dB	
-100dB	+1.42dB	+3.82dB	
Peak Output Level, L		1.596V	
R		1.598V	
Relative Output Level		-1.95dB	
Output Impedance		995ohm	
Radio Frequency Spurious		20mV @ 10-30MHz	
1Hz Noise Modulation		+3.3dB	
CCIR IMD, 0dB		-95.5dB	
Suppression of stop-band IMD		61.0dB	
De-emphasis Accuracy, 1kHz		0.00dB	
5kHz		+0.01dB	
16kHz		-0.06dB	
S/N Ratio (A-wtd), w emp, 0LSB		101.6dB	
w/o emp, 0LSB		102.6dB	
w/o emp, 1LSB		101.6dB	
Digital Output		Coaxial	
Crystal Clock Accuracy		+276.2ppm	
Track Access Time (99)		3.2secs	
Serial Number		000001	
Typical Retail Price		£170	



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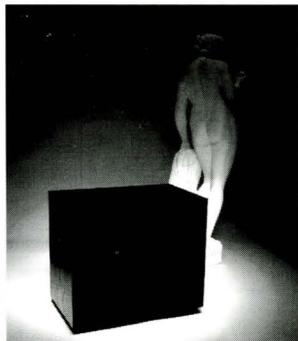
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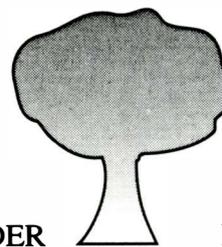
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Technics SL-PG320A

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Our last CD players issue found the digital heart of Technics' classic *SL-PG200A* transferred to the costlier *SL-PG520A*, leaving its progeny, the *SL-PG420A*, somewhat sadder for the loss. Now, with the advantage of two more players under our belts, the method in Technics' corporate madness is finally exposed.

It's all quite simple really. What seems like four separate players all pitched below £250 turns out to be two pairs of like-minded machines. The budget *SL-PG320A*, for example, is basically an *SL-PG420A* minus its remote control, direct access keypad and headphone socket.

You're left with the bare bones: simple track and fast search facilities alongside a 20-track memory, repeat and random play. Technics' Synchro-Edit feature is retained for use with various Technics tape decks, bringing disc-link and time fade options into the fold.

Lift up the bonnet and you'll discover a common *SL-PG320/420* circuit board, complete with MN6475 MASH/PWM DAC and a blank space where the headphone amp should be.

Incidentally, the 'A' in the player's title identifies the country of origin, Germany in this instance. For its European models Technics buys in, and fits, a Philips CDM4 drive mechanism. Incorporating European components ensures that the likes of you and I don't end-up paying over-the-odds for a budget CD player!

Lab report

So what's to say? On the whole this *SL-PG320A* measures just like the *SL-PG420A* (issue 107) from its droopy frequency response (-0.52dB @ 20kHz), 0.0017-0.014 per cent distortion (at 0dB) and 98.4dB 'real-life' S/N ratio. Once again: 16-bit resolution by the skin of its teeth.

Meanwhile the 3D plot shows the same

pattern of stop-band images, caused by the four times and eight times upsamplers (32 times in total) built into its bitstream DAC.

Sound quality

Combine a slightly dry and lean balance with a bustling, explicit sense of detail and you've got the jist of Technics' *SL-PG320A*. Our listeners found it a trifle hard or sharp on occasions but this also lent its music a certain astringent clarity, particularly through its bass which was described as taut rather than fullsome.

Tracy Chapman, for example, might have sounded a little coarse near the extremes of her range yet the player still extricated a variety of backing instruments from what can easily become a muddled lump. Brassy percussion was pulled clear of the mix for a change, a further indication of the player's mid-forward character.

Reverberant detail was also recovered in superb fashion, our panel citing the echo on Jennifer Warnes voice and Marty Paich's 'singing sax' as memorable examples.

Yet in the light of this tremendous breadth of sound the focus and stability of individual images would often seem disappointing. Classical strings, for instance, were criticised for their reedy quality, lacking the robust 'thrill' heard earlier in the day.

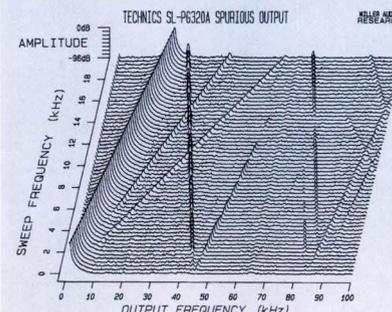
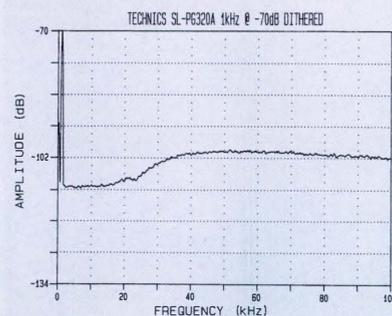
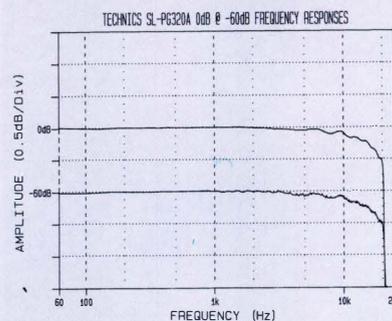
So its musical picture is certainly spread over a wide canvas but, as a consequence, the subtlest elements can seem a little vague.

Conclusion

As expected, the lean but quick and responsive character of the *SL-PG320A* is very much in keeping with the precedent laid down by Technics' *SL-PG420A* in issue 107. The loss of remote control restricts its flexibility, yet there's something undeniably attractive about the nymph of a player left behind. Recommended.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.14dB	0.14dB	0.11dB
Channel Separation	107.6dB	115.4dB	80.4dB
THD vs Level, 0dB	-89.4dB	-95.4dB	-77.0dB
-30dB	-85.9dB	-78.8dB	-61.0dB
-60dB	-47.5dB	-48.1dB	-35.4dB
-80dB	-27.4dB	-27.9dB	-14.8dB
Dithered, -90dB	-17.8dB	-17.6dB	-6.90dB
Dithered, -100dB		-12.3dB	
Dithered, -110dB		-4.20dB	
Resolution @60dB		+0.05dB	+0.04dB
-80dB		-0.04dB	-0.02dB
-90dB		-0.07dB	+0.33dB
-100dB		-0.40dB	-2.80dB
Peak Output Level, L			2.391V
R			2.352V
Relative Output Level			+1.50dB
Output Impedance			798ohm
Radio Frequency Spuria			12mV @ 20-100MHz
1Hz Noise Modulation			+3.5dB
CCIR IMD, 0dB			-95.8dB
Suppression of stop-band IMD			63.5dB
De-emphasis Accuracy, 1kHz			-0.05dB
5kHz			+0.29dB
16kHz			-0.51dB
S/N Ratio (A-wtd), w emp, OLSB			103.4dB
w/o emp, OLSB			103.0dB
w/o emp, 1LSB			98.4dB
Digital Output			None
Crystal Clock Accuracy			+6.1ppm
Track Access Time (99)			3secs
Serial Number			VT2CA03696
Typical Retail Price			£140



Technics SL-PS620A

Panasonic UK, Willoughby Road, Bracknell, Berks, RG12
Tel: (0344) 862 444



Technics has made a valiant attempt to disguise the origins of its SL-PS620A. But just as the SL-PG320A is inextricably linked to the SL-PG420A, so too is the SL-PS620A bound to its cheaper sibling, the SL-PG520A. Basically, the 520's digital gubbins have up and moved house into a fresh new case, complete with an anti-resonant base and very swish matt-bronze fascia.

Philips' CDM4 transport is retained, hence the A in the title, but it has been shifted amidships and placed onto four new isolating springs. Meanwhile separate power supplies feed the digital and analogue circuits in an effort to minimise interference across the two 'halves' of the player.

Operationally of course, the SL-PS620A is another ballgame. Out goes the Shuttle Search Dial, but in comes an equally versatile range of features including program, repeat and random play modes, and a host of Synchro-Edit options. There's also a six-step digital volume control, accessed via the remote control unit.

Lab report

Evidently the foibles of the SL-PG520A have not been eradicated in the SL-PS620A. The 2nd-generation MN6474 MASH/PWM DAC still betrays its customary 11kHz 'glitch' on the -60dB response graph just as the 3D plot could be a carbon-copy of that in issue 107.

Its out-of-band filtering is similarly well engineered (see 1kHz @ -70dB) while both distortion (typically 0.0014 per cent at 0dB and just 0.0083 per cent at -30dB) and low-level resolution maintain enviable trends. Another plus is that Technics' improved power supply has extended the player's 'real life' S/N to 103dB.

On the flip side, THD still increases to 0.06 per cent with the de-emphasis circuit engaged, just as the player still suffers an extended range of odd-order inter-modula-

tion distortions (typically 0.04 per cent). And who let the optical digital output get back on board?

Sound quality

At last, a CD player that justified the thankless blood, sweat and toil of a strict, blind listening test! A big-hearted and generous-sounding player with a realistic grasp of musical dynamics.

'An all round good egg' they added descriptively, the transparent, sparkling but authoritative sound prompting a rare accord among our panel.

Our Mozart CD was finally exposed as a slightly rough recording but this could not conceal the renewed drama, tension and excitement of the classical strings. Then, to our great surprise, the layering of violin, viola and piano opened up before our ears, a vista all but hidden from view by some of the lesser machines in the group.

Furthermore, as our listening progressed, panellists reported hearing new facets of otherwise familiar recordings. A very positive sign having repeatedly thrashed once-cherished tunes through a multitude of unforgiving CD players.

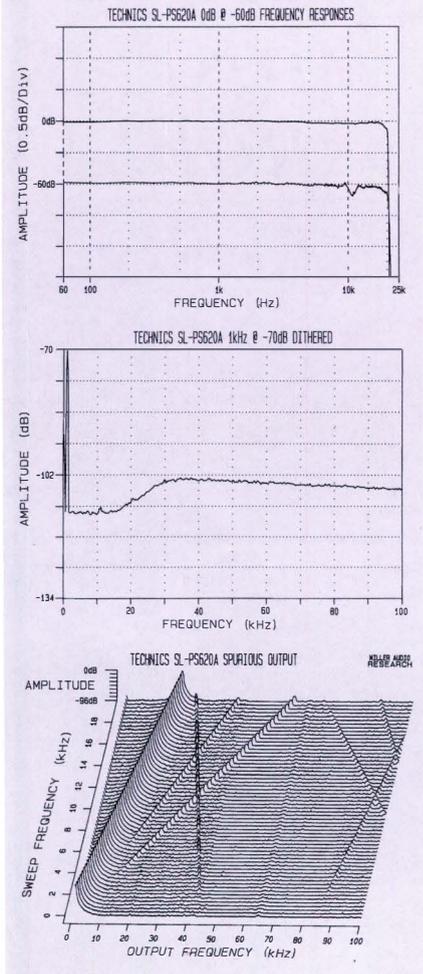
The woody quality of Christy Moore's acoustic guitar now seemed richer than usual just as the backing vocals on Jennifer Warnes' CD were portrayed with an extra gruffness. This was not a 'fuzzy gruffness', they pointed out, 'but a very clear vocal intonation'. Then again, the echo associated with her voice was now extremely obvious — a contrived effect but ruthlessly revealed by this star performer.

Conclusion

Voted the best in this month's test, the SL-PS620A had us enthralled, its marvellously open and bracing sound was packed with detail, yet free of the merest hint of strain. An obvious Best Buy.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.01dB	0.02dB	0.17dB
Channel Separation	116.7dB	109.4dB	70.6dB
THD vs Level, 0dB	-94.3dB	-97.3dB	-75.0dB
-30dB	-87.0dB	-81.6dB	-64.3dB
-60dB	-59.2dB	-53.1dB	-38.2dB
-80dB	-27.7dB	-29.1dB	-18.6dB
Dithered, -90dB	-17.6dB	-20.3dB	-8.50dB
Dithered, -100dB		-14.5dB	
Dithered, -110dB		-5.65dB	
Resolution @-60dB		-0.01dB	+0.18dB
-80dB		-0.15dB	-0.06dB
-90dB		-0.54dB	-1.03dB
-100dB		+0.10dB	-2.70dB
Peak Output Level, L			2.161V
R			2.159V
Relative Output Level			+0.67dB
Output Impedance			805ohm
Radio Frequency Spurious	25mV spikes @ 0.3-1.3GHz		
1Hz Noise Modulation			+4.6dB
CCIR IMD, 0dB			-83.5dB*
Suppression of stop-band IMD			80.8dB
De-emphasis Accuracy, 1kHz			-0.01dB
5kHz			-0.07dB
16kHz			-0.24dB
S/N Ratio (A-wtd), w emp, 0LSB			116.8dB
w/o emp, 0LSB			112.5dB
w/o emp, 1LSB			102.9dB
Digital Output			Optical
Crystal Clock Accuracy			-5.3ppm
Track Access Time (99)			2 secs
Serial Number			VT2DA02433
Typical Retail Price			£230



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XC 700	XC 900	
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DP 5040	DP 7040	
DPM 6640 MULTI		
MARANTZ		
CD 50	CD 60	
CD 42	CD 52	
CD 62	CD 72	
NAD		
5420	5425	5440
PIONEER		
PD 101	PD 201	
PD 5501	PD 5601	
PD 5701	PD 5901	
PDM 601 MULTI		
PDM 701 MULTI		
DPM 901 MULTI		
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XKS 7000	XKS 9000
ADWX 888	ADWX 828
ADWX 929	
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KX 5030	KX 7030
KXW 5040	KXW 6040
KXW 8040	
MARANTZ	
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SD 60	SD 62
NAD	
6325	6340
PIONEER	
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CTS 410	CTS 651R
CTS 510	CTS 610
CTS 710	CTS 810
CTS 910	CTW 401R
CTW 601R	TW 701R
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XA 008		
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KA 7020	DA 9010	
KAV 8500	RA 5040	
KRV 7040	KRV 8040	
MARANTZ		
PM 30	PM 40	
PM 50	PM 80	
SR 50L		
NAD		
3020 I	3225 PE	
3240 PE	7020 I	
7225 PE		
PIONEER		
A 119	A 201	
A 300X	A 400	
A 676	A 777	
A 878	A 351R	
A 501R	SX 121	
SX 221	SX 339	
SX 777		
ROTEL		
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RA 940BX	RA 960BX	
RA 980BX	RX 940AX	
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TAF 240	£119.95	
TAF 270	£144.95	
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SUZ 320	£119.95	
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KT 6040	KT 7020	
MARANTZ		
ST 40L		
NAD		
4225		
PIONEER		
F 201L	F 301RDS	
F 401L	F 676	
F 550ORDS	F 701	
ROTEL		
RT 930AX	RT 950BX	
SONY		
STS 170	£84.95	
STS 370	£129.95	
STS 570	£174.95	
STS 770	£239.95	
TECHNICS		
ST 610	£86.95	
STG 470	£116.95	
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STG 70	£189.95	
STG 90	£274.95	
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SLBD 22	£99.95	
SLDD 33	£107.95	
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SL 1210	P.O.A.	
THORENS		
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XL 3000	XL 4000	

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305	401
601/3	901/6
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B & W	
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DM 620	DM 630
DM 640	ACT 100
SOLIDS	
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802	803
JPW	
MINIM	SONATA
P1	AP2
AP3	
MORDAUNT-SHORT	
MS 3.10	MS 5.10
MS 5.20	MS 5.30
MS 5.40	MS 5.50
CLASSIC 20	
CLASSIC 40	
MISSION	
760 I	761 I
780	
NAD	
8225	8100
TANNOY	
603	605
607	609
611	
WHARFEDALE	
DIAM 4	DELTA 30.2
415	425
430	440

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T50/T60/T70	
HJ17/2	HJ20/2
HJ24/2	HJ10/3
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- RUARK
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- SONIC LINK
- TANNOY
- TDI
- TOWNSHEND



Yamaha CDX-860

Yamaha Electronics UK Ltd, Yamaha House, 200 Rickmansworth Road, Watford, Herts WD1 7JS. Tel: (0923) 233 166



Not for Yamaha the simple expedient of a Technics MASH DAC or a complete Bit Stream chipset from Philips. No Yamaha, like Pioneer, is going it alone. Ploughing its own 1-bit furrow with home-grown technology that reaches its 2nd-generation in the *CDX-860* featured here.

And not only have the digits matured, so has Yamaha's familiar styling. With the *CDX-860* you get both clean lines and a wealth of gadgets, the later housed on a revolving platform that locates snugly under its traditional orange display.

So once you've had your fill of direct track access, index skipping, 25-track memory, three-mode tape edit and four-way repeat facilities, you simply flip this bank of keys into the fascia and out of sight. Simple but very, very effective. And even with half its features buried inside the player, complete flexibility is retained by the matching remote control. There's even a motorised volume knob for good measure.

Incidentally, Yamaha's technology is still flagged as 'S-Bit Plus' because its basic specification remains the same. Specs like a composite of 384 times oversampling (eight times followed by 48 times) filter, 2nd-order noise shaping and PDM DACs. True 1-bit stuff, but closer to Pioneer's implementation of Bit Stream than the Philips approach.

Lab report

So it's all change as Yamaha now supplements its YDC-101 signal processor with the YM3433 eight times oversampling filter. That's why both the *CDX-560* and *CDX-860* show an identical stop-band pattern (see 3D plot). The DACs, however, are quite different. No hybrid DAC here, nor even the old YM7141 used in its *CDX-750* (issue 100). Instead we find Yamaha's current pride-and-joy, the YAC507.

The upshot is a fabulous improvement in peak-level distortion (now just 0.0007 per

cent), an extra 4.3dB in overall S/N ratio and a resolution nudging some 17-18 bits. Nevertheless I am dismayed to find Yamaha joining the list of 'cheaters' as its new PDM DACs have been programmed to disable themselves during conventional S/N measurements.

Residual quirks include the high +8.3dB noise modulation, slow track access and an alarming increase in distortion (3.55 per cent at 5kHz) once the de-emphasis circuit is activated.

Sound quality

According to our panel this was another very spacious-sounding player and one that was likened to Arcam's *Alpha* of all things. Nevertheless this was the heavier-sounding option — dynamics but with the weight and substance to back it up.

Christy Moore sounded light, nimble and airy, his acoustic guitar quick and detailed. Our jazz selection was praised in similar fashion but was also criticised for being 'thematically disjointed'.

No mistaking the adventure of Mozart's strings however, another slightly 'wild' interpretation, but within the frenzy there was unmistakable passion. Our pop selection had a powerful, springy 'almost elastic bass' they remarked, a bass that propelled the music along without blurring its rhythm.

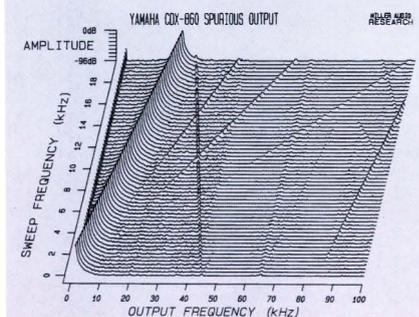
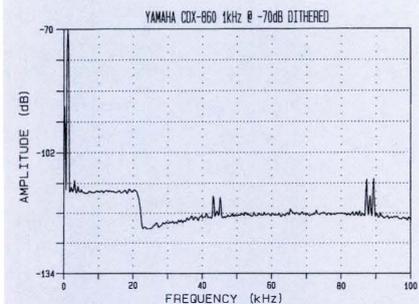
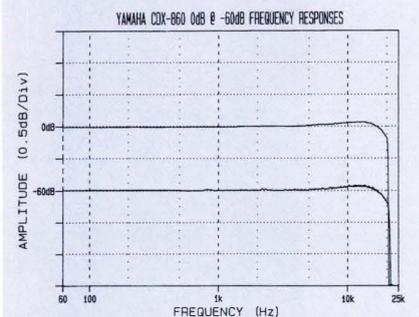
Downside? On occasions there's the sense of it working too hard, a hint of sibilance on the strongest vocals together with a sense of impending defeat with the busiest recordings.

Conclusion

The *CDX-860* was voted a 'good all-rounder' and was a machine that found our panel in appreciative mood, if not exactly ecstatic in their praise. Recommended, and justification, if any were needed, for Yamaha's pursuit of an individual Bit Stream technology.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.00dB	0.00dB	0.06dB
Channel Separation	127.1dB	99.4dB	72.7dB
THD vs Level, 0dB	-104.9dB	-103.1dB	-83.7dB
-30dB	-95.3dB	-81.9dB	-80.5dB
-60dB	-59.3dB	-53.1dB	-52.8dB
-80dB	-28.4dB	-31.4dB	-33.4dB
Dithered, 90dB	-16.7dB	-22.8dB	-23.6dB
Dithered, -100dB		-22.1dB	
Dithered, -110dB		-15.7dB	
Resolution @-60dB		0.00dB	0.00dB
-80dB		-0.09dB	-0.02dB
-90dB		-0.42dB	-0.34dB
-100dB		-0.13dB	+0.90dB
Peak Output Level, L			2.021V
R			2.018V
Relative Output Level			+0.08dB
Output Impedance			641ohm
Radio Frequency Spurious			11mV @ 1.7MHz
1Hz Noise Modulation			+8.3dB
CCIR IMD, 0dB			-102.6dB
Suppression of stop-band IMD			72.5dB
De-emphasis Accuracy, 1kHz			-0.01dB
5kHz			-0.09dB
16kHz			+0.71dB
S/N Ratio (A-wtd), w emp, 0LSB			117.9dB
w/o emp, 0LSB			116.4dB
w/o emp, 1LSB			109.4dB
Digital Output			Coaxial/Optical
Crystal Clock Accuracy			+9.8ppm
Track Access Time (99)			6.5secs
Serial Number			B044502SU
Typical Retail Price			£300



Tech Talk

As you may have noticed, *Hi-Fi Choice* reviews make use of a variety of independent listeners to audition each and every CD player under blind conditions. Each player is thoroughly warmed-up and level-matched to within a fraction of a dB before being auditioned in isolation.

Each player is auditioned using a fixed programme of CDs until the panel has come to appreciate its relative strengths and weaknesses. They then discuss what they have heard among themselves before attempting to convey something of the player's character. I type these impressions directly into the computer, reading back and altering the notes until they are satisfied these accurately reflect the collective opinion. Then, and only then, is the panel informed of the player's price, so as to make the value judgements which, tempered by build quality and facilities, form the basis of our Recommendations and Best Buys.

Paul Miller describes the battery of tests used to evaluate CD player performance and explains the results.

Measurement Programme

As in issues 95 and 100, specialised CD-R (CD-Recordable) discs were used along with conventional test CDs from Sony, Technics, Philips and CBS to provide a wealth of information about each machine. Furthermore, dedicated computer programs were implemented to control a range of digital test equipment via an IEEE interface BUS, resulting in the various plots that accompany each review.

Channel balance, separation, output level and the 'real' Signal-to-Noise ratio

Most CD players adhere to a nominal standard of 2V peak output, though many manufacturers will hike this up to 2.2V or more in order to get a dB's advantage in listening tests. Remember, the loudest CD player is not necessarily the best CD player.

The S/N is determined both with and without de-emphasis as a ratio of this maximum output (all DAC current sources on =0dB) against full digital zero (all DAC current sources off), measured in third-octave mode over 20Hz-20kHz bandwidth, with A-weighting to reduce hum contribution.

Unfortunately many new DACs are pre-programmed to switch-off when they detect the digital zero test signal, leading to a wide but unrealistic S/N figure. The only way to measure the 'real' S/N is to fool the DAC into remaining 'on' using a special digital zero signal that's offset by 1LSB (see issue 100). So if there's a big jump between the figures for 0LSB and 1LSB, you'll know the manufacturer in question is trying to pull a fast one!

Distortion and resolution versus signal level:

In direct contrast with analogue systems like tape decks, phono cartridges and audio amplifiers, distortion in a digital system will increase as the level is decreased. In other words, the quieter the sound the

more distorted it becomes. This is because the CD format uses a linear quantisation to describe the amplitude of each audio sample, and there are some 2^{16} or 65536 equally-spaced quantisation levels spanning the full 16-bit range. Each of these levels is equal to one LSB (least significant bit).

Consequently there are proportionally more levels available to describe the amplitude of a high-level than a lower-level signal. Fewer levels means a relative decrease in the accuracy of the coding (a quantisation error), and that, upon D/A conversion, means both added distortion and a shift away from absolute linearity. Most CD players will give of their best at 0dB (peak level) because here all the quantisation levels are engaged.

Nevertheless, distortion still increases with frequency, through cross-modulation within the DAC and the added strain placed upon later analogue stages. Slew-limiting is the principal culprit here, increasing THD from -100dB to -80dB (0.01 per cent) or more. Other effects such as zero-cross distortion and glitches also make their presence felt at higher frequencies, though these problems are largely overcome by bitstream DACs such as the PDM, PWM or PEM devices found in most current CD players.

Figures for harmonic and intermodulation distortion are provided in each table, the former taken at 20Hz, 1kHz and 20kHz and at decreasing levels from 0dB to -90dB (dithered). These reveal the linearity of the DAC, both at 1kHz and 20kHz and down to a level of -100dB (dithered).

Theoretically the DAC should reproduce a -90dB tone at -90dB and a -100dB tone at -100dB, for example, though in practice they rarely do. The error in DAC resolution is written as the difference between the expected level and that actually obtained, and should be as close to 0dB as possible. Failing that, any error that crops up at 1kHz should be matched at 20kHz. If not then there'll be a change in the player's frequency response at progressively lower levels — changes that can be seen on the two responses published for each machine. In a perfect world the peak-level response (upper trace) should be maintained at -60dB (lower trace), give or take a little noise.

The 3D Spurious Output

Having already discussed how distortion can arise, the result is portrayed most graphically on the accompanying 3D plots which show a complete audio band sweep over its full dynamic range. Cast an eye over the example plot while we examine the different products more closely. First there are the simple harmonic products (2)-(5) which are multiples of the main 20Hz-20kHz sweep (1). Just as the main sweep (1) ends at 20kHz, so the 2nd harmonic (2) ends at 40kHz, the 3rd harmonic (3) at 60kHz and so on.

Furthermore, many plots will also reveal two V-shape tracks, either in full or part. These are sampling images or aliasing distortion, reflections of the main sweep (1) either side of the 44.1kHz sampling and oversampling frequencies of 88.2kHz, 132.3kHz, 176.4kHz and so on. Of course, because the horizontal frequency scale only extends to 100kHz, only the first two of these images are seen in full. Sum and

difference intermodulation products go to make up each V: either 44.1kHz plus (1) or 44.1kHz minus (1). The first option gives (6), the second (7) and both are called 2nd-order effects.

The same thing occurs either side of 88.2kHz, which is the first oversample frequency, producing (8) and (9) respectively. Higher-order images caused by multiples of (1) at higher oversampling frequencies can also occur. The tracks (10)-(13) are the tail end of just such images which begin at 176.4kHz, the four times oversample frequency. Only the very latest oversampling filters able to suppress these images below the level of noise.

The dithered -70dB/1kHz plot and 0.34Hz Noise Modulation:

Noise modulation is also a reflection of quantisation errors, errors that accumulate as noise covering the entire audio band. It's a type of distortion that's generated by any unevenness in the value of the 65536 quantisation 'steps' or, failing this, by jitter (an uncertainty in the timing of the digital transitions).

Using a 0.34Hz (one-third of 1Hz) signal forces the DAC to step up or down just one of the 65536 LSBs per 44.1kHz! Any difference in the magnitude of these LSBs transpires as an increase in background noise, the +dB figure quoted in the tests. Low figures are best though it's quite possible for noise modulation to manifest at low and high frequencies only, which is preferable to the same degree of noise modulation popping up through the crucial midband. So a lone figure tells only part of the story.

At lower levels other problems come to the surface — hence the plot of 1kHz taken at -70dB. In contrast with issues 95 and 100 (but following-on from issues 101 and 103) this is now a dithered signal. Dither is usually a Gaussian or Triangular noise which has the effect of re-randomising the fixed and predictable quantisation errors that accompany low-level signals. Dither 'smears' the fixed errors associated with an undithered low-level signal so they appear as a slight increase in noise rather than as distortion harmonics. Just compare the undithered trace for the Technics *SL-PG200A* (issue 100) with the dithered trace for the *SL-PG520A* in this issue, for example.

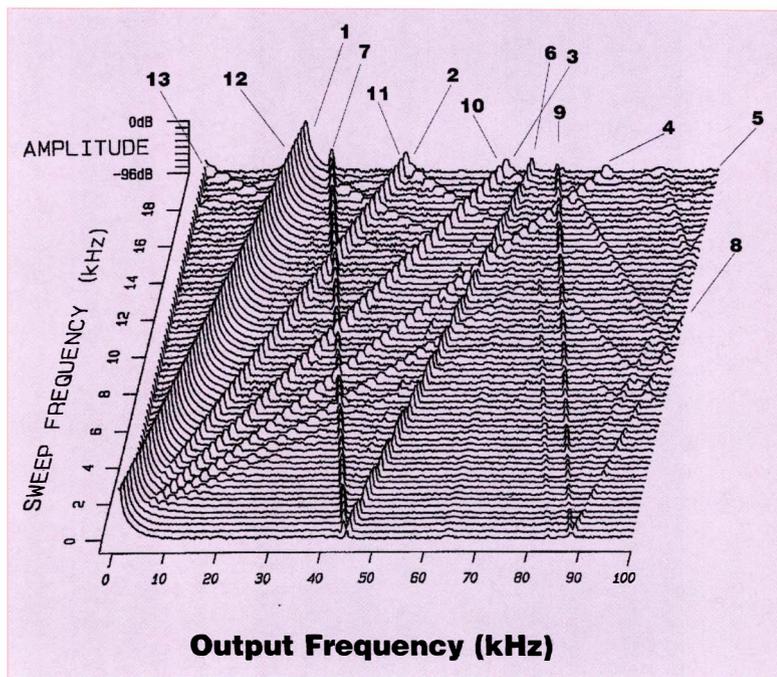
Most music discs are dithered these days, so the trade-off between noise and distortion is well worth having, especially as it concerns quiet, subtle musical detail that can make or break a performance. Not all the CD players by any means prove entirely successful in this regard.

Dithered or undithered, this plot can tell you at a glance whether the player is using a conventional multi-bit or bitstream DAC simply by looking at the pattern of noise above 20kHz. A bitstream DAC generates an awful lot of quantisation noise as it reduces the 16-bit data into manageable 1-bit chunks, so it uses a technique called noise-shaping to shovel as much of this noise as possible out of the audio band. Hence the great hump of noise that curves upwards above 20kHz, the highest directly audible frequency. Current Philips and Marantz players are especially affected because they run the noise-shapers at a low 11.3MHz clock frequency. With an

ordinary 16- or 18-bit DAC you'll find the noise actually decreases above 20kHz revealing 'spikes' of distortion and sampling images.

At higher frequencies still there is contamination from various clumps of Radio Frequency noise that 'leak' from the crystal clock and various digital processors that go to make up each and every CD player.

Just how an amplifier responds to the huge differences in the level and type of ultrasonic noise produced by these players could give us some clue to the differences in sound quality. You might like to re-read the section on RF IMD which was last published in issue 106 and tie-up the unwanted RF produced by these CD players with the sensitivity to such RF demonstrated by many amplifiers.



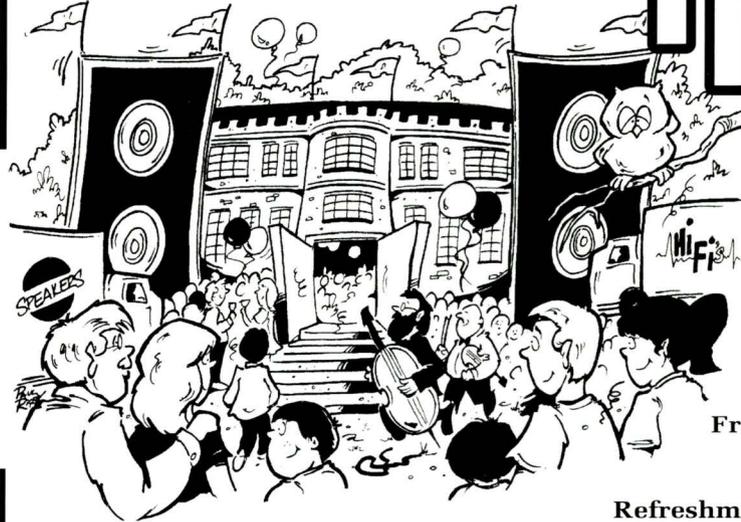
Still, I must reiterate my warning from the amplifier review *Tech Talk*. Do not use these plots as a guide to the absolute quality of the CD players because this simply does not follow. Instead both the 3D and 1kHz/-70dB plots are very much a 'fingerprint' of the oversampling filters, noise-shapers and DACs that are employed in each player.

It's very easy to recognise whether a player is using a Philips, NPC or Sony oversampling filter, for instance, or whether the DAC is a 16-bit or 1-bit chip from Philips, a MASH/PWM DAC from Technics or a Sony PLM bitstream DAC. In most cases I've tried to link the electronics with these plots to provide a feel for what's going on inside the player — just refer to the individual lab reports.

Knowing all this without even having to look inside the player can give a pointer towards potential sound quality, even though the quality of transport, power supplies and final analogue electronics will all have vital roles to play. Clues like these plus the unpredictable influence of RF noise are all pieces in a very complex subjective jigsaw. But the more pieces we have at our disposal then, little by little, the overall picture will eventually start to come into focus.

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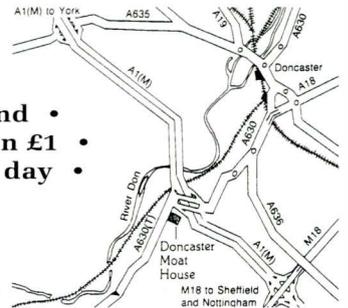
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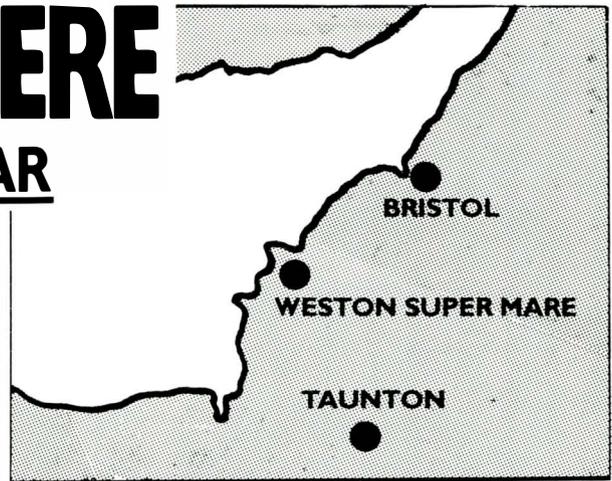
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Conclusions, Best Buys and Recommendations

Just one of the many joys that spring from testing every CD player on the planet (well most anyway) is a 'feel' for the momentum and direction of the format as a whole. And if this batch is any guide at all, then things are currently meandering at a slow crawl. Manufacturers are content to refine tried-and-tested ideas — bitstream in particular — rather than leap feet-first into unknown territory. And in today's economic climate, who can blame them?

In many of this month's reviews you'll find references to existing or earlier players that form the cornerstone of these ostensibly 'new' machines. Ironically the one CD player bold enough to depart from the straight-and-narrow was also the one which caused uproar among our blind listening panel. This is Pioneer's radical *PD-S801*, a player that emulates Wadia's widely-hyped DigiMaster filtering but at a tenth of the cost. Personally, I'd have recommended

CD king Paul Miller summarises the results of the 20 players tested this month and points out the models that achieved Best Buy and Recommended status.

the player for delivering this particular sacred cow to the slaughterhouse, but the panel thought otherwise. However, the player proved to be so interesting that it will be the subject of a *Sessions* piece in next month's issue.

Top of the range

Alternatively, those readers with change left over from their *Choice* subscription might like to consider one of our three top-priced Recommendations.

The lighter, smoother and more generous soundstaging of the 'Plus' version of Arcam's classic 16-bit *Alpha* is evidence enough that the multi-bit option still has considerable credibility.

Less conventional is the Musical Fidelity *CDT*, a player that combines suspect taste in aesthetics with extremely dubious digital electronics, but which camouflages these demerits with remarkable flair thanks to the euphony of its valve output stage. This one is strictly for the enthusiast.

The Philips *CD950* is better material value and features the latest in high Compact Disc technology, DAC7 Bit Stream conversion. Compared to the Musical Fidelity *CDT* it's a thoroughly 'conventional' player with an equally clean, clear and decorous sound unlikely to upset anyone's appplecart — solid stuff to be sure, but no great advance on the *CD850* of yesteryear.

The Yamaha *CDX-860* employs its own brand of bitstream technology and emerges with a similarly dignified sound — light and nimble yet also substantial enough to reflect the beefy dynamics. By contrast the cheaper *CDX-580* is perhaps too assertive for its own good, with a 'straining at the leash' quality that allowed both JVC's *XL-Z452* and Kenwood's *DP-3040* in ahead on stealth grounds. Although the JVC is perhaps the more spirited of the pair, both players enjoy a sense of ease and confidence, and are remarkably sophisticated for the price.

Super, terrific

For significantly less money still, the Pioneer *PD-201* and Technics *SL-PG320A* are both very up-beat performers, the Pioneer taking the lead on froth, thrills and colour. The Technics player is drier in tone but also tauter and more sharply detailed, provided the music isn't too busy.

Though these are both crackerjack budget players, for the total package — remote and all — you should seek out the Sony *CDP-397*. Here's a player that seems to combine the forwardness and astringent detail of Technics' *SL-PG320A* with the ebullience that bubbles from Pioneer's *PD-201*. Sure, it's a trifle lightweight at times and rather unsophisticated when compared to the best at £200 or £300, but Sony certainly has the £140 market sewn-up.

Alternatively, if you're prepared to forego seven or eight CDs, the Technics *SL-PS620A* will be well worth the sacrifice. This player will survive a head-to-head with the best that Marantz, Philips or Sony have to offer at the price, while still providing an attractive alternative to players that put style ahead of sound. But then its success could easily have been predicted. The *SL-PS620A* is little more than a refined *SL-PG520A* — our Best Buy from issue 107. Refined, that is, without quelling the vivid spirit, the bold, generous and expressive sound that won the day for its cheaper sibling.

The test group as a whole once again forces the conclusion that you needn't spend a fortune on a quality CD player to appreciate a high quality sound. Much more than in the days of analogue sources, there's a solid case for spending rather more on the amp and speakers.

As a parting note I must offer my most sincere thanks to the people who made up our 'blind' listening panel, without whose ears none of this would have been possible: Alan Ainslie (Technics), Andrew Cartmel (*Hi-Fi Choice*), Mike Martindell (Arcam), Terry Murphy (Yamaha), Guy Sargent (Audio by Design) and Andy Whittle (Rogers). And the listening panel would also like to thank my mother-in-law for the bountiful supply of Christmas Cake! What a team!



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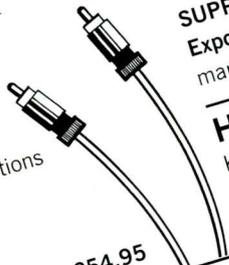
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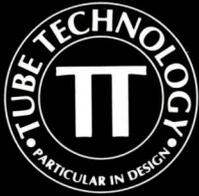
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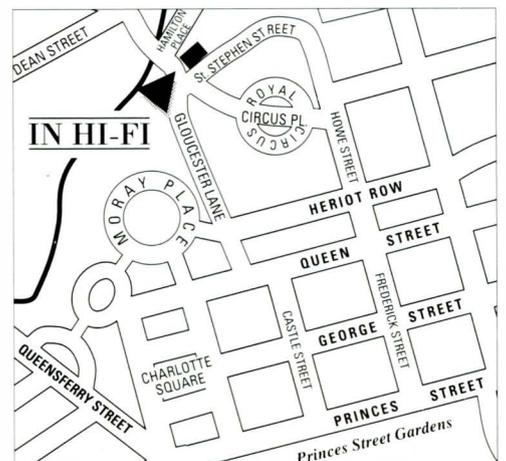
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IN HI-FI

Choosing and Using . . . Valve amps

Even reviewing valve amplifiers as a separate group might seem to smack of technomania. After all, when actually listening to music, does it matter whether the sound goes through valves, transistors or dilithium crystals? Two other factors come into play as well: pride of ownership (and why not?), and expectations of what a valve amp will sound like.

Just what is the 'valve sound'? The phrase is more than a little misleading; with all the valve amps currently available, there are bound to be significant differences between them. But certain qualities are attributed to valve designs, including a long-term listenability, compared to which many transistor amps (less nowadays than a few years ago) can become tiring. Valve amps are often said to sound more natural and more powerful than transistor equivalents of the same nominal rating.

Feel like delving into the rather esoteric world of valve amplifiers? Richard Black discusses how the tests were run for this month's reviews. Glow for it!

Truth, marketing, wishful thinking or just plain oversimplification? Perhaps, from time to time, all four. For a start, there's a lot more to a circuit than just the components used, and part of the 'valve sound' story is the commonality, not so much of valves per se, as of circuit configurations. An astonishing number of designs are simply rehashes of Mullard and GEC applications notes from the Forties and Fifties, and most of them sound like it, for better or worse.

That apart, what sets valve amps apart from other types, and what should one look for in a valve amp? Output power is often lower than from similarly-priced transistor amps. Many people, with fairly efficient loudspeakers in typical modern rooms, never use much power anyway, and the difference is not that huge. But if you use inefficient speakers and like to listen at high levels, beware of claims that valve amps go louder than their specification suggests. This may simply mean that they distort and shout, which is not very nice to listen to but can be quite impressive under certain conditions.

Valve amp distortion often looks alarming, but most of the circuit configurations generate predominantly low order distortion products. Since these are much like the natural harmonics of musical instruments it's likely to sound much less distressing than the much higher order distortions of some types of transistor amps.

Output impedance is relatively high, giving a comparatively low damping factor (nominal speaker

impedance divided by amplifier output impedance). But there's no truth in the claim that enormous damping factors are essential for good bass control; a DF of 2,000 is only five per cent better than one of 20 in this regard. However, very low damping factors (below ten, say) can lead to audible frequency response aberrations.

The frequency response of valve amps is often thought to be inferior to transistor amps, but this is not always true. However, the maximum bass output of valve amps is inevitably somewhat limited (below, or often within, the audio band). This can be an audible problem, but usually isn't.

If you think you might want a valve amp set-up, audition a few such alongside and against transistor alternatives, and take each on its merits. A good valve system can be a wonderful beast, to be sure — but don't buy one just because of the often tenuous reputation attached to the breed!

The tests

The test format followed established *Choice* practice, on the whole. Listening tests included a session with a 'blind' panel, which this time included two women (who, it is said, tend to have much sharper hearing than men). One of these is a musician with a very good ear, who has basically no knowledge or experience of high-end hi-fi. She heard differences, quite unprompted; my thanks to Anette for being such a willing guinea pig.

Each amp was partnered by a PT/SME/Highphonic vinyl source, modified Marantz CD gear, and ATC SCM20 loudspeakers.

Lab tests differ slightly from usual. I measured phono preamp noise with an appropriate source impedance connected. I also quote the noise figure as the ratio between measured noise and that theoretically achievable: the lower figure the better here, 2dB being good for MM and 6dB good for MC cartridges. The second noise figure under the MM heading refers to an MC cartridge connected via a 'perfect' ten-times transformer.

I have added comments on the clipping behaviour of the power amps and their recovery from a 3dB overload (ie, input briefly 3dB higher than that for full rated output). I also tested for transient intermodulation by switching a 1kHz signal between 4dB and 24dB below rated output (the 'bounce test'), and looked for low frequency bumps (bouncing) on an oscilloscope trace. I also checked subsonic output capability at 2Hz, a test that really only applies to transformer-coupled amps. All tests (including output into four ohms) were done with the amplifiers set for driving an eight ohm load, where this is selectable. Power is quoted for a relaxed two per cent distortion limit.



Art Audio VP1/Concerto

Art Audio, 62 Vaughan Avenue, Hucknall, Notts,
NG15 8BT. Tel: (0602) 653 604

Produced in Nottingham by a small manufacturer in the best British valve amp tradition, the Art Audio range is apparently mostly exported, although plans are afoot for greater things in the UK. The two units submitted for review were the *VP1* preamplifier and the *Concerto* power amp; however, a few days before the deadline for this review Art Audio informed us that the preamp will be substantially revised by the time you read this. It therefore seems as well to caution that the *VP1* can at best be taken as an example of the sort of goals Art Audio is aiming for.

Said preamp is a businesslike unit in professional rack mount garb, neatly laid out on the front panel and labelled in gold print. The case and controls feel a little cheap, but then £500 doesn't really go very far on a valve preamp. Ventilation is provided only by slots in the side, which is perfectly adequate since the unit hardly runs very warm. Essentially minimalist, the *VP1* nevertheless provides extensive tape monitoring facilities (for two decks), and passive, active and active (reverse channels) operating modes.

All the circuitry is mounted on a single board, laid out to give almost complete star earthing, this is not very logically done however, as the common point is not as close to the main power supply capacitors as it could be. There is quite a lot of internal signal

wiring, neatly run in standard commercial screened cable. Components are good quality though not 'designer brand' (except the Golden Dragon valves), while the toroidal main transformer is magnetically screened.

Art's *Concerto* is unusual in having two adjustments available to the user; operating mode and feedback. The mode switch alters the connection of the output valves (KT88) between triode and ultra-linear, while the feedback switch adjusts the overall circuit feedback in six steps. Build quality of the *Concerto* is quite good, with a strong and neat case, although a valve cover should certainly be fitted, even if it is removable — apart from the fact that the valves run at a high envelope temperature, if someone were to fall against a valve and break it there's 500V inside with enough current to kill. There are four power resistors in the circuit which run very hot and must cause the various capacitors to run very close to their maximum operating temperature, leading to unreliability. Art Audio would do well to provide much better ventilation or use resistors mounted on a heatsink. In addition, the mode switches (one per channel) are operating well above their rated voltage.

Lab report

Acting on Art Audio's advice that most *Concertos* are used in triode mode with mini-

mum feedback, this is how most lab and sonic tests were carried out.

Power output of the *Concerto* is moderate at 25W (around 35W U-L mode) midband, falling off in the bass and dropping quite considerably into four ohms. Frequency response is wide, although a small lift around 110kHz (+1.1dB) indicates a slight resonance in the output transformer. Bass response shows a subsonic lift which depends on operating mode, with minimum-feedback triode mode the least affected (+0.5dB at 4Hz) and maximum feedback U-L mode the most (+5dB at 1.7Hz). This could in the latter case have audible effects especially with warped LPs, where quite high levels of subsonic garbage may be generated. Since the output transformer saturates in the presence of only a few tens of milliwatts at 1.7Hz, high audio-band distortion could easily result.

Distortion produced by the *Concerto* is quite high in level, especially at low output where valve amps traditionally improve markedly. Not surprisingly, this varies with operating mode, although the distortion waveform is somewhat similar in each case since it's mainly produced by the driver stage rather than the output. The driver stage of the amp is also responsible for poor transient intermodulation shown in the 'bounce test'. In this case, switching the

signal from 0.1W to 10W gave up to 5V peak intermodulation at a frequency of around 3Hz, quite enough to offset a loudspeaker cone temporarily by several millimetres and cause serious distortion in the speaker.

The VP1 preamplifier also measures rather, um, unusually. Its main idiosyncrasy (which apparently will not be carried over into future versions) is an extremely high output impedance in active mode of around 35k. Taking internal cabling and likely loading into account, this is sufficient to roll off treble by up to 7dB at 20kHz, making for a very dull sound.

Taken in passive mode, phono response is a little tailored, with some treble lift, a small lower presence lift and a small roll-off in the low bass. Phono noise is good, although overload margins are indeed marginal and distortion at high levels is therefore rather poor; however, it is almost entirely second harmonic and is unlikely to be objectionable.

With the preamp as supplied, switching from passive to active mode generated large transient voltages, up to 40V into a high impedance, which would damage the input of many solid state amps. Absolute phase is inverted in active mode.

Sound quality

One member of the listening panel liked the Art Audio's reproduction of a string quartet, but otherwise comments weren't exactly enthusiastic. The Little Feat track lost much of its urge and drive, sounding slack and mushy with an emasculated rhythm section that seemed to lag behind the front line, while solo piano sounded indistinct with a sensation of added echo on each note. Jessye Norman's voice in Strauss' *Four Last Songs* sounded distorted and louder than with the other amplifiers tested, although levels were checked afterwards and found to be OK.

The sound was distinctly dull in passive mode, and very much so in active, while

TEST RESULTS

Preamplifier: Art Audio VP1

	Line inputs	Phono MM
Stereo separation		
1kHz	57dB	40dB
20kHz	57dB	35dB
Distortion @ 1V out (phono + 15dB in)		
20kHz	0.07%	0.14%
1kHz	0.07%	0.7%
20kHz	0.03%	3.8%
S/N ratio, A-wtd	96dB	78dB/82dB
Noise figure, A-wtd		<1dB/4dB
Sensitivity for 1V out	160mV	0.46mV
Phono overload		
20kHz		8.6mV
1kHz		70mV
20kHz		94mV
Input impedance	47kohm	47kohm
Output impedance	33kohm (active)/<13k (passive)	
Max. out into 10kohm		6V
Frequency response (line inputs)		
1dB limits		10Hz - 10kHz
3dB limits		5Hz - 22kHz (see text)
Typical price		£498

Power amplifier: Art Audio Concerto

	20Hz	1kHz	20kHz
Power output 8ohm	17W	25W	23W
Power output 4ohm (8ohm mode)	16W	11W	6W
Clipping behaviour	Quite soft, slightly unsymmetric		
Overload recovery (+3dB)	Poor; see text		
Peak current	+3.2A/-3.2A		
Max. output at 2Hz	0.1W		
Input impedance	450kohm		
Output impedance	1ohm	1ohm	1ohm
Stereo separation	>75dB	>75dB	>75dB
THD+N, 1W output 8ohm	1%	0.4%	0.8%
THD+N, 2/3 rated power	1.9%	1%	1.5%
Noise, A-wtd	-82dBW		
Sensitivity for full output	430mV		
Frequency response (1W out)			
1dB limits	2Hz - 100kHz		
3dB limits	1.5Hz - 180kHz (+1dB @ 110kHz)		
Typical retail price			£1,100

RIIA response (MM input)

Distortion at 50Hz, 10W into real load

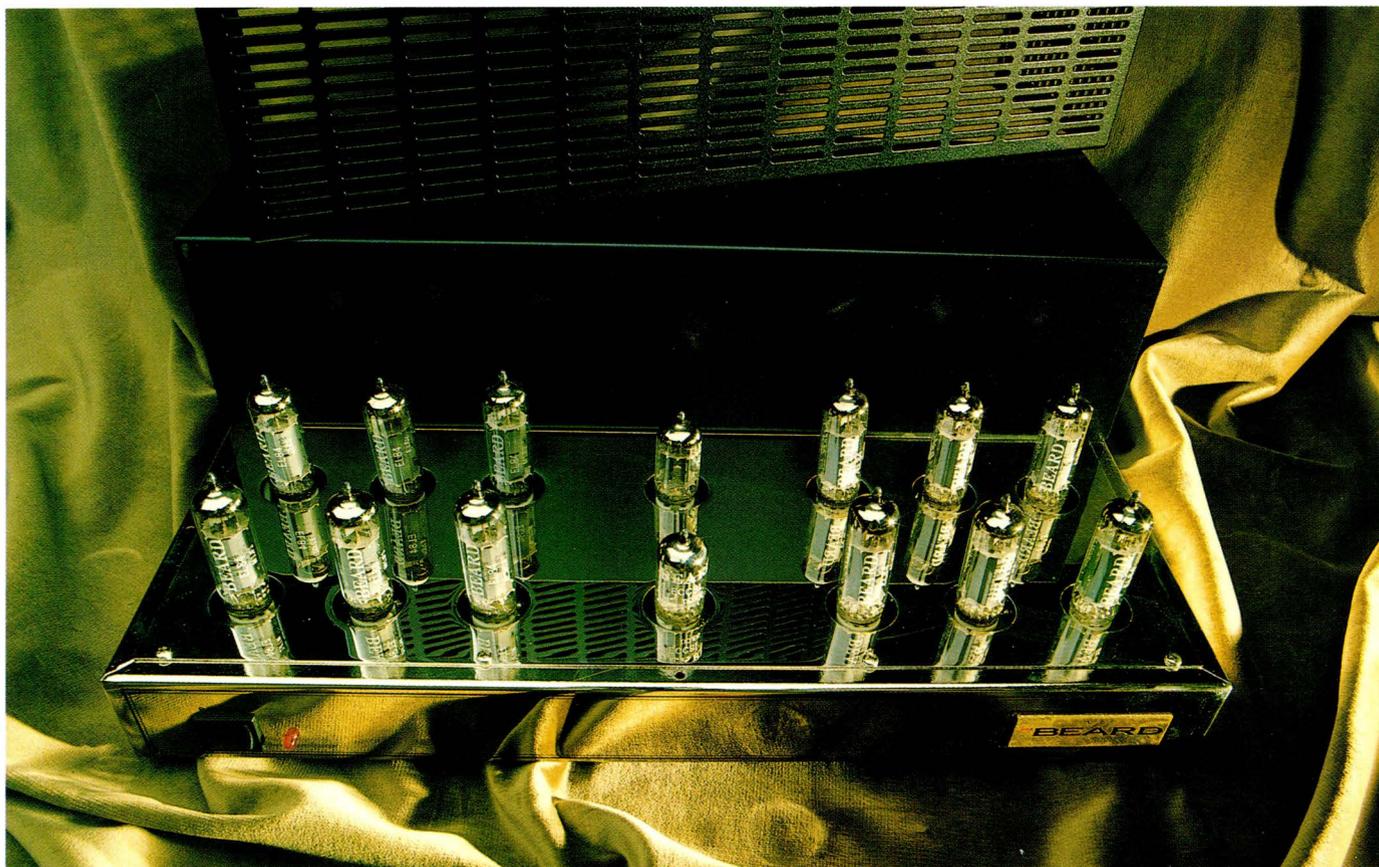
Distortion at 1kHz, 2/3 rated power into 8ohms

Conclusion

Add to the above comments the fact that the phono stage picked up RF rather too easily (I just about managed to kill this by rewiring and using four *Purifiers*), and you will understand why it would be hard to recommend these units.

bass was lacking in all sorts of music. Switching between operating modes had little effect on the overall impression, although higher feedback seemed to give a tidier sound which was paradoxically less easy to hear 'through'. All in all, not a very great success.





Beard Audio CA35/P35 Mk II

Hailey Audio Ltd, 328 Ware Road, Hailey, Herts,
SG13 7PG. Tel: (0992) 714 811

This combination has been reviewed in *Choice* before, but it was over four years ago and the manufacturer has been through a change of ownership since. There is only one actual change in specification; an extra set of preamp output sockets, doubtless to allow for bi-amping. However, I believe the board has been newly laid out in at least some details, so changes in performance cannot be ruled out.

The Beard pre and power amplifiers are well matched and very smart in bright chrome topped with a black grille. Both units are decidedly minimalist, with the preamp sporting only an input selector — phono (moving coil or moving magnet) and three line inputs — alongside the volume control, and the power amp has no features beyond a power switch. Output impedance is fixed and there is no bias adjustment for the output valves.

The only construction feature I don't like is the grille cover for the preamp; for one thing this will allow the unit to fill up with dust over the years, which can easily affect the performance of electronic circuits. More alarmingly, this cover is only held in by friction on four screw threads which simply push into holes in the chassis, and it can therefore easily be removed, possibly by a small child who would then have access to unshrouded voltages of around 300V. More secure fittings should be used. The same

applies to the valve cover on the power amp.

Both units are well made internally, with a large single circuit board carrying all the components in each, with hard wiring kept to a minimum. The components are of good quality and the valves carry Beard's own brand mark, as do some capacitors. To cope with MC cartridges, the preamp features a pair of step-up transformers.

The *P35* uses three parallel push-pull pairs of small EL84 valves for its output, a design decision which I believe dates back to the days when the supply of many valve types seemed less healthy, ironically, than it does now. Anyway, EL84s are still very readily available and Beard's quoted valve life of 3,000 hours may well be pessimistic.

Lab report

In its generally excellent user manual, Beard Audio quotes an output power of 35W for the *P35*, with a power bandwidth of 20Hz to 20kHz for less than one per cent distortion, but I couldn't persuade either channel past 20W in the bass, even with distortion creeping past the two per cent level. Still, power holds up reasonably well into lower impedances and peak current is adequate for the power rating. Frequency response of the *P35* is fine in the treble and well extended in the bass, although a +4dB peak at 4Hz indicates a slight stability problem, some-

thing which can often result in a subjective loss of bass. However, the 'bounce test' showed no signs of transient intermodulation. Clip behaviour is quite clean in the midband, with a small 'twitch' on recovery from mild overload which might lead to a little extra hardness in the sound when the amp is stressed.

Power amplifier distortion is kept to a low level and is mostly in the low harmonic orders, so it should not become audible until near full power. Tested into a real speaker, distortion simply reflects the moderate output impedance of the *P35* and the nonlinear current demand of the drive unit. Both electrical and mechanical noise are practically inaudible.

The *CA35* preamp measures quite well on the whole. Sensitivity and overload margins are all fine, output impedance is sensibly low and maximum output, even into relatively low impedances, is high enough to damage some transistor amps. Bandwidth on line inputs is fine, while the MM phono response is as near flat as makes no odds. However, response measured through the MC transformer varies with source impedance, a point well worth noting since the impedance of moving coil cartridges does in fact vary quite widely.

With a ten ohm source (about average), bass is very nearly flat and treble is flat

within the audio band, though it rises to a nasty +7dB sharp peak at 80kHz. 40 ohms, however, cuts bass by 1dB at 30Hz and about 2dB at 20Hz, which will lead to a rather thin-sounding bass with cartridges which have a highish coil resistance. Of course, one can still use an external transformer, which is what I did since my Highphonic cartridge is a 40ohm type.

Preamplifier distortion is low and largely harmless in character, while noise is low except on the moving coil input, where improvements could certainly be made.

Sound quality

The listening panel was not very impressed by this combination. One phrase used in describing its performance sums the matter up; 'Much less like a real concert'. Or, as another listener put it, 'It's like listening through a cloth'. Bass is lacking in control, and frequently also seems to lack in level, and while the midrange has quite a natural timbre it is not very detailed.

In the Strauss song, Jessye Norman's voice became rather strident, while it was even harder than usual to follow the orchestral accompaniment. With the very different sound of Little Feat, electric guitar was unnaturally twangy and bright, and the rhythm section was not as clear as it might be. It seemed overall that LPs were rather more successful than CDs, but there was still a distinctive 'flavour' in evidence.

Separating the pre and power amplifiers and mixing them with other equipment confirmed that both do have some character in common, particularly the loss of detail mentioned above. The purity of the best recordings can often be made to sound rough, almost as if the amps are being driven too hard even when output is several dB within their range. They are at their best with fairly simple pop vocals and the like, where a little roughness can pass unnoticed, but the refinement of massed orchestral strings, for instance, seems to defeat them.

TEST RESULTS

Preamplifier: Beard CA35 Mk II

	Line inputs	Phono MM	Phono MC
Stereo separation			
1kHz	62dB	64dB	64dB
20kHz	37dB	36dB	37dB
Distortion @ 1V out (phono +15dB in)			
20Hz	0.01%	0.04%	0.15%
1kHz	0.01%	0.03%	0.02%
20kHz	0.01%	0.01%	0.02%
S/N ratio, A-wtd	96dB	75dB/78dB	73dB
Noise figure, A-wtd	-	3dB/8dB	13dB
Sensitivity for 1V out	85mV	1.2mV	0.24mV
Phono overload			
20Hz		33mV	1.6mV
1kHz		900mV	180mV
20kHz		3.6V	640mV
Input impedance	250kohm	47kohm	3300ohm
Output impedance			600ohm
Max. out into 10kohm			29V
Frequency response (line inputs)			
1dB limits			9Hz - 28kHz
3dB limits			4Hz - 50kHz
Typical retail price			£795

Power amplifier: Beard P35

	20Hz	1kHz	20kHz
Power out into 8ohm	18W	37W	36W
Power into 4ohm (8ohm mode)	27W	30W	27W
Clipping behaviour	Quite clean, very slightly unsymmetric.		
Overload recovery (+3dB)	Slight twitch, 4V decaying within 0.3s		
Peak current	+6A/-6A		
Max. output at 2Hz	0.1W		
Input impedance	470k		
Output impedance	1.1ohm	1ohm	0.9ohm
Stereo separation	>80dB	>80dB	70dB
THD+N, 1W out into 8 ohm	0.09%	0.02%	0.04%
THD+N, 2/3 rated power	2.8%	0.17%	0.2%
Noise, A-wtd	-90dBW		
Sensitivity for full output	1V		
Frequency response (1W out)			
1dB limits	8Hz - 50kHz		
3dB limits	1.6Hz - 95kHz (+2dB @4Hz)		
Typical retail price	£995		

RIAA response (MM input)

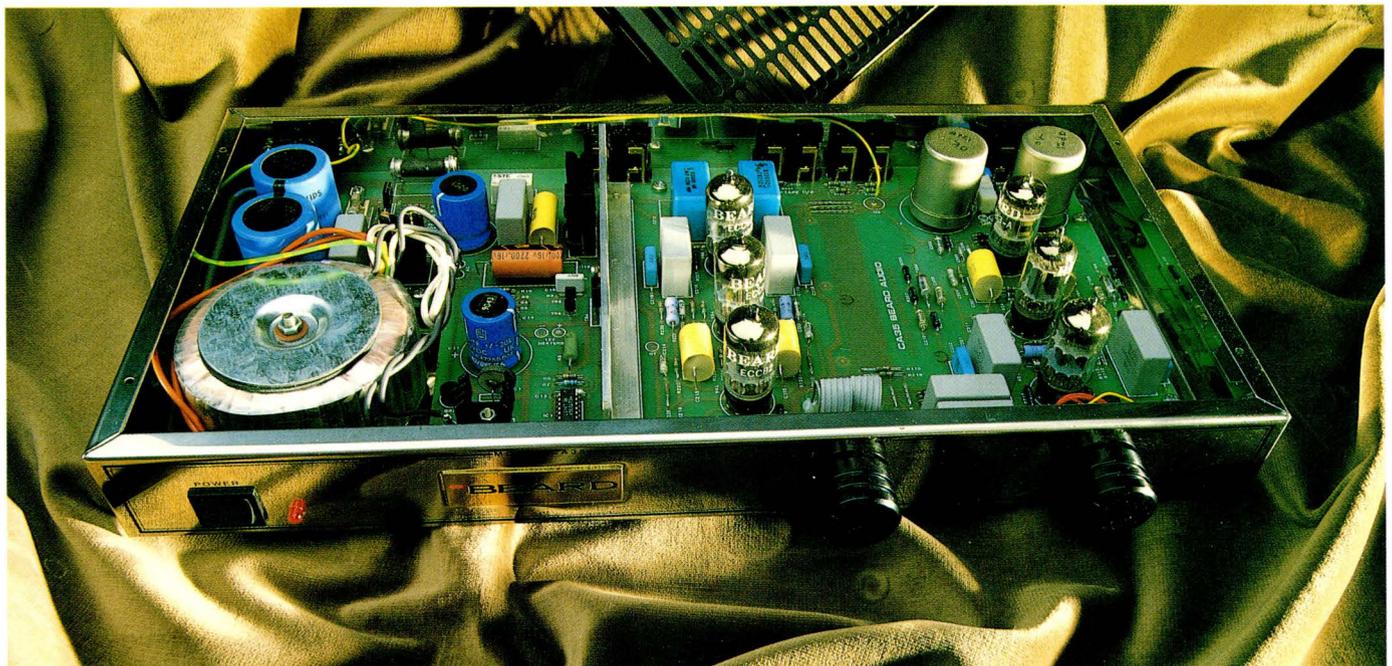
Distortion at 50Hz, 10W into real load

Distortion at 1kHz, 2/3 rated into 8ohms

Conclusion

It is true that the Beards can sound quite bouncy and lively with the right material, but neither unit provides the sort of detail resolution or bandwidth that one expects at this price (not an awful lot to pay for a valve pre/power combination, I know, but still quite a

whack in the general scheme of things). With very carefully chosen loudspeakers, these problems may diminish somewhat, but while lost bandwidth can in principle be compensated for, lost detail is not usually recoverable and this limits the appeal of these amplifiers.





EAR 802/519

EAR, Unit 11, Stukely Meadows Industrial Estate, Huntingdon, Cambs, PE18 6ED. Tel: (0480) 53791

Although the 802 preamplifier has been previously reviewed in *Choice* (with the 509 power amps), the 519 has never featured despite being around for over ten years. In fact, most units of this model are apparently sold to professional users — hence the professional 19-inch rack mount front panel — but these particular samples were borrowed at short notice from a fellow audiophile when it became obvious, at the eleventh hour, that another manufacturer was going to be unable to deliver his review sample in time. The 802 was a distributor's demo sample which showed signs of wear externally but worked fine.

Like the 509, the 519 is a 100W monoblok power amplifier, a compact and heavy unit which hides its valves away at the rear under a grille cover. This grille is not easily removable, which is just as well since the valves have the anode connection (at around 500V) exposed on the top. Even with the cover fitted, this connection should be insulated, which it was not on the review samples. Physical construction of the amp is extremely robust throughout, as is the preamp.

Circuitry in the 519 is mounted on two boards, one carrying the audio circuits while the other handles the clip and bias indicators and adjusters. Two LEDs can be switched to show either power and clip, or bias condition for either valve, bias adjustment then

being a simple matter of twiddling a preset control until both LEDs light equally. The front panel also sports a level control. Valve life is quoted at 10,000 hours, which seems uncommonly long.

The 802 is unusual in its switching facilities, having a row of push buttons for selecting tape monitoring (full monitoring and dubbing between two sets of inputs and outputs) alongside the normal selector switch (phono, CD and tuner). There is also a switchable subsonic filter. MM and MC cartridges are catered for, a rear panel switch selecting direct connection for the former or transformer input for the latter. The review sample was apparently one of the first units to feature these transformers, which (I hope!) accounts for the afterthought appearance of their installation.

Audio circuitry is tightly packed on a fully symmetric circuit board with careful attention to layout paths. The top cover of the 802 has no ventilation slots, the designer preferring to keep the insides protected from dust and dirt, while power dissipation is low enough to keep internal temperatures reasonable.

Lab report

EAR is proud of the fact that its specifications can compare with those of transistor amplifiers without apology, and my tests

bore this out. Power output of the 519 meets the 100W rating right across the audio band, although it does fall off into four ohms (measured on the eight ohm tap; a four ohm tap is also provided). Peak current is quite high and delivered very cleanly. Frequency response is wide, and I noted that in both the treble and the bass the response tails off according to a perfect first-order law, without any of the resonance-induced bumps which often characterise valve amps and which can audibly affect audio-band phase response.

Distortion is very low from the 519, lower overall than any other valve amp I have tested and lower than many transistor amps too. At levels below about 10W it is practically pure second harmonic and can be regarded as essentially inaudible, while at higher power a few more harmonics creep in, though still at almost-inaudible levels. Output impedance is fine and noise is suitably low.

The 802 turns in a similar set of results, the only weakness here being hum on the moving coil input, again possibly due to the prototype status of this unit. Apart from that, and a rather high channel imbalance of 0.8dB (almost certainly the fault of the rather cheap and cheerful balance control, which lacks a centre detent), there is little to comment on. Phono response is subtly tailored

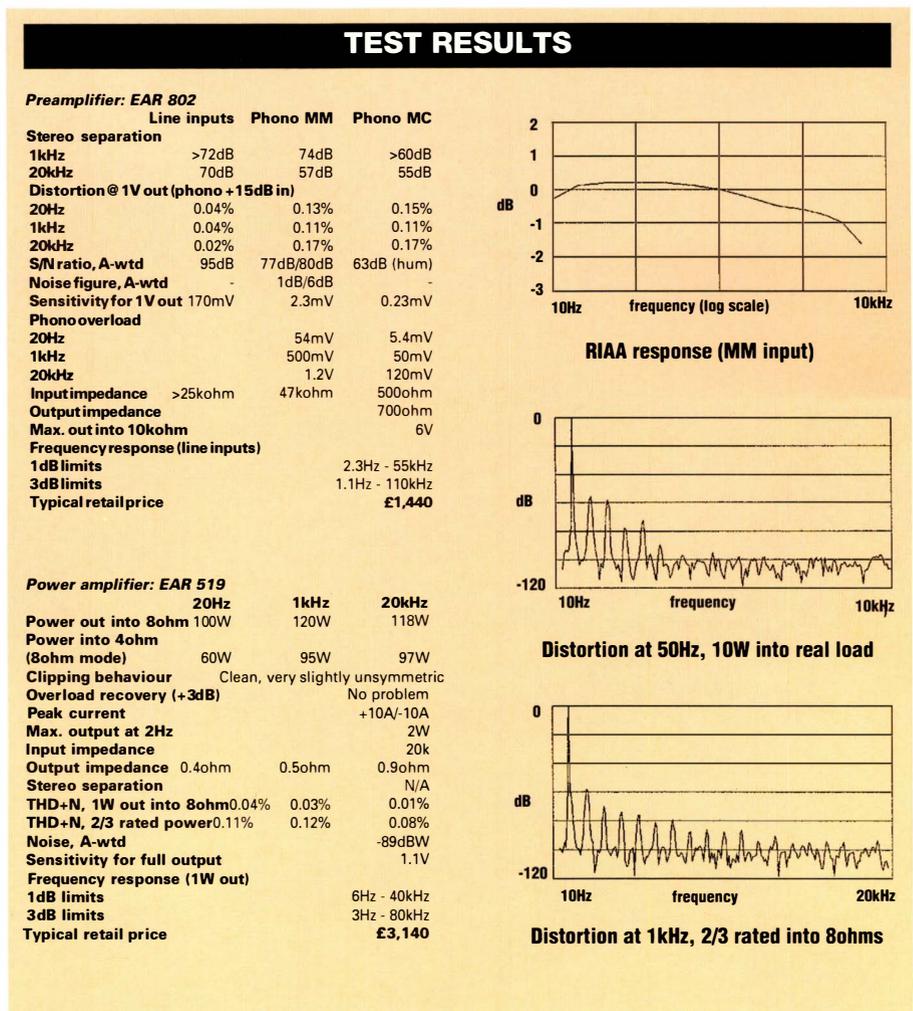
and practically identical on MM or MC setting, the latter quite insensitive of source impedance in the expected range of five to 40 ohms. The moderate output impedance should give no problem with quite long cable runs, and inputs and output have plenty of headroom. Noise is low, crosstalk is fine and distortion is low enough (second harmonic again) at all reasonable levels to be regarded as unimportant.

Sound quality

Perhaps the most interesting comment came from the member of the listening panel who had never before heard any amplifier costing anywhere near £1,000; 'It's amazing, I never thought amplifiers could make so much difference. I can hear all the detail now!'. The other listeners were equally enthusiastic. Throughout the range of music presented everyone felt that more detail was audible than with any of the other amplifiers tested.

In the solo piano recording, the full characteristic sound of the instrument and the venue were allowed to come across unhindered, while in the rock excerpt the rhythm section was crisp and full, clearly audible without in any way drowning the front line. This separation of detail is perhaps the most striking feature of the EAR amps; no matter how complex the music, they allow one to hear everything that is going on, but without throwing it at the listener or unnaturally accenting any one part. They also have exceptionally low listener fatigue, permitting extended listening at any volume and any level of concentration.

Simply put, these EARs really do allow one to listen further into the music. They have a characteristic low (subjective) distortion sound, which can take a while to get used to but which is totally persuasive to those who hear it. Speaking personally, I haven't used from choice any equipment that doesn't possess at least a modicum of this quality since I used an EAR-based pro-



fessional recording system over six years ago.

Conclusion

It depends what you want, of course, and if you want your amplifier to function as a subtle 'effects box' you won't like these.

But if you really want to hear what is going on, and have speakers that can likewise inform, these are amplifiers to save up for. The price does not seem at all out of order for the performance, and the good build quality and reputation are simply the icing on the cake. Strongly Recommended.



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Sonic Frontiers SFL-1/SFS-80

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American high-end with a difference this, it's actually made in Canada, but bears many of the hallmarks of US gear, principally the striking and expensive appearance. Personally I find it rather unattractive but visitors who saw it were divided between love and distaste.

Whatever one's feelings about the looks, there is no denying that Sonic Frontiers knows how to put an amplifier together. The *SFS-80* power amp is built on a chassis of thick stainless steel, while the *SFL-1* preamp has a more conventional painted steel case, with a stainless front panel. Everything is securely and very neatly assembled.

Inside both units is a feast of designer brand components; all the resistors that are located anywhere near the signal path are Holco or Vishay close tolerance, low noise types, while small value capacitors are low loss units from MIT and Wima. Volume and balance controls are from Alps and the selector switch is a high quality gold plated item. Rhodium plated phono sockets and what look like solid copper 4mm output terminals are used, and internal wiring is in Cardas screened twin or PTFE-insulated single equipment wire. All the circuit boards are very high quality double-sided layouts, with ground planes where appropriate.

In fact, the preamp is only just a valve design, it contains precisely one valve, plus

a couple of transistors per channel. The power amp, however, is pure valve in the signal path, with a pair of KT88s providing an 80W output. Its output can be matched to nominal 3.5, 8 or 16ohm loudspeakers, but altering this requires some heavy electrical soldering on the output transformer. Output valve bias is easily adjustable using the fitted meter and a screwdriver.

Preamp facilities include four normal inputs plus 'direct', which bypasses the balance control and mono switch and goes via a separate selector switch to the volume control. There are also sockets for tape in and out, with tape monitoring, two parallel outputs and a mute switch. The usual front panel power indicator is a bicolour LED, which is red during warm-up and when the unit is muted, and green in normal operation, a neat touch.

Lab report

The output of the *SFS-80* easily meets its specification in the midband, but if Sonic Frontiers' claim of a power bandwidth of 20Hz-20kHz is to be allowed, distortion of up to five per cent (20Hz - three per cent at 20kHz) must be tolerated. I suppose it is only fair to point out that most loudspeakers will produce over five per cent of distortion at 20Hz for 80W input. Distortion at 1kHz, shown in the graph, consists mostly of third

harmonic which is not necessarily inaudible at that level, and ninth harmonic is also present at a level which may well be audible, the ninth harmonic being a rather discordant interval.

That ninth harmonic is still evident, though at a lower level, in the 'real speaker' distortion test, which also appears to show a very high level of distortion generally. That, however, is merely a reflection of the *SFS-80*'s most surprising feature, its very high output impedance of six ohms, giving it a nominal damping factor of 1.3. It has been argued that any damping factor much higher than ten or so is wasted on most loudspeakers as it makes very little difference to overall frequency response, but when it is as low as this the frequency response will be profoundly affected.

Other measurements are good. Bandwidth is wide, with a small blip in the generally falling ultrasonic response at 90kHz indicating a less than perfectly damped output transformer. Maximum output at 2Hz is very low, so a subsonic filter might not be a bad idea with any accompanying phono preamp. Clipping is clean and symmetric, but there is slight compression (about 1dB, lasting for less than 0.1s) on recovery from 3dB of overload, probably hardly worth worrying about. The transient intermodulation 'bounce' test showed a small (about 1V)

twitch on the low-to-high-level transition, which could somewhat affect the clarity of sudden loud sounds.

The *SFL-1* measured very well, the only strange result being a channel imbalance of 1.5dB; the balance control has no centre detent and given Sonic Frontiers' care over other details I was surprised it was not more accurately aligned.

Distortion is low, although it rises into low loads, with 0.18 per cent into 10kohms. Since it is almost entirely second harmonic it is unlikely to be audible except perhaps as the subtlest sweetening on very good recordings. Output impedance is a mite high, and if very long (>5m) interconnects are required it might be as well to use low capacitance cable.

Sound quality

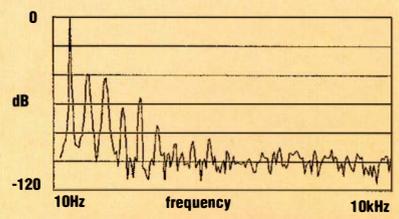
These amps were well liked by the panel. I admit I was rather surprised (in the light of the measurements) when one panellist commented on the amps' neutrality of tone and timbre, proving that there is more to neutrality than just flat frequency response. Comment was made on rather excessive and uncontrolled bass, which does tie in with measurements, but otherwise there was little in the way of coloration. Another listener noted that voices are quite well separated, though not quite as well as by the EAR amps which we had just heard. In the Little Feat track (heard via an outboard phono stage), the soft bass was a mild drawback but was offset by very good detail and precision in dealing with smaller percussion instruments such as bongos.

Taking the units in isolation showed that most of the comments above really refer to the *SFS-80*, the *SFL-1* being very neutral indeed. Comparing it with a direct link (with volume set accordingly), I felt that it might actually add a smidgen of improvement - for which of course read euphonic coloration, but it really was a very small difference and the result was certainly not unpleasant.

TEST RESULTS

Preamplifier: Sonic Frontiers SFL-1

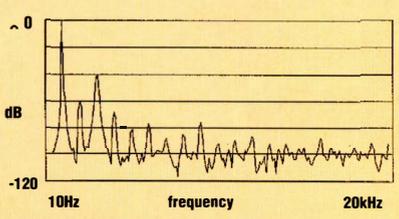
Stereo separation		
1kHz	75dB	
20kHz	50dB	
Distortion @ 1V out		
20Hz	0.08%	
1kHz	0.07%	
20kHz	0.08%	
S/N ratio, A-wtd	>90dB	
Sensitivity for 1V out	140mV	
Input impedance	50kohm	
Output impedance	6kohm	
Max. out into 10kohm	6V	
Frequency response		
1dB limits	2Hz - 70kHz	
3dB limits	1Hz - 120kHz	
Typical retail price	£1,195	



Distortion at 50Hz, 10W into real load

Power amplifier: Sonic Frontiers SFS-80

	20Hz	1kHz	20kHz
Power out into 8ohm	50W	85W	41W
Power into 4ohm (8ohm mode)	30W	55W	10W
Clipping behaviour	Clean, symmetric (midband)		
Overload recovery (+3dB)	Approx. 1dB compression for less than 0.1s		
Peak current			+6A/-6A
Max. output at 2Hz			30mW
Input impedance			100k
Output impedance	6ohm	6ohm	6ohm
Stereo separation	>90dB	>90dB	89dB
THD+N, 1W out into 8ohm	0.15%	0.03%	0.27%
THD+N, 2/3 rated power	1.8%	1.1%	2.1%
Noise, A-wtd			-96dBW
Sensitivity for full output			1.3V (for 50W)
Frequency response (1W out)			
1dB limits	2.5Hz - 54kHz		
3dB limits	1.6Hz - 125kHz		
Typical retail price			£2,295

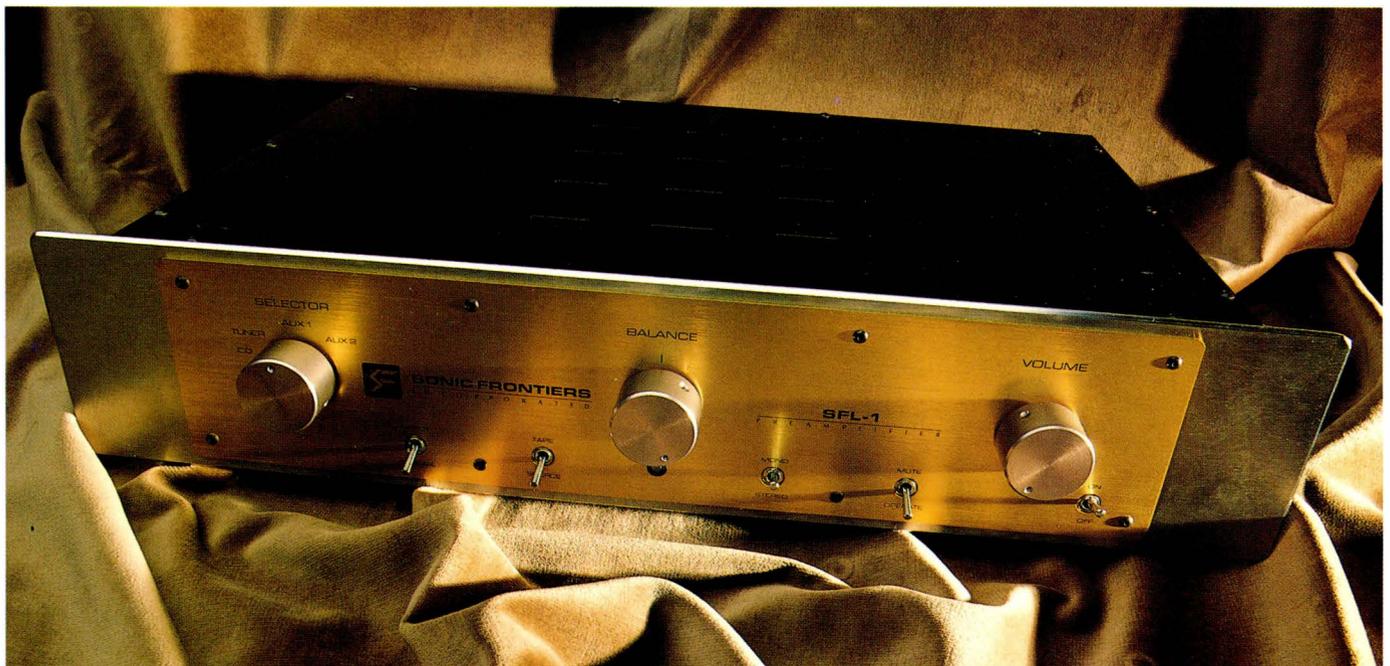


Distortion at 1kHz, 2/3 rated into 8ohms

Conclusion

In other words, then, the *SFL-1* is in most practical senses as near perfect as makes no odds, and given that it is beautifully put together it is easy to Recommend. And the *SFS-80*? That output impedance makes it a real oddball, which will sound different with

every loudspeaker it is used with, so for one thing auditioning with the appropriate speakers is mandatory. But apart from that it does appear to offer a good basic sound quality with few subjective or measured defects, and like the preamp it is very well made, so it too is worthy of Recommendation.



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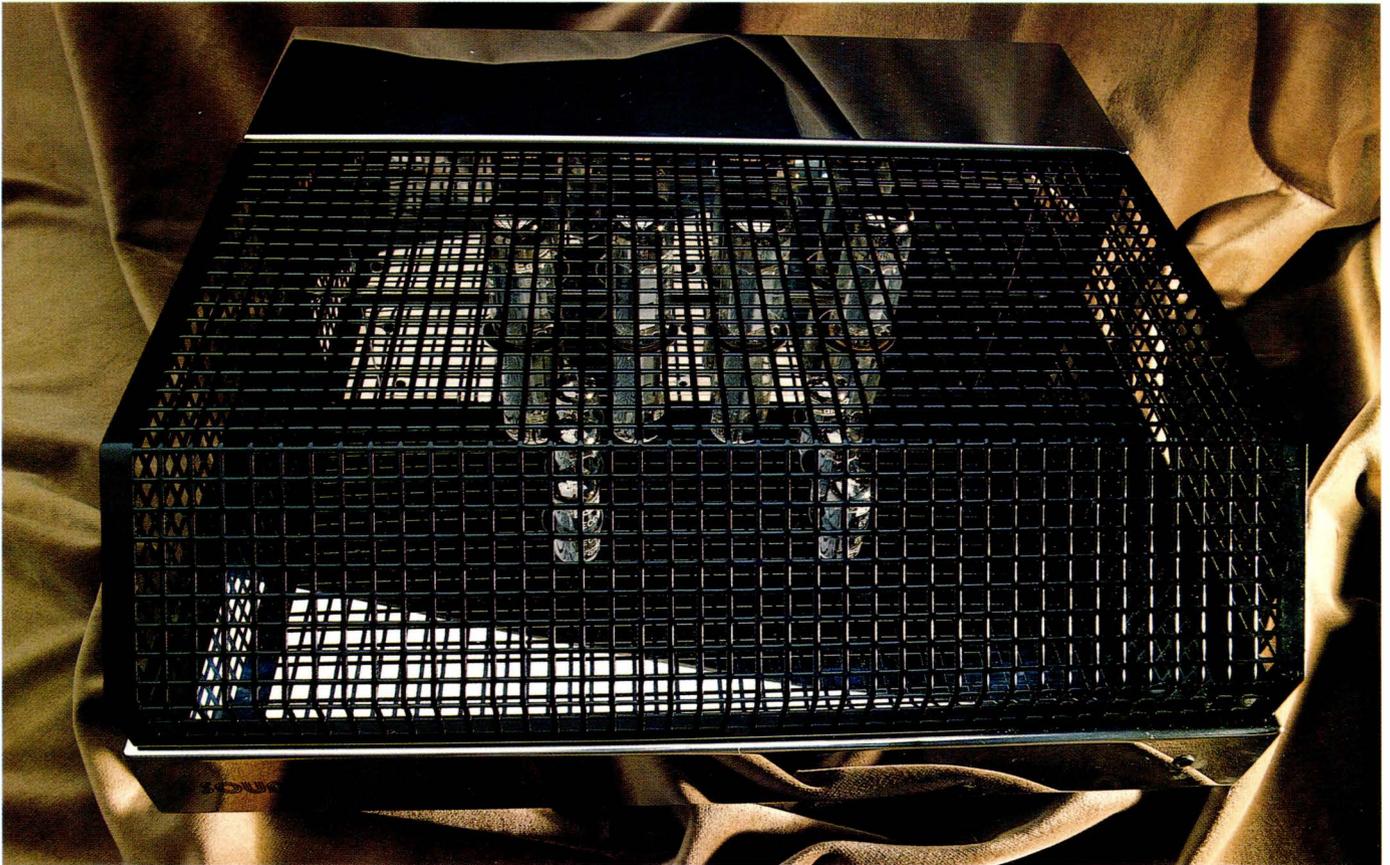
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Sound Research Ltd, Unit 4C, Oaklands Farm, Goatsmoor Lane, Stock, Ingatestone, Essex, CM4 9RS. Tel: (0277) 630 574

Sound Research is descended from Mentmore Industries, the Hackney-based concern featured in *Choice's Craftsman* feature a while back. I don't know much about the old firm, but the new one certainly missed an opportunity to impress this reviewer with its efficiency and technical back-up. A few days before the listening tests, I found an LF instability problem on the power amp, which I duly reported to Sound Research. In the course of the next four days I received effectively three contradictory explanations for what was going on from two people, neither of whom solved the problem. Distributor Kronos Distribution offered to send a replacement unit, but by then it was too late. Fortunately, SR sent me a circuit diagram and I was able to cure the fault (an obvious one!) in minutes.

I hope Sound Research can take that little whinge to heart, because its product seems quite attractive in many ways, if not without a few foibles. The *MM4* is a smart and compact unit, under a foot wide with an attractive polished stainless steel front panel and knobs in the same material. It's worth noting that the *MM4* is available in matt black at a saving of some £300. The power indicator is dimmable and mounted in the volume knob. Facilities are unusual. As well as the obvious source selector (MM phono and five line inputs) and the volume control,

there are also two level controls, one for each channel, and an overall gain control, a screwdriver adjustment accessible under the front panel. Also underneath the unit are four rocker switches, for power, output one or output two select, a selector for source or phono to the tape output sockets, and mute.

These features throw up various comments. For one thing, there is no way of knowing what the rocker switches are set to, which can be very confusing. For another, the high impedance level and gain controls act on the output signal, which causes the treble response of the amp to vary by several dB at 20kHz with typical cables connected, as the controls are adjusted. The rocker switches used are all high power jobs intended to switch electric fires and the like, not small signals; I wouldn't care to guarantee their audio performance in five years. Finally, the input selector knob is small and polished, and therefore very awkward to use.

The *MM4's* circuits are built on two circuit boards, each with four valves, while power supplies occupy a further two boards. Connections between inputs, controls and boards are made using miles of thin screened wire of no great sonic quality. The case metalwork seems not to fit together very well and several screw holes have been elongated to make the thing go together. In

short, the *MM4* appears to be only half designed.

The *SR 80/80* power amp seems rather happier, though again the metalwork could be neater. Features here include output matching for four or eight ohm speakers and an input volume control. Rated output power is 80W per channel (but see below). Bias is adjustable, but not by the user.

Lab report

I certainly couldn't raise 80W from the *SR 80/80*, although one channel managed 65W before clipping. The output valves are EL34s, which are generally good for around 50W, and although Sound Research claims that higher power versions are used I must say they look absolutely identical to standard ones. I have therefore treated the amp as a 50W/channel model in the tests.

Most test results are actually quite good, with power holding up well in the bass. Bandwidth is a little restricted in the treble, and even after sorting out the low frequency instability there is still a rise in response around 1.3Hz, which together with the very limited power output at subsonic frequencies does not bode well for the *SR80/80's* immunity to LP warps. Distortion is quite low in straight numerical terms, but the distortion waveform is spiky and contains a great number of harmonics (see graph),

which makes it more of a problem than typical 'valve distortion'. Even at low power, some spikes are evident in the distortion residual, although the distortion spectrum in the 'real speaker' test looks tidy enough.

Output impedance is reasonable, clipping is clean and symmetric (with good recovery up to 2dB overload but there's a small twitch in the waveform on recovery from +3dB) and there is no sign of transient intermodulation.

If the *MM4* looks rather unpromising from its measurements, it should be said that most of its oddities fall into the category of 'character' rather than sonic disaster. Its most peculiar artefact is very high crosstalk, which at -37dB (even at 20Hz) is clearly not due to stray capacitance. Is this deliberate or an oversight? Frequency response is also unusual, as it rises slightly in the treble (+1.5dB at 20kHz) — unless of course the gain and level controls are set so as to flatten it or make it droop (by up to 6dB at 20kHz), due to the high resultant output impedance. Even at full gain, output impedance is a little high. Input sensitivity is low, but proved adequate in practice for all but the very lowest output MC cartridges (through a typical transformer). Phono response is distinctly bass-shy. Distortion looks high but is almost pure second harmonic, just audible at this sort of level as a subtle 'sweetening' of the sound.

Sound quality

This was the only combination to split the panel's opinions significantly. One listener found it uncomfortably bright (although the frequency response as the *MM4* was set up was almost perfectly flat), another liked it but conceded that some high notes on the violin sounded rather harsh, while a third complained of an unnatural chestiness to the sound and found solo voice badly distorted. All at least agreed that in general there was a good resolution of detail in complex music, at low and moderate levels,

TEST RESULTS

Preamplifier: Sound Research MM4

	Lineinputs	PhonoMM
Stereo separation		
1kHz	37dB	37dB
20kHz	27dB	24dB
Distortion @ 1V out (phono +15dB in)		
20Hz	0.4%	0.4%
1kHz	0.5%	0.5%
20kHz	0.4%	0.4%
S/N ratio, A-wtd	86dB	74dB/76dB
Noise figure, A-wtd	-	4dB/10dB
Sensitivity for 1V out	280mV	5.6mV
Phonooverload		
20Hz		26mV
1kHz		300mV
20kHz		850mV
Input impedance	>47kohm	47kohm
Output impedance		<33kohm
Max. out into 10kohm		4V
Frequency response (line inputs)		
1dB limits		17Hz - 15kHz
3dB limits		9Hz - 43kHz (+1.5dB @ 20kHz)
Typical retail price		£950

Power amplifier: Sound Research SR80/80

	20Hz	1kHz	20kHz
Power out into 8ohm	51W	55W	51W
Power into 4ohm (8ohm mode)	37W	38W	38W
Clipping behaviour	Clean, symmetric.		
Overload recovery (+3dB)	Slight twitch, 1V decaying within 0.2s		
Peak current	+6A/-6A		
Max. output at 2Hz	5mW		
Input impedance	90kohm		
Output impedance	0.8ohm	0.6ohm	1.2ohm
Stereo separation	78dB	80dB	80dB
THD+N, 1W out into 8ohm	0.07%	0.04%	0.3%
THD+N, 2/3 rated power	0.7%	0.1%	0.9%
Noise, A-wtd	-90dBW		
Sensitivity for full output	660mV (for 50W)		
Frequency response (1W out)			
1dB limits			1.9Hz - 16kHz
3dB limits			1.4Hz - 32kHz (+4dB @ 1.3Hz)
Typical retail price			£1,175

RIAA response (MM input)

Distortion at 50Hz, 10W into real load

Distortion at 1kHz, 2/3 rated into 8ohms

and bass was also well liked for its good body and control.

No particular sort of music seemed favoured over others, but several comments related specifically to loud and/or high passages, suggesting that this is not the amp for headbangers and opera lovers!

HI-FI CHOICE 115 NOVEMBER 1992

Hi-Fi Choice

mail order offers

The Purifier £16.90 per pair

The Purifier is a ferrite cable clamp designed to reduce RF induced noise in audio, video and computer systems.

The clamps will accept single or multiple cables of up to half an inch diameter and can be used on both signal and mains cables. The main benefit is a general cleansing of a system's sound allowing finer resolution of low level detail.

They can be particularly beneficial for digital interconnections.

Nagaoka Anti-Static Record Sleeves no.102 £6.99

Packs of 50 plastic record sleeves that can be used on their own or inserted into an existing card or paper sleeve.

The sleeves keep records dust free and eliminate static, but are of course hampered if the record isn't cleaned before it's stored. No great sound quality claims but in these days of disappearing vinyl it pays to take care of what you've got, after all there may never be a format to beat it!

Mk 10 Carbon Fibre Brush with Velvet Pad £9.99

The carbon fibres efficiently remove dirt from the record grooves, which is then collected by an integral felt pad. This can be easily cleaned with the supplied tool after use.

System Cleaning Kit 1 £15.99

Everything needed for maintaining a hi-fi system, all contained in one handsome wallet pack.

Stylus cleaner, auto reverse wet tape head cleaner and cleaning fluid, manual CD cleaner and cleaning fluid and a carbon fibre record cleaning brush.

Milty Work Mat £7.99

The Milty Work Mat is a large rubber mat that has been designed to support records, Laser Discs and CDs when they are being cleaned. It's covered in 1mm long tentacles which gently grip the disc during cleaning. The nature of the material ensures that no static is induced and dirt falls between the tentacles. It's a real boon to disc cleaning and makes using cleaning brushes and solutions completely painless.

Technics Auto Compact Disc Cleaner £39.95

The Technics RP-CL300 is a powered wet/dry CD cleaner that can be run off batteries or the

Our Mail Order Section this month features, among the old favourites such as Furukawa interconnects, some great new accessories to help improve the performance of your system. We've been reviewing some new and interesting products and have selected some that we thought you should know about.



mains. It works by rotating the disc and applying the wet cleaner first (cleaning solution is supplied), then reversing the direction of rotation and dry cleaning the disc. The whole process takes just 40 seconds and a set of batteries should clean 80 discs

Kontak cleaning solution £19.90

Kontak is a two stage contact cleaner for all audio and mains connections. All connections are susceptible to

oxidisation and dirt which impairs electron flow and thus affects sound quality. Here's what PM had to say when he tried some out; "The effect on the power amps was so astonishing I had to do the whole system. By the time I was finished it was utterly transformed. Timing and coherence were back with a vengeance; surface noise and coloration were both much less audible and the soundstage liberated itself from the boxes".



Newnes Audio and Hi-fi Engineer's pocket book (second edition) £10.95

This useful little book covers a wide range of audio topics with concise explanations to clarify the information.

It covers everything from turntables and cartridges to DCC and DAT with as much technical information as the mere mortal could wish for.

If you really want to know what makes your CD player tick and aren't afraid of the odd wiring diagram or equation this is the book for you.

The Art of Digital Audio - John Watkinson (revised reprint) £49.50

This book describes all of the essential theory of digital audio, and a good deal of practice, but it is not a history book. Nor is it a conventional textbook, largely because such things have to choose a target audience and stick to that academic level.

The need for understanding in digital audio is too wide and the subject is too interdisciplinary for that. As you can imagine this is a comprehensive tome that covers all aspects of digital technology including disc drives, rotary and stationary head recorders and even interconnects. It is a must for anyone wanting to get fully acquainted with the subject.

Audio Technica CD lens cleaner AT-6078 £16.95

The focusing assembly for the laser head of a CD player is a very delicate affair and yet it requires cleaning from time to time.

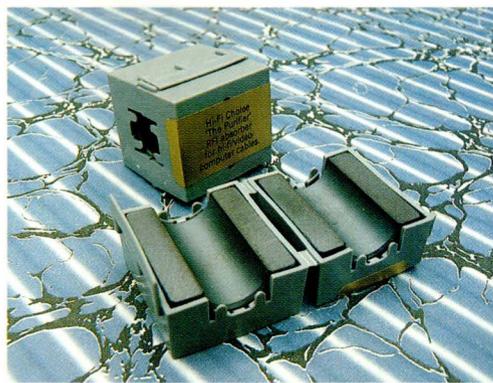
Rather than fumbling about with cotton buds we would suggest you employ an A-T lens cleaner. This is a standard size disc with eight tiny brushes set into it. To use, just apply a drop of cleaning fluid on one of the brushes, place the disc in your player and press play

Ten seconds later, hey presto, a clean laser assembly, and cleaner sound from your CDs as a result.

Gold plated 4mm banana plugs £7.95

Top quality solderless gold plated banana plugs for use with speaker cables. Simply push the speaker cable into the body of the plug and tighten for a perfect connection.

This Furukawa plug accepts cables up to 4mm in diameter. Sold in packs of four.



Top left: A selection of accessories from the Last range. Top right: The Hi-Fi Choice Purifier. Left: Furukawa banana plugs.

This month we are pleased to introduce the Last range of cleaning and protection fluids and accessories.

application can keep records sounding 'brand new' for 200 plays or more.

Last SF-100 Extra Strength Record Cleaner £19.95

Last SF-100 is designed to remove the compounds left over from the pressing process. Use for a first cleaning of new records as well as to revitalise older vinyl.

Last SF-200 Record Preservative £21.95

Without going too deeply into the technical details, Last SF-200 is absorbed into the surface of the vinyl and stabilises the vinyl to prevent gouging and fracturing of the groove wall that can occur during playback. A single

Last SF-300 All Purpose Record Cleaner £15.95

The one to use to for day to day cleaning after your records have been cleaned and protected with SF-100 and SF-200.



In order to let you try out the Last record cleaning and protection system we

have negotiated a special price to enable you to purchase a full size bottle of both the extra

strength cleaner and the preservative for just £34.95. We have also secured a limited number of trial samples of all three products which are available at only £21.95 but as stocks are limited we must restrict this offer to one sample kit per reader.

Last SF-500 Stylus Treatment £13.95

As the stylus is the point at which the music enters the replay system it is essential that it is kept clean. Last SF-400 will remove even the most stubborn deposits, yet, when used correctly, will not damage even the most delicate of stylus assemblies.

As well as products to protect and clean your record collection, Last also makes a range of products intended to perform the same service on your Compact Discs.

The SF-600 CD Cleaner and protection kit consists of a special CD cleaner/polish — to remove dirt, scratches and finger prints from CDs — as well as protective shields, an applicator, an application base and a brush. The cleaner/polish is also available separately.

**CD cleaner and protection kit £17.95
Cleaner only £13.95**

Improve the sound of your hi-fi system for a mere £15

Ever wondered why some people get taken seriously in hi-fi shops while others are given the run around? Wonder no more. The answer to all your hi-fi problems is the Hi-Fi Choice sweatshirt. Tastefully printed in red and black on grey, as well as being this year's most crucial fashion accessory, it will also readily identify you as a reader of Britain's fastest growing hi-fi magazine. You'll almost certainly be taken more seriously and end up with a better system — and all for a mere £15. We can supply the shirts in two different sizes — Large and Extra Large.



Furukawa cables

We have a variety of interconnects and speaker cables on offer, all sourced from respected Japanese specialist Furukawa and all of which were rated as either Recommended or Best Buys in our comprehensive cable surveys in July and August. For those of you interested in reading more about these cables and interconnects are available from our back issues department. We are able to supply a variety of lengths, please see the order form for prices.

Speaker cables Furukawa FS-2T14

Cheapest of Furukawa's Evencap range, this PCOCC cables was rated a Best Buy because of its "natural sense of dynamics and scale".



Furukawa FS-2T20P

Consisting of some 80 PCOCC strands 20P was praised for its "lively and engaging presentation" and was considered to be "taut, detailed and well controlled".



Furukawa FS-2T35P

Similar to 20P, but with 140 strands arranged in seven bundles, this cable was rated "a real corker".



Digital Interconnects

Furukawa FV-1010
75ohm PCOCC digital interconnect which earned Recommendation for its good sense of depth and quality of construction.



Furukawa FO-1110

Voted a "must for 'optical only' transports" 1110 employs a PMMA fibre. Glass and multi glass versions, the FO-1210 and FO-1310 respectively, are also available and both merited Hi-Fi Choice Recommendation.



Analogue Interconnects

Furukawa FD-1010
One of Furukawa's 'unbalanced' coaxial range, manufactured from PCOCC and intended for use between the analogue output of a CD player and the preamplifier.



Audiophile Recordings

We are pleased to be able to offer a selection of records from the world famous Reference label. Guaranteed to get the very best from your system these recordings have been selected for the merits of the performance as well as their outstanding sound quality.

Prof Johnson's Astounding Sound Show: Sampler.

Orchestral Fanfare - Red Norvo Quintet - Cal Arts Ensemble - Richard Morris - Organ - Susan Mc Donald, Harp - Kronos Quartet - David Rosenthal, 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!

Copland: *Appalachian Spring Suite, Eight poems by Emily Dickinson.* Keith Clark/Pacific Symphony Orchestra, Marni Nixon, Soprano (in the poems).

Music by America's best loved composer, *The Appalachian Spring Suite* is presented in its original version for 13 instruments. Also included is the world premiere recording of Copland's orchestration of eight of his Emily Dickinson songs.

This recording was a Grammy Award nominee in 1987. The CD version also contains *An Outdoor Overture*.

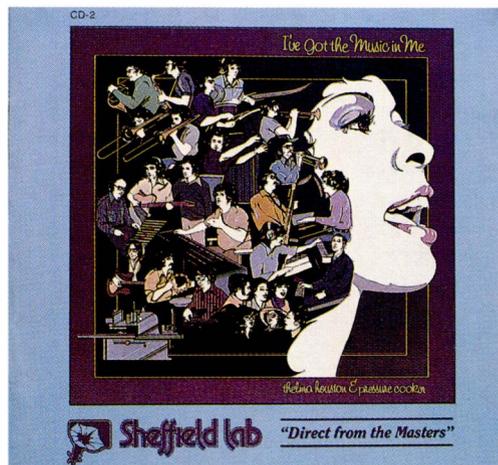
Walker & Garson: *Reflections. Portrait of a friend - Love - First song - Ethereal - Yearnings - Pied piper - The park - Magic spell - You're one of a kind - Reflections - Reason.*

Jim Walker on flute and Mike Garson on piano from the jazz group 'Free Flight' offer something peaceful and soothing for those quiet moments. Surpassingly natural sound.

Helicon Ensemble: *Vivaldi/Bach Vivaldi: Sinfonia in C-Trio Sonata in G minor - Double Concerto in E-Flat. Bach: Trio Sonata in C - Double Concerto in D minor.* (Compact Disc also contains *Prelude in C*)

Albert Fuller conducts from the harpsichord a varied original instrument ensemble in works featuring two solo violins, including the great *Double Concerto* by Bach and three rare, ingratiating works by Vivaldi.

Featured solo artists are Japp



Schroeder, Stanley Richie and Linda Quan.

Recorded at the John Harmes Centre for the Performing Arts in Englewood, New Jersey. CD also has Bach's *Prelude in C*.

Walton: *Facade Suite.*
Walton: *Facade Suite - Strauss/Hasnohl:* *Till Eulenspiegel - Scriabin/Elliott:* *Waltz in A-Flat - Nielsen:* *Serenata in Vano.* Chicago Pro Musica.

An instrumental from Walton's whimsical *Facade* in the composer's original scoring makes a perfect vehicle for these brilliant musicians. A chamber version of *Till Eulenspiegel* and the seldom heard pieces of Scriabin and Nielsen complete this engaging programme.

Tafel Music: *Popular Masterworks of the Baroque.*
Pachelbel: *Canon & Gigue.*
Handel: *suite from 'Water Music' Purcell: air from Suite no. 3 in D and Suite from 'The Moor's Revenge'.* **Vivaldi:** *Concerto op. 10-2, 'La Notte'.*

Canada's finest original-instrument Baroque ensemble plays familiar favourites with outstanding scholarship and musical panache. Note the Pachelbel *Canon* with its seldom heard companion piece, both to the composer's instrumentation. Strings, oboes, recorder and harpsichord offer delightful music recorded in a vaulted ceiling stone church.

Stravinsky: *L'Histoire.*
Stravinsky: *L'Histoire du soldat suite. Blackwood: Capriccio Espagnol.* Chicago Pro Musica.

Stravinsky's landmark composition for a mixed ensemble of seven. Grammy winning performances.

Respighi: *Church Windows.* Keith Clark, Pacific Symphony Orchestra.

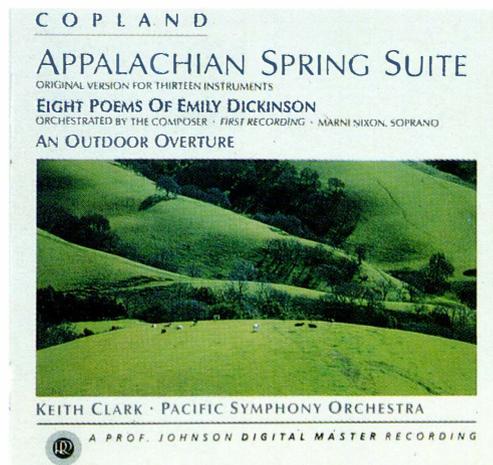
This grandiose work, scored for full symphony orchestra, pipe organ and tam-tam, has at last been given its due, musically and sonically, in this celebrated recording. *Church Windows* quite literally pushes to the theoretical limit the dynamic range it is possible to reproduce at home.

The CD also contains Respighi's rare mini concerto *Poema Autunnale* with the violinist Ruggiero Ricci.

Marni Nixon: *Marni Nixon sings Gershwin. Summertime - Let's call the whole thing off - Someone to watch over me - I've got a crush on you - But not for me - The real American folk song - Nice work if you can get it - Embraceable you.*

Marni Nixon's impeccable intonation and diction bring a welcome elegance to these songs which are perhaps too often jazzed up. By beautifully singing what Gershwin wrote, stylishly accompanied by Lincoln Mayorga's piano, Miss Nixon brings new insights to these immortal songs.

Eileen Farrell: *Torch Songs. Stormy weather - Round Midnight - The end of a love affair - Black coffee - When your lover has gone - Don't explain - Something Cool - and more.*



The album Farrell fans have been waiting for. America's great blues diva makes these songs of lost love her own.

Smoky night club arrangements set the stage for some unforgettable singing.

Dick Hyam: *Dick Hyam Plays Fats Waller. Ain't misbehavin' - Keepin' out of mischief now - African ripples - Honeysuckle rose - Willow tree - Stealin' apples - I've got a feeling I'm falling - Handful of keys - My fate is in your hands - Jitterbug waltz - Squeeze me.*

The world's first direct-to-CD on RR-33DCD. A technological and musical triumph, a true landmark in recording history. RR-33DCD (listed as Ref CD87 on the order form) is available as a deluxe numbered limited edition.

Encoded on the highly sophisticated, computerised Boesendorfer reproducing piano, Hyman's performances were played back for Prof Johnson's microphones, and the digitised signal was transmitted via microwave to the compact disc master as the music was being played.

No recording tape of any kind was used, nor was the digital bitstream corrupted at any stage by copying manipulation or editing.

The digits generated at the recording session are the very digits on the finished Compact Disc. Also on ordinary CD and LP.

Michael Garson: *Serendipity. Lady - Autumn leaves - I should care - Spirit of play - Trio blues -*

My romance

With illustrious sidemen Stanley Clarke (bass), Gary Herbig (sax), Peter Sparague (guitar) and fellow Free Flight members Jim Walker and Jim Laceyfield, Michael Garson has put together a tasty program of exciting mainstream acoustic jazz. Recorded by Prof Johnson in a real concert space, *Serendipity* represents an alternative, non-studio approach to jazz recording. A long standing favourite for audio demo, the CD contains two extra tracks.

Star of Wonder:

Silent night - Nativity carol - We three kings - We'll Dress the house - Come all ye faithful - Deck the hall -

Festive music for the holiday season by an outstanding professional chorus, recorded in San Francisco's St Ignatius Church.

The spine tingling acoustics are ideal for this program and *Star of Wonder* contains the full range of Christmas music: imaginative arrangements of traditional carols, renaissance motets and dramatic 20th century compositions.

The CD contains three extra tracks.

Berlioz: *Fantastique. Symphonie Fantastique.* Varujan Kojian, The Utah Symphony Orchestra.

This is widely considered to be the recording of this magical work. The Utah Symphony Orchestra, playing in Salt Lake City's Symphonic Hall, gives a world class performance, and the excellent recording captures it in its entirety.

The CD contains two versions of the explosive finale, one with standard orchestral bells, and another with digitally recorded church bells.

The 2-disc 45RPM LP set contains two copies of *March To The Scaffold* and *Dreams Of A Witches Sabbath*.

Nojima: *Nojima plays Liszt. Sonata in B minor - Mephisto Waltz - La Campanella - Harmonies du Soir - Feux Follets.*

The recipient of more rave reviews than any piano recording in recent memory, this is truly one of the history books.

Japan's most celebrated concert pianist won the Silver Medal at the Van Cliburn competition. Connoisseurs of great piano playing will treasure this recording, which has also been acclaimed for its outstanding sonic realism

Chicago Pro Musica: *Weill, Varese, Bowles and Martinu. Threepenny Opera suite - Octandre - Music for a farce - La Revue de Cuisine.*

Chicago Pro Musica gives brilliant performances of four magnificent 20th Century works. Kurt Weill's pungent suite for wind, brass and percussion is the centrepiece.

Featuring the first stereo recording of a rare piece by Paul Bowles, best known as the author of *The Sheltering Sky* but also a distinguished composer for the stage.

Martinu's Parisian ballet from the 1920s contains the steamiest of tangos and a mad Charleston.

Eileen Farrell: Rogers & Hart. *I could write a book - I wish I were in love again - Wait till I see him - I didn't know what time it was - Love me tonight - Nobody's heart - It never entered my mind - Mountain greenery - Sing for your supper - Can't you do a friend a favour - Lover - My heart stood still - Little girl blue - You're nearer.*

A wide ranging survey including many great standards and more than a few rarities. Farrell's affinity for the songs of this era is undisputed

Beautifully sung as her earlier pop recordings were, these new performances reveal an added dimension to the Farrell art - total involvement with the lyrics. And what lyrics! A must for admirers of Lorenz Hart.

Nojima: *Nojima Plays Ravel. Miroirs: Noctuelles - Oiseaux tristes - Une baroque sur l'ocean - Alborada del gracioso - La valse des cloches - Gaspard de la Nuit. Odine - Le gibet - Scarbo.*

Here is the eagerly awaited sequel to Nojima's first American recording, featuring some of his most renowned specialities.

Gaspard de la Nuit is the pianist's Everest, attempted by only a few. *The Miroirs* are a distillation of Ravel's impressionist style, requiring a totally different technique. The Nojima performances are incandescent.

Opus 3 test record 1: Depth of image.

Produced with the idea of analysing hi-fi systems and their ability to reproduce depth of image. This is Opus 3's best selling recording. It contains the work of a broad cross section of the label's recording artists.

Opus 3 test record 2: Timbre.

Timbre or tonal accuracy is a crucial area of performance for audio equipment, this disc is composed of tracks designed to show up the timbral strengths of the components its played through. A good recording of interesting and diverse music.

Opus 3 test record 3: Dynamics.

Another compilation on the Swedish Opus 3 label, with musical extracts carefully chosen

to illustrate what is meant by musical dynamics with comprehensive liner notes to show you what you should be listening for. How good is your hi-fi system?

Opus 3 test record 4: Depth of image, Timbre, Dynamics.

In this fourth recording in the test series Opus has linked together the three concepts as a basis for completely evaluating audio equipment. Test record 4 like the first three contains a selection of illustrated music from our catalogue - mostly from the more recent recordings.

Thelma Houston & Pressure

Cooker: *I've got the music in me. I've got the music in me - To know you is to love you - Don't misunderstand - Got to get you into my life - plus four instrumental tracks.*

One of Sheffield Labs' most famous recordings. The original direct cut has been out of print for many years and is now highly collectable - but the recording sessions were of course taped, and this issue will still blow your socks off!

Eileen Farrell: Sings Arlen. *Let's fall in love - Out of this world - I wonder what became of me - I've got the world on a string - Like a straw in the wind - Down with love - Happiness is a thing called Joe - A woman's prerogative - Come rain or come shine - Little drops of rain - Over the rainbow - When the sun comes out - As long as I live - My shining hour - Last night when we were young.*

Farrell worked often with Harold Arlen, and has long been identified with his music: it was an Arlen tune that gave the title to the first of four albums of pop songs she made in the sixties, *I've got a right to sing the blues*.

This definitive new collection is graced with music notes and personal remembrances by Gene Lees.

Jim Brock: Tropic affair *Pass a grill - Ladies of the Clabash - Tropic affair - Anya - Quo qui's groove - Side walk - Palm palm girls - O vazio.*

Vibrant, steamy and sensual, this contemporary instrumental jazz contains more than a touch of the tropics.

Renowned percussionist Jim Brock has recorded and toured with such diverse musical talents as Dave Valentin, Janis Ian and Scott Cossu.

Brock's dynamic ten-piece band, production by legendary Don Dixon, and prof. Johnson's magical live to two-track studio sonics result in a soundstage of such three-dimensionality, you can step inside the music. Enjoy

a vacation without leaving home with tropic affair!

Eileen Farrell: Sings Johnny Mercer *Skylark - I remember you - Early Autumn - Laura - I thought about you - Too marvelous for words - and more.*

Arranged by Manny Albam and Loonis McGlohan, this album includes rarities and favourites from the vast catalogue of America's most poetic and prolific lyricist.

Eileen Farrell: It's over *I get the blues when it rains - How about me? - Easy to remember - Gone with the wind - I remember April - And more memorable tear jerkers.*

Arranged and conducted by Robert Farnon, this album gives Farrell the opportunity to demonstrate her considerable skills, in touching songs of lost love. These great laments respond eloquently to the lush Farnon treatment.

NEW RELEASES

Robert Farnon conducts the Royal Philharmonic Orchestra:

Film music and other works *Suite from Captain Horatio Hornblower - Lake in the woods - Canadian impressions - A la Claire fontaine - and more.*

The Royal Philharmonic Orchestra, conducted by the composer, Robert Farnon at the Town hall, Watford.

The recording session that *Hi-Fi Choice* contributor Richard Black wrote about in the February issue (103), produced by the legendary Prof Keith Johnson using both analogue and digital tape recorders to produce the finest results for LP and CD.

This has the traditional Reference Recordings virtues of wide bandwidth and dynamic range and an unusual degree of clarity, due in no small part to the simplicity of the recording equipment.

Malcolm Arnold: Conducts the London Philharmonic Orchestra.

A Sussex overture - Bechus - Dandi Pratt - The smoke - Anniversary overture - The fair field - Flourish for orchestra - The Commonwealth Christmas overture.

On this very latest Reference recording the London Philharmonic Orchestra is conducted by the composer, Malcolm Arnold, at the Town hall, Watford.

This Keith Johnson production includes first recordings of Britain's leading living composer's lesser known works.

Record and CD PriceTable

Prof Johnson's Sound Show:

Ref RR-7 (LP only) (£18.50)

Berlioz: *Fantastique*

Ref RR-11 (double) (£24.99)

Ref RR-11CD (£18.50)

Tafel Musik: *Baroque*

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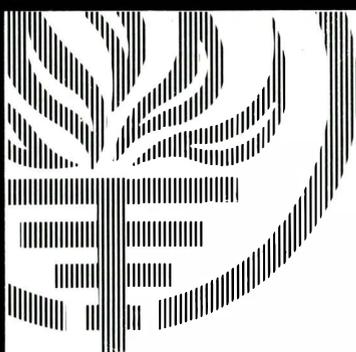
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GOSPEL MUSIC AUDIO, 32A High St Kington, Herefordshire. (0544) 230254. New Shop open: Castle Video, 1 Spa Centre, Station Crescent, Llandrindod Wells (0587 824 0200) Alphason, Alison, Revolver, Luxman, Yamaha, QED, Audio Systemline, Wharfedale, Jamo, Micromega. No appts nec., home trial facilities, service dept. -5.30 +evening dems

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ACOUSTIC ARTS LTD, 101 St Albans Rd, Watford, Herts. (0923) 245250. Fax (0923) 230798 Absolute Sounds, Acoustic Energy, Audiolab, Denon, Marantz, Meridian, Quad, Ref Imports, TDL, Teak, Tues-Sat 9.30-6.00

RADLETT AUDIO, 141 Watling Street, Radlett, Hertfordshire, WD7 7NQ. (0923) 856497. Mark Levinson, Proceed, PRO AC, Magnepan, Albarry, Martin Logan, Tube Technology, Audiolab, Rotel, Rega. Home trial facilities, Free Install, Service Dept. Visa, Access 9-5.30 Mon-Fri 10-5.30 Sat

STUDIO 99, 82 High Street, Harpenden. ((0582) 764 246. 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.

THE AUDIO FILE, 27 Hockerill St, Bishops Stortford, Herts CM23 2DW (0279) 506576. 9.30-5.30 open 6 days. Dealer Of The Year 1988/89. Linn, Naim, Quad, Cyrus, Arcam, Roksan, Denon, Epos, Rotel, KEF, Pro-Ac. 0% credit.

NORTH HUMBERSIDE

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

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

KENT

CANTERBURY HI-FI, 50 Burgate, Canterbury, Kent, (0227) 765 315 B&W, Denon, Kenwood, Cerwin-Vega, Yamaha, Technica, Rogers, Musical Fidelity, Sony, NAD. No appointments necessary. Free Installation. Service Dept. Access and Visa Mon-Sat 9-5.30

JOHN MARLEY HI-FI CENTRES, 2 Station Rd, West Canterbury. (0227) 769329. Also at Dover - (0304) 207562. Arcam, B&W, Heybrook, Infinity, JPW, Pro-Ac, Pioneer, Rotel, Tannoy, Technics. Dem and home trial fac Mon-Sat 9-5.30 closed Thurs. Free install. Credit to £1,000. Access, Visa, Credit charge. Service dept.

KIMBERLEY HI-FI, 193 Broadway, Bexleyheath, Kent. (081) 304 3272. Pioneer, Technics, Kenwood, Denon, NAD, Aiwa, Tannoy, Mission, Wharfedale, Castle. Separate dem room, no appt nec. Free installation. Service Dept. Instant credit facilities. 9.30-5.30. No early closing.

PANATEC SOUND & VISION CENTRE, 83b High Str, Gillingham. (0634) 5731141. B&W, Bose, Dual, Kenwood, Marantz, Pioneer, Philips, Sony, Tannoy, Technics. Dem room facilities. 0% credit, Service Dept. Free Installation Pioneer Reference Point Dealer.

PANATEC SOUND & VISION, 17 Week Str, Maidstone. (0622) 661488. See above for details.

SOUND CRAFT 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.

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

NORMAN AUDIO, 216 Church Street, Blackpool FY1 3PT. 0253 295661. For details see Preston branch entry (below), Open 9-5.30, Closed Wed.

ROMERS HI-FI CENTRE, 94-96 High Street, Rishton, Blackburn, Lancs, BB1 4LQ. Tel: 0254 887799. Musical Fidelity, Technics, Pioneer, Marantz, Revox, Tannoy, Celestion, Sony, Panasonic, Mission. Single Speaker Dem Room, Also wired for pro logic. No appts nec. Home trial fac by arrangement. Free Install, Service Dept. Access, Visa, Switch, Interest free on selected products. Open 9-5.30 Wed 9-1-00

LEICESTERSHIRE

MAYS HI-FI, 27/33 Churchgate, Leicester. LE1 3AL. (0533) 625625 Sony, Technics, Denon, Kenwood, Pioneer(Reference Point) Philips, B&W, Tannoy, Mission/Cyrus, Dual, Listening room, free install, service dept. Full range of credit facilities. Open Mon-Sat 9-5.30 Thurs 9-1-30 THE LEICESTER HI-FI CO, 6 Silver Walk, St. Martins Square, Leicester LE1 5EW. Tel: (0533) 539753. Fax: (0533) 626097. Acoustic Energy, Arcam, Marantz, Micromega, Mission/Cyrus, Musical Fidelity, Nakamichi Meridian, Rogers, Roksan, "and oodles more". 2 dem rooms, home trial arranged, free install, service dept. Credit facilities. Access, Visa, Diners, Amex. 6 days 9.30-5.30. Bada member.

LISTEN INN, 6 Hotel Street, Leicester. (0533) 623754 (Fax) 0533 623758. Linn, Arcam, Royd, Heybrook, Creek, Neat, Mission, Cyrus, Audiolab, Quad, Dewen, etc. 2 Dem Rooms.

SOUND ADVICE, The Factory, Duke St, Loughborough LE11 1ED. (0509) 218254. Mission Cyrus, Rega, Naim, Linn, Meridian, Yamaha, Rotel, Arcam, Nakamichi, JPW. 3 demonstration areas, no appts necessary, free installation, service department. Lombard credit charge. Access, Visa. Mon-Fri 9.30-6.00, Sat 9.30-5.30.

LINCOLNSHIRE

BOSTON HI-FI CENTRE, 65a Wide Bargate, John Adams Way, Boston, Lincs PE21 6SG. (0205) 365477. Quad, Nakamichi, Arcam, Marantz, NAD, Castle, JPW, Rogers, etc. Separate demo studio. Home trial. Free installation. Access, Visa. Tues - Sat 9-5 pm

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, comparator demonstrations, on two floors, part exchange Hi-Fi purchased for cash. No appointments necessary, home trial facilities, free installation, service department. Mastercard, Visa & credit charge, finance available. Mon-Sat 9-5.30pm, closed Thursdays SUPERFI, 271A High Str, Lincoln LN2 1JG. (0522) 520265. See main entry under Nottinghamshire for full details.

LONDON

ANALOG AUDIO, 849 High Road, London N12. (081) 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 T, 190 West End Lane, West Hampstead, London NW6 1SQ (071) 794 7848, Fax (071) 431 3570. Great hi-fi from Linn, Arcam, Audiolab, Cyrus, Denon, Meridian, Mission, Philips, Rotel, Proac, Micromega, Yamaha, and many more. Tue-Sat 10-6pm. 3yr gntee on Hi-Fi. Free del & instal. 30 day upgrade scheme. Home dems. PX. 2 dem rooms. AV Dept.

BILLY VEE SOUND SYSTEMS, 248 Lee High Road, London SE13. (081) 318 5755. Arcam, Linn, Naim, Quad, etc. 2 dem rooms. Int. free credit. Access, Visa. Closed Thurs.

CORNFLAKE SHOP, 37 Windmill St (just off Tottenham Court Rd), London W1. (071) 631 0472 (domestic). (071) 323 4554 (multiroom). Fax: (071) 323 4554 Fax. (071) 436 7165. Tues-Sat 10-7 Rega, Roksan, Naim, Monitor Audio, Arcam, Nakamichi, Rotel, Epos etc. 3 dem rooms. (incl. home cinema) Friendly, professional service. Home trial facilities. Appointments preferred. Full delivery and repair service. Multiroom specialists. Access & Visa COVENT GARDEN RECORDS, 84 Charing Cross Road, London WC2 (071) 379 7635, Fax (071) 836 1345. London's premier digital audio centre, Photo CD, DCC, CD, & 16X9 TV'S. Audiolab, B&O, Marantz, Mission, Cyrus, Philips, Pioneer, Rotel, Rogers, Quad, Sony, Technics, single speaker dem rooms, appointments suggested, installation service available. 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.

GRAHAMS HI-FI, Canonbury Yard, 190a New North Rd, London N1 7BS. (071) 226 5500. Winner Sony/HFN Greater London Dealer Award 1986-1989-1990. Linn, Naim, Rega, etc. £400-£3000-£13,000

HI-FI COMPONENTS, 84 Battersea Rise, London, SW11 1EH. Tel: 071 2231 110. Tannoy, Kenwood, Rotel, NAD, QED+ Wharfedale, Dual, Shure, Ortofon, Celestion. Appts nec, Service Dept. Access, Visa, Diners, Amex, Open 10-6 Closed Wed.

KJ WEST ONE, 26 New Cavendish St, London W1M 7LH. (071) 486 8262/63. Fax (071) 487 3452. Arcam, Audio Alchemy, Audio Lab, Audio Research, Croft, Deltac, Epos, Marantz, Meridian, Mission, Musical Fidelity, Pink Triangle, Roksan. Appts nec. Home trial. Free installation. Service dept. Major credit cards. Mon-Sat 10-6pm. (Late night Thur til 7pm).

MUSICAL IMAGES LTD. See under Middlesex & full page advert in the Product Directory.

MYERS AUDIO, 6-7 Central Parade, Hoe Street, Walthamstow, London, E17 4RT. Te 081 520 72777 Fax 081 5036677

NICHOLLS HI-FI, 430-434 Lee High Rd, Lewisham, London, SE12 8RW. 081 8525780. Sony, Technics, Harman, JBL, Mordaunt Short, Kenwood, Panasonic, Hafler, SÜmo, B&W. Demo facilities, no appt. nec. Home trail facilities, Free Install. Service Dept. Credit available. Access, Visa. Open 9.30-6 Mon-Sat, Thurs 9.30-1pm.

SOUND SENSE, 350 Edgeware 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.

STUDIO 99, 79-81 Fairfax Road, Swiss Cottage, London NW6. (071) 624 8855. Naim, Rega Quad, Meridian, Mission/Cyrus, ATC, Nakamichi, KEF, Yamaha, Arcam, Epos, Acoustic Energy, Bang & Olufsen, etc. 2 single speaker dem rooms. Service dept. Visa/c, Access/c & finance terms. 10-7 Mon-Fri, 10-6 Sat.

SUPERFI, 2-4 Camden High Street, Camden, NW1 0JH (071) 388 1300. See main entry under Notts for full details.

UXBRIDGE AUDIO - CHISWICK, 109 Chiswick High Road, Chiswick, W4 2ED (081) 742 3444 Fax (081) 742 3295. 2 Demo Rooms, Installations, 2 Year Guarantee, 7 day exchange. Major credit cards, Tues - Sat 10 - 6, See Middx entry for brands stocked.

VOLUME ONE, 41 Upper Wickham Lane, Welling. (081) 304 4622. For full details see entry under Kent.

ZEBRA, 18-24 Brighton Road, South Croydon CR2 6AA. 081 688 2093. Audio lab, Arcam, KEF Reference, Marantz, Mission, Micromega, Pioneer, Rotel, Sony, Tannoy, and large range of AV equipment. S2 Air Conditioned Demo Rooms. In a more casual environment. Service department. Mon-Sat 9.30-6.00. Access, Visa & instant credit up to £1000 subject to status.

GREATER MANCHESTER

THE AUDIO COUNSEL, 12 Shaw Road, Oldham, Manchester OL1 3LQ. (061) 633 2602. Linn, Yamaha, Rega, Rotel, Arcam, Micromega, EPOS, Creek, Nakamichi, Denon. 2 dem rooms. Free install. Visa, Access, Licenced credit brokers up to £1000 instant credit. 10.00-5.30 Tues, Weds, Sat; 10.00-7 Thurs & Fri. Closed Mon.

MURRAY HI-FI, 19 Middle Hillgate, Stockport. (061) 429 7666. Linn, Naim, Rega, Arcam, Yamaha, Royd, Epos, Creek, Nakamichi, Rotel. Full demo facilities, free installation & delivery, service dept. Full 2yr guarantee on all products. Access, Visa, Lombard Tricity, licenced credit broker. 10-6 Tue-Sat.

MIDDLESEX

AUDIO T, 159a Chase Side, Enfield, Middx EN2 0PW. (081) 367 3132, Fax (081) 367 1638. Great hi-fi from Arcam, Audiolab, Cyrus, Denon, Meridian, Micromega, Mission, Philips, Rotel, Yamaha and many more. Tue-Fri 10-6pm. Sat 9.30 - 5.30 3 yr gntee on Hi-Fi. Free del & instal. 30 day upgrade scheme. Home dems. PX. 3 dem rooms. AV Dept.

BADA

The Choice Dealer Directory

HARROW AUDIO, 27SpringfieldRd, Harrow. (081)8630938. Mon-Sat9.30-5.30. A&R, Audiolab, Cyrus, Denon, Epos, Monitor Audio, Musical Fidelity, Nakamichi, Quad, Rotel, Tannoy, Thorens, Yamaha. etc. **BADA**

MUSICAL IMAGES LTD. 173 Station Rd, Edgeware (081) 952 5535, fax (081) 951 5864 and 45 High St, Hounslow. Tel (081) 569 5802, fax (081) 569 6353. Most brands available - see full page advert in Product Directory. Interest free credit available, ask for details. Demo Room, Repairs & Service, Mail Order facilities. **BADA**

RIVERSIDE HI-FI LTD, 422 Richmond Road, EastTwickenham, Middlesex TW1 2EB. Tel. (081) 892 7613. Fax (081) 892 7749. A.R., Arcam, Audio Innovations, Castle, Dual, Denon, KEF, Luxman, Michell, Musical Fidelity, Micromega, Marantz, Nakamichi, Rotel, Spenhdor, Systemdek, Tannoy, Yamaha. One demo room, in-car demo for car hi-fi systems. Appts not always necessary. Home trial facilities. Free installation, service dept. Lombard Tricity, Access, Visa, Amex, Diners Club. Mon-Sat 9.30-6, Thurs, Fri 9.30-7

SIGHT N SOUND, The Treaty Centre, Hounslow, Middlesex TW3 IES. 081 572 5418, fax 081 572 5417. Sony, Kenwood, Finlux, Toshiba, Philips, Sanyo, Grundig, Pioneer, Technics, Akai. No appts nec, free intall, service dept. Access & Visa, financing available. 9-6pm Mon-Sat.

MERSEYSIDE

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

P & A AUDIO (BIRKDALE) LTD 31 Liverpool Road, Birkdale, Southport (0704) 68373. Arcam, Cambridge, Creek, Denon, Michell, Mission/Cyrus, Mordaunt-Short, NAD, Pink Triangle, QED, Revolver, Rogers, Rotel, Royd, Tannoy. 3 Single speaker demo rooms and Nicam surround sound dem room. Free delivery, installation (Merseyside) Service dept, Mon-Sat 9-5.30 Half day Tues, Access, Visa, Lombard

WEST MIDLANDS

AMADAEUS SOUND & VISION, 10 Boldmere Road, Sutton Coldfield, West Midlands Tel (021) 354 2311. Arcam, Audio Innovations, B&O, Carver, Castle, QED, Wharfedale, Yamaha, Cambridge Audio, Hafler. Single Speaker demo, appts preferred, service available, installations, B&O link install, home trials. Access, Visa, interest free credit available subject to status. 9.30-6pm 6 days

FRANK HARVEY HI-FI EXCELLENCE, 163 Medieval Spon Street, Coventry (0203) 525200. All major agencies. Free inst. Service dept. Part ex. 3 dem rooms. Mon-Sat 9.30-5.30. Wed til 8pm. **BADA**

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

MUSICAL APPROACH, 37 High Street, Aldridge, Walsall, W. Mids. (0922) 57926. Linn products, Arcam, Creek, NVA, Revolver, Onix, Epos, Marantz, Rotel, Quad & more. Dem facts. Home trial. Service dept. Credit facts available. Access, Visa. 9.30-5.30 Mon-Sat. 9.30-1 on Thurs.

MUSIC MATTERS, 351 Hagley Road, Edgbaston, Birmingham B17 8DL. (021) 429 2811. Roksan, Nakamichi, Arcam, Audiolab, Musical Fidelity, Mission/Cyrus, Meridian, KEF, Monitor Audio, Pink Triangle. 2 single speaker luxury demo rooms. Appts nec, hometrial 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.

NORFOLK

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

MARTINS HI-FI, 5 High Street, Kings Lynn. (0553) 761683. Est. 1968. Making good vibrations for 20 years **BADA**

MARTINS HI-FI, 85/91 Ber Street, Norwich. (0603) 627010. Est. 1968. Making good vibrations for 20 years **BADA**

NORTHAMPTONSHIRE

AUDIO CRAFT 23-25 Derngate, Northampton, NN1 1TY. Tel: 0604 36291Bang & Oulsen, Kenwood, Technics, Marantz, Celestion, Mordaunt-Short. No appts nec, Free Install, Service Dept. Open Mon-Sat 9-5:30pm

CLASSIC HI-FI + VIDEO, School Lane, Kettering, Northants. (0536) 515766. Rotel, Musical Fidelity, Wharfedale, Yamaha, JBL, Cyrus, Nad, Pioneer, Marantz, Kenwood, Kef, Celestion, and many more. Home trial, free instal., service dept. Access, Visa, credit facts. 9.30-5.30pm.

LISTEN INN, 32 Gold Street, Northampton. (0604) 37871 (Fax) (0604) 601430. Linn, Naim, Epos, Royd, Mission, Cyrus, Arcam, Audiolab, Neat, Creek, Quad, Denon etc. 2 Dem Rooms **BADA**

NOTTINGHAMSHIRE

CHANTRY AUDIO, Chantry Walk, 18a Eldon Street, Tuxford, Nr Newark, Notts NG22 0LH. (0777) 870372. Pink Triangle, Deltec, Rotel, SD Acoustics, Ruark, NVA, Michell, Ion Systems, Croft Acoustics, Kelvin Labs, and much more. 2 dem rooms. Home trial, free installation. Access, Visa & credit facilities and mail order. Mon-Fri 9.30-5:30pm Sat 9.30-5.30. Sun & evenings home dem by appt.

DEFINITIVE AUDIO, (0602) 813562. For a carefully considered approach to building a true hi-fidelity audio system with components derived from the following manufacturers; Audio Innovations, Snell, Wadia, Micromega, Deltec, Voyd, Systemdek, SME, Revox, Audionote, Ortofon, Pioneer. Demos by appt. Please phone for further details. Installation free of charge. Mon-Sat 10-7pm, Closed Wed a.m.

NOTTINGHAM HI-FI CENTRE, 120-122 Alfreton Road, Nottingham. (0602) 786919. Over 25 years experience, superb demo rooms, extensive range, free parking. Mon-Sat 9-5.30. **BADA**

PETER ELLIS AUDIO, 29 Kirkgate Newark, Nottingham, NG24 1AD (0636 704571) Quad, Castle, Arcam, QED, Sugden, Tannoy, Thorens, Marantz, Dennon, Teac. Demo Room, Free Install, Service Department. Access, Visa, Mon-Sat 9-5:30 Close at 1:00pm on Thursday.

SUPERFI, 15 Market Str, Nottingham NG1 6HY. (0602) 412137. Kenwood, Technics, Denon, Aiwa, Rotel, Wharfedale, Mission, Marantz, NAD< Celestion, and many more. 2 single speaker dem rooms. Free install on systems, service dept. Access & Visa, Amex. Open 9-5.30, 6 days.

OXFORDSHIRE

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

AUDIO T, 19 Old High St, Headington, Oxford OX3 9HS. (0865) 65961, Fax (0865) 60415. Great hi-fi from Arcam, Audiolab, B&O, Cyrus, Denon, KEF, Meridian, Mission, Rotel, Sony, Yamaha and many more. Open Mon Fri 10-6pm, Sat 9.30-5.30. 3 yr gntee on Hi-Fi. Free del & instal 30 day upgrade scheme. Home dems. PX. 2 dem rooms. A/V Dept **BADA**

OXFORD AUDIO CONSULTANTS LTD, Cantay Hse, Park End Street, Oxford OX1 1JE. (0865) 790879 fax (0865) 791665. NAD, Rotel, Musical Fidelity, Pioneer, Marantz, Rogers, TDL, Thorens, Audio Research, Proceed. 2 Demo rooms. Service Dept. Home trial and free installation. Instant credit, Access, Amex, Visa. 10-6 Mon-Sat.

WESTWOOD AND MASON, 46 George Street, Oxford. Tel: 0865 247783 Arcam, Rotel, Rega, Epos, Tanoy, Rega, Royd, JPW, Mission, Nakamichi, Denon, Aiwa, Naim, Quad, Aura, Teac. Open 9:30-5:00pm. Dem room Closed Thursdays.

WITNEY AUDIO VISUAL, 28 High St, Witney, Oxford. (0993) 702414. Aiwa, Akai, AR, Bose, B&W, Cambridge, Dual, Mordaunt-Short, NAD, Onkyo, Pioneer, Roberts, Sony & Sony ES, Tannoy, Wharfedale, Yamaha, Reference Point Dealer. Dem facilities. Mon-Sa 110-6 Free installation, credit to £1,000. Access, Visa. Service dept.

SHROPSHIRE

AVON HI-FI, 12 Barker Street, Shrewsbury, Shropshire SY1 1QJ. (0743) 55166. NAD, Quad, B&W, Arcam, Kenwood, Aiwa, Bose, Nakamichi, Revolver, Onkyo. Dem room. Home trial. Free install. Service dept. Access, Visa. £1000 instant credit. Mon, Tues, Wed, Fri, Sat 9-5.30.

CREATIVE AUDIO, 9 Dogpole, Shrewsbury. (0743) 241924. Linn, Naim, Roksan, Mission, Arcam, Rogers, Denon, Marantz, Rotel, Celestion, etc. Dem room. Home trial and free installation. Credito £1000. Access, Visa. Tues-Sat 9.30-5.30. Service dept

MID-SHROPSHIRE AUDIO, 4 Holland Court, Dawley, Telford TF4 2EX. (0952) 630172. Audio Innovations, Marantz (inc Music Link), Denon, Tannoy, Ortofon, Pink Triangle, Ion Systems, Systemdek, Ruark, Monitor Audio etc. 2 dem rooms. Home trial, service dept. Instant credit up to £1000 Access, Vsa, Amex.

SOMERSET

MIKE MANNING AUDIO, 110 Middle Street, Yeovil, Somerset BA20 1NE. (0935) 79361, Fax (0935) 32923, Mobile (0850) 325965. Naim, Roksan, Pink Triangle, A+R (Arcam), ION, NAD, Pioneer, Rotel, Denon, etc. Dedicated listening lounge, for relaxed and unpressured demonstrations. Appts not usually nec. but best to phone first. Home trial facilities on request, free installation, service department. Instant credit, Access & Visa, etc. 9-5:30 closed Mondays.

STAFFORDSHIRE

GRANGE HI-FI LTD, 153 Branston Rd, Burton-on-Trent, Staffordshire DE14 3DQ. (0283) 33655. Audio Innovations, Arcam, Castle, Denon, Pink Triangle, Marantz, Rotel, Rogers, Systemdek, SME, Tannoy, . Dem fac, appts nec on Sat, Free Install. Service dept Access, Visa. 9.00-5.30pm Closed Mon & Wed afts, open until 7.00pm Thursdays. Closed for lunch 12.00-12.30.

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 **BADA**

AVALON AUDIO VISION, 12 St Margarets Plain, Ipswich, Suffolk, Tel: 0473 281922. Pioneer, Mission/Cyrus, NAD, Rotel, Yamaha, Marantz, KEF, Mordaunt-Short, Mitsubishi, Wharfedale. Single Speaker Demonstration Room. No appts nec, Hometrial fac, Free Install, Service Dept. Full HP fac, Interest Free Credit available on most components, Part exchange. Open 9:30-6:00 Mon-Sat.

SURREY

AUDIO SOUTH, 24 (The Woolmead) East Str, Farnham, Surrey GU9 7TT. (0252) 714555 Audio Innovations, Audio Note, Deltrec, Yamaha, Cary, J.P.W., Marantz, Rotel, Snell, . 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) 504801. 9-6 Mon-Sat. Linn, Meridian, Creek, Arcam, Quad, Revox, Musical Fidelity, Rotel, NAD, Nakamichi, Marantz. **BADA**

RIVERSIDE HI-FI, 422 Richmond Road, East Twickenham. TW1 2EB. Tel: (081) 892 7613. Fax: (081) 892 7749. See main entry under Middlesex.

ROGERS HI-FI, 13 Bridge Street, Guildford, Surrey. (0483) 61049. Aiwa, Denon, Dual, JPW, Marantz, Monitor Audio, Philips, Pioneer, Systemdek, Tannoy. Demonstration facilities available, no appointment necessary. Free installation. Service department. Access/Visa. Instant credit up to £,000 subject to status. Monday-Saturday 9.30-6pm, later by appointment.

SOUNDS EXCLUSIVE, 1 Kent House, High Str, Cranleigh GU6 8AU. (0483) 268185. Michell (amplification & decks), Marantz, Ariston, Ortofon, AME, Sumo, Proac, Jamo, Origin Live, Kiseki. Demo room, appts preferred, home trial facilities, free install, service dept. Access, Visa. Open 9-5.30 Mon-Sat.

SPALDINGS HI-FI, 352-4 Lower Addiscombe Rd, Croydon, Surrey. (081) 654 1231/2040. 3 dem rooms and home dem. Free installation, credit. Mon-Sat 9-6. Tues to 8. Closed Wed. Service dept **BADA**

SURBITON PARK RADIO, 48 Surbiton Rd, Kingston-Upon-Thames, Surrey (081) 546 5549. Quad, Castle, Dual, Denon, Kenwood, Rotel, Pioneer, QED, B&W, Tannoy. Demo facilities. Access, Visa. 9.30-5.00 Tues-Sat. Service dept.

SURREY HI-FI, 45 High Street, Godstone, Surrey RH9 8LS. (0883) 744755. Parking, easy access - just 2 mins off junction 6, M25. Audio Lab, Quad, TDL, Nakamichi, KEF, Thorens, Rotel, Marantz, Denon, Michell, Tannoy. Single speaker demo room. Demonstration by appointment, free installation, service dept. Access, Visa, Mastercard. 0% Credit. Open 9-6, closed Wed.

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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.

ZEBRA 18-24 Brighton Road, South Croydon CR2 6AA. 081 688 2093. See main entry under London.

SUSSEX (EAST)

JEFFRIES HI-FI, 69 London Road, Brighton, East Sussex, Tel 0273 609431. 2 Dem Rooms, closed Mon. Late night Wed. Free parking. Bus route. Credit Facilities. **BADA**

JEFFRIES HI-FI, (Poultsmouth), 29 London Road, Portsmouth, PO2 0BH Tel: 0705 663604. 2 Dem Rooms, Closed Mondays. Late night Wednesday. Free parking. Bus route. Credit facilities. **BADA**

JEFFRIES HI-FI, 4 Albert Parade, Green Street, Eastbourne, East Sussex. Tel: 0323 31336. 2 Dem Rooms. Closed Mon. Late night Wed. Free Parking. Bus Route. Credit Facilities. **BADA**

THE POWERPLANT, 66 Upper North Street, Brighton BN1 3FL. (0273) 775978. Roksan, Musical Fidelity, Marantz, Rotel, Yamaha, Tannoy, Audiolab, B&W, Micromega, Epos, 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

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AUDIO DESIGNS, 26 High Street, East Grinstead, W. Sussex RH19 3AS 0342 314569. Linn, Naim, Alphason, Arcam, Rotel, NAD, B&W, Quad, Tannoy, Thorens, TEAC, etc. Very comfortable listening room. No appts nec., Home trial facilities, free installation, service dept. Access/Visa. 9.30-6.00 Mon-Sat, late Tue till 8pm.

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CHICHESTER HI-FI, 7 St. Pancras, Chichester, W. Sussex PO191SJ. Tel: (0243) 776402. Linn, Naim, Rega, Creek, Nakamichi, A&R, Denon, Roksan etc. Tues-Sat, 10-1, 2-5.15 (closed Mon). **BADA**

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FRANK HARVEY HI-FI, 163 Spon Street, Coventry, Warwickshire, CV1 3BD. Tel 0203 525200. Arcam, Mission, Cyrus, Musical Fidelity, Marantz, Rotel, NAD, Tannoy, Yamaha, KEF. Open 9.30-5.30 closed Thursday. **BADA**

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.

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WEST MIDLANDS AUDIO, 158 Ombersley Road, Worcester WR3 7HA. (0905) 58046. Nakamichi, Naim, Rega, Absolute Sounds, Meridian, Arcam, Ion Systems, Roksan. 3 dem rooms for budget & high end audio. Appointments necessary. Free installation. Service Dept. Access, Visa, Amex, Diners, Lombard/Hitachi. Mon-Fri 9.30-8.30 by appt Sat 9-5.30.

YORKSHIRE (NORTH)

THE AUDIO CLINIC, 22 Lord Mayors Walk, York, Yorkshire, Y3 7HA. Tel: 0904 646309. Mission, Revox, Yamaha, JVC, Audio Inovations, Celestion, NAD, Musical Fidelity, Allison, Thorens. No appts necc, Home trial facilities, Free Installation. Service Department. Access/Visa, Credit. Open 10-5:30 Mon-Sat.

SCARBOROUGH HI-FI CENTRE, 53 Dean Road, Scarborough, N. Yorks YO12 7SN. (0723) 374547. Aura, B&W, Mission, Quad, NAD, Oxford, Alphason, Rogers, Nakamichi, Ruark, Voyd, Dem room, appointment preferred. Home trial facilities. Free installation. Service dept. Access/Visa/Credit charge/£1,000 instant credit/Amex/Diners. 10-6 Tues to Sat. HARROGATE HI-FI CENTRE, 15 Commercial Street, Harrogate, N. Yorks HG1 1UB. (0423) 504274. Aura, B&W, Mission, Quad, NAD, Oxford, Alphason, Rogers, Nakamichi, Ruark, Voyd. Dem room, appointment preferred. Home trial facilities. Free installation. Service Department. Access/Visa/Credit charge/£1,000 instant credit/Amex/Diners. 10-6 Tuesday to Saturday.

SOUND ORGANISATION YORK, 2b Gillygate, York YO3 7EQ. Tel: (0904) 627108. Linn, Meridian, Micromega, Naim, Rega, Roksan, Arcam, Mission, Denon, Epos, Rotel. 2 single speaker dem rooms. Appts preferred. Home trial. Free installation. Service dept. Credit facilities on request. Access, Visa. 10am-5.30pm Tues-Sat. Sony dealer. Award nominated '86, '87, '88. **BADA**

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HI-FI STUDIO, Sunnyfields, Doncaster. (0302) 781387. Heybrook, Monitor audio, Art Audio, TDL, Michell, Sugden, Acoustic Energy, Alphason, Teac, Dual. Listening room demos. Home trial. Free installation. Licensed credit broker, 2yr guarantee on all equipment. Service available. Access, Visa. 10-8pm 6 days. Phone for further info. & FREE fact pack.

YORKSHIRE (WEST)

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

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CLEARSTONE (Formerly Erricks), Rawson Square, Bradford, (Near John St Market). (0274) 309266. A&R, Linn, Quad, Exposure, Nakamichi, Mission, Denon, Kenwood. Private demo rooms, no appt nec, home trial facilities, free installation, service dept. Access, Visa, licenced credit broker. Mon/Sat 9-5.30 (Tue 10-5.30) **BADA**

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ERIC WILEY, 85 Beacroft Rd, Castleford. (0977) 553066/556774. Arcam, Cyrus, Kenwood, Marantz, Mission, Pioneer (Reference Point), Quad, Rotel, Sony, Technics. Car Audio specialists. Demo facilities. No appts nec. Access, Visa, Lombard tricity credit charge. Mon-Sat 9-5.30, closed Wed

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IMAGE HI-FI, 17 The Springs, Wakefield, WF1 1QE. (0924) 200272. Arcam, Linn, Meridian, Mission, Quad, Rotel, etc. 2 Listening Rooms Free Parking, DelL & Instal Mon-Sat 9.30 5.30 pm **BADA**

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Northern Ireland

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LYRIC HI-FI, 84 Bridge Street, Portadown, Armagh, N. Ireland. (0762) 358 059. Linn, Naim, Rega, Arcam, Denon, Rotel, Musical Fidelity, Revex, Mission, Akai, Panasonic, etc. Mon-Sat 10am-6pm. **BADA**

BELFAST

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

HI-FI EXPERIENCE, 47-49 Fountain Str, Belfast BT1 5EB. (0232) 249117. Quad, Musical Fidelity, Denon, NAD, Rotel, Pioneer, Kenwood, Mission, Tannoy, B&W. No appts necessary home trial facilities, free install, service dept. Credit facilities available. Open 9-5.30, late night Thurs 9pm

COUNTY DOWN

ASTON AUDIO, Unit 8, Kings Road Shopping Centre, Kings Road, Belfast. Tel: 0232 402220. Akai, Technics, JVC, Mitsubishi, Samsung, Toshiba, Panasonic, and many more. Demos available, Open Mon-Fri 10-8pm Sat 10-5pm

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Ireland

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Scotland

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GLASGOW

BILL HUTCHINSON Ltd, 43 Hope Street, Glasgow. (041) 248 2857. A.R., Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha etc. Dem facilities. Mon-Sat 10-6. Free installation, instant credit. Access, Visa. Service dept.

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Wales

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ELECTRO TRADER, 19 Colwyn Crescent, Rhos On Sea, Colwyn Bay, Clwyd. North Wales LL28 4RN. (0492) 548932. Rotel, Yamaha, Harman Kardon, Teac, Alphason, Heco, Infinity, JBL, Musical Fidelity, Tannoy, Rotel, Michi etc. Dem room. Appts preferred. Home trial. Free installation. Access, Visa. Open 9.30-1.00, 2.00-5.30 Mon-Sat.

ACTON GATE AUDIO, 4 Ruabon Rd, Wrexham, North Wales. Tel: 0978 364 500. Arcam, B&W, Marantz, Mission, NAD, Quad, Rega, Rotel, Tannoy, Yamaha, etc, Dem Facilities, A.V. on dem, Mail Order. No appts nec, home trial fac, Free install, Service Dept. Access, Visa. 9.30-5.30 closed Weds PM

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AUDIO EXCELLENCE, 134 Crwys Road, Cardiff. (0222) 228565. Great Hi Fi carefully selected and demonstrated by friendly, enthusiastic staff. Closed Mon.

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GWYNEDD

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Akai (video)/AKG/Beyer Dynamic/Audio Technica

The Directory

The ultimate buyer's guide with comprehensive information on every currently available product tested by *Hi-Fi Choice*.

Including test summaries covering

Amplifiers

Cables

Cassette decks

CD players

DACs

Equipment supports

Loudspeakers

Personal stereos

Tuners

Turntables

And much, much more

The Directory

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. The products are split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its current retail price is placed in its respective category in alphabetical order. The prices of the products are updated on a regular basis, although it should be noted that our value rating are based on the product's price at the time of review.

The next column contains the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests were not carried out. One important point to remember is that they cannot be used to compare products from different categories — for example, a cassette deck rated 'excellent' in sound quality will not usually offer the same standard of fidelity as a similarly rated turntable or CD player (unless you can get hold of first generation copies of the master tape!).

The Comments column contains a potted summary based on the original review, emphasising the

salient points of a product's character and sonic performance. The space available doesn't allow for great detail but in the 20 or so words we have attempted to put across the essence of the review, in some cases using quotes from the review itself. Obviously, important information on compatibility or auxiliary equipment used in the test cannot be included, and we would advise you to refer to the original review for this, of which more later. Please note that these comments are those of the reviewer and not, as is the case with some magazines, those of the manufacturer.

The next column varies from category to category but is usually either features or specifications, the former being facilities available on a cassette deck or amplifier or the type of drive system on a turntable.

Specifications vary with product type but usually relate to suitability or capability. For instance, in the case of arm matching, figures are given with the cartridges, which tie in with the mass figures for the tonearms themselves, making it easier to avoid compliance/mass mismatches.

Perhaps the most influential letters in the *Directory* are those found in the Value column, the Rs and BBs denoting the Recommended and Best Buy ratings that are appended to products we consider meritworthy. The Best Buy tag

means that a product not only offers good sound quality, but is reasonably priced as well. With source components a price limit of approximately £300 is usually used as a guide.

Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively, that a good value standard is achieved but overall attainment falls short of Best Buy classification. Please note that an expensive Recommended product will nearly always sound better than a cheap Best Buy. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment, system building is unfortunately not quite that simple.

These ratings make a useful guideline for shortlisting components, but only experiencing the actual combination will tell you whether it works for you.

The final column contains a reference to the issue of *Hi-Fi Choice* which featured the complete review. If you wish to get a better idea of a product by reading the complete review it is possible to order a copy (if still in print) through our back issues department. Every *Choice* issue contains a Back Issues page for this purpose.

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SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems to be as strong as ever, and certainly represents the route taken by those who place sound quality first.

The first step in putting together a system is to decide which sources you require. There are now three different prerecorded music media competing for the affection of the hi-fi user, and to go for all three will either cost a lot of money or involve substantial compromises in the sound quality of each. For this reason many separates purchasers may start with just one source, adding others or a tuner when funds permit.

Cassette has never really challenged vinyl's superior quality,

but it's a multiple role format, offering 'go anywhere' flexibility, a useful recording capability, plus a broad catalogue of prerecorded music cassette material. As a hi-fi medium cassette suffers from prerecorded material which has been improving but is still patchy in quality and can usually be bettered by a home recording. There is also the worry that a tape made on a specific machine usually plays best on that machine, which may cause aggravation when upgrading a few years hence.

CD is the relative newcomer but in the last decade it has come to dominate the market. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks. It is probably fairest to say that CD is fine for the majority of listeners, but may not suit everyone. Certainly the lack of background noise and deterioration are major strengths.

The advent of two box audiophile players has certainly

helped to gain better acceptance for the format and unless you are prepared to spend a substantial sum, CD arguably offers the best performance in terms of sound per pound. Players are now exceptionally cheap, having been reduced dramatically since the format was launched, however, the prices of the discs remains extortionate.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Both components and loudspeakers benefit to a surprising degree from proper support in the form of stands that enable them to give their best performance, whether floor-standing or wall mounted.

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a simi-

lar immediate acoustic environment, unencumbered by other furnishings and structure, and a similar distance from listeners, nearby walls, and corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from rigid support

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrates some likely alternatives.

The *Directory* has been compiled as a guide in the sense that you should use the information in it to make a shortlist of equipment and then audition it before taking the plunge. Tastes inevitably differ and it's unwise to buy purely on the basis of our recommendation, as dealers are the most experienced people around when it comes to making systems work as a whole.

AMPLIFIERS

The amplifier sits at the heart of the system, processing the outputs from all the various music sources as necessary and then driving the loudspeakers. These two (quite separate) functions are integrated into a single box at the low-to-middle price points; separated pre- and power amplifiers become increasingly common as one moves upmarket. At the upper end of the specialist market, valve amplifiers provide a popular alternative to the transistor types amongst enthusiasts.

There is a substantial difference between specialist (sound quality oriented) amplifiers and the consumer electronics style models. The

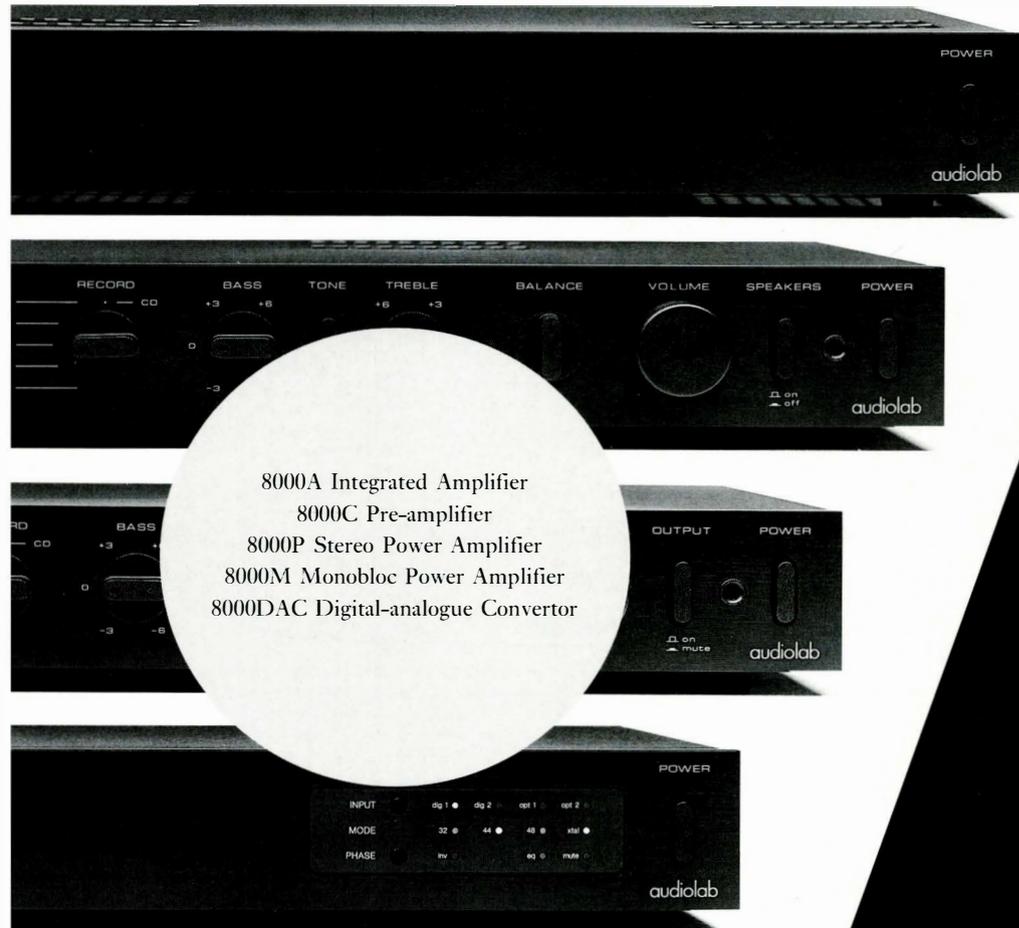
former are bleakly simple, avoiding all unnecessary features to provide the most direct signal path in the interests of best sound quality. The latter range from models with just basic tone controls and tape recorder switching, to those with elaborate facilities such as graphic equalisers, remote control (including volume), surround sound options etc. etc.

Lab measurement provides some useful data, particularly in regard to an amplifier's ability to drive a wide range of different types of loudspeakers, but this is only obliquely related to sound quality. We also include our measured power output (RMS, 8ohm load, 1 channel

driven) – but again, paradoxically, this doesn't necessarily correspond to the loudness capability of the amplifier, which has as much to do with the elegance of the overload characteristics within a given system (valve amplifiers invariably sound more powerful than their rating would suggest). The listing of features provides some indication to the complexity of an amplifier: many users prefer to retain the option of tone controls to 'shape' the overall sound according to taste; many others have found living without tone controls surprisingly easy, with additional benefits in terms of transparency.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research A05 £200	Good + Good +	Capitalises on the strengths of the A-03 and A-07 but escapes the ignominy of their deficiencies. The amp for all AR-based systems	67W, 2 tape, 3 line and both MM/MC inputs. Tone defeat	R	97
Acoustic Research A07 £300	Very Good Average +	Relatively smooth but ineffectual sound quality that lacks some weight and impetus at very low frequencies	75W, 4 line, 2AV and MM/MC inputs		68
Aiwa XA-006 £135	Good Average	Competent enough performer with plenty of facilities. A gutsy sound though one that's rougher via CD than MM.	67W, MM and 5 line i/p's plus independent rec out.		92
Akai AM-47 £200	Very Good Good +	Something of a surprise from Akai: a made-for-Germany amp with plenty of widgets and an unexpectedly sharp, open and detailed sound. Looks ghastly but sounds strainfree.	104W, 3 tape, 4 line and MM disc inputs. 4mm speaker outlets.	R	104
Akai AM-52 £230	Average + Average -	Basically equipped, this amplifier offers a comfortable but hardly over-detailed sound	95W, MM/MC disc, 5 line inputs, loudness		74
Akai AM-65B £299	Good Average	On-board 18-Bit DAC's actually give better sound than standard CD inputs! Punchy via MM disc	101W, MM, 6 line, digital inputs		80
Akai AM-93 £550	Average Average -	Unfortunately Akai's on-board D/A converters were less successful than its conventional analogue CD input.	112W, coax and optical dig inputs. MM/MC		68
Akai AM-95 £620	Average Average -	A revamped version of the older AM-93 with newer onboard bitstream DACs. Its sound is just too eager, however	110W, 3 tape, 3 line, MM/MC plus coax/opt digital inputs		109
Albarré PP1 £400-£500	Average Good +	Available with or without various MM/MC disc options, the 'basic' PP1 has an attractively warm, earthy sound. The budget MM stage needs some further work, however.	48W, 4 inputs with extra gain available for low-level sources	R	104
Alphason Apollo £295	Average - Average +	A year and a half later and Alphason's Apollo is still beset with technical problems. This sample buzzed like a distant bandsaw	38W, 5 line, tape and MM/MC inputs. Solid wood fascia		109
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 R inputs	R	74
Amadeus Silver £270	Average - Good	Limited headroom via disc but still offers a sweet, lush sound. Limited current delivery	37W, MM/MC, 3 line inputs	R	80
Aragon 4004 £1795	Good Good	Despite its imposing bulk, the Aragon is something of a softy at heart. It can deliver oodles of power but its musical presentation is more laid-back	231W power amp		72
Arcam Alpha 3 £200	Good Average	After the enthusiastic reception earned by the older Alpha 2 the generally lacklustre and bland sound offered on this occasion met with (unexpected) disapproval.	53W, 3 line, tape and MM disc inputs. Direct option		104
Arcam Delta 110/120 £720/£520	Good+ Good	Overall performance is limited by the power amp - in isolation the PDM-preamp offers a remarkably open and detailed sound, particularly in 'digital' mode.	112W power amp, MM/MC + four line inputs + coax/opt digital inp	R/-	92
Arcam Delta 60 £300	Good Good +	Very refined and highly detailed sound via MM and CD without any of the hardness noted via the MC stage	59W, 4 line, MM/MC inputs, no tone controls	R	68
Arcam Delta 90.2 £410	Average + Average +	Dark but slightly dead or conservative sounding version of the original Delta 90. Improved disc stage	73W, MM/MC, 4 line inputs, tone bypass, bi-wire	R	74
Art Audio Quintet £725	Average Very Good	Switchable triode/ultralinear output stage. There's 15W and 15W, but in triode mode these are 15 of the sweetest watts around. Surprisingly gutsy	15/25W, variable feedback	R	100
Audio Innovations 1000/2nd AA £1499/£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 £349/£499	Poor + Good	Recently updated, this pre/power combo turns-in a fuller and more substantial performance via MM rather than CD. Otherwise its sound can seem slightly bleached and lacking expression.	10W, 3 line, 1 tape and MM or MC inputs. 'Isolate' switch		109
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 Note Ongaku £34,000	n/a Excellent	An out and out audiophile product, a single ended, zero negative feedback, triode, line level integrated amp. Probably the best amplifier in the world!	6 line inputs, 27W	R	Coll '90
Audiolab 8000A £410	Very Good Very Good	Recent mods have cured the slightly glassy treble, replacing it with a smoother but richer and more solid style of music making	81W, 3 tape, 4 line and both MM/MC inputs. Tone defeat	R	97
Audiolab 8000C/8000P £375/£545	Very Good Good	Audiolab has revamped its pre/power combo though the very distinctive almost stark neutrality that results will not appeal to all listeners. Good value engineering, nevertheless	157W pow amp + bi-wire outputs. 3 Tape, 4 line + MM/MC on preamp		97
Audion CD-1 £399	Average + Very Good	Nicely presented valve (line-only) preamplifier with fine bandwidth and enjoyable, musical sound. Great if you can justify the cost. Well worth hearing	5 line inputs		77
Aura VA-100 Evolution £270 and £300	Average - Good +	This beefed-up VA50 might overheat when driving insensitive, low-impedance speakers but was applauded for its sense of scale and daram via CD	81W, 4 line, 1 tape and MM inputs. Bi-wire outputs	R	109
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 monoblock 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

H i - F i t h a t s p e a k s f o r i t s e l f :



AUDIOLAB

AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Carver CM-1090 £595	Average	Looks very professional with its meters and handles but suffers from a loose and dirty sound that shies away from busy tracks	141W, 2 tape, 4 line and MM disc. Sonic Holography feature	R	97
Cello Audio Suite £1200	Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
Chord SPM-900 £1850	Average + Good +	Technically very interesting, this mini-powerhouse uses a switched-mode supply to deliver a crisp and refined sound	236W with protection into lower loads	R	85
Concordant Excelsior £856	Very Good Excellent	Cottage industry styling might not inspire confidence, but sonically this preamp is tremendously vivid and detailed. Real high-end performance. We loved it!	MM plus 3 line inputs. External power supply	R	77
Concordant Exultant £700	Average+ Very Good	Individual appearance of this valve pre contrasts with sonic invisibility. An extremely dynamic performer. Recommendation withheld pending more appropriate p.s. plug	3 line, MM, variable gain		100
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 too.	MM plus 4 line inputs	R	78
Conrad-Johnson Premier 7A £8995	n/a Excellent	Price has increased since we tested it - but at this price who cares? The 'Seven is designed without compromise, and it's clearly one of the finest (valve) preamplifiers money can buy.	MM, 4 line inputs, sep. Rec Out, versatile cartridge matching	R	Coll.'90
Creek CAS 4040s3 £200	Good Good	Now in mk3 guise the '4040 offers a dry but tidy sound via disc and one that's slightly leaner and better focussed on CD.	41W, 3 line and one MM disc i/p. Tone controls.	R	92
Creek CAS 4140 S2 £230	Average Average +	Running production changes inspired us to re-review this amp which now sounds thicker and 'blurred' compared to the original	41W, 3 line and MM/MC inputs, mono and mute facilities		109
Creek CAS 6060 £470	Good Good	An amp that looks like the '5050 but employs the sort of big, confident and meaty-sounding electronics used in the earlier '4040. Dynamic and impressive.	81W, 3 line, 2 tape and MM/MC disc inputs. Bridge-mono facility		104
Croft Series 4S £850	Good Good	The original IV is still available now supplemented by the higher price and power (S); both are fine performers	40(60)W channel	R	57
Croft Series 4SA £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
Croft Super Micro A £549	Average + Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs. Now in mk.II form	4 inputs, MM, straight line	R	57
Croft Super Micro A 0T/Series V £689/£555	Average+ Good	Micro is still unashamedly "cottage" but offers good performance. Combo is let down by the very low powered Series V	15W, valve, dual vol control, 2 line, MM, tape out		100
Cyclone Catalyst £1995	Good + Very Good	Exceptionally load tolerant and very refined in delivery. Extra options available in future	74W, external MM or MC stages, 3 R line inputs	R	80
Cyrus I £230	Very Good Very Good	Crisp, meaty and exquisitely detailed, this latest Cyrus amp had us enthralled via CD. MM/MC enjoyed a lesser clarity	34W, 4 line + MM/MC i/p's with dual-conc vol.	R	85
Cyrus II £350	Very Good Very Good	Recently updated this popular favourite captured our attention, once again, with its robust and very convincing sound.	60W, 4 line and both MM/MC disc. No tone controls	R	92
Cyrus PSX £250	Very Good Very Good	The PSX does make the Cyrus Two sound better; and also improves the PCM II CD player giving more wallop and clarity	Auxiliary power supply	R	62
DNM 3A £1590	Good + Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/MC twin vol controls	R	44
Deltec DPA 100S £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
Deltec DSP-50S/DPA-50S £725/£925	Excellent Excellent	Remarkable pre/power combo based around the highly linear DH-OA32 hybrid op-amp. Unmatched detail resolution, control and transparency	63W, external feedback wiring, 3 line, MM/MC no tone controls	R	68
Denon DAP-2500/POA-4400A £550/£600 pr.	Very Good Good	Denon's fully-fledged preamp also incorporates D/A convertors that did not improve the sound of our £299 CD player. The power amps are brilliant!	172W, monoblocks Opt/Coax dig + 2 tape, 4 line and MM/MC inputs		68
Denon PMA-250II £140	Good Good +	Spacious yet tactile and gutsy sound via all inputs. Worthwhile upgrade over original PMA-250	53W, MM 3 line inputs, source-direct	R	80
Denon PMA-350 £170	Average+ Good	Bold claims were made at its launch but the sweet and inoffensive sound, though very pleasant, is not mould-breaking at the price.	88W, 5 line and MM disc inputs + source direct.	R	92
Denon POA-6600 £1000 p	Excellent Very Good	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles - now in revised A form	250W monoblok, remote power	R	60
Dual CV600RC £150	Good + Good	The heart of Dual's latest budget range enjoys a very lively, open and vibrant sound. Slightly sanitised via CD perhaps, but still damn good for a features-first integrated amp!	63W, 3 line, 2 tape and MM inputs. Remote control	R	104
E.A.R. 549 £3628 pair	Very Good Very Good	A valve monoblok that measures like a solid state amp is itself an achievement, but exceptional power delivery and bass 'slam' is not fully matched by delicacy and transparency elsewhere	200W monoblok, bias setting		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
EMF Audio Sequel £349	Good - Good +	A fresh start for Mike Creek has resulted in the Sequel, a minimalist amp with a very refined but mildly restrained sound	47W, 3 line, 1 tape, MM or MC inputs.		109
Entire Sound EX50 £500	Average- Average+	A new and fairly costly Mosfet power amp of limited output. Resolution of detail is pretty good but sound is cold-hearted.	40W Power amp. Internal P/S included for ES preamp.		92
Exposure VI/VII*/VIII £1580	Good Very Good	An established company like Exposure could do more to improve the 'look' of these amps which, nevertheless, sounded confident, dry and musical. Dual version no longer available	63W, Super mod. 4 line and 2 disc inputs with full rec-out switching	R	68
Exposure VII/VIII £530/£580	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/MC, 3 inputs, straight line		62
Exposure XI/XII/VIII Super £1900	Good Very Good	New preamp and improved power amp led to a smooth and refined sound, MM/MC less transparent than CD	61W, MM/MC, 5 line inputs	R	80
Goodmans GSA-600 £140	Good Poor	Designed to form the heart of a Goodmans separates system, the wishy-washy and faceless sound of this amp fails to stack up	76W, tape, 3 line and MM inputs. Remote control		97
Grant G60AMS £948 pr	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monoblocks 8ohms	R	57
Hafler DH120 assembled £365	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 SE-100/SE-120 £370/£380	Good + Good +	The smallest of Hafler's pre/power range but still imbued with the open, sparkling quality of their bigger models. Preamp sounds significantly better via CD than MM or MC	96W, bridging option, 2 Tape, 3 line + Aux or MM/MC	R	97
Hafler XL-600 £1200	Very Good Very Good	Sounds remarkably open, transparent and inherently 'musical'. XL-600 is tremendously powerful and very compatible	426W in stereo mode, 1.5kW in bridge	R	74
Harman Kardon Citation 25/22 £699/£899	Good Average +	Not as outrageous as previous Citation amplifiers but neither as punchy nor exciting in the sonic stakes. A good all-rounder but lacks sparkle	138W, MM/MC full range of input and record out		74
Harman Kardon HK6150 £160	Good Good +	Based on the older HK6100 but with a more solid, punchy and expressive performance that attracted considerable praise from our listeners	44W, 3 line, 2 tape and MM inputs, loudness, tone controls	BB	109
Harman Kardon HK6850 £700	Good + Good	This monster is derived from the HK6800 with a similarly deep and powerful sound but a rather steep price tag	101W, 4 line, 2 tape and MM/MC inputs. Preamp direct		109

AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Heybrook C3/P3 £479/£660	Average + Average -	There's a chance our power amp was a dud for the combo sounded very disappointing on the whole - glassy and uncouth	138W with plenty of current. Passive line inputs	85	
Heybrook C3/P3 £479/£660	Average + Average -	Since we last looked at this combo Heybrook has improved the manufacture of its power amp though flaws in the preamp's disc input remain unchecked	146W, oodles of current, passive line inputs	104	
Heybrook Signature £649+£150/£92	Good + Very Good	Heybrook have re-boxed the best facets of the old C3/P3 to produce a stunningly powerful and vivid-sounding combination which is equally impressive via vinyl or CD	148W, 3 line, tape and MM/MC inputs. Outboard transformer	R	109
JVC AX-A342 £169	Very Good Average	A value-conscious budget amp offering plenty of power but a slightly untidy and inconsistent sound	77W, 3 line, 2 tape and MM inputs, tone, loudness controls		109
JVC AX-A3TN £140	Very Good Good	A true minimalist amp from the masters of mass-production! Offers a very comfortable, accessible sound yet with some loss of deep bass and extreme treble.	50W, 3 line, 1 tape and MM i/ps. CD DiRt and 'Bass Compensator'	R	92
JVC AX-A441 £210	Good+ Average	A return to the traditional style of mass-market design brought an inconclusive reaction from our panel. Blowing 'hot and cold', our listeners ultimately found its music uninteresting.	93W, 3 line, 3 tape, MM/MC inputs. CD direct facility		104
JVC AX-Z1010 £650	Very good Good+	JVC's flagship amplifier also houses a couple of ancient 16-bit DACs for good measure! One of the best behemoths: a big amp with a big, boppy and unmuddled sound	124W, 6 line and MM/MC inputs plus opt/coax digital inputs	R	109
Jadis JP30/JA30 £4990/£4900	Average Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound. Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R	60
Jeff Rowland Coherence One/Mod	Very Good Very Good	The technical design of these amps is very elaborate but ensures they achieve an extraordinarily transparent and potent sound. However, the CD i/p is clearly superior to the disc inputs	448W monoblok MM/MC with loading options. Balanced topology	R	72
Kelvin Digital Integrated £550	Good + Very Good	Not so Class A as before but now fitted with a PDM DAC which offers a smooth, detailed and naturally 'musical' sound	34W, digital, line and MM i/p's only	R	85
Kelvin Integrated £449	Good Good	Recent mods have reversed the Integrated's previous good fortune, this unit was just too syrupy.	21W with 10-12W in Class A. Four line + MM/MC		92
Kelvin Labs Absolute Zero/M30 £395/295/595	Good + Average +	Latest versions of the M30 offers a true 30W Class A and a slightly muddled but very comfortable sound. MC preamp is a very linear design	33W monoblok MC only + 4 line inputs. Separate L/R balance	R	74
Kenwood KA-3020 £140	Good + Good +	An unassuming little amplifier that turns in a remarkably balanced and entertaining sound. Lively, detailed and engaging	66W, 2 tape, 3 line + MM disc. Source direct	BB	97
Kenwood KA-4020 £170	Good + Average +	On paper this is a beefier version of the '3020 yet our listeners thought it sounded weaker, lacking richness and detail	103W, 2 tape, 3 line + MM/MC Source direct		97
Kenwood KA-4040R £220	Good + Average +	In many respects this sophisticated amp is a 'digitised' version of the KA-4020 with relay-switched inputs and full remote control. Unusual looks but can seem insubstantial via CD.	82W, 3 line, 2 tape, MM/MC inputs. Full remote control	R	104
Kenwood KA-5020 £220	Very Good Good+	Something of a powerhouse on the cheap this amp can keep pace with the most challenging of dynamics. Its sound is vibrant but some fine detail is lost.	115W, 3 line, 3 tape and MM/MC. Source direct.	R	92
Kenwood KA-5040R £270	Good + Average	A flexible, remote-controlled amp that uses the old KA-5020 as a building-block. Unfortunately it lacks dynamics, sounding stifled and uninteresting	100W, 3 line, 2 tape and MM/MC inputs. Source Direct		109
Klyne SK5a £2590	Very Good Very Good	Beautifully made and presented, this American thoroughbred has a good lab performance, but although versatile, is rather expensive for the quality of sound offered	Balanced output, versatile cartridge loading		72
Lecson Quattra £350	Average+ Good	Underpowered but with the flexibility of four independent power amps. Very deep, captivating sound with 3D soundstaging.	19W via all 4 channels. 5 line and MM/MC inputs.	R	92
Lecson Stereo £200	Poor Very Good	Can reflect the full weight and ambience of a tense, classical performance. A genuinely deep, detailed and enthralling sound marred by unreliability of our sample. New stock will be cured.	76W, 4 line, 2 tape, MM/MC inputs.		104
Lectron JH50 £2300	Average Very Good	Sexily presented valve power amplifier from France. Lovely valve sound too, with delicate and airy top end. Not especially powerful and rather expensive but very desirable!	50W		78
Linn Intek £398	Good - Average +	Linn have slashed its price and made various internal revisions, but their no-nonsense Intek still lacks the authority and confidence to support its forward balance.	55W, 3 line, 2 tape, MM/MC inputs, rec-out, mono + mute		104
Linn LK1/LK280 £598/£763	Good Good -	A very modern, logic-controlled amp with distinctive and inoffensive sound quality. Its restrained sound could do with extra insight and zip.	84W, compact amp CMOS sw. for 2 tape, 2 line and MM/MC, xlr sockets		68
Linx Nebula £500	Average + Average +	Ambitious both in style and design this amp was less impressive in the sonic arena — positive but two-dimensional	88W, logic-controlled i/p switching		85
MFA Magus £1147	Good Very Good	Versatile valve preamp from USA, genuine MC compatibility and high class construction make the Magus a bargain	3 line, MC, tape out, variable gain	R	100
Magnum MP150/MF150 £320/£320	Average + Good	This is no technical masterpiece but the strain-free, fluid sound augers well for CD-based systems. Excellent value	89W, 3 line + MM/MC i/p's. No tone cont.	R	85
Marantz PM-30 £130	Good + Good +	The building-block for Marantz's popular budget 'SE' amplifier is no slouch, providing a lively and very expressive sound with plenty of strong bass. A good 'un.	49W, 3 line, 2 tape and MM inputs, source-direct	BB	104
Marantz PM-30SE £150	Very Good Good+	The breathed-on version of Marantz' PM-30 offers an engagingly detailed and spacious sound though one that's warmer via MM disc than CD.	50W, 3 line, 2 tape and MM disc. Source direct	R	92
Marantz PM-40SE £240	Very Good Good +	The improved version of their basic PM-40 model has itself been updated to provide a bigger and more exciting sound. A good 'un	61W, tape, 3 line + MM/MC disc. Source Direct	R	97
Marantz PM-50 £260	Good + Average +	One of Marantz's new breed, the PM-50 has a big and beefy sound yet one that lacks refinement	92W, MM/MC, 4 line inputs, source- direct		80
Marantz PM-72 £300	Good + Average	This is a very neutral, pleasantly detailed and even-handed performer but one that lacks a sense of emotion or expression	155W, 3 line, 2 tape and MM/MC inputs		109
Marantz PM-75 £500	Good Average	More successful than most amps with on-board DACs but still not as balanced as other Marantz products	136W, opt/coax dig inputs, 6 line + MM/MC		68
Marantz PM-80 £400	Very Good Good +	Technically robust with an equally beefy and tactile sound. Great sense of power and control but spatially a little flat	133W, 3 tape, 4 line + MM/MC. Class A option	R	85
Meridian 201/205 £760/£525each	Very Good Good +	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/MC 6 line inputs remote capable straight line	R/-	62
Moth Series 30 £132/ £203 (£254)	Good Very Good	A modular system capable of cracking results. The passive preamp and power amp combination is especially good value and warrant a Best Buy in their own right.	35W, 4 line inputs on passive pre, MM/MC on phono eq unit	R/BB	109
NAD 3020i £150	Very Good Good +	The most balanced and communicative of NAD's 3020 series. Great at revealing subtle musical clues without aggression	31W with tone controls, 3 line + MM inputs	BB	85
NAD 3225PE £160	Average + Average +	Light and detailed if not as rich or weighty sounding as others. MM input sounds warmer than CD	42W + 70W dyn. headroom; soft-clipping, MM only	R	68
NVA AP20 £260 or £290	Average - Good +	Available with or without a disc stage this utilitarian amplifier sounds gentle and restrained but is euphonic and utterly engaging	35W, 2 line, tape and either MM or MC inputs	R	109
NVA P70MC/A60 £830	Average Average +	NVA's speaker cables are a must, the amp offering well-integrated but not particularly crisp sound	68W, MC, 3 passive line inputs		80
Naim Separates £750 pl	Very Good Good	A consistent and coherent series of 'building blocks' for conventional passive or active operation. Sound quality ignores conventional audiophile standards of presentation, but	40-70W, MM/MC etc	R	60
Onix OA-21s/SOAP £350/£180	Average + Good -	Via MM disc this amp comes alive with a fresh and vibrant sound though its CD input sounds utterly dead by comparison.	60W, 1 tape, 3 line and either MM or MC. Outboard PSU option		97
Orell SA-040 £359	Good Good +	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/MC, 4 line inputs, straight line	R	56

AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Orell SA-040SE £400	Average Average +	Very natural, relaxing if not overly exciting via CD, the sound closed-in to become 'pinched' or fettered via disc	64W, 5 line + MM/MC i/p's. Tweaky components.		71
Philips DFA-888 £300	Good Average	As above but including a modified disc input and onboard DAC. Sounds tight but also slightly thin	107W, as above + opt and coax digital inputs		74
Philips FA-880 £200	Good Average	A new and cheaper design from Philips that sounds best via MM disc. Can appear soft and unbalanced via CD	108W, MM/MC source-direct tone		74
Philips FA-930 £200	Average Average +	Radical styling hides a digital switching facility plus full remote control over what is Philips' best effort to date	99W, tape, analogue and digital inputs with ESI BUS	R	109
Philips FA-890 £230	Good + Good -	Based on their FA880 model but tarted-up with a remote control facility. Inoffensive, civilised but unexciting sound is retained	120W, 6 line + MM/MC logic-controlled input switching		97
Philips FA-960 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-229 £130	Average + Average	An unambitious amplifier that fights shy of tricky speakers with a sound that's equally unadventurous. Slightly soft and comfortably even-handed presentation	60W, 2 line, 2 tape and MM inputs, loudness and direct		104
Pioneer A-300 £160	Very Good Good	The cheapest of Pioneer's dynamic duo gives off its best with CD rather than MM disc which failed to shine quite so brightly.	55W, 3 line, 2 tape and MM. Independent rec out facility.	R	92
Pioneer A-400 £250	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
Pioneer A-676 £280	Good + Average -	A lusty amplifier at a modest price yet one that failed to inspire our listeners with its bland, indifferent sound	98W, 4 line, 3 tape and MM/MC inputs + subsonic filter		109
Pioneer A-777 £400	Very Good Average -	A larger version (!) of the A-676 that offers more power but an equally sluggish and uninspiring sound	121W, 4 line, 3 tape and MM/MC inputs + muting facility		109
Proton 520 £115	Average Average	Very well equipped budget amp with a slightly flat and undynamic sound - acceptable at the price though	31W, MM/MC with variable MC gain, 4 line inputs	R	74
Proton AP-1000/AA-1150 £250/£395	Good + Average +	Bags of headroom available from this pre/power combo, but can seem bloated or unrefined via MM	67W, MM/MC, adjustable MC gain, 5 line inputs		80
QED A240 CD II £249	Good + Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A270CD/PA £369/£429	Good Good +	Recent updates have bolstered the output of the A270 without adding to its colourations. The PA option is a touch expensive	61W, 2 tape, 3 line + MM or MM/MC from PA board	R/-	97
QED C300/P300 £329/£370	Good Good	A cost-effective combo, limited in its resolution but no less beguiling as a result. Disc stage is sweeter but samey	58W, 2 tape, 3 line, MM/MC + mono/biamp opt	R	85
Quad 34 £366	Very Good Average	This well-built durable preamp has useful filtering and above average tone controls but was found lacking in sound quality (viz: detail/dynamics)	4 inputs MM/MC tone controls		44
Rational Audio £175	Average- Average+	This wacky newcomer from Czechoslovakia offers a very open and fluid sound via CD but its performance via MM depends very much on the cartridge's load impedance	129W, caters for line and MM disc sources but has no i/p selector.		92
Ray Lumley Model 75 £1995 p	Average Good +	Monstrous valve monoblocks which represent good value. What they lack in musical subtlety they make up for in sheer muscle. And these are Lumley's small monoblocks!	75W monoblok		78
Revox B150 £1047	Very Good Average +	Beautifully constructed but hampered by Revox's convoluted logic control. Open and smooth sound. Still costly.	117W, CMOS sw. for 3 line, 2 tape and MM		68
Revox B250 £1467	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/MC system/house remote tone controls		56
Rose RV-23 £395	Good Very Good	Beautifully built classy British 'hybrid' preamplifier. You can spend more to get a more transparent sound but it's hard to criticise given the competitive price	MM plus 3 line inputs	R	77
Rotel RA-930AX £160	Good - Very Good	Based on the original RA-820AX but featuring a new look and a tweaked circuit design, this budget wonder captivated our listeners with its clean, vibrant and thoroughly involving sound	53W, 3 line, tape and MM inputs, tone bypass	BB	104
Rotel RA-940BX £200	Good Good	Rotel's cheapest 'BX' amplifier prompted a mixed reaction, some finding it muddled while others thought it 'exceedingly musical'	53W, 3 line, 2 tape plus MM/MC inputs. Tone defeat	R	109
Rotel RC-960BX/RB-960BX £150/£180	Very Good Good -	With excellent standards of construction, flexibility and plenty of power under the bonnet, this duo represents an ideal choice for the first-time buyer.	80W, bridge-mono facility. 3 line, 2 tape and MM/MC on preamp	R	104
Rotel RC-980BX/RB-980BX £275/£350	Excellent Average	Plenty of watts per pound sterling from a technically flawless combination. Its sound is equally expansive but lacks a sense of poise, of control and fine detail - a disappointment	143W (33A!), 3 line, 2 tape and MM/MC inputs + headphone socket		109
SAE P102/A202 £499/£599	Average + Average +	Microprocessor-controlled pre and power amp that sounds much better at low rather than high volume levels. Pro-oriented aesthetics	151W, MM/MC + 2 liner and 2 tape, tone memory, spk switching		74
Sansui AU-X111 £100	Good Average	Sansui has engineered an amp that's both solid and flexible for the price, but its sound is rather bland compared to competition in the £110 sector	5 line inputs, MM, 52W		92
Sansui AU-X911DG £700	Very Good Good +	At its best when used with the on-board MASH/PWM DAC where it sounds technically neutral but still emotionally charged	112W, 4 dig, 3 line and MM/MC i/p's. Rec-out	R	85
Sony TA-F440E £180	Very Good Good	A new budget amp based on tried-and-tested circuits but free of spurious widgets like tone controls. It has a fresh and up-beat sound with plenty of detail, can sound smeared via CD	109W, 3 line, 2 tape and MM + rec out	R	104
Sony TA-F540E £230	Very Good Good -	An extra £50 buys you an MC input but little else over and above the TA-F440E. This version sounds more consistent from input to input but is still rather superficial or unconvincing	108W, 3 line, 2 tape, MM/MC + rec out		104
Sony TA-F670ES £400	Very Good Good	Nothing fancy, just a heavyweight amplifier that puts up 'a damn fine show'. Fresh and sharp-sounding but a little too expensive	133W, 3 line, 2 tape, direct and MM/MC inputs. Pre-out facility		109
Sony TA-F730ES £450	Very Good Good	A very stable and coherent amp but one that lacks a crucial sense of involvement	133W, MM/MC, 3 tape, 2 line, full rec-out		80
Sony TA-F770ES £600	Good + Average -	Another monster amp offering full remote control and buckets of power. It's also another monster amp that sounds boring	125W, 3 line, 3 tape, direct and MM/MC inputs. Remote operation		109
Sound Audio VP3a/HBP60a £599/£599	Good Average ++	Hybrid power amp and valve line stage. Big 'n' beefy power amp is the stronger partner	4 line, 1tape 60W	R	100
Sugden A21a £395	Average+ Good	The modern-day relative of Sugden's original Class A amp and one that offers a smooth, easy-going sound. Best partnered with sensitive speakers.	25W power amp with a good 16W inPure Class A		92
TEAC A-X400 £115	Average Average	Sibilance and a lack of crisp vitality hamper the performance of this amp, as does the stringent protection circuitry	59W, 4 line + MM + tone + mic i/p level control		85
TEAC A-X5000 £229	Good Average -	This amplifier is compromised by a grey and muddled sound that taxed the concentration of our listeners. Better via MM disc	107W, 3 tape, 3 line + MM/MC Source Direct		97
Technics SU-810 £130	Average + Average	Our sample started off sounding fast, taut and well-integrated yet eventually failed on the MM disc input	66W, 2 tape + 3 line + MM. Tone + loudness		85
Technics SU-VX600 £200	Good + Good	What looks like a fairly ordinary mass-market offering is actually the first 'tweaked' amp from Technics, its solid and sharply focussed sound a taste of things to come.	90W, 3 line, 2 tape, MM/MC + power-amp inputs	R	104
Technics SU-VX800 £450	Very Good Average	On the other hand, this is a mass-market amp still hampered by over-enthusiastic protection circuits! It sounds raw and congested when the going gets tough - positive but raucous	148W, 3 line, 3 tape, balanced input + MM/MC		104
Technics SU-VZ220 £100	Good Average -	Cheap, cheerful and pretty flexible to boot yet the SU-VZ220 quickly sounds thin, splashy and relentless when the going gets tough	50W, 3 line, tape and MM inputs plus tone and loudness controls		109

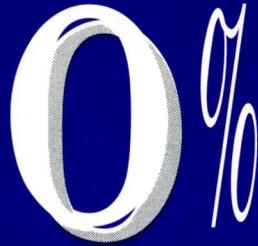
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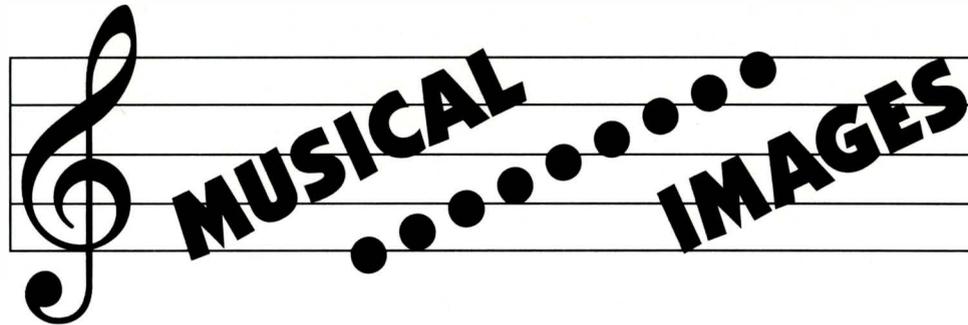
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AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Threshold FET 10e system/ £1395/£1695	n/a Very Good	Almost valve-like limpidity and excellent soundstaging are star qualities of the Threshold amps. Line input resistive loading is too low	Component FET phono stage, line pre, FET power amp 100w		Coll. '9
Woodside SC26/STA35 Renaiss £2995	Good Good+	Synergistic pairing with a cool, controlled sound, good focus and transparency. More about poise than grunt	35W, valve, 3 line, optional MM or MC, 2 tape outs		100
YBA 1 power amp £2295	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
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	neutral yet lacks the ability to involve on an emotional level	131W, 5 line + MM/MC. Pure Direct + remote control		97
Yamaha AX-750 £399	Very Good Average	Big and bulky with remotely-controlled input and volume. Impressive handling, but two samples split the opinion of our listeners, one sounded squashed the other fast and articulate	149W, 3 line, 2 tape, MM/MC inputs + remote control		104

CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as any amplifier does, it's really not too surprising that they can influence sound quality.

The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, RF characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The interconnects summarised here were tested in 1m terminated lengths and therefore the results and prices relate

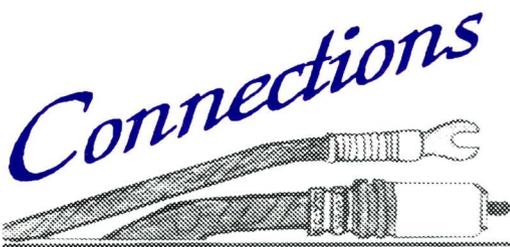
to that length - some cables may well perform differently when used in longer lengths. What's more, most cables are significantly cheaper if you are prepared to fit the plugs yourself. The features column contains information on the material makeup of the different cables with the following abbreviations: OFC - oxygen free copper, OFHC - oxygen free high conductivity (Audionote defines HC as high crystal), PC-OCC - pure copper by ohno continuous casting, LC-OFC - linear crystal oxygen free copper.

CABLES - INTERCONNECT

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Audio Note Copper ANA £44	Average Good	ANC sounded punchy with a faintly lean but tightly-focused bass character. This crystalline precision waned slightly at higher frequencies	OFHC copper twin-axial	R	59
Audio Note Flexible Silver ANS £99	Average Very Good	ANS scored a hit with its transparent midband and revealing but quite unforced treble quality. Bass transients were slightly softened	Silver signal & Copper screen	R	59
Audio Note Silver ANV £154	Poor Excellent	Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle	21 strand silver Litz		59
Audio-Technica AT-6115 £40	Very Good Average	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional	PC-OCC copper coaxial		59
Audioquest Livewire Ruby £49	Average Good	Smoother sounding than the Topaz, the extended crystal Ruby is less grainy and coarse, better able to resolve complex passages	FCL copper twin axial	R	59
Audioquest Livewire Topaz £35	Good Average	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end	Gold-plated plugs, OFHC copper		59
Chord Mono-t £27/1.2m	Average + Average +	Offers a slightly rolled-off treble but its rich sound is an upgrade from patch-cords	Unsymmetrical 4-conductor cable	R	83 Supp.
Deltec Gortex Black Slink £152	Very Good Excellent	A true reference quality cable providing an exceptionally detailed and transparent sound	Symmetrical, 8-conductors, Gore-tex ins.	R	83 Supp.
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange	4 silver plated OFC strands PTFE dielectric	BB	59
Kimber Kable KC-1 £65.55	Very Good Average	Tonally faintly leaner and brighter than the more open-weave PSB, KC-1's treble detail was just too sharp and grainy	Multi-gauge PTFE dielectric		59
Kimber Kable PSB £41.40	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open	OFC, PTFE dielectric	BB	59
Monster Interlink 300 £30	Average + Average	A big, larger-than-life sound but with some emphasis of midband detail and loss of bass	Screened, symmetrical cable		83 Supp.
Monster Interlink 400 £50	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life	Multi-gauge	R	59
Origin Live Soli-Core Super £60	Good Average	Improves over previous Soli-core samples in stereo depth and bass weight, but a 'loud' treble presentation remains	Solid-core gold-plated AT plugs		59
QED Incon Graphite P1G Gold £19.95	Average Average	A shielded version of Incon P1, it sounded thicker at the frequency extremes, the top end being coarser and more out of focus. Good for long runs though	OFHC Graphite shielding	R	59
QED Incon P1-Gold £16.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight	OFHC, gold plated Deltron plugs	BB	59
Supra EFF-1 £60/0.75m	Average Average	A new, costly and mildly disappointing addition to the range. Edgy, smeared sound plugs	Screened, symmetrical dir. cable		83 Supp.
van den Hul MC-Gold £230	Average Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances	Silver & gold plated copper		59
van den Hul MC-Silver £750	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models	19 silver plated copper strands		59
van den Hul MCD-102 III £61.50	Good Good	Possessing the same endearing qualities as the D300, it presented open and transparent soundstages and improved timbral resolution	Twin axial silver plated copper	R	59
van den Hul Thunderline £92	Good Average	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'lizzy' coarseness, bass is tight and dryscreening	Silver plated 'matched copper'		59

CABLES - LOUDSPEAKER

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Absolute Wire Force 4 £4.75 per metre	Good Average +	By current standards there was a loss of fine, sharp detail at the frequency extremes, but it has a big, friendly sound	744 OFC strands, PVC dielectric		64
Audio Innovations OR-200 £16 per metre	Average + Average +	Open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies	200 LC strands, polyurethane and cotton dielectric		64
Audio Note AN-SP £100 per metre	Average - Excellent	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent	15 silver strands, polyethylene dielectric		64
Audio-Technica AT-6120 £10 per metre	Average + Average	Compared to earlier LC-OFC cables, this PC-OCC derivative sounded smoother and less aggressive	PC-OCC, PVC dielectric		64
Audioquest Livewire Black £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green	OFHC, surface only - foam core construction	R	64
Cyrus £2.50 per metre	Average + Good	Because of its impedance characteristic this cable will deliver a smooth and unfatiguing treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	64
Deltec 8S £144 - 5m pair	Good Good +	The unerring transparency and detail resolution of 8S throughout the midband makes it a cleaner and more spacious sounding cable than others at the price	4 silver plated OF copper strands, PTFE	R	64
Deltec Gortex Black 16 £528 - 4.5m pair	Very Good Excellent	Improvements in bass resolution, transparency and treble poise maintains status of this cable	Silver-plated OF copper with Gore-tex ins.	R	83 Supp
Exposure £2.50 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs	56 OFC strands, webbed PVC dielectric	R	64
Furukawa FS-2F09 £3.50 per metre	Good Average +	Some loss of bass weight but otherwise offers a fresh and open sound. Good value	Multi PC-OCC stranding, PVC dielectric	R	83 Supp.
Furukawa FS-2T15S £50 per metre	Good + Very Good	An advanced solid-core cable with a highly fluid, detailed and inherently musical sound	Single 1.5mm Super PC-OCC	R	83 Supp.
Kimber 4VS £7.15 per metre	Average + Average	Similar construction to 4TC but dissimilar materials infer a slightly tizzy sound	Open-weave, multistrand, PVC ins.		83 Supp.
Kimber Kable 4PR £54 - 5m pair	Average Average +	This directionally marked cable benefited from an open and airy treble quality but seemed notably leaner than 4TC. Bass was well round and satisfyingly taut	4 x 7 copper strands per conductor, PVC diel.		64
Kimber Kable 4TC £17.65 per metre	Good Good +	4TC made a great impression in the listening tests with an open midband, a smooth and unfatiguing treble with slightly rich but suitably weighty bass	OF copper, PTFE dielectric	R	64
Linn K20 £2.95 per metre	Good Average	Subjectively, it erred on the forward and bright side of neutral but enjoyed an essentially clear and punchy delivery	56 OFC strands, webbed PVC dielectric		64
Monitor PC Silverline PC4 £5.75 per metre	Good Average	Sonically, it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables	2072 x 0.07mm silver plated copper strands		64
Monster Original £3.49 per metre	Good Average +	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass	Multistrand		64
Monster SCI 16-4 £3 per metre	Average Average	Not as thick-sounding as early Monster cables but still slightly unbalanced. Versatile construction	4 x 16-gauge conductors, OFC strands		83 Supp.
NVA LS1 £6 per metre	Average + Good	A light and breezy sounding cable best suited to short lengths, NVA benefited from a clear and transparent outlook	7 x 0.25mm silver alloy strands, PTFE	R	64
QED 79-Strand £1 per metre	Good Average	For much of the last decade QED 79-Strand has been the first port of call for enthusiasts on the upgrading ladder, a tradition that should still hold true today	79 strand, PVC dielectric	R	64
QED Fiat 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
van den Hul CS-122 £6.50 per metre	Average + Good -	Characterised by a driving and powerful bass, CS-122 is a heavy sounding cable. Mid treble detail was refreshingly clear but there was a slightly muted air about the extreme treble	19 x 0.45mm silver plated strands, rubberised dielectric	R	64
van den Hul D-352 £12 per metre	Good Average +	Subjectively it sounded like CS-122 only more so, the deep rumbling bass tending to overwhelm subtle musical details. It also appeared a trifle peaky in the treble	7 x 0.76mm + 168 x 0.125mm silver plated strands, rubberised diel.		64
van den Hul SCS-12 £10 per linear metre	Good + Good +	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different 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



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CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs to be taken in choosing the best tapes for a

specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.)

Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price.

All modern hi-fi decks have Dolby B and the majority have Dolby C besides; the very worthwhile HX Pro system is becoming steadily

more widespread. Remote control remains rare, though sometimes it is available as a system option.

Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research RD-06 £300	Average Average	Acceptable middle market player with very simple facilities and cramped control section, but unusually good looks	Dolby B/C/HX Pro, fine bias, counter memory, repeat		69
Aiwa AD-F410 £100	Average Average	Comparable to AD-F500 but cheaper: Good all round performance, well adjusted, useful basic and not so basic features	2 head, Dolby B/C/HX Pro, bias adjust	BB	99
Aiwa AD-F500 £160	Average Good	Noise levels are a little higher than usual, but sound quality is otherwise very good - open, explicit and very neutral tonally.	Dolby B/C/HX Pro, cue/review, fine bias, record sensitivity adjust	R	93
Aiwa AD-F810 £200	Good Good	First class budget 3-head machine with a dual capstan transport that really works at reducing the 'fudge' factor	Dolby B, C, HX Pro, bias adjust, track search, variable hdpd	BB	99
Aiwa AD-WX616 £160	Poor Poor	Sonically sub-standard twin transport deck which has sensible range of well implemented features, yet which sounds compressed and uneven.	Twin full logic, 1 records, Dolby B/C track search	R	93
Aiwa XK-S9000 £700	Good + Good +	Genuine state of the art in battleship pale gold/wood gloss clothes. Fabulous build, clunky transport and sharp, refined sound quality with Dolby S or B and metal tapes	Dolby B/C/S/HX Pro, built in DAC, tape alignment	R	105
Akai OX-57 £200	Good Good	Confident sounding price deck which eschews fancy gadgets for a good transport and decent electronics. Sound quality is firm and tidy under most conditions of use; avoid Dolby C.	3 heads, dual capstans, Dolby B/C/HX Pro, variable bias		105
Akai GX-32 £170	Average Poor	Constrained and smeared sum up this deck well. It has poor bass and treble definition alike, though it proved well aligned for prerecorded cassettes	Dolby B/C, variable bias, headphone out, track search		69
Akai GX-52 £250	Very Good Very Good	Well finished and a pleasure to use, this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track locate features	BB	57
Akai GX-65 £300	Average Average	Fine un gimmicky middle ranking deck with simple, purposeful controls, works best with metal tapes. Performance standards fair to good	3-head, dual capstan, Dolby C/HX Pro		87
Akai GX-95 £400	Good Very Good	Well designed and finished cassette deck with features well judged to please the audiophile The calibration system is simple and effective, and the deck sounds great	Dolby B/C/HX Pro, 3 head, manual tape set-up	R	69
Akai GX-95II £400	Good Very Good	Sharp, clear and articulate sounding deck, with superb performance extending to frequency extremes	3 heads, dual capstans, tape calibration, Dolby B/C/HX Pro	R	99
Akai GX-R35 £200	Average Average	Middling sound quality at best with Dolby B; deteriorates with Dolby C and unsatisfactory anyway with testing material due to loss of low level information	Auto-reverse (optically triggered), Dolby B/C/HX Pro, bias adjust		99
Akai GX-W45 £299	Average Average	Costly but musical high-spec dual deck, doesn't like modern high energy Type IIs and IVs, but with careful tape matching it has all the key attributes, including stability and clarity	Dual auto reverse, record/play transports, Dolby B/C/HX Pro	R	111
Arcam Delta 100 £850	Excellent Excellent	Ambitious first cassette deck from Arcam has a superb transport and a ripe, spacious sound. The Dolby S installation more successful than most. Some replay incompatibility	3 heads, dual capstans, Dolby B/C/S, tape calibration	R	111
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-710 £230	Average Average	Although this is a fair performing model, the design has lost some of the competitive edge of its predecessor, the DRM-700. Memo: must try harder - and where's the timer standby?	Dolby B/C/HX Pro, fine bias adjust, record return		105
Denon DRS-610 £200	Average+ Good	Unique loading mechanism provides stability, and the deck has a crisp, clean quality. But has occasionally anaemic bass and a channel mismatch with metals	Drawer loading, Dolby B/C/HX Pro, R fine bias, track search,		111
Denon DRS-810 £300	Poor Average	Basically good deck with non-stressful material let down by an inability to deal with high energy tapes properly. The horizontal loading mechanism is a success.	CD style loading drawer, real time remaining display, Dolby B/C/		105
Denon DRW-650 £200	Average Average	This simply equipped model is a little fiddly to operate at time, partly because of the way the single set of transport keys is assigned. But sound quality is generally workmanlike - good value	Twin transport, Dolby B/C/HX Pro	R	93
Dual CC800RS £150	Average - Average -	Low(ish) cost auto-reverse deck has mic input but lacks some niceties. Delivers a punchy but ultimately rather crude impersonation of source material, and a thin, lightweight bass.	Auto reverse, Dolby B, C, HX Pro, microphone input.		105
JVC TD-R441 £170	Average - Poor	This deck would make a good choice for those who need the unattended recording time to deal with absentee recording off air, but is a less than wholly convincing musical advocate.	Auto reverse transport, Dolby B/C/HX Pro, CD direct input		105
JVC TD-V1010 £400	Good+ Excellent	Very high grade enthusiasts deck with almost-CD like resolution and stability, especially with Type IV tapes	3 heads, Dolby B/C/HX Pro, variable bias, sens, 3 line,	R	111
JVC TD-V541 £280	Very Good Very Good	Crisp, lively sounding deck with excellent timing and occasionally slightly thin tonal quality. Best with metals and Dolby B	Dolby B/C/HX Pro, 3 heads, fine bias, display off	BB	105
Kenwood KX-5030 £200	Good Average	confusing mishmash of listening impressions caused by poor set-up afflicting metal tapes and Dolby C in particular. Promising otherwise	2 head, Dolby B/C/HX Pro, auto-bias, track search		99
Kenwood KX-5530 £190	Average - Average -	Neat looking and well equipped deck, adequately engineered but somewhat lacking musically. Worth considering if auto-reverse is the key to your happiness.	Dolby B/C/HX Pro, auto reverse, auto biasing, auto fader		105
Kenwood KX-7030 £260	Good Good	Fine, articulate middle price cassette deck whose only (mild) failing with some programme material is a just perceptibly synthetic glaze	3 heads, dual capstans, Dolby B/C/HX Pro, auto bias	R	99
Marantz CP230 £330	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz CP430 £400	Average Average	Uniquely flexible and compact package for outside work which at a pinch can double as a domestic cassette deck. dbx is useful for location work; results with Dolby B are acceptable	Portable 3 head, dbx, fine bias, charger/adaptor	R	87
Marantz SD315 £180	Average Average	Sound quality is promising, but somewhat offset by 'shut in' top end. Pitch integrity suspect. Dolby C sound quality and dubbing performance poor	Dolby B/C/HX Pro, twin transports, one rec/play, one play only. Mic i		93
Marantz SD40 £150	Average Very poor	Obstructive aesthetics are offset by apparently good build and sensible features, but sound quality is uneven or worse.	Dolby B/C/HX Pro, fine bias	R	93
Marantz SD50 £230	Good Very Good	Fine, exacting all-rounder offering good stereo, precision and focus. Good with prerecorded tapes too.	Dolby B/C/HX Pro, track & intro search, variable bias etc	R	81
Marantz SD515 £350	Poor Poor +	Good electronic design is let down by mediocre alignment and poor transport stability. Disappointing at the price.	Twin auto-reverse, both transports record, HX Pro, parallel recording		93

CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Marantz SD60 £350	Good Very Good	A first rate, highly capable deck offering energetic yet refined sound largely due to good electronic design	3-head, Dolby B/C/HX Pro, variable bias & sensitivity	R	81
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 1.5 £500	Good Very Good	High grade 3 head deck with minimal features but fine engineering and sweet, open though slightly coloured sound quality.	Dolby B/C 3 heads, bias adjust	R	105
Nakamichi Cassette Deck Two £350	Very Good Very Good	Not completely neutral, this deck is assured, dynamic and quick, with abundant detail and some coarseness. Stable transport but rudimentary features accompany fine under the skin engineering	Dolby B/C, manual tape type selection, bias adjust	R	93
Nakamichi RX-202E £600	Good Very Good	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control	Auto reverse, Dolby B, C, 2 head	R	63
Philips DCC900 £500	Average Good-	Intriguingly uneven performer, ranges from grim with prerecorded material to erratically excellent when recording. Analogue cassette replay satisfactory	DCC deck with analogue playback compatibility, Dolby B/C.		111
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-91a £550	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
Pioneer CT-S410 £200	Average+ Average+	Powerful selection of features, excellent ergonomics and the fine, explicit sound with metals, though some instability was noted and the first test sample was faulty	3 heads, Dolby B/C/HX Pro, automatic tape alignment	BB	111
Pioneer CT-S610 £270	Good Very Good	Exactly engineered and highly articulate up-market cassette deck. Electronics are slightly coloured, but imagery and dynamics are finely resolved	3 heads, Dolby B/C/HX Pro, Super Auto BLE, CD Sync	R	111
Pioneer CT-W601R £200	Average- Average-	Mediocre performance attributable to flimsy build and less than stable transport. Frequency responses not wholly accurate even with Auto BLE. Not ideal ergonomics	Dual auto reverse, one records, Dolby B/C/HX Pro, Auto BLE		111
Pioneer CT-W650R £200	Average Average	There were some intermittent problems with the tape alignment system on the test sample, but the deck was otherwise good, despite a coloured bass and inability to exploit Type IV tape	Twin deck, both reverse, one records, auto align, B/C/HX Pro	R	105
Revox B215 £1727	Very Good Very Good	Fine, consistent and solid sound quality, with excellent under the skin engineering and many useful features — but you're also paying for the same	Dolby C/HX Pro, 3 heads, dual capstans, auto tape align	R	87
Revox B215-S £1826	Very Good Very Good	This is a superbly engineered deck with a classically fine performance that almost transcends the stereotypes. Ergonomics are flawed but the user interface is both powerful and flexible	3-head, dual capstan, Dolby B/C/HX Pro, auto calibration	R	75
Revox H1 £1,145	Very good Very good	Bare bones version of B215 is still a sophisticated piece of kit, and lacks for none of the 215's engineering prowess	3 heads, Dolby B/C, auto tape align, semi-auto record level set.		99
Revox H11 £938	Average + Average +	Costly and well engineered deck which boasts the bare minimum of facilities and which is primarily designed for the Revox multi-room H-Line system. Moderate performance.	3 head, Dolby B/C/HX Pro, manual tape alignment		105
Revox Pro Series C115 £843	Good Good	Not for the numbers freaks, it's unobtrusively musical, with a slightly wayward top and a very clean, extended bass	Professional 3 head, Dolby B/C/HX Pro, variable bias & sensitivity.		111
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-X111E £120	Poor Poor-	Very high levels of flutter, and a shabby, hollow sound with metallic colorations and a severe loss of detail - is it necessary to go on?	Dolby B/C/HX Pro, fine bias adjust		105
Sansui D-X117WR £220	Poor Poor	Bass is thin and coloured, and the sound lacks dynamics, pitch accuracy and overall stability - the sound is neither stable nor solid. Prerecorded cassette quality is also poor	Dual, one transport records, both auto reverse, Dolby B/C/HX Pro.		111
Sansui D-X211HXR £170	Good Good+	Clean, stable and open sounding recording quality distinguishes this player,- and auto-reverse too. A great improvement on earlier mid price Sansui models, and excellent value.	Auto reverse, Dolby B/C/HX Pro, BB bias adjust	BB	93
Sansui D-X311WR £250	Poor Poor+	Not wholly successful auto-reverse deck which suffers because it has tried to be all things to all people. Lack of clarity is the main limitation	Twin optically triggered auto-reverse, Dolby B, C & HX Pro		99
Sherwood DS-1135C £100	Average 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-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 Pr		99
TEAC V-7000 £400	Good Good	Intrinsically sharp, clear and solid sound spoiled by exaggerated detail with prerecorded material and losses imposed by Dolby circuits	3 heads, quartz locked dual capstans, tape align, Dolby B/C/HX		99
Teac R-9000 £450	Good + Good	Much better than average auto-reverse deck, well worth considering, though short of the special qualities required for formal endorsement at this price. Nicely engineered too.	Auto-reverse, 3-head, tape calibration, Dolby B, C, HX Pro		105
Teac V-8000S £700	Good + Good	Superb stability and real subtlety from a cassette deck, this must be the best Teac yet. The only disappointment was the Dolby C circuit which was coloured and lacking in transparency.	3 heads, dual capstans, Dolby B/C/S/HX Pro, tape calibration	R	105
Technics RS-BX626 II £180	Good Good	First rate deck at a bargain price. Losses when recording are low and mostly benign, and dynamic range with high energy tapes is excellent. An all-round achiever	3-heads, Dolby B/C/HX Pro, optional remote control	BB	111
Technics RS-BX707 £220	Average Average -	Uneven but ultimately messy sounding deck with a number of oddities, including a tape calibration system lacking in accuracy and poor Dolby alignment	3 heads, Dolby B/C/HX Pro, bias & level calibration		105
Technics RS-BX828 II £300	Good + Good	Fine middle ranking deck, with explicit detail and stability, but which in the final analysis doesn't go much further musically than the cheaper RS-BX626	3 heads, Dolby B/C/HX Pro, tape bias/sensitivity lineup,		111
Yamaha KX-260 £150	Average Average	Lively, entertaining deck that trades gadgets for a convincing performance at an attractive price point	Dolby B/C/HX Pro, Play Trim, bias adjust	BB	111
Yamaha KX-360 £179	Average Average	Updated KX330, performance has a very KX-260 like dryness and precision. Good - but doesn't "breathe," and occasionally sounds unstable	2 heads, Dolby B/C/HX Pro, bias, Play Trim, intro scan,		111
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-W362 £250	Average- Average-	Almost a good deck, it is let down by audible levels of wow & flutter, apparent even with prerecorded material. The audio circuits are good	Two auto reverse, 1 records. Dolby B/C/HX, Play Trim		111

The Directory

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 -	Basic Philips machine with beefed-up chassis and a revised analogue board. Distortion is higher than normal while the sound lacks both immediacy and clarity.	Remote control, programming but no direct track access, 16bit 4x		95
Acoustic Research CD-07 £300	Good Good	AR's first Bit Stream CD player relies heavily on Rotel know-how to produce a smooth, detailed but undemanding sound	Few features on player, remote, dig o/p. SAA7321 PDM DAC	R	100
Aiwa XC-300 £130	Average + Average +	Cheap, cheerful and gratifyingly free of digital 'nasties', this new bitstreamer is well-equipped but safe rather than thrilling on the sonic front.	Remote control, optical output, Toshiba bitstream DAC.	R	107
Aiwa XC-700 £180	Good+ Very Good	Generously equipped player that harbours a top Philips' Bit Stream DAC. Offers a characteristically smooth and effortless 'bitstream sound'. Exceptional value	Remote control plus index skip, midship transport and 7350 PDM DAC	BB	95
Aiwa XC-900 £210	Good + Good -	The loss of transparency and general awkwardness of this player comes as a surprise after the XC-700. Extra features have taken their toll	Remote control with variable o/p, midship transport, 7350 PDM DAC	R	100
Akai CD-52 £249	Good Good	A nice surprise from Akai, genuinely good sound from this mid-priced model. Better linearity will help further	Remote, digital output, headphone socket	BB	64
Akai CD-55 £230	Good Average -	Budget model which fails to compare with the CD52	Remote, hdph, Good programming		83
Akai CD-57 £180	Average + Average +	A very flexible machine with a slightly lumpy but fullsome bass, no model of clarity but very entertaining!	Remote control, motorised volume, hybrid PWM DAC.	R	107
Akai CD-62 £330	Average Very Good	Looks, build quality and the technical specification are right up to date. As it stands it sounds ve good but if the indifferent lab performance is improved, it would probably sound even better	Remote, programme, hdph, comprehensive display etc	BB	70
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
Akai CD-93 £700	Good Very Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation though that's not to dissuade lovers of	Track entry remote, menu display etc.		58
Arcam Alpha Plus £420	Good - Good +	As its name suggests, this is the 1992-version of a classic 16-bit player with an all-round smoother sound!	Remote control, 20-track memory, digital o/p, 16-bit DAC	R	112
Arcam Delta 70.3 £650	Good Good+	Latest in a line of Delta 70 CD players and one that offers a distinctly rugged, beefy sound. Plenty of power behind individual instruments but lacks a feeling of involvement	Remote control, display dimmer, variable and dig outputs. 7350 PDM		95
CEC 880CD £230	Poor Average	The dynamic and spritely sound of this machine is gratifying in the light of its primitive design but is otherwise poor value	Remote control, direct track access, dig o/p, hybrid PWM DAC		100
Carver TL-3220 £495	Good Average	A lightweight player with primitive display. We thought it sounded rather sparse and dry, and though Carver's DTL feature certainly fleshed-out the bass it also softened the stereo focus	Remote control with volume keys, 'Digital Time Lens', 18bit 8x		95
Carver TL-3300 £595	Good + Poor	Carver needs to listen critically to CD sounds; in our opinion. DTL does not improve the recipe	DTL, remote, programming, digital output		83
Cary Audio Design CAD-955 £899	Average Average +	Rotel's latest 16-bit wonder with an add-on valve processor to filter-out any residual RF garbage. Nice idea but the player sounds very dry and taut, lacking warmth and body.	Remote control, triode-output stage, Philips 16-bit chipset.		107
Creek CD60 £500	Good + Good	A big and confident sound from a player that's stuck with a green display, green lettering and green-fronted drawer. So it looks ghastly even if the internal design is very thoughtful.	Remote, spring-loaded buttons, coaxial digital output, 16-bit.		107
Denon DCD-1290 £319	Good Good -	This player certainly looks the business but its sound is a real five-minute wonder. Its compelling fizz lasts about as long as your average firework.	Remote, pitch control, index skip, variable output, 18-bit		107
Denon DCD-1460 £400	Good+ Average+	Here's a player that benefits from solid casework and decent features yet the overly complex electronics knock the stuffing from its sound	Remote control, volume, index search. 18+2-bit DACs		100
Denon DCD-2560 £570	Very Good Good	Beautifully built and generously equipped yet with a sound that's decidedly sluggish, particularly through the bass. Vocals are more forward but can sound a little glassy	Remote, pitch, tape edit features, opt/coax digital output, 20bit 16		95
Denon DCD-860 £250	Average+ Good+	This is a well designed and generously equipped budget player that offers a very spacious and appealing sound. There's a hint of treble emphasis but it still sounds great at high volumes!	Remote, pitch and full tape edit facilities. 18bit 8x.	R	95

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The Directory

CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Denon DCD-890 £270	Good + Good -	Similar to the DCD-1290 in its execution though manages a better technical performance. Sounds lively and powerful but lacks subtlety.	Remote control, 20-track memory, tape edit, 18-bit DACs		112
Dual CD1080RC £200	Very Good Average -	A rather strange-sounding player with a top-heavy treble that does little to redress its lack of vibrancy and emotion. The back-lit LC display and clean digital output are plus points.	Remote, coaxial digital output, digital volume, MASH/PWM DAC.		107
Ferguson CD008 £150	Average Average	Not as strong as its relatives, sample fault perhaps? Though performance is fair enough overall	Remote, midi digital output, 2x O/s, timeshare 16 bit		64
Goodmans GCD-435 £140	Poor Average -	Goodmans has the power to source with more care than this, music centre quality!	multibit, remote, basic facilities		88
Harman Kardon HD7450 £260	Poor Average +	This player looks little different to other HKs but its performance is dominated by a budget decoder/oversampling IC. Good bass nonetheless but pop tracks can sound fizzy and tiring	Remote control, display-off, timed-shared mono 18-bit DAC		107
Harman Kardon HD7500II £300	Good+ Good+	An update of the original HD7500 but featuring superior analogue electronics to the HD7450. Tonal integration is much improved, packed with detail that's expressed with enthusiasm.	Remote, variable, digital and headphone outputs. MASH/PWM	R	95
Harman Kardon HD7600II £400	Good+ Average+	Based on the HD7500II but with a motorised volume control and extra-heavy casework. Either way it lacks the transparency and sparkle of the cheaper machine	Remote, variable and digital outputs. MASH/PWM DAC		100
Harman Kardon HK7300 £200	Average Average -	Budget low bit technology, does not deliver enough for a recommendation	No remote, no digital out; basic control features		83
JVC XL-V152 £130	Very Good Average	Based on earlier budget designs but minus a remote control. The voluminous but vague sound is equally familiar.	Tape edit, DDRP, PEM bitstream DAC		112
JVC XL-V241 £160	Good Average	Even with its mkII PEM DAC this new machine sounds pleasant but not especially interesting. Stereo imaging is a trifle suspect	Remote control, slim centralised drawer, PEM bitstream DAC		100
JVC XL-Z1011 £520	Very Good Good+	JVC's current flagship combines old K2 technology with PEM bitstream to deliver a full, beefy and engagingly dynamic sound	Remote control, variable and digital outputs, PEM bitstream	R	100
JVC XL-Z431 £200	Very Good Average-	This is a player that started life off the back of the successful XL-V231 but whose performance fails to come up to scratch. The sound is weak and uninspiring - poor use of JVC's PEM DAC.	Remote operation, motorised volume + tape edit. PEM bitstream		95
JVC XL-Z441 £200	Very Good Good	The smoothest-sounding of JVC's budget machines - clear and bold but also very even-handed. One if not their best sub-£500 players to date and strongly recommended.	Remote control, tape edit, index skip, PEM bitstream DAC	R	107
JVC XL-Z452 £180	Very Good Good +	Another lightweight player but graced with a surprisingly bold and detailed sound. Impressive stuff for the money.	Remote control, 32-track memory, volume control, PEM DAC	R	112
Kenwood DP-3040 £180	Good + Good +	The sophisticated sound of this budget player could teach Kenwood's costlier offerings a thing or two!	Remote control, 20-track memory, volume, NPC bitstream DAC	R	112
Kenwood DP-4030 £180	Good+ Good+	Kenwood's first and cheapest bitstream player enjoys a deceptively detailed and refined sound but one that is mildly veiled right across the spectrum. Excellent value nonetheless.	Remote, variable and opt digital outputs. NPC bitstream DAC	R	95
Kenwood DP-5030 £200	Good+ Good+	This looks like the DP-4030 but has more in common with the DP-7030 inside. Either way its neutral, uncluttered and intimately detailed sound is better than both	Remote control, motorised volume, disc file. Sony PLM DAC	R	100
Kenwood DP-5040 £200	Very Good Average	Better built and technically superior to the older DP-5030 but its untidy, detached treble quality proved a real disappointment in our listening tests.	Remote, display control, tape edit, peak search, Sony PLM DAC.		107
Kenwood DP-7030 £300	Good+ Good+	By adapting established Sony bitstream technology Kenwood has moulded its own exceptionally smooth and polite sound. Very nicely built machine with midship transport mechanism.	Remote, index scan, variable and optical outputs. Sony PLM bitstream	R	95
Kenwood DP-7040 £300	Very Good Good	A classy, polished sound from a decidedly refined piece of engineering. Close to the older DP-7030 in terms of performance but better value in construction and technology.	Remote control, Disc File memory, display control, Sony PLM DAC.	R	107
Kenwood L-1000D £830	Very Good Good	A beautifully constructed and very stylish player that really only gives off its best when teamed-up in balanced-mode with Kenwood's matching pre/power combination	Remote control, balanced XLR's, 16-bit integrating DACs		100
Luxman D105u £699	Average Average	Visible valves are essentially for show in this rather ordinary player - both sound and lab	"valves", remote inc vol, hdph, well equipped		88
Marantz CD-42 £180	Average + Good +	Not as warm or rugged-sounding as the CD-52 but still wonderfully spacious and intimately detailed. Currently the best player under £200, plus it's got a decent coaxial digital output.	Remote control with direct track access, SAA7350 Bit Stream DAC	BB	107
Marantz CD-52 £200	Average+ Good+	Hardly the most neutral player on the planet but its rich, full and very generous sound cannot fail but warm the coldest of hearts	Remote control, FTS and dig outputs, SAA7350 PDM DAC	BB	100
Marantz CD-52SE £280	Average + Very Good	A similarly dramatic yet far more neutral sound than the basic CD-52. Either way, its engaging and believable performance was a real hit with our listeners.	Remote, FTS memory, switchable digital output, Bit Stream DAC	BB	107
Marantz CD-62 £300	Good Good-	Basically this is a Philips CD850II with Signetics op-amps all plonked into an old CD-50 chassis. Something of a range-filler	Remote control, index, 8-step volume and FTS. SAA7350 PDM	R	100
Marantz CD-72 £400	Good - Good +	A heavily-constructed player based on the same digital electronics as the CD-42 and CD-52. This implementation sounds astonishingly solid and immediate but also rather too 'clean'.	Remote, variable and digital outputs, FTS, Bit Stream		107
Marantz CD-72SE £500	Good Good +	A recommendation just eluded the grasp of this superbly built player thanks to its very polished but restrained sound.	Remote control, 20-track memory, FTS, volume, BS DAC		112
Marantz CD-80 £560	Very Good Good	A dynamic and bold sound from a machine that is equally bold in appearance. It betrays no fear of the most thundering crescendos yet can sound a little hard or glassy with pop CD's.	Remote, motorised volume + FTS programming, 16bit 4x.		95
Memorex CD1650 £200	Poor Poor	An overpriced music centre player. Surely the giant Tandy corp. can get a better standard than this?	remote, keypad, multi bit, midi		88
Meridian 206B (DAC7) £971	Good + Very Good	Plenty of tight, strong bass but a little mechanical or even sparse at times. Its technical presentation of music is spot-on, only the sense of drama or anticipation needs working on.	Remote control, novel direct-loading transport, DAC7		107
Meridian 208 £1,550	Excellent Excellent	State of the art CD sound combined with a decent preamp and full remote control	Hdph + remote level. Programming, R phase invert, various outputs		83
Micro Seiki CD-M100 £5541	Very Good Good	One of the hernia inducing bricks of hi-fi, the Micro is extravagantly styled, finished and built. The good lab performance led to an 'only good' sonic display when the price demanded excellent	Balanced output, remote, display blanking		72
Micromega Logic £500	Good- Good	A rather expensive version of Philips CD624 with new op-amps and CD tray. Still, it does sound rather meatier, better integrated and more purposeful	Remote control, no FTS but switchable digital output, SAA7321		100
Mission DAD5 £300	Good Average +	Similar-sounding to Philips' 600-series players: lively, plenty of space and full of 'bounce' but a little too eager to impress in the short term.	Stylised remote, no 'stop' key on player, digital out, Bit Stream		107
Musical Fidelity CD1 £400	Average + Good -	Put together in Taiwan to MF's specifications, the main PCB and digital electronics are also used by Rotel's RCD-965BX! This version lacks the creamy, engaging quality of the latter.	Simple remote, index and track skip, digital out, SAA7323 DAC		107
Musical Fidelity COT £500	Poor - Good +	An oddball player equipped with a cheap top-loading transport and appalling digital gubbins yet saved by the euphony of its valves!	No remote, no memory, hybrid DACR with valve output stage		112
NAD 5425 £200	Very Good Very Good	Not much in the way of facilities on offer but a sound that is both wonderfully open, detailed and appealing. This is a very communicative player that sounds positive without being brash	Worthless remote control, track skip/scan. MASH/PWM bitstream DAC	BB	95
NAD 5440 £300	Very Good Good+	The 'no compromise' version of NAD's 5425 but still rather lacking in facilities. Its sound is smoother and richer than the 5425, preferring to seduce with subtlety rather than have	Remote with direct track access, variable output, MASH/PWM	R	95
Nakamichi CD Player 2 £625	Average+ Average+	This may look like a CD Player 4 but features a special transport able to store 7 CD's with one in play. Nevertheless its digital electronics are flawed and its sound powerful but blunt	Music bank, remote, volume control, digital o/p, 18 bit DACs		100
Nakamichi CD Player 4 £300	Average+ Good-	Attractively styled but suffers high-ish distortion for a modern CD player. Best suited to up-beat pop rather than complex classical works which seem to lack focus and secure soundstaging	Remote with track access, coax dig. output. 18bit 8x		95
Nakamichi OMS-5EII £1500	Good + Very Good	"... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price ..."	Skip and scan, simple track programming.I		51

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Nakamichi OMS-7EII £2000	Good + Good	The only serious criticism here is of the price. And in our opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry programming, hdph		51
Philips CD930 £180	Good + Good -	Featuring new 900-series lively and digital circuitry similar to Marantz's players but a sound that's a little too ripe and soft.	Remote control, Personal Presets, FTS, 30-trk memory, BS DAC		112
Philips CD950 £350	Very Good Good +	Philips' top 900-series player is the first to employ its advanced DAC7 chipset. Sounds very crisp, clear and confident	Remote control, FTS, volume, display off, DAC7 Bit Stream	R	112
Pioneer PD-201 £150	Good + Good -	A budget player with a genuinely fizzy and exciting sound. Hardly neutral but audacious and entertaining nonetheless	Remote control, 24-track memory, volume, PFM Bit Stream DAC	R	112
Pioneer PD-75 £800	Very Good Very Good	A confident yet beautifully poised and relaxing sound from an equally luxurious package. Oodles of refinement plus Pioneer's hi-tech Stable Platter transport, but still expensive.	Remote, index and track skip, display off, PDM Bit Stream DACs		107
Pioneer PD-7700 £250	Good+ Good+	A busy-looking player with an upside-down transport yet one that offers a very tight, confident and dynamic sound. Bubbly and entertaining but still very refined	Remote control, turntable drive mechanism, 1-bit PDM DAC	R	100
Pioneer PD-8700 £300	Good+ Very Good	A pair of PDM DACs builds upon the sound of the 7700, crafting a generous soundstage populated with big-hearted and thoroughly captivating musical images	As 7700 plus index skip, display off and motorised volume. 1-bit	BB	100
Pioneer PD-91 £900	Excellent Excellent	Close to state of the art in nearly all areas soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player	Track entry remote, calendar display	R	64
Pioneer PD-93 £1430	Very Good Good+	The extremely civil, understated feel of its music contrasts markedly with the over-engineered construction of this unit. It will not offend anyone but then neither will it spark much excitement	Remote with fader and index facilities. Two dig o/p's. 20bit 8x		95
Pioneer PD-S501 £190	Good + Average +	This is the cheapest player thus far to be equipped with a Stable Platter mech, but compromises elsewhere have suffocated its flair	Remote control, 24-track memory, hi-lite scanning, Bit Stream DAC		112
Pioneer PD-S801 £300	Unusual! Good	Pioneer's version of Wadia's Digimaster digital filtering provides odd technical results with an equally unpredictable sound. Capable of poor or superb results, depending on system.	Remote control, stable platter mech, Legato Link + bitstream DAC		112
Proton AC-120 £180	Average Average -	Fine styling, low price but barely average performance	15 track memory, simple design, remote, hdph		76
Revox B126 £649	Very Good Good	Made in Switzerland so the build quality and technical performance is high, but then so is the price and the sound quality is only good	Programming, Revox system compatible		70
Revox B226S £840	Good Average	Top quality build and finish for the Revox system enthusiast. For high value sound look elsewhere	Remote vol, hdph, 19 track memory, digital op		76
Rotel RCD-955AX £260	Good + Average	Touted as a repackaged version of the evergreen RCD-855. In practice, however, our sample disappointed on several visits lacking the clean, cohesive quality of the original.	Remote control, digital output, repeat, scan, Philips 16-bit		107
Rotel RCD-965BX £320	Average+ Excellent	Two years on and the 865's replacement turns out to be an exceptionally refined bitstreamer: transparent, exquisitely detailed and powerfully emotive. A landmark player	Remote control, index skip, digital out. SAA7323 PDM DAC	BB	100
SAE D102 £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved	Remote (inc volume), skip, scan etc.		58
Sansui CD-X311mklI £250	Good+ Good	Sansui's mid-ranked player uses Technics' technology but provides a warm and cuddly sound that's atypical of the breed	Remote control, variable and digital out, MASH/PWM DAC	R	100
Sansui CD-X317 £300	Good + Average	Not in the same class as Sansui's older CD-X311mklI. Same technology and a similar appearance but the sound is neither as responsive or engaging.	Remote, fixed, variable and digital outputs, MASH/PWM DAC		107
Sansui CD-X617 £300	Good + Average	This 'double-DAC' version of the CD-X317 is no more impressive, sounding light and tizzy with pop but dull with classical CD's	Remote control, 24-track memory, display dim, MASH/PWM DACs		112
Sansui CD-X711 £600	Excellent Very Good	Luxury features, finish and sound from this classy Sansui; no excuses required here	Hdph + vol, remote full programming	R	83
Sharp DX150 £129	Average Average	This is one oversampled player which is rather outclassed for technical and sonic merit by the vast majority of the competition. Pretty enough but would you want to put discs in it?	Programmable, skip, search, repeat		70
Sharp DX750 £179	Average Average	It has a remote control but it's too like the 150 which is rather outclassed for technical and sonic merit by the vast majority of the competition	Remote, programmable, skip, search, repeat		70
Sony CDP-397 £140	Very Good Good	The first CD player to be almost entirely composed of miniature surface-mount components. Unsophisticated but enthusiastic sound	Remote control, 24-track memory, fade, tape edit, PLM DAC	BB	112
Sony CDP-591 £160	Good+ Average+	Tons of features at a highly affordable price but let down by its lacklustre if inoffensive sound quality. The sound of these new Sony players lacks the grip and purpose of the last generation	Remote control, variable and optical digital out. PLM bitstream		100
Sony CDP-797 £200	Good + Good -	Another day, another DAC. This new budget player succeeds with its taut imaging, clean and impressive soundstaging. Can seem a little too lean or dry, however.	Remote, motorised volume, edit and scan facilities, PLM DAC	R	107
Sony CDP-991 £230	Good+ Average+	Another well-equipped and well-specified machine and one that can sound very up-beat and detailed with simple material. Tends to loose its way with complex stuff, however	Remote control, Custom File programming, variable out. PLM DAC		100
Sony CDP-X229ES £300	Excellent Good -	Built to the same standards as the CDP-X339ES but with a colder and less forgiving sound. Lacks a sense of integration and warmth	Remote control, Custom Edit and Custom File, PLM bitstream		112

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Sony CDP-X333ES £400	Very Good Good-	This beautifully built player has a very tidy and well-ordered style of music-making, but in the long run it lacks the ability both to excite and involve	Remote control, Custom File programming, Complementary PLM		100
Sony CDP-X339ES £430	Excellent Very Good	Superbly constructed, this tour-de-force of features and technology offers a tightly detailed almost cavernous sense of acoustic. The mid and treble can sound positively magnetic	Comprehensive remote, Custom/Edit Navigation System, new PLM DAC		R 107
Sony CDP-X77ES £1000	Excellent Good+	Rather like Pioneer's PD-93 this flagship player is beautifully put together but simply lacks the thrill or conviction of cheaper and perhaps more ragged-sounding machines. Still,	Remote, everything but Custom File titling, Complementary PLM		95
Stax Quattro £2995	Very Good Very Good	Now in mkII guise this substantial player recreated exceptionally strong and convincing bass lines together with a beguilingly musical midband	18-bit DACs, 20-track memory, full IR remote, variable o/p	R	72
TEAC CD-P3500 £170	Good + Average	A well-meaning attempt to pare-down the CD-P4500 results in a similar looking player with a thoroughly uninspiring sound	Remote control, volume, cue-lock, index skip, Philips BS DAC		112
TEAC CD-P4500 £250	Good + Good	TEAC's first genuine 1-bit player uses Philips BS DAC to great effect, its sound described as having a certain 'organic warmth', very composed and easy-going.	Remote, pitch control, variable out, SAA7350 Bistream	R	107
Technics SL-PG200A £160	Good+ Good+	This season's version of last season's favourite (the SL-P277A) offers extra features and a similarly punchy, dynamic and up-beat sound. All this plus an uncommon poise - Best Buy	Remote control, random play, variable out, MASH/PWM bitstream	BB	100
Technics SL-PG320A £140	Good + Good +	A cheaper and remote-less version of the '420A with an equally dry but vivid, spacious and astringent sound. A good 'un	No remote, synchro-edit, auto-cue, 20-track memory, MASM	R	112
Technics SL-PG420A £160	Good + Good +	No repackaged version of the SL-PG200A but a new player in familiar clothes. Still offers an open, transparent and uncommonly fresh sound but a little of the 'magic' is missing	Remote, digital volume, synchro edit, auto cue, MASH/PWM DAC	R	107
Technics SL-PG520A £200	Good + Very Good	A cracking player that builds upon the astonishing out-of-the-box sound of earlier budget players. Superb clarity and dynamics, thrilling but musically involving too.	Remote, shuttle search dial, edit mode, peak search, MASH/PWM DAC	BB	107
Technics SL-PS620A £230	Good + Very Good	A costlier, tarted-up version of the SL-PG520A that loses very little in the way of clarity, sparkle or in compelling dynamics	Remote control, synchro-edit, 20-trk memory, MASH/PWM DAC	BB	112
Technics SL-PS900 £350	Very Good Good-	Just about the quietest transport in existence and a sound that is equally unobtrusive, polite and refined. There's plenty of detail too but the overall result won't set your pulse racing	Huge remote control, function manager MASH/PWM DAC		100
Wadia WT-2000/Digimaster 2000 £	n/a Very Good	Very high grade player which provides state of the art in believable music making from CD, and promises a degree of upgradeability	Transport/multi bit DAC - 32, 44.1, 48kHz o/s		Coll. '9
Woodside WS2 £1095	Good Good+	Prompted a mixed reaction on audition, responding well to our jazz and classical selection but sounding bright and grainy with the pop CD's. RF emission is very high	Remote control, display defeat, variable and digital outputs, 16bit		95
Yamaha CDX-450 £170	Average+ Good	A contentious player this and one that prompted a range of reactions from enthusiasm to disinterest among our listeners. It could prove too safe-sounding but worth a try at the price.	Remote control, track access, variable out. 18-bit hybrid DAC	R	100
Yamaha CDX-560 £180	Good Good	A real advance on the old CDX-450 though the light, up-front if not entirely welcoming sound of this newcomer could shock the timid listener	Remote control, volume, tape edit, 18-bit hybrid DAC		112
Yamaha CDX-750 £250	Good Average+	A sleek machine that can sound rich and vibrant with simple material but seems to lack expressiveness and subtlety when dealing with more complex passages	Remote control, variable and digital out, LC display, PDM DAC		100
Yamaha CDX-860 £280	Very Good Good +	A strong recommendation for what is probably Yamaha's best CD player to date: powerful and confident yet delicate and nimble when the occasion demands.	Remote control, variable o/p, dimmer, 25-trk memory, PDM DAC	R	112

CD TRANSPORTS AND DACS

A CD player can be split into two basic components, the mechanism which reads the information from the disc, known as the transport, and the device which turns the digital numbers contained on the disc into the music that comes out of your speakers, this device being referred to as a digital to analogue convertor or DAC. Although at the lower end of the market both of these are contained in a single box, at the top end of the market two box machines consisting of a CD transport and a separate DAC become more common.

Although many of these units will be purchased as two box machines, which are generally considered to sound better than a one box equivalent, a DAC can also be used to upgrade an existing CD player. A good example is where an early machine with a satisfactory drive unit but a rather dated DAC can be brought up to the latest spec by the addition of a new DAC.

When upgrading an existing player best results are usually obtained using the electrical digital output rather than optical, and obviously

to be upgradeable your CD player must have a digital output in the first place.

The choice of interconnect is crucial in linking drives and DACs and conventional interconnects used for analogue signals should be avoided, a dedicated 75ohm digital cable will give far better results.

Mixing and matching transports and DACs from different manufacturers can be a bit of a lottery and readers are referred to the full reviews where this subject is discussed in more detail.

CD TRANSPORTS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Arcam Delta 170.2 £620	Very Good Good	An upgraded Delta transport, it sounds different but not really better. More research is required here	Transport only, display off, usual programming		88
Kenwood DP-X9010 £500	Average Average +	Compromised by jitter, RF noise and poor clock selection this transport generally encourages a dynamic but bright and edgy sound with most DACs	CD transport, optical + coax outputs, Class 2		96
Marantz CD-95DR £1500	Very Good Good	At its best with Philips-based DACs, this transport sounds confident if not totally pure, sparkling or fresh	CD transport, optical + coax digital, Class 1		96
Meridian 200 £895	Very Good Very Good	Broadly compatible with most DACs and offering a light, fresh and very bubbly sound that is both natural, engaging and unfatiguing	CD transport, optical + coax outputs, Class 1	R	96
Meridian 602 £1,750	Very Good Good	This dedicated CD transport teams-up most successfully with the 606 DAC. Otherwise it lacks the life and pizzaz of the 200	CD transport, optical + coax outputs, Class 1		96
Philips CDD882 £500	Good Good	A butchered CD880 CD player-cum-CD transport that pairs up well with most Philips-based DACs. Dynamic and lively but can also sound a little mechanical	CD transport, optical + coax outputs, Class 1		96
TEAC P-10 £1499	Good Very Good	A chunkier and altogether more successful transport than the P-500 with an especially beefy and compelling sound. TEAC's best	CD transport, coax + optical outputs, Class 1	R	96
TEAC P-2 £2849	Very Good Good	TEAC's flagship CD transport is beautifully styled and constructed but its sound is bleached and generally less inspiring than that of the P-10	CD transport, coax + optical outputs, Class 1		96
TEAC P-500 £649	Good Good +	Provides a smooth and very sympathetic sound with most DACs yet is also rather vague, lacking the crispness and resolution of its peers	CD transport, coaxial and optical outputs, Class 2	R	96
Technics SL-PA10 £470	Good + Good	Built to partner the SU-MA10 upmarket integrated amp/DAC, this transport has the unusual limitation of only optical output. Reassuringly solid and more immune to vibration than most	CD transport, optical output only, remote		88
Wadia WT2000 £5614	Very Good Good +	Based on TEAC's P-2 with onboard mains transformers, active digital output and solid alloy casework. Dynamic and crisp sound best realised with Wadia DACs, otherwise less impressive	CD transport, AT&T opt +direct -coupled coax outputs, Class 1		96
Wadia WT3200 £1800	Excellent Very Good	Based on Marantz's CD-95DR with new casework, active digital output and revised grounding. Very clean, clear and authoritative sound with Wadia and Philips-based DACs	CD transport, AT&T opt + direct -coupled coax outputs, Class 1	R	96

DIGITAL TO ANALOGUE CONVERTORS (DACs)

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Arcam Black Box 2 £260	Very Good Very Good	An upgraded version of the old BB1 with more inputs and improved sound quality	Optical and wired inputs	BB	76
Arcam Black Box 3 £360	Good + Very Good	Top of a series of three decoders it can offer a high sonic standard with top class transports	Bitsream, auto input switching,	R	88
Audio Alchemy Digital Decoding Engine V1.0 £376	Good Very Good	A very sweet and seductive sounding unit that gives good results with a wide range of CD players/transports	Coaxial and optical inputs, phase invert, Bit Stream DAC	BB	101
Audio Research DAC1-20 £3898	Very Good Good	This expensive DAC works surprisingly well with Meridian's cheaper 200 transport, an impressively weighty and engaging combo that proved entertaining on audition.	BNC, Toslink and AT&T optical inputs, phase invert, 20-bit DACs		103
Audiolab 8000DAC £695	Very Good Good	Needs to be used with a genuine Class 1 digital drive. At its best with the Wadia WT3200 where it sounds vivid and alive. Otherwise can sound a little antiseptic.	Coax and opt inputs, phase invert, crystal lock, Bit Stream		103
Deltec Bigger Bit £650 + £98	Good Very Good	Partnered with either TEAC P-10 or Meridian 200 transports, the Bigger Bit delivers a very taut and dynamic sound, bathed in an open acoustic. Deltec's RF mains filter is a must.	Coax and opt. inputs, Deltran sync facility, DAC7 Bit Stream	R	103
Deltec Little Bit (Optical) £400	Very Good Good	Our sample suffered from radiated RF interference but new LB's are now cured. Works especially well with Meridian's 200 transport but does require the services of Deltec's 'Power' mains filter.	Coaxial and optical inputs, SAA7350 Bit Stream DAC		101
Deltec PDM1 £500	Average Very Good	A no frills audiophile bitstream converter at an affordable price	Coax-in, special cable and mains filter options	R	83
Deltec PDM1 Series 3 £1195 + £196	Very Good Good +	Hailed as a budget version of the PDM2, it bears technical comparison with both the PDM2 and Bigger Bit but - in terms of sound quality - is no great advance on its cheaper relative.	Coax and opt inputs, two-box construction, DAC7 Bit Stream		103
Deltec PDM2 £2000	Excellent Excellent	State-of-the-art technical performance with a pristine sound to match. Repertoire includes a solid, invert, two-box DAC7	Coaxial and optical inputs, phase	R	101
Forte Audio Model 50 £950	Good Very Good	The first American DAC7 design and one that offers a typically big and full-blooded sound, infiltrated by a slightly euphonic quality but never hard or gritty.	2 Coax and 2 optical inputs, DAC7 Bit Stream technology	R	103
Kelvin PDM DAC £200	Average + Average +	Don't disregard this DAC-in-a-matchbox for though it can sound a little unconvincing it is capable of developing a surprisingly lyrical and natural sound with the right transport.	Single coaxial input, low analogue outputs, SAA7320	R	103
Meridian 203 DAC7 £510	Good Very Good	This is another broadly compatible DAC that's free of fatiguing nasties yet remains bubbly and exciting. If you find the 606 too sober then the 203 will undoubtedly suit	Coaxial and optical inputs, single-box DAC7 Bit Stream	R	101
Meridian 606 DAC7 £1220	Very Good Good	Extra cash buys you a better standard of construction and finish over the 203 yet by refining its sound further Meridian have also tempered its vibrancy and 'life'. Fickle with other transports	Two coaxial and optical inputs, phase invert, DAC7 chipset		101
Micromega Duo BSII £500	Average Good	This DAC has a tendency to sound light, airy and 'fast' but it can also become a little hard or - fatiguing with some digital outputs. At its best with Meridian's 200	Coaxial and optical inputs, phase invert, SAA7321 Bit Stream		101
PS Audio Superlink £1498	Average Good -	Another transport-fussy DAC that, once again, does the business with Meridian's 200 but can sound bloated, smeared and even vaguely electronic with standard 75ohm digital outputs.	Touch-sensitive coax and optical inputs, phase invert, 18-bit		103
Proceed PDP2 £1595	Average Good -	The PDP2 has a wobbly input impedance that's suited to specific drives, ie Meridian 200, or Proceed's own. At its best expressive and enticing, otherwise it can seem gutless and smeared.	Coax and XLR inputs, balanced outputs, 18-bit DACs		103
Stax DAC-Talent £1400	Excellent Good +	Natural, refined and never over-zealous, the DAC Talent is also capable of sounding very spicy and dynamic. Capable of wielding a maturing influence over a light or bright-sounding system	Coaxial and optical inputs, phase invert, mute, 20-bit DACs		101
TEAC D-500 £399	Good + Good +	An unusual combination of NPC oversampling filter and no less than two Philips' DACs. Its reliable 75ohm input infers broad compatibility. A dynamic and 'interesting' sound	Coax and optical inputs, complementary 16-bit DACs.	R	103
Threshold DAC 1/e £3150	Very Good Very Good	The DAC 1/e can sound beautifully detailed with a marvellous sense of scale and sharp, solid images. Its unpredictable behaviour with unknown transports precludes recommendation.	Coax and opt inputs, balanced outputs, phase invert, MASH/PWM DA		103
Wadia DigiMaster X-32 £2000	Average - Good -	Wadia's freaky input circuit gives unpredictable results with non-Wadia transports. Otherwise it can sound bold, dynamic and crisp but lacks the warmth to bind its music together	BNC and optical(TosLink and HP) inputs, 18-bit 32x		101
Wadia DigiMaster X-64.4 £5000	Average Good*	The X-64.4 positively buzzed with vibrant, sharply-etched detail. An exciting sound	BNC + Toslink/AT&T optical inputs, phase invert, 18-bit 64x		101
Woodside DAC 1 £895	Good Good	Fine but slightly dated and costly package in performance terms - but flexible, musical and t well built	2 electrical + optical i/p. tape ou		87
Woodside DAC2 £510	Good Good +	Based on Woodside's earlier 16-bit CD player and offering a similarly sharp and dynamic sound, all the more captivating for its lack of graininess and 'tizz'. Should be a reliable upgrade	BNC coaxial input (no optical), 16-bit 4x	R	101

DIGITAL AUDIO TAPE

DAT, or digital audio tape, has been on the market for quite some time now but has never really 'made it' as a consumer medium, probably due to the fact that very little prerecorded software has been made available.

In the last year or so it has begun to carve itself a niche at the top end of the market replacing reel to reel tape recorders as the audiophile's tape based medium.

The DAT standard specifies a 48kHz sampling rate, which is higher than CD, so direct copying in the digital domain is only possible on those machines with dual sampling frequencies, ie 48kHz and 44.1kHz. Some machines also record at 32kHz to give a longer recording time for a given length of tape.

To try and get around the copying problem many machines incorporate SCMS, the Serial

Copy Management System, a device which enables you to record from a CD but not to 'clone' one digital tape from another.

Portable machines are now entering the market but make sure the price you are quoted includes an analogue to digital 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-S100 £450	Average - Average -	Largely bulletproof in non-critical and semi-critical applications. Despite the usual limitations of DAT as a hi-fi medium, the HD-S100 is a practical and well built tool.	Portable, ADC, mic in, phone/line sockets (3.5mm), 70 min battery	R	105
Aiwa XD-S1100 £550	Poor Average -	A muddled fascia detracts from the appeal of this inexpensive deck, but the real no no is a significant loss of the finer virtues: detail, imagery etc	SCMS, analogue, coaxial & optical in/outputs, full subcode editing		99
Aiwa XD-S260 £500	Poor Poor	Unlovely sounding deck lacks weight, clarity and presence. Low pricing and mini dimensions excuse many sins however	SCMS, optical/coaxial and analogue in, optical/analogue out		99
Casio DA-7 £400	Average Poor	Below average notebook size portable, and in some ways inferior to Casio's own DA-R100 pocketable due to high noise floor, flat dynamics and poor soundstaging	Portable DAT with case. SP record mode, basic editing		111
Casio DA-R100 £410	Average Average-	Somewhat flat sounding and lacking differentiation through the analogue inputs but good via the digital ones, a masterpiece of miniaturisation, wonderful tool where size is important	SP/LP record, optical/electrical in/out, 2.5hr battery life	R	111
Denon DTR-2000 £700	Good Very Good	Not cheap, but first rate DAT recorder, good to excellent fidelity in all modes, with a slightly cool detached quality when differences are detectable.	Digital LP/digital & analogue SP rec/play, LP analogue play only	R	93
JVC XD-Z1010TN £1050	Good Average-	Ambitious but ultimately disappointing deck which marries poor ergonomics and an opaque musical delivery to a feature roll call longer than the weekly shopping list	SP/LP record, mic input, remote control, display off, auto fade		111
JVC XD-Z505 £620	Good Good	Competent middle market DAT with uncomplicated (but still flawed) user interface, but good basic sound quality. A fine CD dubbing machine.	DAT SP/LP en/decode, low bit conversion, remote control	R	105
Kenwood DX-7 £500	n/a Average	Sound quality is pretty fair, but a little rougher than the best of the breed. Controls are good, the display however is poor - and most users will require the accessory pack	Mains recorder, LP mode. Optional accessory packs adds battery/ADC		94 Supp.

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DIGITAL AUDIO TAPE

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Kenwood DX-7030 £700	Average	Bland sounding deck that lacks low level clarity and imaging. No analogue LP mode. Build quality is good however and ease of use ranks highly	Remote control, stand-alone DAC facility, optical/coaxial in/out		99
Panasonic SV-3700 £1111	Good Average	Slick, powerfully equipped and reasonably priced, this pro DAT has a clear, quick and colourful sound somewhat lacking in weight and substance	Professional DAT, infra-red remote, S/PDIF & AES/EBU I/O		111
Pioneer D-500 £600	Good - Average	Looks extremely good. Fascia design is complex yet accomplished, and offers very slick tape handling. Musically however it is on the messy side compared to others in this price area.	SP/LP en/decode 1-bit converters, many search/display aids		105
Sony DTC-750 £450	Good Good	Superb value for money: the lowest price full size DAT on the market, fine features, build, measurements and sound approaching the best DAT has to offer at any price.	SP/LP record, real time/date recording	BB	105
Sony DTC-77ES £1000	Excellent Average	Superb engineering, many well implemented features (including off tape monitoring) and technical near perfection (!) don't offset perceptibly slowed, thickened sound	4-head, tape monitor, many search/display options, SP/LP		105
Sony DTC-M100 £799	Very Good Very Good	Only available from professional outlets. Clean clear sounding second generation model with most of the features and sound of the DTC-1000ES	Mid-width, alpha-numeric display, remote, optical interfaces	R	63
Sony TCD-D3 £500	n/a Very Good	At the time of writing, this model represents the state of the art, and beats all comers.	DAT recorder, detachable rechargeable power pack, LP/SP	BB	94 Supp.
Tascam DA-30 £1199	Good Average+	Interesting pro DAT deck with solid, tangible sound quality which is nevertheless lacking in analysis	Wired remote control, S/PDIF, AES/EBU and standard analogue I/O		111

EQUIPMENT SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two broad schools of design. The most common

is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be.

The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses spikes at the base but Blu-

tack or the like for coupling with the cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

EQUIPMENT SUPPORTS - COMPONENTS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (H x W x D)	VALUE	ISSUE
Alphason R444 £120	Rack Good	A heavyweight structure with stressed MDF shelves, ideally suited to the Sonata turntable	82 x 60 x 39.5cm	R	83
Audioquest Sorbothane Feet £40 for four	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS6 £60	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		83 Supp.
Foundation Stable Table £100 (with Supe)	Table Good	Similar to Stand Design's table though less well finished and certainly less stable	64 x 46.5 x 36cm		58
Origin Live Skyline Super £100	Table Good	An asymmetric table that helps provide a quick, lucid and solid sound with most decks	41 x 50 x 40cm	R	83
Roksan Equipment Table £169	Rack Good	An upgradable/expandable system suited to Roksan's Xerxes if not other competing turntables	65 x 52 x 38cm		58
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

EQUIPMENT SUPPORTS - LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (H x W x D)	VALUE	ISSUE
Appolo A10 £52.50	4 leg Average	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old.	19 x 19cm 44cm	R	58
Appolo A820 £44	4 leg Average	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Foundation Fred £70	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Maggi £159 to order	Plinth Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £269 to order	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/5	R	58
Foundation Sir Fred £80	2 leg Good	Upgraded 'Fred' with special in-fills. Sweet sound but one that also lacks bite and edge	19 x 19x46.5cm		83 Supp.
Goldring Black Satin £65	1 leg Very Good	Screw together stand tastefully hewn from medite. Some loss of bass but still pleasantly rhythmic	18 x 20 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

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EQUIPMENT SUPPORTS - LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (H x W x D)	VALUE	ISSUE
Heybrook P5S £69	3 leg Very Good	An unusual triangulated open frame stand that can help certain speakers sound more transparent and fluent - a good value stand	23 x 21.5cm 47cm	BB	58
Linn Kan II £101	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers.	19 x 16cm 59cm		58
Linn Sara £112	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Origin Live Three Leg £89	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R	58
QED TS22 Tristand £60	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband.	19 x 17cm 45/50/58cm	BB	58
Standesign Z20 £75	1 leg Excellent	Well built and finished with optional sand in-fill. Ideally suited to Wharfedale 505.2's	16.5 x 19 50cm	R	83 Supp.
Target HJ15/3 £107	3 leg Very Good	Sound quality was basically very good though without the sand 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.

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.

HEADPHONES

MODEL PRICE	FIT SOUND	COMMENTS	TYPE	VALUE	ISSUE
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
AKG K500 £119	Good Very Good	Distinctively open and clear, they reproduced music with impressive definition, balance is on the light side but transparency is high for the price	Circumaural, open-back, dynamic	R	111
Aiwa HP-X30 £31	Good Good -	A flashy personal stereo phone which alternatively could be used at home. A slight LF tonal preference slightly colours the response, but it ain't a bad can	Supra-aural, closed-back, dynamic		75
Audio-Technica ATH-308 £26	Good- Average-	These small cans have a fairly forward balance which helps perceived clarity but they can become wearing over time, good for personals	Supra-aural, semi-open, dynamic	R	111
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-9000 £246	Very Good Good	These electret cans connect up to the amps speaker outputs via an adaptor, it sounds a little too smooth and relaxed but would suit aggressive amps	Circumaural, open-back, electret		111
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 DT411 £49	Good Good	A reasonable but not very thrilling headphone that doesn't really offer enough at the price	Supra-aural, open-back, dynamic		111
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 DT911 £179	Good Very Good	Probably too revealing for many headphone amps these are very subtle and fine if expensive cans	Circumaural, open-back, dynamic	R	111

HEADPHONES

MODEL PRICE	FIT SOUND	COMMENTS	TYPE	VALUE	ISSUE
Beyer DT990 £102	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
JVC HA-D690 £40	Average Average	Competent but rather undistinctive cans, a bit middle of the road and well suited to aggressive sources	Supra-aural, closed-back, dynamic		111
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
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
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 RE2530 CD £20	Average Average	Rather an 'average' £20 phone that some found uncomfortable due to high pressure on the ears. Sonic balance is on the bright side	Supra-aural, closed-back, dynamic		75
Ross RE2560 CD £25	Good Average +	If you're not too fussy about quality of finish and don't have an elfin head then these British phones warrant attention. Sound could be smoother	Supra-aural, semi-open, dynamic		75
Sennheiser HD 480II £50	Good+ Good	Not the most accurate cans on the market but amongst the most enjoyable	supra-aural, open-back, dynamic	BB	111
Sennheiser HD 540II £100	Good+ Good+	A good but not great headphone that due to its high impedance and efficiency should work well with most sources	circumaural, open-back, dynamic		111
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-CD1000 £150	Very Good Very Good	A fine sounding and comfortable headphone that's likely to work well with most sources	circumaural, closed back, dynamic	R	111
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-CD750 £73	Good+ Good+	Reasonably comfortable and eminently listenable these Sonys have characteristically good bass power and relaxed hf	Circumaural, closed-back, dynamic	R	111
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/£2	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/£8	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 (i)	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	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 Energis	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
Technics RP-F3 £100	Poor Average	Robocop styling coupled with a turbo bass switch and an uncomfortable fit, rhythmically OK but not up to the price	Supra-aural, closed back, dynamic		111
Yamaha YHD-1 £46	Good+ Good	Stylish semi-folding design with a slightly forward balance that very nearly scraped a recommendation	supra-aural, open-back, dynamic		111
Yamaha YHL-006 £30	Average Average	Unusual personal stereo oriented phones that curl up when not in use. Earphones are like golf balls and balance is well suited to Walkmans	Supra-aural, open-back, dynamic		75

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LOUDSPEAKERS

Last item in the hi-fi chain, to some extent the loudspeaker is merely the slave of what has gone before, capable only of reproducing a signal as good as it is fed. Nevertheless the distortions (colorations and stereo effects) introduced by loudspeakers (and rooms) tend to be more immediately obvious than those anywhere else in the chain, so careful choosing according to taste is very important.

The average loudspeaker consists of a smallish enclosure, much of which may have begun life as part of a tree, plus a couple of drive

units hidden behind a removable grille. Inside the box lurks a simple electrical circuit known as a crossover, which divides the incoming (full range) signal into the right bits for the drivers to handle. Variations on the above formula are specifically identified in the entries. The designer's primary task is to balance the sensitivity of the loudspeaker (how loud it goes for a given electrical input) against the bass extension (how low does it go) for the given box size. After that such subtleties as coloration and dispersion come into the equation.

Careful placement of the loudspeakers within the room is as important as the initial choice of model.

For good stereo they need to be more or less the same distance from nearby walls, and preferably on rigid stands. The listener should be about the same distance from and listening angle to each loudspeaker. The ideal placement depends on the way a particular model has been balanced (not to mention a number of other factors), and our recommendation is given in the entries.

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
ATC SCM20 £1419	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 28Hz (in room)		86
Acoustic Energy AE1 £767	Good Good	Amongst the best miniatures around, this metal driver pioneer shows exceptional mid focus and coherence, but is pricey and could be faster and more agile.	29.5x18x25cm stands clear of wall	84dB 48Hz (in room)		102
Acoustic Energy AE2 £950	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	88dB 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 23Hz (in room)	R	86
Acoustic Research Pi 3 £219	Average- Average	Lively good value box has extra bass driver to give plenty of thump, but lacks refinement and extension	51.5 x 21 x 23cm close to wall	88dB 50Hz (in room)		110
Acoustic Research AR M1 £199	Good Good	Cute shaped miniature delivers splendidly unboxy bass and midrange, but is a little marred by a rather bright treble	27 x 20 x 26cm close to wall	85dB 30Hz (in room)	BB	110
Acoustic Research AR-112 £125	Average Average -	Nicely presented and engineered, but sounds a bit small and boxy without true coherence	36 x 19 x 18.5cm stands near rear wal	87dB 75Hz		66
Acoustic Research AR-122 £150	Average Average	Despite a promising enough list of ingredients, the 122 failed to excite real enthusiasm amongst the listening panel	38.5 x 19 x 22cm stands near rear wal	87dB 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 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
Alexander SE11 £299	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 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 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 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 45Hz (in room)		78
Allison AL110 £220	Good+ Good-	Compact bookshelf model is a little dry and mid forward, but bass is extended and solid. Free space balance is good, though build quality could be improved.	40x24.5x22.5cm stands 1-2ft from wa	86dB 28Hz (in room)	R	102
Allison AL120 £429	Good Average	Cleverly engineered compact floorstander is pretty well balanced if slightly mid forward, but sound quality is a little disappointing for the price	63 x 28 x 27cm floor, clear of walls	88dB 30Hz (in room)		98
Allison CD6 £290	Average Good -	An unusual cube-shaped model designed for wall mounting gives exceptional bass extension from a small box, though it's also a bit heavy, coloured and slow	28.5 x 28.5 x 28.5cm stands against rear	88dB 45Hz	R	71
Allison MS 200 £220	Average- Average-	Built as small and solid as a brick, this micro-miniature has limited bass and bright balance, but sounds agile and communicative	25.5 x 14.5 x 15cm close to wall	85dB 50Hz (in room)		106
Alphason Amphion £695	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 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 50Hz (in room)		94
Alphason Orpheus £1070	Good Good +	Large hi-tech two-way features unusual, sweet-sounding isodynamic tweeter; well engineered and balanced if a shade odd in appearance	65.5 x 28 x 34cm stands near rear wal	87dB 43Hz	R	71

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LOUDSPEAKERS

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
Apogee Caliper Signature £3998	Good + Very Good	Pretty but power hungry full range panels have remarkable transparency and delicacy, though loudness and bass 'grunt' are both a bit lacking	122 x 59-70 x 6.5-28cm floor, free space	81dB 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 30Hz (in room)	BB	82
Arcam Delta Two £340	Average+ Good	Pretty luxury compact sounds a shade forward and coloured but has dynamic and lively bass for its size	37.5 x 22.5 x 27.5cm stands 1-2ft from wa	87dB 40Hz (in room)	R	94
Audio Note AN-E £1300	Very Good Very Good	Lovely coherence, great midband dynamics and transparency, extended bass and high sensitivity — pity it's so darn ugly!	80 x 36 x 28cm low stands, free space	91dB 20Hz (in room)	R	106
Audio Note AN-J £799	Very Good Very Good	Light damping and local unevenness adds some coloration, but doesn't spoil the very lively, dynamic and coherent sound. Fine sensitivity and balance.	58.5 x 33 x 24.5cm heavy stands, free s	90dB 25Hz (in room)	R	110
Audioplan Kontrapunkt £799	Good Good +	Cute little German miniature sounds as sweet as it looks, dressed expensively in real wood with matching stands. Not for bass or loudness freaks	31 x 24 x 13cm free space, matching stan	83dB 48Hz (in room)	R	86
B&W 610 £200	Good Average	Fine presentation and good perceived value, with good in-room bass extension and impressive loudness credentials too, but rather indifferent integration and coherence.	49x23.5x30cm stands clear o	89dB 25Hz (in room)		102
B&W 620 £320	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 25Hz (in room)	BB	94
B&W DM600 £160	Good+ Average+	Attractive hi-tech appearance and clever engineering makes for an impressively smooth overall balance, but sound is a touch bland with it	35 x 20.5 x 25cm stands 1-2ft from wa	85dB 30Hz (in room)	R	98
B&W Matrix 801 £3295	Good + Good +	Lacks the transparency of the best panels, and the drama of the best dynamics, but is something of an acoustic tour de force, with low coloration and fine imaging	77/99 x 56 x 43cm floor or stands, fre	86dB <20Hz (in room)	R	81
B&W Matrix 805 £795	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
Bose 305 £360	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 40Hz (in room)	R	78
Bose 401 £430	Average - Average	Cheaply built but distinctively styled semi-omni floorstander suffers from heavy midbass but still manages to sound lively and open	78.5 x 30 x 28.5cm clear of walls	89dB 28Hz (in room)		110
Bose 901 MK6 £1650	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	(9dB midband) 28Hz (in room)		86
Bose Interaudio 3000XL £160	Average Average -	Lots of perceived value and well enough balanced, but low cost cabinet and driver engineering results in a crude and unsubtle sound	46.5 x 29 x 23cm stands in free space	89dB, 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 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	88dB 63Hz		41
Boston Acoustics T830 £399	Good Good	A lot of speaker for the money, the T830 is a smooth and accomplished performer with a big and easy - or alternatively a lazy and laid back - sound	82.5 x 25.5 x 24cm floor, away from wal	87dB 30Hz (in room)	R	82
Boston HD5 £115	Average Average	Tiny and prettily shaped miniature has an attractive lack of boxiness, but is a little short of drama and dynamic drive	25 x 16 x 18.5cm close to wall	86dB 30Hz (in room)		110
Brinkmann Endymion £395	Average- Average+	Omnidirectional design with rococo styled urn-shaped ceramic enclosure. Distinctly bass light, but sounds impressively coherent and solid	48 x 29 (diam)cm stands in free space	85dB 50/150Hz (in room)		106
C-J Synthesis LM210 £895	Good Good+	Elegant compact US floorstander is eminently relaxing and listenable, with open and coherent midband, if a bit short on welly and drive	90 x 26 x 27cm 28Hz (in room)	86dB clear of walls	R	106
Cabasse Bisquine £600	Good+ Good+	Classy French large bookshelf speaker has great coherence and dynamic grip, but a rather mid-forward overall character	48 x 26 x 30.5cm 20-30cm from wall	91dB 30Hz (in room)	R	110
Cambridge SoundWorks Ambianc	Average Poor	Attractively styled sub-miniature sacrifices sensitivity in the interests of bass extension, but manages to lose dynamics along the way too	28 x 18 x 14cm close to wall	83dB 45Hz (in room)		94
Canon S-50 £349	Average Average+	Though only a small cone miniature at heart, the fascinating styling and extended stereo listening area feature make it utterly original and unique.	30x24(diam)cm stands in free space	84dB 48Hz (in room)	R	102
Castle Chester £599	Good Very Good	A brilliant throwback, using horn-type approach to provide startling midrange dynamics and coherence.	94 x 23 x 27cm floor, experiment	87dB 45Hz	BB	98
Castle Durham £259	Average + Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB 67Hz	R	46
Castle SG Trent £129	Average Average	The grey paint finish looks much more modern than black vinyl woodprint, and this miniature wall-mount sounds lively and engaging, if a bit rough at the top.	33.5x18x20cm stands close to wall	88dB 50Hz (in room)	R	102
Castle Warwick £229	Good Average -	Excellent presentation and fine engineering with overload protection, but a sonic disappointment in bass and dynamic qualities	46.5 x 25 x 23cm stands 1ft from rear	88dB 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 25Hz	R	90
Castle York £340	Good Average+	Pretty little real wood compact has an engaging transparency, good balance and fine timing, but could do with more authority and welly	43 x 22 x 26cm clear of walls	86dB 30Hz (in room)		110
Celestion 3 £115	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 55Hz (in room)	R	78
Celestion 5 £155	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 30Hz		90
Celestion 6000 £1510	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	82dB	R	60
Celestion 7 £200	Average Average+	Good value, good looking large bookshelf size wall-mount has lively up front presentation. Can sound a bit coarse and stand selection is critical.	45 x 24.5 x 32cm heavy stands close to wall	87dB 30Hz (in room)	R	98
Celestion 9 £249	Good Average	Nicely presented and fair material value, with impressively flat bass-to-mid balance, the 9 doesn't really make a convincing case for the return of the three-way.	49.5x20.5x24cm stands clear of wall	89dB 30Hz (in room)		102
Celestion DL8 Series II £205	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	87dB 60Hz	R	59
Celestion SL12Si £615	Average Average	Careful setting up does reveal elements of fine sound quality, but this 'grown up' SL6 variation has a lumpy response alongside its improved power handling	53 x 20 x 27cm matching stands clea	85dB 50Hz		66
Celestion SL600Si £820	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 52Hz		68
Celestion SL6Si £409	Average+ Average+	This stereotype luxury compact can sound a bit dull and congested, but really opens up on Slate Audio stands; favours CD	37.5 x 20 x 25cm stands 1-2ft from wa	86dB 30Hz (in room)		94
Creek CLS20 £120	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 30Hz		90
Dali 700 £600	Very Good Average	Good material value and fine bass extension for size and price, but overall sound is disappointing, perhaps due to complexity of driver array	110 x 28 x 35cm clear of walls	88dB 20Hz		90
Diamond Acoustics Ref III £895	Average Good+	Lovely freestander suffers from indifferent bass alignment, but is fast, coherent, solid and very informative indeed.	87 x 27.5 x 28cm well clear of walls	90dB 30Hz (in room)	R	106

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Eltax Linear Response 8 £399	Average- Average+	Good material value Danish floorstander suffers from 'loudness contour' balance due to twin main drivers, but nevertheless has pleasing coherence	97 x 21 x 33cm floor, free space	88dB 22Hz		98
Epos ES11 £330	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 45Hz (in room)	BB	94
Epos ES14 £485	Good Very Good	Substantial stand mount model delivers delightful midrange focus and delicacy with good bass control. Tends to be system sensitive	49 x 22.5 x 29cm own stands 1-2ft from wa	85dB 25Hz (in room)	R	98
Faraday FS5 £589	Good Good	Pricy and ugly, but with its own sonic charm nonetheless, thanks to the substantial (largely positive) influence of the concrete enclosure has upon the sound	46x27x26cm stands in free space	90dB 28Hz (in room)		102
Faraday Siren £330 (d)	Average- Average-	Interesting if ugly high mass concrete cabinet is let down by imbalance of ageing driver combination	46 x 27 x 27cm stands, free space	87dB 48Hz (in room)		94
Genexxa SE100 £150	Average Average	Pretty little Tandy-stocked miniature is attractively lively, coherent and communicative, but could do with more grunt and welly and lower coloration	28 x 15.5 x 19cm close to wall	84dB 50Hz (in room)		110
Goodmans B-Max/Maxim 2 £100/£9	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 55Hz (in room)		78
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 50Hz (in room)	R	86
Goodmans M300 £110	Average Average -	Conveying much of the charm and life which has made the Maxim 2 so popular, the M300 is sensitive, bu hampered by upper bass cabinet coloration	38.5 x 21.5 x 17cm stands close to rear	89dB 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 50Hz (in room)		94
Goodmans Maxim 3 £110	Good Average	Smooth and accomplished wall-mount miniature makes a worthy replacement for the bestselling Maxim 2	26 x 17 x 21cm stands against wall	85dB 50Hz (in room)	R	106
Harbeth HL Compact £584	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	87dB 65Hz		59
Harbeth LS3/5A £379	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 60Hz		66
Heco Presto Superior 750 £600	Good+ Average	Tall slim and attractive floorstander delivers a fine, even in-room balance but lacks transparency, coherence and dynamic drive	95 x 24 x 27cm clear of walls	87dB 22Hz (in room)		106
Heco Reflex 10 £160	Average+ Average	This nicely balanced and well mannered small bookshelf wall-mount is a competent rather than exceptional package for the price, thanks to indifferent build.	32x21x23cm stands up to 1ft fro	90dB 30Hz (in room)		102
Heco Superior 740 £599	Good Good -	A similar sonic package to the cheaper Interior 530, these Superior clothes are very pretty indeed, though spikes are still awaited	84.5 x 22 x 25cm on floor in free space	88dB 30Hz (in room)		78
Heco Superior 940 £999	Good Good	This large and beautifully finished floorstander has an impressively smooth and transparent midband. Bass is well extended but follows rather than drives the music	110 x 26 x 31.5cm free space	88dB 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 £300	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 50Hz	BB	66
Heybrook Prima £120	Average+ Average+	Neat and discreet miniature delivers fine coherence, pace and timing, though balance is a trifle forward and bass a bit light	29 x 19.5 x 18cm close to wall	86dB 50Hz (in room)	R	110
Heybrook Sextet £1079	Good Very Good	Elegant floorstanding 3-way is engagingly coherent and a highly analytical, partly due to distinct and not always comfortable upper-mid forwardness.	96x27x20cm close to wall	85dB 25Hz (in room)	R	102
Heybrook Solo £159	Average + Average +	Discreetly styled wallmount sounds a little untidy in both bass and treble but handles complex rhythmic material much better than most	36 x 23 x 22cm HBS1 stands close to wall	87dB 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 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 33Hz		72
Infinity Modulus £695	Good Average +	Luxury high-tech miniature, carefully conceived and beautifully built. Undeniably attractive in the mid and treble, it failed to handle the bass as successfully	30 x 18 x 26cm high stands 1ft from wall	84dB 45Hz (in room)		86
Infinity RS2001 £180	Average Average +	A little coloured and unruly in the treble, the 2001 nevertheless retains the lively dynamic bounce of its predecessor; pity the price has gone up	36.5 x 22.5 x 20cm lightweight stands	87dB 50Hz (in room)	R	78
Infinity Reference 10 £149	Average Average	Follows the Infinity tradition in providing an engaging and lively sound from a prettily finished and substantial small bookshelf size model	36 x 23 x 23cm stands in free space	87dB 50Hz (in room)	R	98
Infinity Reference 20 £220	Good Average	Large bookshelf size model is well presented and balanced with good bass control, but somehow lacks convincing cohesion and agility; build was slightly suspect too.	46x27x24cm stands 1-2ft from wa	88dB 27Hz (in room)		102
Infinity Reference 30 £330	Good Good	Drivers from Ref 20 in box from Ref 50 creates a well balanced and extended floorstander at a very competitive price	85 x 26.5 x 25cm clear of walls	87dB 25Hz (in room)	R	106
Infinity Reference 50 £499	Average Average-	Despite hi-tech drivers, attractive presentation, good bass extension and sensitivity, this three-way floorstander suffers from a forward, coloured sound	86 x 26.5 x 25cm floor in free space	89dB 25Hz (in room)		98
JBL Control 1 Plus £206	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 50Hz		90
JBL LX33 £270	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 48Hz	R	82
JBL LX44 £350	Good - Average	This generously built model offers good power handling, bass extension and dynamic range, but suffers from the 'three-way syndrome', with middle middle	58.5 x 30 x 29cm stands in free space	89dB 40Hz		71
JBL LX55 £400	Good Average	This big bluff three-way provides lots of speaker, bandwidth and loudness for the asking price, but is ultimately a bit of a dinosaur	66x34.5x29cm stands clear of wall	91dB below 20Hz (in room)		102
JBL XE2 £160	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
JPW AP2 £180	Good Average	Good size bookshelf model offers real wood veneer at a bargain price; performance is cleaner but broadly comparable to P1 Vinyl overall	43.5 x 25.5 x 26cm stands in free space	86dB 45Hz (in room)	R	106
JPW AP3 £225	Good Average +	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB 57Hz	R	46
JPW Minim £79	Average + Average -	Very civilised but dynamically limited, the Minim is well suited to the smaller room and where limited loudness is acceptable	27.5 x 18 x 19.5cm stands against wall	85dB 28Hz (in room)	R	82
JPW P1 £155	Good Average +	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems	44 x 25.9 x 26.1cm free space on stands	89dB 60Hz	R	59
JPW P1 Vinyl £135	Good Average	Not particularly pretty, this is still a lot of highly competent loudspeaker for the price, with a safe and middle-of-the-road sound that's unlikely to disappoint.	43.5x25.5x26cm stands 1-2ft from wall	87dB 32Hz (in room)	BB	102
JPW Sonata £115	Good Average +	Well balanced and integrated, this near-miniature offers fine sound if limited bass and dynamic range, plus real tree wood at a nearly silly price	32 x 23 x 20cm stands near rear wall	86dB 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 30Hz		90

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LOUDSPEAKERS

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JRT AD1 £500 (s)	Average + Good +	A most auspicious Choice debut for relative newcomers JRT. A fair share of cosmetic deficiencies do little to spoil the impressive coherence and timing	59.5 x 28 x 36cm own stands close to rear	86dB 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 50Hz (in room)	R	94
Jamo Concert II £300	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 48Hz		66
Jamo Concert V £500	Average Average	Compact, solid, nicely finished floorstander delivers unusually extended bass at the expense of lowish sensitivity; midband is smooth but laid back.	86x24x28cm well clear of walls	85dB below 20Hz (in room)		102
Jamo Concert VII £800	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 25Hz (in room)		94
Jamo Cornet 40 £110	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
Jamo Cornet 50 £150	Average Average+	Good value bookshelf size speaker has a rough and ready sound but good heart, engaging liveliness and fair timing	42 x 23 x 22.5cm away from wall	87dB 28Hz (in room)	R	110
Jordan JH400 £504	Average- Average+	Beautiful piano finish hexagon has single full range driver and controversial sound, with uneven balance but delightful mid coherence	33 x 24 x 30.5cm 1-2ft from wall	83dB 50Hz (in room)	R	106
KEF 104/2 £1,295	Very Good Very Good	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound level	90 x 28 x 41.5cm floor standing in free spa	92dB 50Hz	R	60
KEF K120 £159	Good Average	Physically pretty and sonically competent but undistinguished medium bookshelf size model has good sensitivity but limited extension	34 x 20.5 x 26cm 1ft from wall	87dB 45Hz (in room)		106
KEF Q60 £379	Good Good	Uni-Q co-axial driver provides fine imaging and mid coherence, while magnet decoupling reduces cabinet coloration. Bass not entirely convincing	48x25x27cm stands close to wall	90dB 25Hz (in room)	R	102
KEF Q80 £499	Good Average+	Uni-Q floorstander has good stereo and fine midband coherence, but bass lacks extension, drive and resolution	85 x 24.5 x 26.5cm free space	87dB 45Hz (in room)		106
Kammerzell Reference Mini Monitor	Average+ Good	Lovely miniature has a beguilingly sweet sound with good pace and drive, but scale is restricted and presence a little dulled considering the high price	27x17x24cm stands 1-2ft from wa	85dB 50Hz (in room)		94
Kenwood LS-770E £260	Good Good	Impressively communicative made-in-Japan large bookshelf size model has fine vigour, scale and dynamics, if not the smoothest sound around	48 x 27 x 25cm stands in free space	89dB 25Hz (in room)	R	106
Lindley New Age £1100	Average - Average +	Attractively different presentation with classy finish, this tall cylindrical floorstander has fine bass extension but a rather uneven overall balance	105 x 23 x 23cm clear of walls	86dB 25Hz		90
Linn Helix II £357 (s)	Good Good+	Ku-Stone supported, this is one of the best 'large bookshelf' size models around. Dry, controlled bass and very open, if slightly aggressive balance.	57x24x30cm KuStones 1-2ft from	88dB 33Hz (in room)	R	102
Linn Index II/KuStone £110	Good Good	Stand and speaker looks and sounds very good for the price, 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 28Hz	BB	90
Linn Kaber LS500 £1198	Average Good +	Wall-mount package trades sensitivity for fine bass extension and midbass performance; little relentless but has prodigious dynamic capabilities	93 x 19 x 28cm floor against rear wall	86dB 28Hz (in room)	R	82
Linn Kan II £495	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 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 60Hz		59
Magneplanar MG1.4 £1090	Good + Good +	Replaces the stalwart MG1c with a revised panel layout. Offers a very crisp and articulate sound, particularly revealing of upper mid vocal details	155 x 8 x 57cm open space	88dB 40Hz	R	72
Magneplanar SMGa £688	Average - Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB 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 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 45Hz	R	72
Meridian Argent 1 £995	Good+ Good+	Beautifully built, finished and shaped but pricey compact has fine bass extension and virtual absence of 'boxiness'; needs a big amplifier	33 x 27(max) x 27(max)cm Slate stan	83dB 28Hz (in room)		98
Meridian Argent 2 £875	Good+ Good	Beautiful but pricey high-tech 'large compact' delivers 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 23Hz (in room)		94
Meridian M30 £950	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	AccdB 40Hz		46
Mission 760i £120	Average+ Average+	Attractively styled little wall-mount miniature has livelier dynamics and bass drive than most of its type, but sounds as little shut in	29.5 x 18 x 20cm close to wall	87dB 48Hz	R	110
Mission 761i £170	Good Average	760 theme adds an extra main driver for easier amp loading and power handling. Sound judged slightly inferior to its simpler, cheaper stablemate.	38x19x24cm stands close to wall	88dB 48Hz (in room)		102
Mission 762 £230	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 55Hz		66
Mission 763 £350	Average + Average +	A very artful combination of generous volume and good bass extension at a modest price. Works well in the listening room despite a few rough edges	77 x 25 x 32cm near rear wall	86dB 40Hz	BB	68
Mission 764i £450	Good Average	Despite improvements, this large floorstander still lacks low frequency authority, which is probably a function of its comparatively modest price	88.5x25x32.5 1ft from wall	87dB 20Hz		94
Mission 765i £700	Good Average+	Big heavyweight floorstander has good sensitivity and bandwidth, but somehow lacks agility, authority and dynamic grip	102 x 25 x 33cm clear of walls	91dB 22Hz		110
Mission Cyrus 780 £180	Good Average +	Pricey but very pretty miniature based on Mission 760 but with beefed up box and crossover network to enhance sound quality still further	29 x 18 x 26cm light stands close to wall	88dB 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 28Hz (in room)	R	86
Mission Cyrus 782 £350 (s)	Good - Good -	Lively, articulate and beautifully finished, this compact wall-mount model with twin main drivers has good integration but a rather rich, 'Loudness' balance	50 x 25 x 32.5cm Cyrus stands near wall	90dB 50Hz		71
Monitor Audio MA700 Gold £400	Good Average	Lovely luxury compact does a good job of voice reproduction, but sounds a bit lazy and off the tempo with faster, busier material	35 x 21.5 x 25cm clear of walls	85dB 50Hz		110
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 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 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 70Hz		74

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■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
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 30Hz		78
Monitor Audio Monitor One £150 (ewoo)	Average+ Average+	Pricely but very cute little micro-miniature just about gets away with it sonically, though performance envelope is inevitably limited	24 x 15 x 16cm stands against wall	85dB 55Hz (in room)	R	106
Monitor Audio Studio 10 £1200	Average Average +	Expensive, luxury build/finish and all-metal driver diaphragms provide engagingly transparent midrange and treble, spoiled by over-strong mid-bass.	40 x 20 x 25cm heavy stands clear of wall	87dB 45Hz		90
Monitor Audio Studio 15 £1,600	Average+ Good	A little slow and lazy but better balanced than the smaller Studio models, the midband coherence and focus is superb, but it aint cheap	51x20x26cm free space	87dB 45Hz (in room)	R	102
Monitor Audio Studio 5 £700	Average+ Average+	All metal diaphragm luxury miniature has splendid presence coherence but sound can be aggressive and lacks welly.	32 x 18 x 20cm stands close to wall	83dB 28Hz (in room)		98
Mordaunt-Short 5.10 £119	Good Average	Plenty of well engineered speaker for the money, and smoother than most of the competition, but lacks timing and enthusiasm	30.5 x 18.5 x 21.5cm c20cm from wall	85dB 50Hz		110
Mordaunt-Short 5.30 £200	Average+ Average-	Good hi-tech material value for money, but a disappointingly dull and rather bland sound. Safe but uninspiring.	42.5 x 25 x 28cm stands clear of walls	86dB 28Hz (in room)		106
Mordaunt-Short 5.40 £299	Average+ Good	Elegant near-floorstander has an even balance that makes it very easy on the ears, yet also inviting and informative	64 x 21.5 x 26.5cm low stand clear of walls	85dB 28Hz	R	110
Mordaunt-Short Classic 20 £395	Average+ Average+	Luxuriously finished compact delivers beguiling mid transparency but bass is altogether less convincing — one for the carpet slippers generation perhaps	37x22x27cm stands in free space	86dB 45Hz (in room)		102
NAD 8100 £300	Average+ Average+	Floorstanding variation on attractive 8225 miniature adds some half convincing extra bass thump and saves the price of stands - very cost effective	75 x 20 x 25cm floor clear of walls	88dB 25Hz (in room)	R	98
NAD 8225 £150	Good Average +	Notwithstanding lacklustre styling and an unprepossessing appearance, this NAD miniature has a smooth and even midband plus an appealing overall jauntiness.	34 x 20 x 18cm stands close to wall	87dB 45Hz (in room)	R	86
NVA Cube 1 £600 (s)	Good - Good +	Attractive, cube-shaped semi-omni is very sturdily built, and gives an idiosyncratic but unusually open, spacious and informative sound	33 x 32 x 32cm own stands c0.5m from wa	85dB 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 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 28Hz (in room)		78
Naim NA IBL £798	Average+ Good	This tiny floorstanding wall mount delivers outstanding dynamics, speed and detail, marred by pronounced upper mid forwardness	80x18x15-20 against wall	84dB 30Hz		94
Naim SBL £1475	Good Very Good	Impressive scale full bandwidth coheren an attractively discrete floor standing wall-mount coloured midband very well balanced and agile with it.	88x26.5x17-27cm close to wall	86dB 25Hz (in room)	R	102
Neat Petite £525	Average Good+	Pricely and far from perfect, this near miniature is nevertheless one of the most entertaining and enjoyable speakers around, colorations notwithstanding.	30.5x20x18cm stands close to wall	86dB 33Hz (in room)		102
Nobis DM7 £560	Average+ Good	Pretty but pricey US bookshelf size model has more than enough speed, timing and coherence to make up for a measure of coloration	38 x 21.5 x 28.5cm 30-60cm from wall	85dB 25Hz		110
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	86dB 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 65Hz		74
Origin Live OL1 £499	Very Good Good	Luxury miniature has very good overall balance, sacrificing sensitivity to achieve remarkable bass extension for the box size	30.5 x 19 x 21cm stands close to wall	82dB 25Hz (in room)		106
Pearl & Oakley Victoria 200 £1099	Average - Average -	Extraordinary — and to many very attractive — 'ginger jar' presentation in Staffordshire ceramics, but let down by need for further acoustic development	93 x 33 x 33cm on floor in free space	87dB 30Hz (in room)		78
Philips FB820 £470	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 £700	Good Good	Generous sounding and impressively uncongested for the type, loudness and bass extension don't quite match the large and rather plastic box	110 x 29 x 41cm on cones clear of walls	88dB 25Hz	R	90
Professional Monitor Co LB1 £998	Good+ Good+	Delightful smoothness and transparency distinguishes this classy compact, though bass extension and sensitivity are both limited	53.5 x 18 x 26cm high stand well clea	86dB 33Hz		110
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 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 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 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 45Hz (in room)		94
RCF Mytho 3 £1,395	Average Average+	Undoubtedly very attractive and well built, incorporating a number of unusual and interesting ideas, the highish price isn't really justified by the performance.	100x21.5x30cm away from walls	88dB 25Hz (in room)		102
Rega ELA £405	Average+ Good	Very compact floorstander with integral stand has serious coherence and dynamics, but a measure of brightness and untidiness	84.5 x 20 x 30cm c20cm from wall	86dB 30Hz	R	110
Richard Allan CD5 £176	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 80Hz		68
Rogers LS2a/2 £220	Good+ Good	Balance is a bit warm and rich but 2a/2 has delightful mid-to-treble coherence and transparency, and more welly than Mk1	35.5 x 23 x 22cm stands clear of walls	84dB 30Hz (in room)	BB	106
Rogers LS4a/2 £300	Good Average+	Very civilised but a trifle lazy with it, this large bookshelf size model hasn't quite the timing or agility to be particularly engrossing or exciting	43 x 25.5 x 25.5cm clear of walls	86dB 25Hz		110
Rogers LS8a £450	Average + Average +	This modestly priced floorstander is a mixed bag, with plenty of scale and welly but lacking the subtlety, clarity and agility delivered by some rivals	89x25.5x25cm clear of walls	91dB 48Hz (in room)		102
Rogers Studio 1a £599	Very Good Good -	The classic BBC monitor style sound sensitively updated — transparent and natural with fine stereo, but a touch 'heavy' in balance	63.5 x 30.5 x 30.5cm stands in free space	87dB 36Hz	R	66
Roksan Darius £1569 (Good Very Good	Now totally realigned, the current Darius provides an exceptionally impressive combination of transparency and delicacy with fine information retrieval and speed	47 x 27 x 40cm own stands angled in spa	82dB 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 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 75Hz	R	53
Royd Apex £500	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 33Hz (in room)	R	78
Royd Eden £245	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 85Hz	R	66

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■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
Royd Sapphire £200	Average+ Good-	Neat little miniature sounds a touch cold and thin but unusual main driver delivers remarkable speed and coherence for such a reasonably priced model	30.5 x 20.5 x 21cm frame stands 1ft fro	88dB 28Hz (in room)	R	98
Royd Sintra £330	Average + Good	Balance is bass light and a little bright, but superb dynamics, speed and timing make this luxury miniature musically very informative and satisfying	30.5 x 20.5 x 19cm stands close to wall	88dB 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 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 30Hz	R	90
SD Acoustics OBS £865]	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 30Hz (in room)	R	82
SD Acoustics Ribbon £2295	Average Good +	A little underdeveloped and rather amplifier sensitive, 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 30Hz (in room)		81
SD Acoustics SD1 £1650	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 50Hz	R	60
SD Acoustics SD3 £399	Good Good	Port firmly blocked, the new SD3 has the agility and charm of a quality miniature, with good bass extension but low sensitivity	38 x 19.5 x 29cm stands 1ft from wall	83dB 25Hz (in room)	R	106
Seventh Veil System IV £1290 (Average Good +	Lacks welly and loudness but delivers astonishing results with female vocals in particular. Antithesis of the 'good allrounder'	72 x 44 x 21 x 29cm own-stands close to	84dB 28Hz (in room)	R	86
Shahinian Arc £1062	Average Good	Unusual and occasionally wonderful small floorstanding omni; too bright but exceptionally coherent and revealing	69 x 35 x 25cm well clear of walls	85dB 24Hz		110
Shan Shimna £315	Average+ Good-	Pretty little miniature with resin-based enclosure has a bright, thin but sweet and communicative sound; loudness and welly are both limited	31 x 21 x 17cm own stands 1ft from wall	84dB 48Hz (in room)	R	98
Sony APM-101ES £100	Good Average	Big hearted sound from small bookshelf successor to BB '10ES, sounds a little untidy at frequency extremes, so suits CD better than vinyl	39.5 x 22.5 x 23.5cm stands, free space	86dB 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 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 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 40Hz		71
Spendor S20 £510	Very Good Good	This solid and elegant luxury compact maintains Spendor's tradition for peerless mid-to-treble coherence and perspectives. Bass is rather unconvincing	38x22x26cm stands 1-2ft from wa	83dB 25Hz (in room)	R	102
Spica Angelus £1295	Good Average	A little bass shy and soft in the bass and lower mid, the free standing Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm away from walls	86dB 50Hz		60
Spica TC50 £599	Good - Good	This triangular-profile 'groun 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 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 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 25Hz (in room)	R	82
TDL Monitor £1999	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 28Hz	R	66
TDL Studio 0.5 £450	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 40Hz (in room)		94
TDL Studio 1 £650	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 Free space	84dB 25Hz (in room)	R	78
Tannoy 603 £120	Average+ Average+	Pretty hexagonal cabinet miniature is optimised for free space siting and delivers fine imaging with little boxiness, but little in the way of welly and power either.	33.5x22(max)x16cm high stands in free	85dB 45Hz (in room)	R	102
Tannoy 605 £150	Good Average+	Largish bookshelf size hexagon is potentially fine performer, though unusual stand sensitivity makes optimisation difficult	40 x 27.5 x 18cm stands 1-2ft from wall	85dB 25Hz (in room)	R	106
Tannoy 609 £250	Good Good	Distinctive hexagonal cabinet reduces box colorations, and new dual concentric driver is sweeter than its predecessors, making this one very superior speaker	50x32(max)x22cm stands clear of wall	90dB 25Hz (in room)	BB	102
Tannoy 611 £399	Good Average	This compact floorstander would seem to have plenty going for it, but somehow failed to gel musically under our listening conditions	72 x 32 x 24cm clear of walls	92dB 25Hz		110
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	R	Coll '87
Technics SB-EX2 £180	Average- Average	Nicely presented, well built and decent size enclosure sounds solid but somewhat dull, thanks presumably to rather ordinary, low cost drivers	48 x 23.5 x 27cm stands clear of wall	86dB 20Hz (in room)		98
Technics SB-RX50 £650	Very Good Average +	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB 40Hz	R	46
Townshend Glastonbury IIS* £1700	n/a Very Good	What? No bass? Actually, like the KEF 107, Glastonbury II goes down so low you might not notice how good it is. A truly remarkable performer. Superb	91.5 x 28 x 4.6 free standing in room	88dB 27Hz		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 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 23Hz (in room)		86
Vecteur Premiere £695	Average Good	Expensive for its material content, this pretty French compact nevertheless has a beguiling sound quality that indicates painstaking development	34 x 19.5 x 25cm light stands clear of wall	88dB 48Hz (in room)		98
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 90Hz	R	74
Visonik David 6001 £173	Average - Poor	Sharp styling a classy looking miniature makes, but the complex grillework worsens a sound which starts off with too much top and not enough bottom	20 x 12 x 13cm against rear wall	87dB 130Hz		74
Wharfedale 410 £130	Good Average-	One step up from the Diamond, this attractive and sensitive small bookshelf model sounds smoother but is also rather bland and uninvolving	34.5 x 22 x 22.5cm stand against wall	89dB 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 55Hz	BB	66
Wharfedale 515 £260	Good Good	Effectively a technical update on the continuing 505 theme, this is still more evenhanded, with better bass extension and smoother treble.	40 x 25.5 x 30cm stands clear of walls	85dB 28Hz (in room)	R	106

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Wharfedale 517 £400	Good Average	Similar to the 515 but half as big again, the hefty 517 should offer an improvement, but somehow has a less effective overall subjective balance	53 x 26.5 x 34 stands clear of wall	86dB 25Hz		110
Wharfedale Coleridge C £600	Good Good	Very prettily dressed and sounds pretty good as well, though whether enough to justify the £600 pricetag is open to debate. Well balanced, smooth and a little dull.	48x25.5x25.5cm stands clear of wall	86dB 30Hz (in room)		102
Wharfedale Delta 30.2 £100	Average- Average	This hundred pounder has a bigger main driver than many of its rivals, and so packs a bit more welly and loudness. Coloration is rather obvious, but timing uis good	38 x 22 x 17cm stands close to wall	88dB 48Hz (in room)	BB	98
Wharfedale Diamond IV £109	Good Average +	Thanks to a new metal dome tweeter, the new Diamond is much more civilised than its predecessors, with an attractive lively bounce but some boxiness	27 x 18 x 18.5cm stands close to wall	86dB 48Hz	R	90
Yamaha NS 1000M £900	Good Good +	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stan	90dB 40Hz	R	46
Zyp A1 £199	Average Average+	Cute metal cased micro-miniature is quite coloured but great fun, with surprising dynamics and fine wall-loaded room balance	22.5 x 14.5 x 13 close to wall	85dB 30Hz	R	110

LOUDSPEAKERS - SATELLITE AND SUBWOOFER SYSTEMS

Satellite and subwoofer systems, sometimes referred to as three way systems, consist of a small pair of speakers (the satellites) and an extra box (or two) to handle the low frequencies.

Most systems use a single sub-woofer to supply low bass output, although stereo sub-woofer systems are available. By freeing the main speakers of the necessity of generating deep bass they can be made much smaller than a standard design and as a result sat and

sub systems are usually visually unobtrusive.

Positioning of the sub-woofer is usually not as critical as the positioning of a conventional speaker and as a result the largest part of the system can be hidden away entirely, although please refer to the placement notes below as this does not apply to every system.

In general the sonic performance of these systems will fall below the performance of a good, comparably priced, conventional speaker. The value ratings given below are judged in the

context of sat and sub woofer systems only and are not judged by the same criteria as the main speakers, thus a Recommended sat and sub system probably won't sound as good as a Recommended traditional speaker.

If you are prepared to compromise slightly in terms of sound quality then a satellite and sub-woofer system might represent a good solution for those situations where the loudspeaker should be heard but not seen.

LOUDSPEAKERS - SATELLITE AND SUBWOOFER SYSTEMS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (cm) PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Allison MS 205 £420	Average Good -	Tasty high quality satellites give this quite pricey 3-box system a touch of class. Subwoofer is very compact and only slightly boomy.	25.5x14.5x15 + 29x 29x36 stands close to wall	86dB 30Hz	R	104
Bose Acoustimass AM3 £289	Average Average	Ultra compact 3-box is well balanced though limited in loudness and bass. Tiny satellites are a bit fierce, and grilles unhelpful	9x11x11 + 20x37x19 close to wall	85dB 48Hz		104
Bose Acoustimass AM5 £569	Average + Average +	Pricey but cleverly engineered 3-box system is well balanced and uses tiny twin-driver satellites to good effect	16x7.7x12 + 36x19x48 sats at wall, sub 2ft from wall	85dB 40Hz	R	104
Heco Libero £375	Average Average	Attractive 3-box package uses neat metal satellites with versatile mounting accessories, but subwoofer is boomy in the midbass	18x11x12 + 21x55x 31.5 uncritical	85dB 45Hz		104
Jamo SW/SAT300 £300	Average Average	Attractively finished 3-box package has 'tunable' subwoofer that allows boom to be minimised and a good balance achieved	21x15x8 + 21x48x34.5 uncritical	85dB 40Hz	R	104
RSS Solid/Bass Station £550	Average Average	Multi-driver macho subwoofer adds mucho muscle to Solid satellites, but it's much more midbass than serious extension	24x12x12 + 47x 4x x 20 sub at wall, sats in free space	91dB 45Hz		104
Wharfedale 2130 £300	Average Average +	3-box system marred by indifferent boomy subwoofer but rescued by novel wide-dispersion satellites that give an open sound	14x24x11 + 19x32x 50 sub away from wall	86dB 48Hz	R	104

PERSONAL STEREOS

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than all manner of domestic systems and as such demand some attention.

Now that personal CD players have joined the ubiquitous Walkman in the market, the variety and standard of sound quality is huge, with obscurely named cassette players practically falling out of your cornflakes packet and the top Discmen going for £300 or more.

Despite their diminutive size personals attempt to incorporate as many gimmicks and features as possible, cassette players often incorporating tuners, Dolby noise reduction or

even graphic equalisers.

CD players are don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Rechargeable batteries are extremely useful and increasingly popular, some can now be recharged within the unit and charge capacities are also being increased. Most models come with a mains adaptor, which in some cases doubles as a battery charger and some include a wired remote control. A few are now appearing with infra-red remote control.

Sound quality on the cassette front seems to have a proportional relationship to price and

integrity of construction – wow and flutter being quite obvious on the cheaper models.

CD players become less noisy as they get dearer and also reduce in size; one drawback of the latter seems to be that immunity to shock suffers as a consequence, although newer models are starting to buck this trend. Cassette players do, on the whole, seem better suited to the outdoor life than their digital counterparts, as does the software. Bear in mind that the sound and lab ratings given below cannot realistically be compared to those in other categories or between cassette and CD personals

PERSONAL CASSETTES

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa HS P505MkII £70	Good	Very good clutch of features and accessories plus good sound at a reasonable price. Could be more user friendly	Remote control, rechargeable battery and charger	BB	102
Aiwa HS-PL707 £135	Very Good	Has a precise, attractive sound, if a little clinical and cold. This player might be ideal for the user who will listen to mostly classical music. Somewhat fiddly to use	Remote control, BBE sound enhancer, charger & battery	R	102
Aiwa HS-JX705 £220	Good	Rather expensive radio-equipped player. Sound quality on tape playback didn't match up to the Aiwa HS-PL707	FM/AM tuner, recording mic remote control, charger		102
Panasonic RQS15 £85	Good	Considerable power and immediacy to the music though with some raggedness. Good features and accessories. Well designed and easy to use	Remote control, rechargeable battery and charger	R	102
Panasonic RQV520 £100	Good	Features an onboard radio without sacrificing sound quality on tape playback. You lose out on accessories, though (no battery charger)	Radio, remote control, bass enhancer		102
Panasonic RQS65 £130	Good+	Solid, warm sound plus a good selection of features and accessories all combined in a stylish and very user friendly package. Comes with one of the better remote controls	Remote control, rechargeable battery and charger	R	102
Sanyo MGR401D £40	Average-	Easy to use budget model with a radio and some useful features (including a simplified remote control). Sound quality on tape isn't great but is helped by the bass enhancer	Radio, remote control, bass enhancer with graphic equaliser		102

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PERSONAL CASSETTES

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Sanyo MGR580 £50	Poor	A more sophisticated radio than on Sanyo's 401D but the feature count is low and the tape playback unexceptional	Radio 'digital tuner', auto reverse		102
Sanyo SPT1000 £40	Average	Despite outlandish colourful trim and features completely unrelated to audio enjoyment (a 'Pedometer' for monitoring jogging) this has a better basic sound than the other Sanyos	Bass enhancer		102
Sharp JC-510 £30	Average	Serviceable sound quality and some decent features at a low price	Radio, bass enhancer, auto reverse		102
Sharp JC-K99 £160	Good-	Sharp's 'extremely lightweight' model. Well made, elegant and it certainly doesn't weigh a lot. Pleasant sound, marred on the test sample by some distortion	Remote, rechargeable battery and charger, bass enhancer		102
Sony WM DD33 £90	Good-	Well built and resistant to vibration on the move but comes with very limited features and accessories for the price	Bass enhancer		102
Sony WM EX80 £150	Good	User friendly Sony with a good remote control and high quality, accurate sound. Comes with all the extras	Remote control, rechargeable battery and charger	R	102
Sony WM DD99 £240	Good-	Mixed bag of accessories (nice headphone storage system, but no remote control) with variable sound quality at a steep price. But it does have Dolby B&C, good build quality and ergonomics	Dolby B&C, rechargeable battery and charger, auto reverse		102
Sony Walkman Pro £249	Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56

PERSONAL CDS

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa XP-6 £150	Good	Punchy sound both via headphones and when used in a system but transport lets the side down a bit - not one to take out jogging	Digital output, mains adaptor, remote, headphones	R	106
Denon DCP-100 £250	Good	Solidly constructed and nicely finished in the slightly impractical Velvex, almost walkable, competent if uninspiring sound quality	Remote, mains adaptor, no earphones, rechargeable bats		94 Supp.
Denon DCP-50 £180	Average +	Not very walkable, but lightweight and nicely finished in a nextel like grey. Sound through a system is a tad unexciting but not too bad	No headphones, remote, mains adaptor		94 Supp.
Goodmans GCD-10 £120	Average -	Cheap, flashy and not short on accessories, the GCD-10 is a rather noisy player that left a lot to be desired on the sound quality front	Mains adaptor, headphones		66
Kenwood DPC-41 £130	Average -	Lightweight, not very walkable but nice control layout. Sound through the phones is on the thin side, through the line output it's pretty average for a portable	Mains adaptor, rechargeable bats headphones		94 Supp.
Kenwood DPC-81 £200	Good +	Chunky metal cased player that makes pretty confident sounds through a system but sounds dry via earphones and ain't exactly walkable	Remote control, mains charger and bats, digital output		94 Supp.
Philips AZ6897 £200	Good +	Unusually designed and equipped with a radio the Philips is almost joggable, it sounds remarkably good via a system and a little cautious through the phones	Mains adaptor with built in plug, wired remote, clock, headphones	BB	94 Supp.
Philips AZ6819 £300	Excellent	Unusual looking machine with interesting radio headphones, Excellent sound quality but not one to walk with, superb styling	Radio headphones, rechargeables, plinth, infra-red remote	BB	106
Samsung MY-CD2 £110	Poor	Cheap and not particularly cheerful, minimum of facilities and naff sound quality, could suit those on a very tight budget	Headphones, mains adaptor		106
Sanyo CP-12 £260	Good +	Sonically amongst the more enjoyable CD players and capable of revealing the musical aspects of a disc in an interesting and entertaining fashion	Wired remote, headphones main adaptor	R	66
Sony D-11 £135	Average -	Chunky player with old fashioned styling, a rather lightweight sound and limited dynamic range.	Headphones, AC adaptor bass boost		106
Sony D-202 £160	Average +	Good sound quality twinned with relatively good portability accounts for the recommendation, can also sound OK in a main system. Nice entry level machine	Headphones, AC adaptor rechargeables, remote, digital out	R	106
Sony D-303 £280	Excellent	Tidy design with adequate features but not as cluttered as the D-350. Excellent sound quality and will even serve as a CD transport	Headphones, AC adaptor rechargeables, remote, digital out	BB	106
Sony D-350 £300	Good	More buttons and widgets than any of the others but not the sound quality or walkability to go with it	Mains adaptor, clock, rechargeable batteries		94 Supp.
Sony D-66 £180	Average +	One of the few walkable CD players on the market, sound quality is a little muddled but not offensive	Mains adaptor, rechargeable battery pack	R	94 Supp.
Technics SL-XP1 £140	Good +	Remarkably competent and enjoyable player that you can actually use on the move and sounds enthusiastic through a domestic system	Rechargeable bats, mains adaptor/charger, headphones	BB	94 Supp.
Technics SL-XP505 £180	Average -	Excellent transport makes this one of the most stable players on the market and the infra-red remote control is a nice bonus. Sound quality leaves a little to be desired	Headphones, AC adaptor rechargeables, infra-red remote		106
Technics SL-XPS900 £280	Excellent	Great sound quality both via phones and in the home backed up with an impressive array of accessories. Transport is not up to use on the move	Headphones, AC adaptor rechargeables, infra-red remote	R	106

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective.

Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier

cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering

The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent. For more information on choosing and aerial see the feature in issue-108

Tuners come in two basic types. Analogue

models tune gradually (and usually manually) across the bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories. (The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

TUNERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa XT-003 £105	Average 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-56L £170	Good Good -	Listenable, but not exciting, was the overall verdict - it had no gross flaws but failed to capture the imagination	FM/MW/LW digital, 20 presets, 2 aerial sockets, switchable IF bandwidth		108
Akai AT-93L £250	Good + Good +	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	65

TUNERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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
Aura TU-50 £230	Good Good	Tonally neutral, but with rather poor imaging and a certain woodenness to the sound.	FM digital, 16 presets		109
Creek T40s3 £220	Average+ Average	Creek's FM-only analogue tuner is now in series 3 form, though the aesthetics remain unchanged. Ours was hampered by an obvious bass 'hump' though production units are said to be cured.	FM-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.
Denon TU-660L £190	Good Good	Not so successful under 'ideal' conditions, the '660 nevertheless made a fair fist of real reception, if a little muddled and lacking life.	FM/MW/LW digital, 30 presets, switchable IF bandwidth, remote	R	108
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 TU9200 £170	Average Average	The listening panel appreciated its liveliness, but found it a little muddled. Excessive pilot tone breakthrough may be distressing to listeners under 30 and indicates some design slip-up.	FM/MW digital, 16 + 16 presets		109
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, signal strength meter	R	93 Supp.
Harman Kardon TU9600 £299	Average Good	Good bass and detail, and good - perhaps slightly 'enhanced' - dynamics, but measured performance is odd in normal mode and poor in 'Active Tracking' mode.	FM/MW digital, remote control, 24 presets, 2 aerial sockets		109
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 £140	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 £660	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 £1377	Very Good Excellent	There may be better sounding tuners in the world, but we have yet to hear one	No presets. Two box, flywheel tuning, FM only, Analogue	R	50
NAD 4225 £160	Good Good ++	Slightly edgy at times and a tad coloured too, but the sound is so free and open that the tuner must be regarded as one of the most enjoyable models of its type.	FM/MW digital, 14 presets.	BB	108
Nakamichi Tuner 2 £350	Good Good +	Generally a believable sound with good detail in complex music, but imaging is not 100%. The price seems rather high for the performance offered.	FM digital, 30 presets, switchable IF bandwidth		109
Nakamichi ST-7E £765	Good + Good +	Exceptionally good for weak-signal areas, and good all round	16 AM/FM presets, auto time digital		55
Pioneer F-676 £200	Good + Good ++	Pioneer's extensive homework on the design seems to have paid off in a tuner that's detailed and clean-sounding. Perhaps a little bright, but not unpleasant.	FM/MW digital, 36 presets, switchable IF bandwidth, 2 aerial sockets	R	108
Pioneer F91 £360	Excellent Good +	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/AM 24 presets	R	60
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-930AX £150	Good Good -	A competent rather than exciting performer, with low audible interference though slightly compressed and muddled sound.	FM/MW/LW digital, 20 presets	R	108
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.
Sony ST-S570ES £200	Good Average	A host of features, but the sound is muddled, compressed and lacking in frequency extremes.	FM/MW/LW digital, 30 presets, RDS, switchable IF bandwidth		109
Technics ST-G70L £200	Good+ Good+	Another very polite and refined-sounding tuner but one that does retain just enough sparkle to keep your interest. Plenty of widgets to play with too...	FM/AM digital, 39 presets, selectable RF/IF + fine tuning, signal. str. mtr.	R	93 Supp.
Yamaha TX-950 £260	Good + Good +	Very clean and civilised - a bit too much so for one listener. But tonal balance, detail and clarity are all very good; lots of useful features add to its value.	FM/MW digital, up to 40 presets, switchable IF bandwidth, 2 aerial sockets	R	108

TURNTABLES - CARTRIDGES

Very much the 'slave' of turntable and tonearm and to some extent undermined by the supply of free 'starter' cartridges on many turntables, 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 records - and the cartridge also plays a significant role in determining the system balance.

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 MM 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.

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Arcam C77 £22	Average + Average +	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
Arcam C77Mg £30	Average - Average	Punchy sound quality with plenty of extra energy to liven things up. The solid body seems well worth the extra £10	4-8g Normal, MM	BB	67
Arcam E77Mg £50	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8gN Normal, MM	R	48
Arcam P77Mg £60	Average + Average +	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
Arcam PMX10 £100	Good + Very Good	Not the very clearest in complex high-frequency sounds, but lively and exciting, good transients	5-11g Low, MC	R	85

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Audio Note IO2VDH £1295	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity', needs a transformer	8-18g Very low, MC	R	43
Audio-Technica ART1 £800	Good + Very Good	This is a delicate and very fluid-sounding MC that tracks well, offers very low distortion and exceptionally good stereo separation	9-18g Low, MC	R	72
Audio-Technica AT-420E £35	Average Average	Better suited to pop recordings, this MM bears some of the sonic hallmarks of the Linn K5	7-14g (damp) Normal, MM	R	67
Audio-Technica AT-95E £19	Average - Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio-Technica OC-10 £307	Good + Good +	Good treble and good detail too, but some congestion and coloration reduces its informativeness.	4-12g Low/MC	R	103
Audio-Technica OC-5 £123	Good + Good	For the price, it's unusually effortless and detailed, but it tends to become rather relentless and tiring after a while.	5-14g Low/MC	R	103
Audioquest AQ 404i-L £400	Very Good Good +	Slight harshness detracted from the performance of this otherwise clear-sounding and detailed cartridge	8-16g Low, MC		84
Audioquest AQ 7000 £1200	Good Good +	Stunning stereo imaging and good detail at low levels are spoiled by less-than-perfect tracking and high sensitivity to arms.	6-20g Low, MC		91
Audioquest MC5 £220	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Cello Chorale £750	Average + Good	Now available through a new distributor at a saving of some £300, the Chorale is still blessed with a delicate but highly detailed treble. Arm matching is a problem	3-9g Low, MC		72
Denon DL103 £99	Good Average +	An oldie but in many ways a goodie, the 103's good performance in bass and general 'life' is seriously let down by its spherical stylus which kills subtle details.	9-22g Low/MC		103
Denon DL110 £69	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £89	Average + Good	Although listeners just preferred the 110, its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Normal, MC		43
Denon DL304 £200	Very Good Excellent	Uncoloured, detailed, neutral, superb tracking; top notch altogether, and a top notch bargain too.	4-12g Low/MC	R	103
Dynavector 17D2 £280	Very Good Very Good	Clear, detailed, neutral and generally very informative - excellent.	6-18g Low, MC	R	91
Dynavector DV-50X £99	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC	R	48
Dynavector DV10X IV £125	Average Average +	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g (damping) Normal, MC	R	48
Dynavector DV23RS £230	Average + Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector XX-1 £680	Very Good Good +	Good, but not immensely competitive at the price, and not helped by comparison with the low output version	7-15g Normal, MC		84
Dynavector XX-1L £680	Very Good Very Good	Very clear, very detailed, no troubles with tracking; response lift around 20kHz seems to do no harm	7-13g Low, MC	R	84
Empire Benz Micro MC-Gold £130	Good + Good	Nothing is obviously wrong, but nothing is stunningly right either and tracking isn't perfect. Safe, but perhaps a little too safe	7-17g Low/MC		103
Empire Benz Micro MC-Silver £130	Good Good	High output MC that though ultimately not the peer of the MCGold is more appropriate to the sort of equipment it's likely to be partnered with	8-18g Normal/MC	R	103
Empire Benz-Micro MC-2 £699	Average Good +	Similar to both the Empire MC1000 and vdH MC2 in design, the Benz offers a warmer and very transparent account of the music. Its tracking prowess is slightly limited	5-12g Low, MC	R	72
Glanz GMC-10EH £50	Good Good	The rising HF trend of this high o/p MC may cause problems in certain systems but with a favourable wind its seductive qualities will win out	8-14g Normal, MC	R	67
Glanz GMC-10LX £80	Average + Average +	Bearing some of the hallmarks of the '10EH, the '10LX is still less competitive in the sonic stakes	7-15g Low, MC		67
Glanz GMC-20E £129	Good + Good +	Very good tracking, smooth sound and good detail. Very slight surface noise enhancement	5-10g Low, MC	R	91
Glanz MFG-110EX £25	Average Average	A little bright but giving detailed bass and clear treble, this was competitive at the price	6-16g Normal, MM	R	43
Glanz MFG-310LX £50	Good + Very Good	Detail and treble outstanding for sub-£100 cartridge. Slight coloration may be due to body resonance	6-10g Normal, MF	BB	85
Glanz MFG-610LX £90	Good + Good +	Similar to cheaper '310 but slightly clearer transients and bass. Benefits from lowish impedance loading	3-10g Normal, MF	R	85
Goldmund Clearaudio £1500	Average + Very Good	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring 1012 £50	Good + Good	Slightly harsh sound but plenty of life and quite good detail. Some very high frequency coloration apparent	6-12g Normal, MM	R	85
Goldring 1022 £70	Good + Good	As with 1012, a touch harsh; detail and transient purity improved, though, and it goes well with electric guitar!	5-11g Normal, MM	R	85
Goldring 1042 £90	Good + Good	Not terribly subtle, and not such good value alongside 1012 and 1022. Quite lively, though	7-12g Normal, MM		91
Goldring Elan £20	Average + Average	A lightweight and frisky-sounding MM that appears to be based upon the same body as the Nagaoka mm4	7-15g Normal, MM	R	67
Goldring Elite £200	Good + Good	The basics are right, and the Elite will cheerfully tackle any source material, but its sound possesses a certain dirtiness which can irritate.	8-18g Low/MC		103
Goldring Epic II £32	Average Average +	An excellent budget choice though the limitations of the stylus are rather obvious at higher frequencies	5-12g Normal, MM	R	67
Goldring Eroica H £105	Good Good -	More confused and coloured than its low-output sibling - high output less of an issue in these days of cheap MC-compatible amplifiers	8-15g Normal, MC		84
Goldring Eroica LX £120	Good + Good	Not the most subtle cartridge in the world; can sound edgy at times, but lively and informative	8-14g Low, MC	R	84
Goldring Excel £549	Average + Good	Goldring's most expensive cartridge to date errs on the warm and heavy side of neutral. Strong bass lines are its forte though its ability to resolve subtle treble details is weaker	6-13g Low, MC		72
Goldring Excel GS £600	Very Good Good +	The Excel has some true high end quality in its lack of annoying colorations, but tracking seems indifferent and high levels tend to sound rough and edgy.	9-20g Low/MC		103
Grado ZF3E + * £47.50	Average - Average	Downturning 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

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Kiseki Blackheart £1795	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Blue Goldspot £450	Very Good Good +	Good bass and imaging, but hints of spit and coloration let the side down slightly	8-15g Low, MC		84
Kiseki Lapis Lazuli £4000	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluidity of the Clearaudios	4-12g Low, MC		60
Kiseki Purpleheart Sapphire £799	Good + Good +	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		48
Koetsu Black S £612	Average Good +	The S is an OEM design built to Koetsu's blueprint. It features a sturdier fixing plate and offers a brighter, faster and more tactile sound than the earlier K	8-15g Low, MC	R	72
Linn Asaka £373	Good + Good +	Disciples of Linn who are trying to realise their true "Karma" may find that saving money is not a short cut to heaven	9-18g Low, MC	R	Coll. '86
Linn K5 £39	Average Average +	Not as crisply focused as the costlier Linn magnetics, the K5 offers a smoother presentation	7-16g Normal, MM	R	67
Linn K9 £89	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal, MM	BB	Coll. '86
Linn Karma £564	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems; results may be less predictable in more general application	9-18g Low, MC	R	Coll. '86
Linn Troika £798	Very Good Good +	Good all-rounder, but still some hint of unhappiness at very high levels. Good imaging and bass.	6-18g Low, MC		91
London Maroon £149	Average Average +	Now manufactured under the London brandname this Decca cartridge is as iconoclastic as ever	9-20g (damping) Normal, MM		67
London Super Gold £300	Poor Average -	Immediate and (in the midrange at least) detailed, but very coloured, very nonlinear and questionable effect on records. Devotees swear by it	9-15g (damping) Normal, fixed stylus MM		84
Milltek Aurora £249	Good + Good +	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	Coll. '86
Milltek Olympia £349	Average + Good +	Warm and detailed sound - packs the punch of the best MCs with high output as a bonus	12-20g, (damping) Normal, MC	R	54
Nagaoka MP10 £18	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48
Nagaoka MP11 Boron £40	Average Average +	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP11 Gold £47	Average - Average +	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Ortofon 510 £30	Good Good +	For the price, a good blend of virtues - weight, clarity and neutrality.	3-11g Normal, MM	BB	85
Ortofon 520 £50	Average Average +	Very sensitive to load capacitance this new Ortofon maintains the company tradition for a lively, effervescent SQ	7-16g Normal, MM	R	67
Ortofon 530 £80	Good + Good +	Very clean and assured sound; transients not quite perfectly pure but plenty of detail.	4-11g Normal, MM	R	85
Ortofon 540 £100	Average - Average	Graced with an advanced FGII stylus our sample possessed too high a compliance for broad arm matching. It could also sound a little unforgiving	3-8g Normal, MM		67
Ortofon MC10 Super £70	Average Good	"What a delightfully sweet-sounding cartridge this is . . ." we said	5-15g Low, MC	BB	48
Ortofon MC15 Super £100	Good + Very Good	A good all-rounder, with outstanding performance in detail retrieval, even if it can be very slightly bright and close-up at times.	10-24g Low/MC	BB	103
Ortofon MC20 Super £200	Average + Good +	An "inviting" sound quality; polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low, MC	R	Coll. '86
Ortofon MC3 Turbo £100	Average + Good	Not terribly subtle, but it obviously doesn't aim at that. The 3 Turbo is bright, cheerful and bouncy - take it as it comes!	10-24g Normal/MC	R	103
Ortofon MC30 Super £270	Very Good Good +	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coll. '87
Ortofon MC3000 MkII £850	Very Good Excellent	Low levels of body resonance are a real ear-opener. Nothing to criticise elsewhere; one of the very best	9-16g Low, MC	R	84
Ortofon MC5000 £1500	Good + Good	Review sample could not be fully run-in, which might explain limited tracking ability and bright and forward sound, though imaging is excellent. Fussy about s.	12-20g Low, MC		91
Ortofon Quartz £120	Good + Good	Lively, quite detailed, and a touch bright, the Quartz has many qualities of the much dearer Quasar	3-12g Low, MC	R	91
Ortofon Quasar £300	Very Good Very Good	Many of the qualities of the MC3000, although a touch bright. Good detail and delicacy	8-15g Low, MC	R	84
Ortofon Quattro £200	Good + Good +	Undoubtedly a competent performer, the Quattro however seems a less obvious choice than the other Qs. Generally neutral, but can be edgy and bright in loud passages.	6-18g Low/MC		103
RATA RP20 £22	Average - Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average +	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average +	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
Rega Bias £34	Average Average +	Difficult to mount in some arms due to its shallow build, the bias offers a gentile, refined SQ that certainly makes it worthy of audition	4-10g Normal, MM		67
Rega Elys £74	Good Good	Clearly superior to the Bias, despite their common heritage, the Elys is both more detailed, accurate and musically convincing	8-15g Normal, MM	R	67
Revolver £20	Average + Average	This modified AT-95E enjoys a very lively mid and treble even if the bass is somewhat 'slower' in comparison. A firm budget buy	8-16g Normal, MM	BB	67
Roksan Corus Black £110	Good + Good	Recognisably related to Corus Blue, but distinctly more civilised and smoother.	7-12g Normal, MM	R	91
Roksan Corus Blue £65	Good + Good	Roksan-specified modified Goldring 1012; slight harshness detracts from otherwise good sound.	7-11g Normal, MM		91
Shure M104E £36	Average - Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure M105E £49	Average Average -	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 Summ

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Shure M110HE £60	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 Summ
Shure M111HE £72	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal, MM		38 Summ
Shure M92E £17	Average - Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £29	Average - Average -	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 Summ
Shure ME75ED £26.50	Average Average -	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure ME97HE £49	Average Average +	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48
Shure ML120HE £95	Average + Average +	Quite decent sound quality and a generally fine balanced performance	6-18g Normal, MM		48
Shure ML140HE £120	Average + Good	Qualitatively the treble of this well-balanced moving magnet model was a match for many moving coil cartridges	6-16g Normal, MM		43
Shure Ultra 500 £499	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Shure V15 VMR £215	Good Average +	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure VST V £173	Very Good Very Good	Quite exceptional assurance with difficult material; very stable and clear sound. One of the best. Dynamic Stabilizer actually works!	4-11g Normal, MM	R	85
van den Hul MC One £699	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale - worth it for the extra money	6-12g Low, MC	R	60
van den Hul MC Two £899	Good Very Good	Connected directly to any standard MM input the vdH MC Two rewards with a highly detailed yet fluid and musically convincing portrayal	6-13g Normal, MC	R	72
van den Hul MC1 Super £799	Very Good Very Good	Slight softening effect on transients was the only real flaw, but it didn't quite seem to have that special touch one expects for the money	8-15g Low, MC		84
van den Hul MC10 £599	Good Good +	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60
van den Hul MM1 £200	Good + Very Good	If its wooden-sounding midrange coloration could be tamed, the excellent imaging and admirable all-round security of the MM1 would make it an excellent performer.	7-15g Low/MC	R	103

TURNTABLES

The schizophrenic split between consumer electronics and 'real hi-fi' is most obvious amongst turntables. The former are supplied simply as a means of playing vinyl in a system context. Cheaply manufactured in the Far East, these are complete 'record players' with a variety of automatic facilities, sometimes tied into a system remote control. But engineering compromises usually severely limit sound quality, cartridge choice may be P-mount restricted, and nowadays such machines are rarely stocked by specialist hi-fi dealers

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 components, but 'naturally sympathetic' combinations exist, and a good dealer can help. Listed separately as integrated players and

as motor units and tonearms, our sound quality rating is based on results achieved using a high quality system - but in point of fact the deck is usually the limiting factor soundwise in any system.

Lab performance rating summarises the speed stability, vibration generation and environmental isolation of turntables, along with the friction, alignment and adjustment of tonearms. The tonearm's physical characteristics also define a range of compatible cartridges.

TURNTABLES - INTEGRATED

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	ISSUE
Acoustic Research EB-101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Sonata/HR-100S MCS/Atlas £835/£550/£400	Very Good Very Good	Good sound in all areas - bass, clarity and neutrality all in the top class and bettered by very few decks, Atlas PSU expensive but worthwhile	Belt drive, suspended, optional PSU, 13g	R	79
Ariston Pro £160	Good Good	Remarkably clear and detailed for the price, very neutral. Benefits from cartridge upgrade	Manual, belt drive, 12g, cart.	BB	91
Ariston Pro Maxim/RB250 £210	Average Fair	Warm, full sound with a deep bass and solidity is partly offset by lack of fine detail in mid and top. On a suitable surface, with a crisp sounding cartridge, it easily qualifies for shortlisting	Solid plinth, belt drive, manual, 11.5g		103
Ariston Q-Deck £180	Good Average +	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid, inc. cart	BB	67
Dual CS-505-4 £170	Average Average	Easy to set up and to use, this is a consistent sounding and well isolated turntable with a long pedigree. It is slightly lacking in balls, but compensates with a consistently unmuddled presentation and good stereo focus perspectives.	Auto-armlift, interlocked cueing, 2 speed, pitch control	R	103
Dual CS-750 £300	Average- Average-	Attractive but lazy performance from a deck with many good ideas and which is a pleasure to use. Cartridge is past its sell by date. Has 78rpm facility	Solid plinth, belt drive, cart 3-speed, quartz referenced, auto lift		103
Dual CS430 £100	Average Average -	Ragged, sometimes unpleasant cartridge mixes with a modest pleasing player in a very sharply priced package	Belt drive, with cartridge, auto return, 5g	R	67
Dual CS5000 £230	Average Average +	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Dual CS-503-2 £145	Good - Average	Not wholly inspiring; generally coarse and woolly sound is at least not offensive, but easily bettered by the CS505-4. Good value in material terms	Semi auto, belt drive, 10g	R	91
Goldmund ST4 £4589	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard performance at £2,000 less, in a neatly integrated though bulky package	Solid subchassis, direct drive, parallel arm, detachable h/shell	R	60
Goldring Excelda 1 £160	Poor Poor	Untidy, resonant sound, narrow effective dynamic range and lack of tracking security. The cartridge (the only authentic Goldring part) is quite nice	Manual integrated arm, synchronous motor, auto-start/stop		103
Heybrook TT2 turntable & arm £469/£269	Average Good +	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, R belt drive, 14g		67
JVC AL-FQ555 £170	Average - Poor	Clear midband sound but woolly bass and crude treble. Ease of use however ranks highly, and there's little to go out of adjustment	Auto, direct drive, 5.5g		67

TURNTABLES - INTEGRATED

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ FEATURES ARM EFF. MASS	■ VALUE	■ ISSUE
Kuzma Stabi/Stogi Reference £995/£899	Very Good Very Good	Beautifully made in a solid oak plinth, the Stabi also sounds very clear, detailed and extended. Stogi Reference is also most capable.	Manual, belt drive, subchassis.12g	R	91
Linn Axis/Akito £443	Good - Average +	A neat, attractive and well-made package which delivers a rather harsh sound with a 'one-note' effect in the bass, but it's well suited to mid market systems	Belt drive, semi-suspended, electronic PSU, 10g		79
Linn Basik £250	Good Average+	Strong midband analysis and imagery, clean if sharp treble is matched to a good if occasionally wooden bass. Good at the price, and requires no complex setting up or fine tuning in service	Solid plinth, inc cartridge, manual speed change	R	103
Linn LP12 Basik/Akito £599/£137	Very Good Good	Familiar Linn virtues and vices - plenty of the former though and few of the latter. Trails the full LP12 significantly, but pace, rhythm, timing etc. still in top class, and bass tauter than of old	Suspended subchassis, belt drive, single speed, 45rpm adaptor	R	103
Linn LP12-Lingo/Ekos/Troika £1168/£1097/£798	Good + Good +	The classic reference is improved (at a price) by the Lingo but character remains the same - not as detailed or neutral as the best. Ekos arm, though pricey, is well made and suited to many decks	Manual, subchassis, belt drive, 9g	R	91
Manticore Mantra/Musician £340/£170	Good + Good +	Well engineered deck with satisfying sound. The arm is particularly fine and very good value	Belt drive, suspended, 15g	R	79
NAD 5120 £90	Average Average	A number of running improvements have given this player a range and tautness denied its lazier sounding antecedents.	Semi-auto belt drive, detachable armtube/weight, 9g	BB	67
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 arm10g	R	91
Rega Planar 2 £185	Average + Good	A remarkable product at the price, surprisingly articulate and confident	Manual, 11.5g	BB	48
Rega Planar 3 £250	Good Good	A long time leader in its price category, the '3 (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Manual, 11.5g	BB	48
Revolver Rebel £185	Average Good -	Quite lively and detailed but not the strongest on subtlety, with slightly lumpy bass. Motor breakthrough audible, and watch for bent motor shaft on delivery!	Manual, belt drive, semi-suspended 12g	R	91
Revox B291* £892	Average - Average -	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, cart		55
Roksan Radius/Tabriz zi £635	Good Good	Truly modern turntable in appearance. The design is subtle, refined and easy on the eye. Musically it offers exceptional performance with a minimum of setting up and operational fuss	Semi-suspended, belt drive, mains plug PSU	R	103
Roksan Xerxes 33/Tabriz zi £550/£255	Good Good	Good but not exceptional sound quality from expensive package. At its optimum with a relatively inexpensive arm/cartridge unless upgrade to full Xerxes is contemplated. XPSII PSU adds 45rpm and much to sound quality	Semi-suspended, belt drive, 33rpm only, mains plug PSU, one piece arm tube, 'intelligent' counterweight		103
Roksan Xerxes/Artemiz /Artaxerxes £785/£655/£559	Excellent Excellent	Superb though costly record playing hardware, highly integrated and synergistic in nature, but suitable for use with any good MC cartridge. Will not suit all tastes, however	Semi-suspended, belt drive, quartz locked 2 speed PSU	R	103
Rotel RP-855 £200	Good Good	Great sound for the money - detailed and clear with good bass and no irritating nasties	Belt drive, solid, speed adjust, 9g	BB	79
Systemdek 1/900 £188	Poor Average-	The motor unit is derivative of the Rega Planar 2, but sounds inferior by virtue of insufficient structural integrity. Pitch stability is also far from acceptable	Solid plinth, manual speed change, no cartridge		103
Technics SL-DD33 £120	Average Average	As with the DD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
Technics SL-L20 £120	Poor Average -	A rather lightweight parallel tracker achieving a poor overall rating, with little to recommend it unless you dig facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £150	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Technics SLBD-22 £100	Average - Average -	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi automatic, solid plinth, electronic, 6g P-mount	R	48
Thorens TD 166 Mk V £240	Good Good	Classic suspended-subchassis deck with clear, stable sound of no particular character. Unlikely to make enemies	Belt drive, suspended, 12g	BB	79
Thorens TD 280 Mk II £190	Good - Good -	Legendary Thorens build quality on the cheap - slightly unobtrusive sound but eminently liveable-with and very good value	Belt drive, solid, electronic PSU, 12g	BB	79
Thorens TD 316 Mk II £250	Good Good -	Very solid deck with neat split-chassis construction. Sound is a bit insecure in the bass, but it could suit classical music lovers well	Belt drive, suspended, electronic PSU, 12g	R	79
Thorens TD-3001/TP90SF £850	Very Good Good	Excellent middle ranking esoterica, with strong all round abilities rather than excellence in particular areas. Engineering content is particularly high	Suspended subchassis, belt drive, available w/o arm	R	103
Thorens TD166 VI/UK/RB250 £270	Good Average-	Refined and articulate sound with well focused imagery, suitable for use with good MM and budget MC cartridges. The Rega arm is the best at its price, a good purist deck	Manual, belt drive, suspended, 11.5g	BB	103
Thorens TD2001 £650	Good Good -	Similar to TD320 but much dearer - why? Sound is comfortable but not very detailed	Semi-auto, belt drive, subchassis 15g		91
Thorens TD280 II/UK £189	Average Average	Excellent value for money from a built to last player which is also easy to use. Will benefit from a cartridge upgrade in due course, but has an energetic and detailed sound	Solid plinth 2-speed player, inc cartridge	BB	103
Thorens TD320 Mk II £400	Good Good	Good, consistent sounding deck with much improved (but not ideal) arm. A little expensive for performance offered	Semi-auto two speed belt drive, 14g		67
Townshend Rock Reference/Excalibur £2295/£745	Excellent Excellent	Overall the closest reproduction to master tape we've yet heard, with stunning real bass and excellent neutrality. Front end damping trough improves LF detail significantly	Belt drive, suspended, electronic PSU, front-end damping, 12g	R	79
Voyd Reference/Helius Cyalene £5414/£1350	n/a Excellent	Voyd's flagship is equipped with three of the biggest motors in the business, a Lexan platter and a real brute of a power supply (it dwarfs most power amps!). A strong contender for best turntable in the known universe	Belt drive, 3 motors, subchassis, outboard PSU, 12/14g	R	Coll. '90
Well Tempered WTAT £1690	Average Very Good	Intriguing and challenging design. Musically it is not ideal, but it has a limpid quality and a lack of artificiality that sets standards as well as turning the ear, though it's not completely uncoloured. A charmer yet mainstream enough in its virtues to be viable	Manual 2-speed, damped, suspended arm, 7.5g	R	67
Zarathustra S4/Pluto 5A Prestige/PSU £1500/£2500/£500	n/a Excellent	The very well made and finished heavy platter S4 with the superb Pluto arm make a devastating combination ranking up there with the very best	Subchassis, manual, available without PSU	R	72

MOTOR UNITS

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ FEATURES	■ VALUE	■ ISSUE
CEC ST930 £599	Good Very Good	A rarity - a serious hi-fi product that loses nothing to budget rivals in finish or convenience. Good clean sound, very stable and assured	Belt drive, external PSU, 78 speed inc.	R	79
CS Audio Resan kit for Rega £90	Good - Good	After-market kit to convert Rega 2 or 3 to semi-suspended subchassis style. Looks good and sounds tidier than original. Feedback is much reduced	Conversion kit, all work reversible	R	79

MOTOR UNITS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
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
Oracle Paris £695	Good - Average	Looks good but sounds coarse, confused and uneven, with bass liable to thump	Belt drive, semi-suspended, electronic		91
Origin Live Oasis A £495	Good - Average	Rather coarse sound with lack of detail resolution - but lively presentation may appeal. Appearance is industrial	Belt drive, external mains filter, 33rpm only, suspended		79
Origin Live Oasis B £199	Average Average +	Aesthetics are not its strong point, but its lively and articulate - if idiosyncratic - sound will please some tastes. Highly resonant construction is very sensitive to feedback	Belt drive, 33Gy1/3Gyrpm only, solid plinth/subchassis		79
Oxford Acoustics Crystal Reference £2495	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery. Recently updated to mk.II form	Manual, belt drive, subchassis, stand	R	60
Pink Triangle Anniversary £1175	Excellent Excellent	Possibly the most detailed, clear, neutral and therefore accurate deck around. Likeness to master tape is almost uncanny	Suspended, belt drive, electronic, motor on subchassis	R	91
Pink Triangle Export £676	Very Good Excellent	Basically a PT TOO with built-in power supply. Retains features of great transparency and neutrality. Review sample had highish motor noise - presumed untypical	Suspended, belt drive, electronic	R	91
Pink Triangle Little Pink Thing £392	Good + Very Good	Leads the field for clarity and neutrality at this price or a good bit more. It also looks very smart! Excellent value. Arm cut-out suits Rega or Linn style	Belt drive, semi-suspended, electronic PSU	R	79
Revolver £150	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Systemdek IIX/900 £200	Good Good	The Systemdek IIX is a high performance, low cost turntable which is particularly strong in the areas of fine detail resolution and imagery. Tested with Rega RB250	Suspended subchassis, metal armboard, glass platter, 2 speed	BB	103
Systemdek IIXE/900AP £358	Good Good+	A development of the IIXE/900, with a comparably detailed sound reinforced by better frequency extremes, timing etc. Needs careful setting up.	Suspended subchassis, metal armboard, acrylic platter, PSU	R	103
Systemdek IV £495	Good Very Good	The level of wow is a theoretical concern at least, but elsewhere this player shines, combining euphony, information and imaging in a polished, untemperamental package	Two-speed manual belt drive	R	67
Voyd 0.5 £3062	n/a Excellent	Based on the standard 3-motor Voyd but with upgrade options (better bearing, platter, etc) which take it half way to a Voyd Reference. Superb build and finish; colourful, dramatic performance.	Belt drive, 3 motors, subchassis, outboard PSU	R	72
Voyd Valdi £868	Good - Very Good	Recent power supply upgrade has resulted in alround improvements. This Perspex plattered, two motor deck is remarkably competent, revealing and neutral	Belt drive, suspended subchassis, electronic PSU		79
VPI HW-19Mk3 £1600	Very Good Very Good	Built to accommodate parallel tracking arms, this large but elegant deck produced clean, smooth sound when fitted with an SME arm. Good bass	Belt drive, suspended subchassis	R	79

TONEARMS

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFF, MAS	VALUE	ISSUE
Airtangent 1B £1990	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	60
Alphason Delta £230	Good Average +	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason HR100S £490	Very Good Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	Coll. '86
Alphason Xenon £286	Good Good +	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Audio-Technica AT-1130 £186	Good Good	Well suited to most cartridges including high compliance ones, the AT is smooth and tonally neutral, if slightly lacking in 'balls'	8.5g	R	67
Decca London International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48 Summ
Eminent Technology £1000	Good + Very Good	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	Coll. '86
Goldmund T3F arm £4400	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll. '87
Kuzma Stogi Reference £899	Very Good Very Good	A large, solid and well-made arm that holds the cartridge firmly, giving exceptionally clear sound with just a hint of brightness	12g	R	79
Linn Ekos £1097	Very Good Very Good	Superb, state of the art design which builds significantly on Ittok's strengths	9g	R	67
Moth Arm £95	Good Good +	The ultimate budget arm? Refined, detailed, sweet and natural - performance improves in line with the rest of the system	12g	BB	60
Naim Aro £752	Good Good -	Designed for use on the Linn LP12 turntable and Troika cartridge, the Aro is a little bright and congested.	10.5g		91
Rega RB300 £139	Very Good Very Good	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
Roksan Artemiz £655	Average Good	Interesting design which works a treat on the Xerxes deck. Fits Rega cut-out.	8g		67
Roksan Tabriz £165	Good Good +	Though obviously targeted at Roksan's own Xerxes, it is also a good alternative to the Rega arms in many applications. A trifle bright.	9g	R	91
SME 3009 Series III £253	Good Average +	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009 Series IIIS £182	Good Average +	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009R £335	Average + Average +	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME 309 £568	Very Good Very Good	Beautifully made, finished and presented, this arm is fully and easily adjustable and a highly neutral performer	10g	R	79
SME Series IV £828	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1232	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60

Personal Messages

Despite having more grey hairs than the rest of the *Choice* staff put together, I'm still not old enough to remember when hi-fi was exclusively monophonic, or the doubtless painful and highly controversial changeover to stereophony in the late Fifties.

The eagerness with which 'old' technology is regularly discarded in favour of a new and implicitly 'improved' variety is one of the sadder aspects of the current human condition. We've seen it happen to valve amplifiers and vinyl records, not to mention real beer and crusty bread, three at least of which have so far enjoyed a subsequent revival. Now maybe it's time to look again at the forgotten strengths of single-speaker mono.

Pick up a hi-fi magazine from the mono era (there was only one) and scan the advertisements for the brands that were active in those days. Only a handful of (mostly British and Danish) names survive today, and I suspect it's no coincidence that one of these, introducing its latest all-singing-and-dancing, state-

Could three speakers be better than two? Paul Messenger contemplates the centre mono channel and its potential advantages.

of-the-audio/video-art systems, provided the trigger for this month's column.

One of the many unusual features of B&O's AV9000 (detailed in *Update*, page 4) is its use of five separate full-range active loudspeakers. These are used in a number of different configurations according to the type of material being reproduced.

Two of the speakers, placed either side behind the listeners (and operating together in dual mono, as it happens) are entirely optional, and only needed when full surround sound effects are required or appropriate. They're not relevant to the rest of this discussion, so I won't refer to them again.

Conventional audio-only hi-fi stereophony is of course intended to be reproduced through just two speakers, ahead and either side of the main listening zone. However, the movie-derived, A/V-oriented Dolby Stereo/Surround system, when Pro-Logic decoded, adds an extra mono 'dialogue' channel at centre front.

I was under the impression that the major purpose of this centre-front contribution was to help all those poor unfortunate cinema goers who don't manage to get a central seat in line with the screen and equidistant from the stereo speakers, helping to lock the dialogue lock itself to the picture even for those sitting off at the side. I therefore inquired whether it was really necessary to have this extra centre-fill in the more precisely controlled home environment, and wouldn't a conventional stereo pair suffice. It was politely pointed out that single speaker mono is different from and preferable to the 'double mono' arrangement on which stereophony relies for central images, and I might find it interesting to check it out when I get home.

I did, and it is, different, preferable and interesting, which has profoundly disturbing implications. Disregarding the complexities of surround sound matrices, two-channel 'real' stereophony remains the most elegant way of recording and reproducing a coherent soundfield. But the amount of recorded material actually available that features purist and coherent stereophonic recording techniques is (and always has been) a vanishingly small percentage. The advent of multi-track recorders and mixing desks in the Sixties was the end of a golden era for genuine stereophiles, ushering in the age of the multi-mono, pan-potted recordings that masquerade for stereophony today.

Add in the fact that the hi-fi system is also increasingly used to deliver non-musical sources such as spoken word radio and TV, and movies and drama which combine dialogue with incidental music and sound effects, and the argument for purist stereophony is further weakened.

That the conventional stereo loudspeaker pair is capable of creating a 'phantom' central mono image of a sort when each is fed exactly the same signal is indisputable, and is the foundation of the stereo/mono compatibility that our broadcasters, for example, take for granted.

Don't take my word for it, try it for yourself by comparing the reproduction of mono spoken word through a 'double mono' stereo pair with both speakers driven, and then with just one operating, remembering to boost the volume a little (3dB) to compensate for fading out one of the speakers via the balance control. To my ears at least, the 'phantom' double mono image sounds relatively hollow and diffuse, lacking in both presence and solidity compared to single speaker mono.

B&O reckons that high frequency comb-filter reinforcement/cancellation effects arising from the use of two sources is the root cause, and this seems to be borne out by my own, hitherto rather inconsistent, measurement attempts.

Whatever the reasons, the implication must be that three- (or more) channel stereo may offer some real advantages, especially with mixed media sources, and movement in this direction probably reflects the future of the industry.

Amongst others, I spoke to Raymond Cooke, Life President of KEF and one of the industry's most reliable historians, and he felt that this makes a lot of sense, pointing out one of the main reasons why stereo started with two channels was simply because that was all that was affordable and achievable back in the late Fifties.

Such cost and technology constraints are now a thing of the past, and the advantages of adding some centre mono fill — and maybe some surround as well — are becoming indisputable.

Martin Colloms reminded me that the high end Mark Levinson *Cello* system of a few years back did indeed feature something of the sort, and this was as no-compromise a system as any the world has seen. My more immediate practical concern is how to find room for a third Tannoy *Westminster Royal* — and then where to put the telly.

Reach for the best



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A black Mission speaker is the central focus, partially covered by a vibrant green vine with several purple flowers. The vine's leaves are bright green and have a lobed shape. One flower is in full bloom, showing a yellow center and purple petals, while another is a closed bud. The speaker's grille is visible at the bottom, with the word "MISSION" printed in a stylized, outlined font.

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